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Fort Collins Solid Waste 5-Year Strategic Plan:

Strategies to Reach 50% Diversion from Landfill Disposal

DRAFT REPORT

Prepared for:

City of Fort Collins

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February 8, 2006

ORGANIZATION OF REPORT

APPENDICES (under separate cover)
Appendix A: Public Forum Report
Appendix B: Comment Card Report
Appendix C: Fort Collins Business Survey Report
Appendix D: Fort Collins Residential Survey Report

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1 EXECUTIVE SUMMARY AND NEXT STEPS FOR FORT COLLINS

Fort Collins is one of Colorado's leaders in recycling. The City adopted a varied array of programs and incentives – including Pay As You Throw (PAYT), recycling access, and other ordinances and policies – and has achieved a diversion rate of 24%. This diversion rate is high, but Council had adopted an even more aggressive goal of 50% diversion.

Project Approach: The City determined to identify programs that would help it reach the 50% diversion goal. To assist in this effort, the City hired the consulting firm of Superior-based Skumatz Economic Research Associates, Inc. (SERA) in conjunction with InterMountain Corporate Affairs and Corona Research. Each member of the consulting team does independent work for both private and public entities; and SERA has over 25 years of experience specializing in waste management options analysis and problem solving.[1]

The main tasks of the Fort Collins project were to:

- Identify the "gaps" in current recycling, refine the diversion measurement definition and approach, and estimate the current recycling rate for the City.
- Gather feedback from residential and commercial customers about diversion needs, program preferences, and willingness to pay for diversion opportunities.
- Identify and assess diversion program options and devise recommended programs to reach the City's 50% diversion goal.

Focus on Input: Input was provided through several methods. The City established a Steering Committee, which provided a venue for local interested and knowledgeable stakeholders to advise the City on options and provide feedback to the consultants as the work progressed. In addition, telephone surveys of both residential households and commercial businesses were conducted to gain feedback on program needs and preferences. The consultants also organized an open house. The open house allowed City staff and consultants to present to City residents and businesses preliminary program options that could increase diversion, and gather the community's reactions and feedback.

Program Recommendations: After extensive analysis, SERA provided the City with Phase I and Phase II diversion program recommendations. The City may find that residents desire more aggressive options; however, infrastructure may be lacking, and haulers have shown considerable reluctance to have additional requirements imposed. The recommended set of programs is realistic, provides strong diversion, and requires relatively low investment by the City and relatively low cost for users. The research indicates that the total cost for users[2] for Phase I seems to fall within a range of extra fees that households and businesses report they are "willing to pay" for access to additional diversion opportunities.

Phase I and Phase II elements are provided because:

[1] SERA provides cost-effective, cutting-edge economic, rates, planning, survey, and evaluation / measurement services based on sound economic research and evaluation techniques. The principle researcher for SERA, Dr. Lisa Skumatz, specializes in statistics and econometric modeling and has authored numerous articles about solid waste and recycling for research and trade publications nationally and internationally, as well as presenting quantitative research findings at regional and national conferences. The database that Dr. Skumatz has developed to document trends in solid waste management and recycling over the past quarter century is extensive, and includes her first-hand findings from over 1500 communities throughout North America.

[2] As a weighted average of the fees users report they might be "willing to pay".

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- Estimates are approximate values,
- Technology and programs are always improving and evolving, and
- Infrastructure to support the potentially most desirable mix of programs is not yet available in the region.

The City may consider invoking elements of Phase II should results of Phase I efforts require additional diversion. The program suggestions for both Phases are summarized in **Error! Reference source not found.**. The suggestions for Phase II provide sufficient diversion to exceed the City's diversion goal.

