Introduction

Michael Carleton ENV-SP

- Authored several solid waste management plans, including Houston, NCTCOG Regional 20 Years Solid Waste Plan and several other local plans
- Project Manager for landfill site selections in Corpus, BVSWMA, TASWA, Lubbock, NW Ark

Arredondo, Zepeda & Brunz LLC

- Civil, Environmental, Surveying
- *Dallas, Fort Worth, Laredo, San Antonio*
- Specializing in Landfills, Transportation, Water, Transit, Environmental Assessments
- 35 Years serving Texas communities
Purpose

• Evaluate Solid Waste Infrastructure in Houston, DFW, Austin and San Antonio
• Identify factors that affect available landfill capacity
• Benchmark key solid waste indicators on a regional basis
• Establish a method for examining investment priorities
• Assess the current status of landfill capacity in four major metro regions - current and proposed facilities
• Provide recommendations on how to promote greater long-term landfill capacity
Why is it important?

• Continued population & economic growth = more waste
• Difficulty securing new capacity - 10 to 15 year horizon on new sites
• Minimal state investment in solid waste infrastructure
• Shrinking city budgets
• In spite of major recycling efforts, landfill disposal will continue to be a critical part of waste management
Why These Regions

DFW, Houston, Austin & San Antonio Areas

- 67% of the state’s overall population;
- 76% of the state’s gross domestic product (GDP); and
- 70% of the total waste disposed statewide.

<table>
<thead>
<tr>
<th>Region</th>
<th>2015 Million Tons Disposed</th>
<th>2016 Million Tons Disposed (Preliminary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTCOG</td>
<td>9.6</td>
<td>10.5</td>
</tr>
<tr>
<td>HGAC</td>
<td>8.9</td>
<td>8.6</td>
</tr>
<tr>
<td>AACOG</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Total</td>
<td>23.7</td>
<td>24.1</td>
</tr>
</tbody>
</table>
Continued population & economic growth

Historically - populations in the four regions have experienced between 2 and 3 percent annual increase between 2005 - 2015. On the high side, TDC projects similar growth through 2030.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HGAC</td>
<td>5.39</td>
<td>6.79</td>
<td>9.46</td>
</tr>
<tr>
<td>NCTCOG</td>
<td>5.69</td>
<td>7.23</td>
<td>10.11</td>
</tr>
<tr>
<td>AACOG</td>
<td>2.01</td>
<td>2.49</td>
<td>3.32</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>1.56</td>
<td>2.11</td>
<td>3.19</td>
</tr>
<tr>
<td>Total</td>
<td>14.65</td>
<td>18.62</td>
<td>26.08</td>
</tr>
</tbody>
</table>
Projected Waste Disposal Quantities

Projected NCTCOG Waste Disposal

- Tons MSW
- Tons C&D
Five with less than 20 years capacity
5 landfills reach capacity - impacts remaining landfills
8 landfills with less than 20 years
2030 Capacity Situation
Regional Capacity - 2016 Outlook

Forecasted Regional Capacity in Years and # of Type I Landfills
Type I Market Share (disposal)

NCTCOG MSW Disposal Market Concentration - 18 Landfills
HGAC MSW Disposal Market Concentration - 12 Landfills
CAPCOG MSW Disposal Market Concentration - 4 Landfills
AACOG MSW Disposal Market Concentration - 6 Landfills

If a landfill closes - an average of 500,000 tons has to find a new home - equal to about 180,000 households
Public - Private Disposal Market Share

2015 NCTCOG Remaining Capacity - Public / Private
- 76% Public
- 24% Private

2015 HGAC Market Concentration Remaining Capacity - Public / Private
- 93% Public
- 7% Private

*three are publicly owned, but privately operated
Local Options for Assuring Disposal Capacity

- Reduce the amounts of waste generated or disposed
  - Reduction / Recycling Programs
  - Composting
    - C&D Processing or Disposal
- Improve landfill operations
- New Capacity
- New Technology
Historic State Disposal Rates - pounds per capita per day

Source: TCEQ Annual MSW Report
### 2015 Disposal Rate Comparison -

<table>
<thead>
<tr>
<th>Region</th>
<th>Type I PCD</th>
<th>Type IV PCD</th>
<th>Total PCD</th>
<th>MSW PCD</th>
<th>C&amp;D PCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTCOG</td>
<td>6.82</td>
<td>0.47</td>
<td>7.29</td>
<td>5.81</td>
<td>1.48</td>
</tr>
<tr>
<td>HGAC</td>
<td>5.65</td>
<td>1.50</td>
<td>7.15</td>
<td>5.06</td>
<td>2.09</td>
</tr>
<tr>
<td>AACOG</td>
<td>5.89</td>
<td>0.71</td>
<td>6.60</td>
<td>5.30</td>
<td>1.30</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>5.21</td>
<td>0.58</td>
<td>5.79</td>
<td>4.55</td>
<td>1.24</td>
</tr>
</tbody>
</table>

