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EXECUTIVE SUMMARY
The City is striving for sustainable, system-wide solutions to waste disposal, carbon reduction and renewable energy. To pursue these goals, the City asked the consulting team of Sloan Vazquez, LLC and Clements Environmental to analyze the City’s wastestream.

WASTE STREAM ANALYSIS
The 2012 Waste Composition was primarily derived from the integration of heterogeneous data sources; the Larimer\(^1\) and Boulder County\(^2\) Studies. In addition, tonnage data collected by the City and anecdotal information gathered from local waste haulers and recyclers informed the analysis.

The 2012 Waste Composition identified three (3) primary waste streams; residential, commercial, and construction and demolition. Fourteen (14) material categories were selected in order to best identify opportunities for recovery and diversion from landfill disposal.

1.0 INTRODUCTION
The City of Fort Collins engaged the services of Sloan Vazquez, LLC and Clements Environmental to conduct a Waste Stream Study (Section 1) and a Waste Conversion Technologies Review (Section 2). The purpose of the Waste Stream Study was to determine how much more of the City’s waste that is now going to a landfill can be diverted toward materials markets or to potential energy conversion systems. The purpose of the Waste Conversion Technologies Review was to identify at least two of the most feasible types of systems or technologies in which the City may wish to invest for future waste stream management.

Accordingly, this Report provides the following:

- Identification of specific discards from the residential, commercial, and Construction and Demolition (C&D) sectors that are still available for recovery and quantification of their commodity value and/or energy generation capability
- An economic analysis of how to optimize the recovery of the landfill-disposed materials and professional recommendations for “highest and best” use in current or future recovery systems
- Quantification of the total amount of discarded or under-utilized materials that is locally available, which may provide “feedstock” for a waste-to-energy processing facility
- Examination of options for various technologies designed to capture more value from discards

\(^1\) http://www.larimer.org/solidwaste/publications/WasteSort.pdf
\(^2\) http://www.bouldercounty.org/find/library/gogreen/boulder_finalwcs2010.pdf
2.0  WASTE STREAM STUDY

In order to plan for the City’s future municipal solid waste (MSW) management needs, it is important that the City understand both the volume and the composition of MSW that is currently being disposed in landfills.

For solid waste planning to be effective, consideration must be given to the many factors that can, and do, cause wide fluctuations in the volume and composition of MSW. During the past five years, the economic recession and the collapse of the housing and construction industries has rendered a decrease in the volume of MSW and caused extraordinary demand and price fluctuations in the recycling markets. Concurrent with the economic decline, the U.S. has seen a rising “green” ethos that has spurred the success of municipal recycling programs, changed manufacturing practices, and reduced consumption. This combination of events has made the forecasting of MSW volume and composition a tricky, albeit achievable, task.

2.1  WASTE COMPOSITION STUDY APPROACH

The Project Team developed a new, data-based waste composition (2012 Waste Composition) of the waste generated from the City that is currently landfilled. The 2012 Waste Composition is based primarily upon waste composition studies prepared for the Boulder County Resource Conservation Division and for Larimer County. In addition, the Project Team referred to tonnage data collected by the City, anecdotal information gathered from Larimer County Public Works/Solid Waste (including the observation of loads disposed at the Larimer County Landfill), local waste collection companies, and recyclers.

Our analysis and interpretation of the methods and results of the Boulder and Larimer County studies confirmed their validity as reasonable and reliable sources for the development of a new data-based waste composition for the City. In the Boulder and Larimer County studies, the Project Team determined that the sampling plans, sampling procedures, field data collection, and statistical analysis were developed and implemented to assure that the waste composition results were statistically representative of the total disposed waste stream and statistically valid.

The 2012 Waste Composition is primarily derived from the integration of the two heterogeneous data sources. The Larimer County study was completed pre-recession (in 2007) and is primarily based upon 2006 data. The Boulder County study was completed in 2010 and captures the effects of waste generation and composition wrought by changing economic and environmental conditions. Because the communities share many similar geographic, demographic, and economic characteristics, the methodical combination of results from the two studies projects a reasonable waste composition for City’s planning purposes.

3 “Municipal” refers to the community’s entire stream of discards, with the exception of industrial material and construction/demolition debris (http://www.epa.gov/wastes/inforesources/pubs/orientat/rom2.pdf).
2.2 Waste Stream Study Results

The 2012 Waste Composition for the City is presented in Table 1 as well as in Chart 1. The waste is categorized into 14 material types. A percentage of total waste is provided by material type by for each waste stream (i.e., residential, commercial, and C&D), as well as for the total waste.