Table 1-1: Recommended Diversion Package for City for Fort Collins

Package	Program Elements / Concepts[3]
Phase I: Package 6 Low cost • 19% add'l diversion • New total 43% adding to current 24% • 16 programs, $13 total cost/ton • $4/ton city, $9/ton user	7. Residential curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 10. Commercial food waste for largest businesses 12. Commercial 3 months free recycling to businesses signing up for 1 year 15. Commercial recycling container mandatory for businesses with garbage service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 20. Commercial recycling cooperatives for small businesses 22. Construction & Demolition (C&D) deposit system 25. C&D drop-off wood waste site 26. Hauler incentives to "prospect" for C&D 32. Enhanced PAYT incentives for residential (by ordinance) 41. Multifamily (MF) single stream "push"; make mandatory and recruit volunteers at complexes 42. Hauler incentives for MF recycling, adding complexes 43. Volunteer program to recruit "champions" at multifamily complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling
Phase II, depending on performance of Phase I (Beyond 50%)	23. City preferences for contracts that promise to recycle C&D (Cumulative results: City $4, User $9, 19%) 2. Consider drop-off yard waste site (Cumulative results: $4, $9, 20%) 29 & 31. Consider bans on yard waste and recyclables, if needed (Cumulative results: $4, $10, 22%) 30. Consider bans on e-waste (Cumulative results: $4, $12, 22%) 10. Consider expanding food waste programs, if successful 24 & 28. Consider mandatory recycling of C&D or bans if and as facilities become available (Cumulative results: $4, $13, 24%) 16. Mandating recycling embedded for all commercial businesses (Cumulative results: $3, $16, 27%)

Next Steps: The City has several key actions to undertake:

- Review the program recommendation by City staff, and by the Steering Committee;
- Provide feedback to SERA on recommended program options and additional modeling that may be required;
- Consider conducting a (cost-effective) set out survey and waste sort (residential, and possibly a drive-by survey of a sample of businesses) to gather additional information to verify program / material needs and program potential;
- Implement the new measurement protocols and definition suggested, and collect data on an on-going basis to track diversion progress toward the 50% goal;

[3] Program element/ concept numbering comes from the handout of program options (see Table 5-2) presented to the City, Steering Committee, and public open house attendees; thus, program option numbers remain consistent throughout the report to assist in identification.

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- Review and refine / define the program concepts; and
- Implement the preferred programs.

Implementation Steps: If the City determines that the recommended set of programs (the "Recommended Diversion Package") is adopted, there will be a succession of implementation steps needed. They include:

- Monitor completion of necessary infrastructure and facilities;
- Work to provide lists of available opportunities for construction and demolition (C&D) recycling / infrastructure and wood waste recycling – and where possible, to encourage development of additional facilities, assistance on grants, etc.;
- Meet with the haulers and others affected to discuss the best ways to implement these program initiatives and timing issues;
- Develop a detailed implementation plan, schedule, and responsibilities;
- Modify city ordinances to change service standards for residential recycling to require single stream and alternate-week yard waste;
- Modify city ordinances to change service standards for multifamily and commercial recycling;
- Modify city ordinances addressing the PAYT incentives for the residential sector;[4]
- Develop an education program for the residential sector;
- Work with the building and permits department to institute a C&D deposit system;[5] and
- Contact or solicit bids from Abitibi Consolidated, Waste Management, and others for a provided paper recycling program – like Abitibi's Paper Retriever.[6]

Conclusion: The City of Fort Collins has a solid base of diversion to work from, as well as the opportunity to capitalize on infrastructure changes and upgrades that are currently underway – including development of a single stream materials recovery facility (MRF) in the area. Using an analytical process, greatly informed by feedback from stakeholders as well as commercial and residential generators, the research provides:

- A set of recommended diversion options for the City to consider,
- A program mix that helps move the City toward its 50% diversion goal,
- Options to increase diversion in a cost-effective, diversified, and effective manner,
- Measurement protocols to track future recycling, and
- Modeling tools the City may use to refine programs, options, and progress into the future.

[4] The recommendation is to simplify and enhance the incentive. Consider requiring that the total of the residential bill – including recycling – must increase by at least 80% as volume for garbage doubles.

[5] The system should dovetail with the existing permitting system, with the new fees computed and collected at the same time as current permit fees. The fees should vary by the size (square footage) and type of project (new vs. remodel, single family vs. multi-family vs. commercial). The smallest 25% of jobs should be omitted. The city may elect to omit roofing-only jobs. The city should assure that unreturned deposits carry through to the recycling department to assist in funding additional program initiatives and help encourage C&D recycling infrastructure through grants or other investments. Examples of fees and a successful system can be found in San Jose California, and elsewhere in California and Florida.

