Analysis of Waste & Recyclable Materials Collection Arrangements

Minnesota Pollution Control Agency
Presented by Jeff Schneider
4-16-2009
Presentation Topics

- 1. Purpose of Study & Scope of Work
- 2. Types & Prevalence of “Systems”
- 3. System Cost / Rates Comparison
- 4. Impacts on Program Outcomes
- 5. Impacts on Roads
- 6. Greenhouse Gas & Fuel Consumption
Common Terminology

- Only Addressing Curbside Residential Collection Services

- “Open Collection” Systems – Household Chooses any City Licensed Hauler

- “Organized Collection” Systems – City or County Either Contracts w/ a Private Hauler or Collects w/ Municipal Trucks / Crews

- Sometimes Applied to MSW & Recycling Separately
1. Purpose of Study

- Develop “Quantifiable” Data Comparing Open & Organized MSW & Recyclables Collection Related to:
  - Economics, Rates / Costs
  - Impacts on the Environment
  - Efficiency & Effectiveness Program Outcomes
  - Related to MPCA Objectives for GHG & Energy Reductions
1. **Scope of Work**

- Literature Review & Analysis of Past Efforts to Organize Collection
- Survey of MN Cities with 10,000+ Population
- Comparison & In-Depth Analysis of 10 Select Cities – 5 Open Compared to 5 Organized
- Conclusions Related to Above
- Information Development Only –
  - No Recommendations or Policy Options
2. Prevalence of Collection Arrangements

- Open Collection is Prevalent in Minnesota
  - Statewide Estimate for Open Collection ~
  - 65% to 80% have Open MSW
  - 40% to 50% have Open Recycling

- National Reports Suggest Organized is more Common Outside of Minnesota
  - Survey of Cities Est. ~ 72% Organized
  - Survey of 100 Largest Cities in US Found ~ 80% Organized
2. Use of the Organized Collection Statute

- Several Examples Follow a Typical Process
  - City expresses interest in organizing
  - Staff work along with a committee
  - Haulers involved, generally opposed
  - Rallying of the “troops”, slanted messages
  - Residents express desire for freedom of “Choice”
  - Councils decline to proceed

- Study found no city that changed from open to organized collection since ~ 1991
2. Typical Municipal Goals & Objectives

“City expresses interest in organizing” because…

- Reduce Amount of Truck Traffic & Related Impacts
- Reduce Monthly Cost / Rates per Household
- Improve Program Outcomes & Standardize Services
- Improve Management of Waste According to SWM Plans & Hierarchy
2. Waste Hauler Goals & Objectives

Hauler Involvement, Rallying of the Troops…

• Haulers oppose organized collection to protect their business interests

• Favor free market – customer choice

• Risk loss of customers, limits growth, limits company value

• Raise issue of “Just Compensation/Inverse Condemnation”
2. Public Entity Association Goals & Objectives

• Maintaining ability to organize collection

• Opposed to Inverse Condemnation
3. Costs

• Cost Issues Addressed from Multiple Approaches
  • Literature Review for historical information
  • Municipal surveys/in-depth analysis with follow up billing surveys
  • Review of contracts
  • Review of websites
3. Costs

- While there are exceptions, and cost related issues can be complex –

- **Residents in Organized Collection Systems Can & Do Pay Less**
3. Costs

- Literature review found examples of surveys from organized collection studies.

- Consistent conclusions by those cities is that organized cities show a lower cost across 30 to 60 to 90 gallon service.
## 3. Historical Rate Survey Example

<table>
<thead>
<tr>
<th>City</th>
<th>Type</th>
<th>30 Gal</th>
<th>60 Gal</th>
<th>90 Gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falcon Heights (average of 6 companies)</td>
<td>Open</td>
<td>$13.59</td>
<td>$15.56</td>
<td>$17.17</td>
</tr>
<tr>
<td>Roseville (average of 7 companies)</td>
<td>Open</td>
<td>$12.85</td>
<td>$14.90</td>
<td>$16.84</td>
</tr>
<tr>
<td>Maplewood (average of 9 haulers)</td>
<td>Open</td>
<td>$12.19</td>
<td>$14.11</td>
<td>$16.08</td>
</tr>
<tr>
<td>Little Canada, 2002 (most recent rates listed)</td>
<td>Organized</td>
<td>$8.29</td>
<td>$9.77</td>
<td>$11.29</td>
</tr>
<tr>
<td>White Bear Lake</td>
<td>Organized</td>
<td>$7.50</td>
<td>$11.00</td>
<td>$15.00</td>
</tr>
<tr>
<td>Stillwater, 3 years ending 12/31/05</td>
<td>Organized</td>
<td>$8.16</td>
<td>$10.06</td>
<td>$12.03</td>
</tr>
</tbody>
</table>
3. Literature Review Costs