PCD - pounds per capita per day

HGAC has 21% of total waste going to Type IV Landfills - NCTCOG only has 10% going to Type IV Landfills

If NCTCOG had CAPCOG Disposal Rate - it would generate 11 million tons less waste between 2016 - 2030

Waste imports into the region does impact these disposal rates - waste is flowing across all borders - could be approximately 300,000 tons per year in the NCTCOG region
In the four regions - 2016 estimated total C&D Generation = 5.6 million tons - approximately 23% of total waste disposal

<table>
<thead>
<tr>
<th>Region</th>
<th>Type I C&amp;D Disposal Tons (% of Total C&amp;D Waste) (000)</th>
<th>Type IV C&amp;D Disposal Tons (% of Total C&amp;D Waste) (000)</th>
<th>Total C&amp;D (000)</th>
<th># / capita / day of C&amp;D disposal</th>
<th>Tons / $million Construction GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-GAC</td>
<td>500 (19%)</td>
<td>2,095 (81%)</td>
<td>2,595</td>
<td>2.09</td>
<td>101</td>
</tr>
<tr>
<td>NCTCOG</td>
<td>1,357 (69%)</td>
<td>617 (31%)</td>
<td>1,957</td>
<td>1.48</td>
<td>100</td>
</tr>
<tr>
<td>AACOG</td>
<td>281 (47%)</td>
<td>312 (53%)</td>
<td>593</td>
<td>1.30</td>
<td>110</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>256 (53%)</td>
<td>222 (47%)</td>
<td>479</td>
<td>1.24</td>
<td>93</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,383 (43%)</strong></td>
<td><strong>3,243 (57%)</strong></td>
<td><strong>5,627</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Landfill efficiencies have gotten better in most regions - larger facilities = greater efficiency

<table>
<thead>
<tr>
<th>Region</th>
<th>2005 Weighted PPCY</th>
<th>2015 Weighted PPCY</th>
<th>% Improvement 2015/2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTCOG</td>
<td>1294</td>
<td>1504</td>
<td>16%</td>
</tr>
<tr>
<td>HGAC</td>
<td>1662</td>
<td>1658</td>
<td>0</td>
</tr>
<tr>
<td>AACOG</td>
<td>1609</td>
<td>1737</td>
<td>8%</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>1344</td>
<td>1410</td>
<td>5%</td>
</tr>
</tbody>
</table>

PPCY – pounds per cubic yard weighted average

Operational Efficiency Changes 2005 – 2015 Type I Facilities
Landfill Size & Efficiency

TYPE I LANDFILL EFFICIENCY & WASTE QUANTITIES
Disposed

Reported PPCY vs. Tons Accepted Per Year
## Landfill Efficiency Quotient

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>Disposal Rate (pcd)</th>
<th>Disposal Efficiency (ppcy)</th>
<th>Annual Tons</th>
<th>Landfill CY</th>
<th>CY/Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGAC</td>
<td>500,000</td>
<td>5.65</td>
<td>1,658</td>
<td>515,563</td>
<td>621,909</td>
<td>1.24</td>
</tr>
<tr>
<td>NCTCOG</td>
<td>500,000</td>
<td>6.82</td>
<td>1,504</td>
<td>622,325</td>
<td>827,560</td>
<td>1.66</td>
</tr>
<tr>
<td>AACOG</td>
<td>500,000</td>
<td>5.89</td>
<td>1,737</td>
<td>537,463</td>
<td>618,840</td>
<td>1.24</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>500,000</td>
<td>5.21</td>
<td>1,410</td>
<td>475,413</td>
<td>674,344</td>
<td>1.35</td>
</tr>
<tr>
<td>Best Case</td>
<td>500,000</td>
<td>5.21</td>
<td>1737</td>
<td>475,413</td>
<td>547,395</td>
<td>1.09</td>
</tr>
<tr>
<td>Worst Case</td>
<td>500,000</td>
<td>6.82</td>
<td>1410</td>
<td>622,325</td>
<td>882,730</td>
<td>1.77</td>
</tr>
</tbody>
</table>
Securing new capacity ... Heavy public opposition