[6] These should be provided at no cost to the City or to participants, and should revenue-share with the locations or charitable organizations at which the bins are placed.

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2 INTRODUCTION AND PROJECT BACKGROUND

2.1 Understanding of the Project

The City of Fort Collins has been a leader in the state in recycling. Fort Collins is among the few communities in the state with a landfill diversion goal, and remains one of the few with incentives and policies that have been demonstrated to be effective in encouraging diversion, including residential Pay As You Throw (PAYT), and other ordinances and programs.

The City Council adopted a diversion goal of 50%, and the City has implemented programs to enhance recycling and diversion opportunities for residents and businesses. As a result of these efforts and strategies, staff estimate the City of Fort Collins currently has a diversion rate of about 25%. In order to accomplish the 50% diversion rate goal, the City determined to explore different programs and policy initiatives aimed at increasing recycling participation in the residential and commercial sectors of the City. A set of "next steps" was needed to move toward its 2010 goal of 50% diversion. The City issued a Request for Proposals (RFP) with three main objectives:

- **Refine the definition and measurement approach to monitor progress in achieving the Council-adopted goal:** A number of years ago, the City established a system requiring reporting from haulers and facilities, and it has used these data to estimate City diversion rates. However, the City recently reviewed its monitoring efforts to identify whether it might able to improve its diversion tracking efforts. Working with a consultant[7], the City identified additional recycling occurring in the City and updated its diversion rate; however, it also became clear that there were variations in the definition of recycling and diversion used in different communities. The City was interested in developing a refined, agreed-upon definition of diversion progress for use going forward.

- **Identify appropriate strategies for the City's "next initiatives" in recycling, composting, re-use, and waste prevention to move toward the City's 2010 goal:** Over the years, the City has undertaken an array of activities to help increase and enhance the programs and climate for recycling in Fort Collins, including education and outreach, as well as specific programs and initiatives. Both the commercial and residential sectors have achieved diversion that has helped the City achieve goals to date. However, to increase current diversion to 50% by 2010, additional efforts are needed. The City was interested in examining strategies that will help the City reach this goal, be acceptable to the public and other stakeholders, move diversion forward in sectors beyond the single family, and do so cost-effectively. Assistance in identifying practical options to increase diversion was requested as part of the RFP.

- **Ensure public involvement helps drive the process:** No recycling or waste diversion program will be successful without guidance and buy-in from the public – including residences and businesses alike – and other stakeholders such as haulers and environmental interests. The City wanted to involve the public and other stakeholders

[7] Skumatz Economic Research Associates, Inc. (SERA)

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through the use of a community forum and public opinion survey. The City later added a very active peer review / stakeholder group to the project, involving significant interactions with the contractor. Additional tools for informing and gathering input from the public were also suggested as part of the project efforts, including a project website and a survey of the business sector.

2.2 Project Organization and Background

The City issued the RFP, evaluated the responses, and interviewed several firms to select the consultant team to conduct this work. Skumatz Economic Research Associates (SERA), assisted by subcontractors InterMountain Corporate Affairs, and Corona Research, comprised the successful team.[8]

- SERA was responsible for project coordination, "gap analysis" and diversion measurement[9] approach, program development / modeling / costing / evaluation, survey development, and conducting commercial surveys. SERA coordinated extensively with the Steering committee.
- InterMountain Corporate Affairs was responsible for media relations and gathering citizen feedback from a public process. InterMountain conducted the public outreach and coordinated / arranged the public open house.
- Corona Research was responsible for conducting and analyzing the large-scale residential feedback survey.

City staff were very involved in this project at all stages. They:

- Selected, coordinated, and organized the stakeholder group;
- Provided needed data for the consultants;
- Coordinated public outreach efforts;
- Reviewed and provided rapid feedback on all project materials, including: survey instruments, program proposals, modeling / diversion / cost analyses, and program recommendations;
- Reviewed and suggested additional programs of interest for the City;
- Provided background material on programs, tonnage, materials, and existing diversion levels; and
- Provided feedback on program directions.