- Similar results
  - Oakdale survey (2001)
  - 1993 Metro Area Study (GBB Report)

- Important to identify variables that affect rates
  - Service levels
  - Distances
  - Tipping fees
  - Taxes and surcharges
  - Impact of bulky waste costs
3. **2008 Municipal Rate Survey**

- Rate information collected as part of survey included:
- Billing survey sought rate breakdown for:
  - Garbage service levels at 30 – 60 – 90 gallons
  - Taxes
  - Surcharges
  - Recycling
  - Yard Waste
  - Bulky Wastes
3. **2008 Municipal Rate Survey**

- St Paul Public Works solicited participation

- Data also collected from:
  - Staff
  - Contracts
  - Websites
  - Follow-up discussions

- Discarded incomplete responses

- Totaled 156 responses entered

- Data limitations – not a “scientific survey”
3. Rates Varied for Same Hauler in Same City

<table>
<thead>
<tr>
<th>MSW Hauler</th>
<th>30 Gallon</th>
<th>60 Gallon</th>
<th>90 Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eagan – Hauler A</td>
<td></td>
<td></td>
<td>$16.98</td>
</tr>
<tr>
<td>Hauler A</td>
<td>--</td>
<td></td>
<td>$30.06</td>
</tr>
<tr>
<td>St. Paul – Hauler B</td>
<td>$24.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hauler B</td>
<td>$29.80</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>St. Paul – Hauler C</td>
<td>$36.99</td>
<td>$47.76</td>
<td>$39.08</td>
</tr>
<tr>
<td>Hauler C</td>
<td>$22.87</td>
<td>$48.32</td>
<td>$29.75</td>
</tr>
<tr>
<td>Hauler C</td>
<td>$21.50</td>
<td>$18.29</td>
<td>--</td>
</tr>
<tr>
<td>Hauler C</td>
<td>$43.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Paul – Hauler D</td>
<td>$25.08</td>
<td>$32.97</td>
<td></td>
</tr>
<tr>
<td>Hauler D</td>
<td></td>
<td>$9.60</td>
<td>--</td>
</tr>
<tr>
<td>Woodbury-Hauler E</td>
<td></td>
<td>$13.92</td>
<td>$21.18</td>
</tr>
<tr>
<td>Hauler E</td>
<td>--</td>
<td>$18.12</td>
<td>$25.22</td>
</tr>
</tbody>
</table>
3. **Rates Paid to Same Hauler for 60 Gal. Service - Open & Organized**

<table>
<thead>
<tr>
<th>Open Cities</th>
<th>60 Gallon w/o taxes</th>
<th>Org. Cities</th>
<th>60 Gallon contract prices w/o taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chanhassen</td>
<td>$14.50</td>
<td>City A</td>
<td>$11.40</td>
</tr>
<tr>
<td>Eagan</td>
<td>$16.01</td>
<td>City B</td>
<td>$9.04</td>
</tr>
<tr>
<td>Eagan</td>
<td>$28.06</td>
<td>City C</td>
<td>$5.56</td>
</tr>
<tr>
<td>St. Paul</td>
<td>$30.80</td>
<td>City D</td>
<td>$11.09</td>
</tr>
<tr>
<td>St. Paul</td>
<td>$9.08</td>
<td>City E</td>
<td>$15.07</td>
</tr>
</tbody>
</table>
### Overall Survey – Average Monthly Rates Charged to Residents

<table>
<thead>
<tr>
<th>Collection System</th>
<th>Average Monthly Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 Gallon</td>
</tr>
<tr>
<td>Open MSW</td>
<td>$22.64</td>
</tr>
<tr>
<td>Organized MSW</td>
<td>$14.83</td>
</tr>
<tr>
<td>Difference</td>
<td>$7.81</td>
</tr>
<tr>
<td>% Change</td>
<td>+53%</td>
</tr>
</tbody>
</table>
### 3. Average Monthly Service Rates Credited to Haulers

<table>
<thead>
<tr>
<th>Collection System</th>
<th>Average Monthly Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 Gallon</td>
</tr>
<tr>
<td>Open MSW without taxes</td>
<td>$19.25</td>
</tr>
<tr>
<td>Organized MSW (contract prices)</td>
<td>$12.19</td>
</tr>
<tr>
<td>Difference</td>
<td>$7.06</td>
</tr>
<tr>
<td>% Change</td>
<td>+58%</td>
</tr>
</tbody>
</table>
3. Factors Affecting Rates