- In 2016 - only 3 Type IV (c&d) and 1 Type I (msw) permit amendments approved in 4 regions
- 10 new permits or permit amendments known to be in process - all 6 Type I’s facing heavy public opposition
- The success in legislatively affecting landfill site
- County land use ordinances
In addition to public opposition - land use more difficult

- Harder to find land with minimal development
- Oil & gas development is now significant land use
- Transportation issues & Access
- Timeframe is 10-15 years for new site
Known permit amendments and new facilities add 176 million cy Type I and 50 million cy Type IV

<table>
<thead>
<tr>
<th>Region</th>
<th>Landfill</th>
<th>Type</th>
<th>Additional Capacity (MM CY)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTCOG</td>
<td>Camelot Landfill</td>
<td>I</td>
<td>37.7</td>
<td>Recent agreement with local government following state legislation requiring local approval in this specific case</td>
</tr>
<tr>
<td>NCTCOG</td>
<td>IESI Fort Worth C&amp;D Landfill</td>
<td>IV</td>
<td>18.4</td>
<td>Approved by ED in December 2016</td>
</tr>
<tr>
<td>NCTCOG</td>
<td>City of Denton Landfill</td>
<td>I</td>
<td>34.5</td>
<td>In review</td>
</tr>
<tr>
<td>H-GAC</td>
<td>Pintail Landfill</td>
<td>I</td>
<td>Unknown</td>
<td>On July 6, 2016 Pintail Landfill initiated a new landfill permitting process</td>
</tr>
<tr>
<td>H-GAC</td>
<td>Ralston Road Landfill</td>
<td>IV</td>
<td>1.0</td>
<td>Application Process</td>
</tr>
<tr>
<td>H-GAC</td>
<td>Tall Pines Landfill</td>
<td>IV</td>
<td>15.1</td>
<td>Application Process</td>
</tr>
<tr>
<td>H-GAC</td>
<td>Fairbanks Landfill</td>
<td>IV</td>
<td>26.2</td>
<td>Approved in 2016</td>
</tr>
<tr>
<td>H-GAC</td>
<td>Galveston County Landfill</td>
<td>I</td>
<td>22.4</td>
<td>Approved in 2016</td>
</tr>
<tr>
<td>AACOG</td>
<td>Post Oak Landfill</td>
<td>I</td>
<td>87.0</td>
<td>Public hearing completed - awaiting Commission’s decision</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>130 Environmental Park (Caldwell County)</td>
<td>I</td>
<td>33.0</td>
<td>Administrative review and Technical reviews have been completed. Public hearing is ongoing, with no scheduled agenda date (TCEQ Web Site November 23, 2016)</td>
</tr>
<tr>
<td>CAPCOG</td>
<td>IESI Travis Co. Landfill</td>
<td>IV</td>
<td>6.9</td>
<td>Approved by TCEQ in 2016</td>
</tr>
</tbody>
</table>

Source: TCEQ Web Site: Municipal Solid Waste Applications Posted on the Internet, December 2016
Thoughts & Recommendations...

Increasing / High Waste Generation Rates

State

• Support public information programs to reduce waste
• Mandatory bans on the disposal of certain materials *(Yeah right in Texas)*
• Providing financial incentives through the State Fund 5000
Thoughts and Recommendations...

**Local Governments**

- **Support public information programs to encourage source reduction and recycling, including composting of organics.**
- **Focusing greater attention on the commercial sector’s**
- **Communities may want to limit the types of materials accepted at landfills. A challenge in Texas**
Thoughts and Recommendations...

Decreasing Available Disposal Capacity

State

- Continue to monitor landfill capacity throughout the state.
- Establish a permitting protocol that both protects local residents and allows for future new facilities and expansions.
- Provide funding through subsidized loans or other means to encourage investments in better landfill equipment to improve operational efficiency.
- Evaluate the results of landfill methods such as enhanced leachate recirculation
Local Governments

• Undertake a current assessment of solid waste disposal capacity.

• Evaluate contracts for disposal and determine if modifications are necessary to assure long term availability of capacity.

• Evaluate contracts and procurement documents for future capacity. Consider whether landfills are operating efficiently, their long-term capacity situation and whether they are planning expansions.

• Encourage the development of more Type IV landfills for C&D waste

• Cities should begin examining the potential need for transfer stations as a means of reducing future haul cost increases if landfills reach capacity and longer haul distances are required.
Questions

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