The City-organized Steering Committee was also an integral part of the process. The membership included:

- Hauling companies, involved in residential and commercial garbage and recycling collection and processing;
- Recyclers – public and private;
- County landfill staff;
- Composting firms;
- Citizen advisory committee members; and
- Others.

[8] The primary staff responsible for the assignments were Lisa Skumatz (SERA), Drew Kramer (InterMountain) and Kevin Raines (Corona).
[9] Assisted by Delyn Kies of Kies Strategies for the development of the diversion measurement approach.

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The remainder of this report provides information on the major project efforts. The report includes the following sections:

- Chapter 3 - Gap analysis / diversion measurement assessment
- Chapter 4 - Resident and Business Feedback– open house summary, commercial survey summary, and consumer survey summary
- Chapter 5 - Program Planning / Modeling and Recommended Diversion Package

In addition, four attached appendices provide more detailed information on the surveys and outreach efforts.

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3 DIVERSION MEASUREMENT OPTIONS

3.1 Introduction and Executive Summary

This chapter provides the Task One write-up on the findings of the definitions/protocols used elsewhere and their conceptual and practical pros and cons from the perspective of the interviewees. This research incorporates information from initial research on the topic, as well as feedback from City staff and the Steering Committee established by the City. The organization of this chapter follows:

- First, we review the three main approaches to measurement that have been implemented by communities and states across the nation. We review the advantages and disadvantages of these approaches (Section 3.2).
- Then we provide the results of data gathering on measurement approaches used in specific areas of the country (Section 3.3).
- Finally, we provide definition and measurement / tracking recommendations for the City of Fort Collins (Section 3.4).

To conduct this work, interviews were conducted in three states with a long history of documenting recycling: Washington, Oregon, and California. Interviews were conducted with a variety of large and small cities and counties, and with state agencies.[10] The mid-sized cities provided the insights most relevant for Fort Collins; however, the larger cities and state agencies use the most sophisticated approaches and often provide helpful tools that can be used by jurisdictions of all sizes. The U.S. Environmental Protection Agency also provides tools for local jurisdictions. The combined recommendations of the interviewees are presented below, followed by descriptions of particular measurement approaches, available tools, and a compilation of specific comments offered by interviewees.

This report provides several findings and recommendations:

- **Multiple Measurement Approaches:** The City should monitor progress in more than one way. It is important to include a strong overall indicator of progress, but the City should also monitor program-by-program impacts to provide information necessary to watch for indications of program progress or stalling and to provide feedback to help improve programs.
- **Optimal Level of Effort:** "Reasonable" efforts should be expended to try to monitor progress – extraordinary efforts that take significant time away from actual delivery of programs is not well-spent. Precise data in this field is difficult (and time-consuming) to obtain – and in fact, it is not possible to collect truly accurate information on several types of diversion (e.g. commercial recycling, backyard composting, etc.). The underlying principle should be that the level of effort is sufficient to provide data that can reflect progress, and

[10] Information for this memo was drawn from the State of Oregon Department of Environmental Quality; California Integrated Waste Management Board Office of Local Assistance; King County, Washington; Metro, Oregon (represents 3 counties and 25 cities); City of Portland, Oregon; Alameda County Waste Management Authority, California (represents 14 cities); City of San Francisco, California; and West Contra Costa County Integrated Waste Management Authority, California (represents 5 cities).

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avoid "wrong" decisions about programs and assist in identifying need for program changes or new programs; however, it does not have to be much more accurate than that. The effort should not take away from development and implementation of needed programs.

- **Collect Qualitative and Quantitative Data:** Information on how programs are working is not just gathered numerically – it is important to conduct interviews and gather qualitative information as well in order to assess the progress of programs and the possible need for changes in existing programs or adding new programs.
- **Consider Mandatory Programs to "require" progress:** Many communities are reducing efforts for detailed measurements and to assure continued progress in diversion, they are just adding new "mandatory" requirements and programs as part of the portfolio to make sure diversion increases over time. This is an element that may be useful to consider; however, evaluation is also an important part to assure program funds are being well-spent and that programs are continuing to deliver valuable and worthwhile services, commensurate with their funding or needs.
- **Benchmarking estimates show the City has achieved significant diversion progress:** Estimates show City-wide diversion of approximately 24%. On a per-capita basis, we find generation (disposal and diversion combined) is approximately 1.60 tons per year for residential waste; per-business generation is approximately 42 tons per business per year (or 1.1 tons per year per employee). Combining all waste generated and diverted within the City (excluding asphalt), we find per capita generation in the City is about 1.22 tons per year, and diversion is about 0.25 tons per year per person. These results are presented in Table 3-2.[11]