Table 1 – Fort Collins 2012 Waste Composition

<table>
<thead>
<tr>
<th>Material</th>
<th>Residential</th>
<th>Commercial</th>
<th>C&amp;D</th>
<th>Total</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>20.39%</td>
<td>26.67%</td>
<td>0.38%</td>
<td>16.66%</td>
<td>21,658</td>
</tr>
<tr>
<td>Plastics</td>
<td>12.31%</td>
<td>12.29%</td>
<td>0.45%</td>
<td>9.13%</td>
<td>11,869</td>
</tr>
<tr>
<td>Metal</td>
<td>3.54%</td>
<td>5.24%</td>
<td>2.17%</td>
<td>3.61%</td>
<td>4,693</td>
</tr>
<tr>
<td>Glass</td>
<td>2.34%</td>
<td>2.79%</td>
<td>1.18%</td>
<td>2.14%</td>
<td>2,782</td>
</tr>
<tr>
<td>Organics</td>
<td>40.12%</td>
<td>33.40%</td>
<td>5.08%</td>
<td>28.99%</td>
<td>37,687</td>
</tr>
<tr>
<td>Rock/Concrete/Brick</td>
<td>0.85%</td>
<td>1.26%</td>
<td>31.22%</td>
<td>9.10%</td>
<td>11,830</td>
</tr>
<tr>
<td>Asphalt Shingles</td>
<td>0.49%</td>
<td>0.72%</td>
<td>18.02%</td>
<td>5.25%</td>
<td>6,825</td>
</tr>
<tr>
<td>Wood (Painted/Stained/Treated)</td>
<td>0.30%</td>
<td>0.44%</td>
<td>11.06%</td>
<td>3.22%</td>
<td>4,186</td>
</tr>
<tr>
<td>Untreated Dimensional Lumber</td>
<td>0.15%</td>
<td>0.21%</td>
<td>5.31%</td>
<td>1.55%</td>
<td>2,015</td>
</tr>
<tr>
<td>Clean/New Drywall</td>
<td>0.14%</td>
<td>0.20%</td>
<td>5.06%</td>
<td>1.47%</td>
<td>1,911</td>
</tr>
<tr>
<td>Demo/Painted Drywall</td>
<td>0.28%</td>
<td>0.42%</td>
<td>10.34%</td>
<td>3.01%</td>
<td>3,913</td>
</tr>
<tr>
<td>Problem Waste (appliances, etc.)</td>
<td>18.84%</td>
<td>15.94%</td>
<td>4.73%</td>
<td>14.31%</td>
<td>18,603</td>
</tr>
<tr>
<td>Other</td>
<td>0.19%</td>
<td>0.28%</td>
<td>4.98%</td>
<td>1.50%</td>
<td>1,950</td>
</tr>
<tr>
<td>Household Hazardous Waste</td>
<td>0.06%</td>
<td>0.13%</td>
<td>0.00%</td>
<td>0.06%</td>
<td>78</td>
</tr>
</tbody>
</table>

According to data collected by the City, approximately 130,000 tons of municipal solid waste generated in the City were landfill disposed. Applying the 2010 Waste Composition to the City’s landfilled tonnage produces the weights, in tons, of the specified material types as represented in Table 1, Column entitled Tons.

For the City’s planning purposes, the Project Team chose to base recovery and recycling projections upon the treatment/processing of the commingled waste stream. That is, the direct processing and separation of mixed commercial, residential and industrial materials.
Chart 1 – Fort Collins 2012 Waste Composition

- Organics, 28.99%
- Paper, 16.66%
- Plastics, 9.13%
- Metal, 3.61%
- Rock/Concrete/Brick, 9.10%
- Asphalt Shingles, 5.25%
- Painted/Stained/Treated Wood, 3.22%
- Untreated Dimensional Lumber, 1.55%
- Clean/New Drywall, 1.47%
- Demo/Painted Drywall, 3.01%
- Other, 1.50%
- Glass, 2.14%
- Household Hazards, 0.06%
- Problem Waste, 14.31%
- Other, 1.50%
Chart 2 – Fort Collins Waste Tonnage by Material Category

- Household Hazards, 78
- Problem Waste, 18,603
- Paper, 21,658
- Plastics, 11,869
- Metal, 4,693
- Rock/Concrete/Brick, 11,830
- Asphalt Shingles, 6,825
- Painted/Stained/Treated Wood, 4,186
- Untreated Dimensional Lumber, 2,015
- Clean/New Drywall, 1,911
- Demo/Painted Drywall, 3,913
- Other, 1,950
- Organics, 37,687
- Glass, 2,782
- Problem Waste, 18,603
- Paper, 21,658
- Plastics, 11,869
- Metal, 4,693
- Rock/Concrete/Brick, 11,830
- Asphalt Shingles, 6,825
- Painted/Stained/Treated Wood, 4,186
- Untreated Dimensional Lumber, 2,015
- Clean/New Drywall, 1,911
- Demo/Painted Drywall, 3,913
- Other, 1,950
- Organics, 37,687
- Glass, 2,782