- There can be many variables included or not included in “Monthly Rates”

- One of most critical are charges for “extra services” such as bulky waste collection

- In some open systems, haulers choose not to charge for extra service to avoid causing the customer to change haulers
3. Factors Affecting Rates

- Some organized systems have rate schedules for extras that can be high.
- Some organized systems manage the extra costs very well, controlling extra costs within the base rate.
3. Example - City of Robbinsdale System

<table>
<thead>
<tr>
<th>2008 Rate Schedule</th>
<th>Average Monthly Rate Paid to Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 Gallon</td>
</tr>
<tr>
<td>Organized MSW</td>
<td>$7.09</td>
</tr>
<tr>
<td>Yard Waste</td>
<td>$2.53</td>
</tr>
<tr>
<td>Recycling</td>
<td>$2.57</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$12.19</td>
</tr>
</tbody>
</table>
3. City of Robbinsdale Contract
   Service Scope of Services

   • Weekly garbage collection
   • Every other week recycling
   • Unlimited yard waste collection April to November
   • Dispose one Christmas tree
   • Bulky waste collection (except for white goods)
   • Hauler pays disposal costs
   • “Free” service at 6 city facilities
3. Example - City of Robbinsdale System

<table>
<thead>
<tr>
<th>2008 Rate Schedule</th>
<th>City Billing vs Monthly Rate Paid to Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City Monthly Billing</td>
</tr>
<tr>
<td>City Monthly Billing</td>
<td>$19.19</td>
</tr>
<tr>
<td>Total Paid to Hauler</td>
<td>$12.19</td>
</tr>
<tr>
<td>Difference</td>
<td>$7.00</td>
</tr>
</tbody>
</table>
3. Example - City of Robbinsdale System

- Additional funds cover
  - State taxes, county taxes, administrative cost
- Operation of a drop-off facility
- Code enforcement related to solid wastes
- Payment to annual CIP for road improvements ($150,000 in 2008)
3. Example - City of Robbinsdale System

- Additional highlights
  - Fuel adjustment clause built into contract
- City receives management reports
- City directs MSW according to County Plan
- Contracted rate increases over contract term for yard waste and recycling
3. Robbinsdale Summary

- Cost effective base rates
  - Weekly garbage
  - Unlimited yard waste
  - Every other week recycling
  - Bulky item collection
  - City utility bill fees cover other costs

- Collect management data
- No added cost for city facilities
- Contracted rate increases
- Built in, step based fuel adjustment clause
3. Fuel Cost Adjustments

- There was a wide range for fuel surcharges reported in open cities.
- Where reported in open cities, the range was $0.59 to $6.02 per month.
- In organized cities, some contracts are “silent” on fuel adjustments. Hence, negotiable.
- Some like Robbinsdale cover fuel escalation in the contract (in 2008, calculated to $0.82 for 60 gallon service).
4. Organized Collection Impacts on Program Outcomes

- Analysis of SWMCB Re-TRAC™ data found an increase in recycling pounds per household in cities with organized recycling collection (95% significance)

- Open MSW/Open recycling = 510 pounds
- Open MSW/Org. recycling = 583 pounds
- Org. MSW/Org. recycling = 573 pounds
- Average for Org. recycling = 579 pounds
4. Organized Collection Impacts on Program Outcomes

- Using the 69 pounds per household difference applied to 41 open Re-TRAC™ cities yields:
  - Another ~ 11,000 tons of recyclables per year
  - Equivalent to ~ 32,000 metric tons less per year of CO$_{2e}$
5. Impact on Roads

- Commonly stated concern for municipalities with open systems
  - City engineers and/or public works directors

- Literature Review and follow-up did not find much documented, quantifiable data on actual residential streets in MN

- Relative impact is likely variable based on street type and relative amount of garbage truck traffic to other traffic
5. Impact on Roads

- Data available relating a garbage truck to other types of vehicles
  - Equivalent Single Axle Load (ESAL)
  - MnDOT uses a formula of one garbage truck equivalent to 1,000 car trips

- City of Falcon Heights attributed the impact of garbage trucks on roads as
  - High in alleys (~86% of impact due to garbage trucks)
  - Low in heavily traveled areas (~8% due to garbage trucks)
5. Impact on Roads