Table 3-1: Measurement Recommendations from the Perspective of the Interviewees

PURPOSE	RECOMMENDATION
To establish the baseline and plan programs	Conduct a limited waste generation study (WGS) to understand the local waste stream. Use a combination of the WGS data and simple modeling to develop plan. (Can use factors provided in state or EPA calculators.)
To monitor and evaluate individual programs	Develop a monitoring program prior to implementing the recycling program. This will ensure that you have collected the right kind of base information. Monitoring and evaluation for individual programs are usually custom-tailored for a specific program or set of programs. What is measured, how it is measured, and when it is measured varies widely. "What" may include, for example, weight, participation rates, customer satisfaction, cost, contamination rates, capture rates. They may be quantified at the source (e.g. residential routes) or central location (e.g. composting facility). "How" may be, for example, by observation, equipment, survey, anecdotally, or formal study. "When" may be determined by whether the program is a pilot or for the long-term, and whether there are significant seasonal or other variations (e.g. tourism or university related).
To monitor and evaluate the overall "set" of programs	Tabulate individual programs OR tally disposal and subtract from adjusted base year generation rate, depending on availability of information. Conduct periodic WGS for feedback and planning purposes. WGS may be more or less extensive depending on need for updated information. Some recommend conducting a WGS

[11] Note to reviewers: these are draft results

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PURPOSE	RECOMMENDATION
	every five years; others recommend every ten years.

Table 3-2: Computation of Fort Collins Diversion Metrics (DRAFT – missing some recycled tons)[12] (Assume results are 24% diversion without asphalt, 42% with)

Diversion Metric	Excluding asphalt	Including asphalt
Residential diversion percentage - %	20.3%	N/A
Commercial diversion percentage - %	20.2%	63.6%
Total diversion percentage - %	20.3%	49.3%
Generation statistics	(Informational only)	
Residential generation per household per year – Tons per Year (TPY)	1.60 TPY generation 0.32 TPY diversion	N/A
Commercial generation per business[13] per year - TPY	41.64 TPY generation 8.42 TPY diversion	91.34 TPY generation 58.12 TPY diversion
Commercial generation per employee per year - TPY	1.07 TPY generation 0.22 TPY diversion	
Per Capita Metrics	(key metrics to track)	
Total	1.22 TPY generation 0.25 TPY diversion 20.3%	1.92 TPY generation 0.94 TPY diversion 49.3%

3.2 Approaches To Measuring Diversion Progress

There are several basic strategies for measuring recycling and diversion.[14] Each of these options has (conceptual) pros and cons, as illustrated in the table below.

- **Program-by-program diversion and "sum up":** This approach measures the diversion associated with individual programs and initiatives and "adds them up" and compares with disposal to generate an estimated recycling or diversion percentage.[15]
- **Landfill disposal as reflection of diversion:** This approach establishes a baseline year, and monitors only disposal. It is assumed that reductions in disposal are in recycling and diversion, and the percentage diverted from the landfill is the key (ultimate) indicator of progress.
- **Per Capita metrics:** In this approach, the City examines the waste generation and disposal (and potentially recycling) on a "pounds per capita per year" basis and looks for reduced generation or disposal figures as indicators of success.

Each of these approaches has advantages, and each is used in some set of communities in the U.S. However, they have their disadvantages as well. These points are summarized in Table 3-3.

[12] Draft results

[13] Note: employees may be easier to track

[14] Of course, these are only cursory definitions – there are many steps involved in deriving recycling or diversion estimates from each method. For example, the landfill diversion method should establish a dynamic baseline – estimating what would have been disposed without programs (e.g. based on population, business activity, etc.). Implementation is much more complicated than these simple conceptual descriptions.

[15] Given that programs include many different types, this may get at a reflection of percent of generation that is diverted. Alternatively, we can define "generation-based" approaches as a separate method.

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The SERA team believes that the best approach is actually a multi-pronged measurement method – including at least two of these methods to help capture the advantages of both and avoid the pitfalls of either. We believe multiple methods are needed to tell the real story and reflect progress in a way that is useful for monitoring and program refinement purposes.

However, even after selecting a basic approach (or approaches), it is still necessary to identify the "specifics" – if there is one area of recycling where the "devil is in the details," it is in measurement! Many of these details are discussed in the interviews in Section 3.3; the recommendations are included in Section 3.4. Some cities include or exclude particular materials (car bodies, etc.) that can provide a significant "swing" in the numbers. There are very specific and well-defined measurement protocols available from the EPA, from the States of California, Minnesota, and Oregon,[16] as well as a number of other sources.

Table 3-3: Advantages and Disadvantages of Methods for Measuring Diversion Progress

	Advantages	Disadvantages
Program diversion	• Data gathered at program and disposal level; relatively straightforward • Provides feedback on relative program performance (and comparisons or benchmarking) for evaluation / refinement • Baseline relatively easy – zero or some starting year	• Difficult to measure / attribute impacts to source reduction and education programs
Landfill disposal as metric on diversion	• Data gathered from relatively limited number of sources / places / facilities / haulers • Incorporates gains from source reduction and education programs automatically	• Does not provide information by program – no information for program specific improvements or benchmarking. • Difficult to establish baseline – need data from all landfills or disposal destinations that handle all sectors of waste from the City including wherever self-hauled material may go – and it must be identified as City-originated waste. Gathering this data for a past year that may be designated as "baseline" may be particularly difficult. • Results dramatically impacted by changes in economic conditions – landfill may go down because the economy falls or may increase as population increases. "Correction" factors may be needed.
Per capita	• Provides better "normalization" for growth, etc. than landfill diversion method • Provides good data for comparison over time and for comparisons with other cities • May be defined to reflect per capita generation, program, or landfill disposal definitions	• If based on disposal, same pros and cons as landfill diversion discussion. If based on generation, specific data also needed from programs.

3.3 Tracking And Measurement Definitions

[16] SERA is already quite familiar with most of these.

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We conducted a detailed review of secondary literature as well as interviews with staff at a number of states, communities, and agencies[17] to provide feedback on current practices and strengths/weaknesses/recommendations from various locations. This information is summarized in the sections below.

3.3.1 California's Diversion Rate Approach

Background and Helpful Tools: Solid waste management planning and monitoring have been required in California since 1989. The process began when the State required each jurisdiction to conduct a waste characterization study, calculate an initial diversion rate, and prepare a Source Reduction and Recycling Element (SRRE) that described how the jurisdiction would reach the State's targets of 25% diversion by 1995 and 50% diversion by year 2000.[18] Once a jurisdiction's SRRE was approved, it was required to submit annual reports to the California Integrated Waste Management Board (CIWMB). Thus, some jurisdictions have been submitting annual reports for close to 15 years. During this time, the reporting process has evolved some, but continues to be based on the same general diversion rate formula.

The CIWMB specifies the contents of the annual reports, but not their format. The CIWMB does, however, provide a model report that jurisdictions can use and submit electronically. To help with reporting, the CIWMB provides extensive information on its website, under the section called "Local Government Central" (www.ciwmb.ca.gov/LGCentral). The site includes, for example, the model report, a diversion rate measurement calculator, waste characterization data, per capita disposal rates, and disposal rates by business types (e.g., tons disposed per restaurant employee per year). The CIWMB cautions that some of the information is provided for planning purposes only and should not be used as measurement tools.

Methodology: California calculates diversion in tons as follows:

DIVERSION = GENERATION - DISPOSAL

The method for calculating diversion for the base year is somewhat different than for subsequent years.[19]

Disposal: Initially and subsequently, disposal is based on actual facility records, and includes both landfilled and exported material. The robustness of this figure depends on the availability, reliability, and completeness of facility records.

Generation: For the base year, generation is the most elusive figure. It is usually a combination of reported and modeled data. After the base year, the generation rate is adjusted annually using changes in population, employment, and inflation-adjusted taxable sales growth. This rate can also be adjusted for unusual events, such as major disasters, and for imports.