- Design loads of residential streets plays a factor

- City of Arden Hills memo that while reducing the number of heavy trucks should be positive, there are environmental factors generally responsible for majority of pavement deterioration on City’s 9 ton load designed streets
5. Impact on Roads

• Cost estimates of road impacts for cities

  • Open systems:

    • City of Roseville noted $20 to $40 per household per year from garbage trucks ($188,000 to $376,000)

    • City of Oakdale reported an estimate of $120,000 to $300,000 per year

  • Organized systems:

    • City of Robbinsdale set aside $150,000 from solid waste fees for roads in 2008
6. Fuel Use & Greenhouse Gas Emissions

• Overview:

  • Open systems result in higher fuel use than a single hauler collecting every household

  • As the percentage of the households increases, there is greater efficiency, less drive-by time, lower relative fuel use, and less GHG per household
6. Fuel Use & Greenhouse Gas Emissions

- Field work was conducted to measure fuel consumed at different distances between stops and while loading (on route time)

- Fuel consumption measurements assumed a standard truck

- The analysis demonstrates relative differences between servicing every household versus serving a lower percentage
6. Developing Field Trial Data

- Base line fuel use data was established by actual field test results

- A 20 cubic yard, tandem axle, packer truck was used to replicate field conditions and collect fuel consumption data

- Engine management data was collected for the different distances
6. Developing Field Trial Data

- Field fuel use measurements were collected for following distances in feet:
  - 100
  - 220
  - 330
  - 500
  - 600
- Plus, idle time fuel use to replicate loading
6. Field Trial Fuel Consumption

[Graph showing the relationship between Feet per Stop and Ounces of Fuel Consumed.]
6. Field Observations

- Trucks were followed on sample routes in the in-depth cities
- Measurements included the average distance between all potential stops and the average distance between households actually serviced
- The key data is the average distance between all potential stops
6. Field Observations

Distance per household serviced
Actual Distance per Household Total route

<table>
<thead>
<tr>
<th>City</th>
<th>Distance per household serviced</th>
<th>Actual Distance per Household Total route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eagan</td>
<td>582</td>
<td>118</td>
</tr>
<tr>
<td>Duluth</td>
<td>275</td>
<td>112</td>
</tr>
<tr>
<td>Rochester</td>
<td>291</td>
<td>86</td>
</tr>
<tr>
<td>Woodbury</td>
<td>315</td>
<td>123</td>
</tr>
<tr>
<td>St Paul</td>
<td>586</td>
<td>83.7</td>
</tr>
</tbody>
</table>
6. Market Share Data

- Estimates of the market share for haulers operating in the five open cities in the in-depth analysis were developed
  - County hauler reporting data
  - Discussions with county or WLSSD staff of their knowledge combined with available data
6. Market Share Data

- Percentage of market share data leads to the estimated number of households.

- Number of households served and average distance between all households provides the average distance between each hauler’s stops.
6. Market Share Data

- Haulers with market shares below 10% were grouped together as it is not likely these haulers drive the entire city residential area.

- Fuel use calculations were completed for each of the five open cities for both MSW collection and recycling collection.
### 6. Percentage of Increased Fuel Use

<table>
<thead>
<tr>
<th>City</th>
<th>Eagan</th>
<th>Duluth</th>
<th>Roch.</th>
<th>Wdbry.</th>
<th>St.Paul</th>
</tr>
</thead>
<tbody>
<tr>
<td>% More Fuel</td>
<td>216%</td>
<td>294%</td>
<td>250%</td>
<td>355%</td>
<td>437%</td>
</tr>
</tbody>
</table>
6. Factors Affecting Increased Fuel Use

- City of Eagan has one hauler with over a 60% market share resulting in relatively lower relative fuel use.

- City of St. Paul has the most haulers with relatively lower market shares (highest ~25%) resulting in higher relative fuel use.
6. Greenhouse Gas Differences

- Converting the increased fuel use to GHG provides the following for the five open cities:
  - MSW = 2,347 metric tons of CO$_2$e
  - Recycling = 998 metric tons of CO$_2$e
  - Total = 3,345 metric tons of CO$_2$e
6. Greenhouse Gas Differences

- Calculating a difference on a household basis and applying it to the 30 municipal survey cities households with open systems provides an estimated additional 6,070 metric tons.

- Total estimate = 9,415 metric tons of CO$_{2e}$
Public Comment Being Sought Now!

- [www.pca.state.mn.us](http://www.pca.state.mn.us)

- Waste Collection Service Arrangements…

- Check it out!!!!

- Jeffrey Schneider
  - 507-529-8830