[17] In addition to the States and agencies listed, SERA interviewed at least 6 cities in Colorado, as well as 10 cities elsewhere in the country, including Seattle and San Jose (leaders) and a set of more "normal" cities.

[18] This is a simplified description of the process!

[19] Note, there is an option for jurisdictions to calculate diversion by tallying records and estimates for various source reduction and recycling activities. However, when the reporting requirements were first adopted, few jurisdictions had extensive recycling programs in place, and thus chose to use the method described above.

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Diversion: Diversion is then the difference between generation and disposal. Once generation and disposal tons are determined, diversion can also be expressed as a percentage. For instance, the State diversion rate for 2004 was 100% - 52% = 48%.

Recently, the CIWMB has looked more and more closely at the demographic and economic factors used to adjust generation rates in order to identify relevant trends. For example, in recent years construction employment in the state has grown far faster than average employment. This additional information has provided useful guidance for program planning.

Over time, California's method has proven more accurate for large jurisdictions than for small. Rural and small jurisdictions are more sensitive to single changes in the waste stream. For example, several large self-haul loads to the landfill will be felt more in the numbers for a small jurisdiction than for a large one.

3.3.2 EPA'S Method For Determining Recycling Rates

Background and Helpful Tools: The U.S. EPA developed and released a recycling measurement tool in 1997 that "ensures fair comparison of recycling rates among jurisdictions, produces useful information for planning and decision-making, provides accurate, up-to-date numbers for market development, and allows for easy data collection from the private sector."[20] The tool is available on the EPA's website at www.epa.gov/garbage. It includes a guidance document; worksheets; sample survey forms for recycling collectors, processors disposal facilities, and end users; planning checklists; and volume-to-weight conversion factors. Pennsylvania, Washington, the Northeast Recycling Council (www.nerc.org), and others have all used the EPA's measurement tool.

The recycling rate is based on tons recycled as follows:

RECYCLING RATE (%) = MSW RECYCLED x 100 / TOTAL MSW GENERATED

This method relies on distributing survey forms to solicit data about the quantities of materials collected, processed, disposed, and recycled.

The method also relies on "traditional" definitions of municipal solid waste (MSW) and recycling. The definition of MSW does not include, for example, construction and demolition (C&D) debris and sewage sludge. The definition of recycling includes, for example, off-site composting, but not backyard composting. Data for these materials can be collected and analyzed separately using the same basic methodology.

3.3.3 Oregon's Annual Recovery Rate

The State of Oregon's Department of Environmental Quality (DEQ) calculates a statewide "Annual Recovery Rate" each year. The DEQ's process is a unique approach, quite elaborate, and much more extensive than necessary for a single jurisdiction.

[20] Quoted from EPA literature.

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The DEQ has been calculating the State's Annual Recovery Rate since the early 1990's, and now uses a sophisticated software program to run the calculations. The data are based on mandatory reports submitted by haulers, some large generators, and recyclers (scrap metal dealers are exempted). The reports include how much was recycled and to whom it was sold. DEQ tracks the materials to their endpoints, and then balances what is bought and sold. This is a very labor-intensive effort and requires substantial legwork by the DEQ staff. The resulting information is reported back to each "wasteshed" (counties or other jurisdictional entities) in the state.

3.3.4 Other Measurement / Inputs: Waste Characterization Studies and Set Out Surveys

Waste Characterization Studies: As noted above, California's cities and counties have been conducting waste characterization studies since 1989. In addition, the CIWMB has completed two statewide studies, one in 1999 and one in 2004. The "2004 Statewide Waste Characterization Study" is based on 550 samples that were collected from three sectors (residential, commercial, and self-haul) and sorted into 98 material types.[21] This is up from about 60 material types used for the 1999 study. Newly added types include specific types of electronic wastes, several types of plastic film, various CRV[22] containers, and used oil filters.

Of particular interest to this project, the 2004 study notes:

> Comparing the content of the current statewide disposed waste stream to that of the 1999 study produces some interesting results. At about 15 percent, food is still the number one material type in the overall disposed waste stream. The new study also shows that lumber has moved up to the number two spot at about 10 percent. *Interestingly, when comparing the two studies, 8 of the top 10 material types in the overall disposed waste stream remained the same. Their percentage of the overall stream may have changed, but those top 10 still comprise more than one-half of the total waste disposed.* [Emphasis added]

This may provide an argument for directing limited funds to ongoing program development and implementation rather than to extensive monitoring, reporting, and analysis.

Set Out Surveys: In addition, communities across the nation conduct set out surveys – often in conjunction with waste characterization surveys. These studies are designed to gather data on the amount of material that households or businesses are recycling based on weighing the materials set out for collection. While these can be conducted for either residential or commercial sectors, the work is much more easily conducted for residences – collection happens on a limited set of days, while commercial materials may be collected once per week up to daily.

No matter where these studies are conducted, the procedures are fairly similar. The data are collected by selecting a random set of households with geographic clusters to make the data

[21] The 132-page report can be downloaded from the CIWMB's website; Appendix B of the report lists the 98 material types.
[22] CRV refers to California Redemption Value, and applies to the specific containers affected by the State's bottle bill. CRV container types accounted for many of the new material type categories. For example, clear glass small CRV, clear glass large CRV, and clear glass non-CRV were all separately tabulated.

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collection feasible. Garbage and programmatic materials are weighed and recorded (and the weight of containers subtracted). In some cases, notes are made about the presence of specific recyclable materials to provide first-hand indications of the share of residents that know about the range of recyclables eligible in the community. These data collection efforts provide valuable information to community programs – and provide information beyond what can be provided by monthly or annual tonnage figures from the haulers for disposal and program tonnages, including:

- Data on the range of recycling or diversion percentages by household,
- Information on the percent of households that appear to have understood the range of materials that can be recycled – which can be valuable in refining education programs,
- The percent of homes that are recycling at all – "participation" information, and
- Other information.

While some communities conduct very elaborate studies, other communities report that the 80/20 rule is important here. The 80/20 rule states that the vast majority of important data can be collected very inexpensively, and the additional information provided by expensive studies may not be worthwhile. However, conducting these studies periodically generates important feedback that cannot necessarily be gathered via other methods.

3.3.5 Selected Comments from Interviewees

In this section, we note comments from the interviewees regarding a range of topics.

Baseline Information

- Setting a solid base year is essential for future comparisons and reporting.
- Before planning programs initially, look closely at the local waste stream and waste flows. Fifteen categories of waste types may be sufficient (versus 98 for some states / jurisdictions!).
- Determine from the outset whether to include university-related materials and wastes in the waste generation study and plan.
- Most problems with base year disposal rates stem from poor data regarding imported and exported wastes.
- Most under-reporting for diversion is related to source reduction activities.

Materials of interest for baseline and planning purposes

- Tires (From the public health and nuisance points of view.)
- Vehicles (Whether or not to include auto bodies has been a long-standing controversy.)
- Bulky wastes (Track these consistently. In Oregon, whether a refrigerator counts or not depends on whether it is delivered to a drop-off facility or scrap dealer.)
- Electronic wastes (Of interest due to hazardous components, and as growing component of the waste stream.)
- C&D debris
- Materials used for alternative daily cover at landfills
- Sewage solids
- Materials targeted in national, state, or local programs
- Materials with strong local market development potential

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Special Populations

- Jurisdictions in California with large colleges have run into problems when calculating rates based on population (e.g. Davis). Students may not be attributed to their college locations during the 10-year census. Thus the population data may under-report actual population.

New Sector

- Several jurisdictions are considering collecting and reporting data specific to large events, such as sports events, conventions, and festivals.

How Much is Enough?

- While some monitoring and evaluation is necessary, it is better to focus more on implementing programs than on detailed monitoring and evaluation. These efforts can be time-consuming and costly. Data collection and analysis always takes longer than you think they will. (Heard from almost every interviewee.)
- There is ongoing discussion in the recycling community about whether to move away from mandated numerical goals (e.g. 50% by 2010) toward mandated programs and/or best management practices. There are advantages and disadvantages to both. Measurement approaches would vary somewhat, depending on how the ultimate goal is stated.

Diversion Rate Based on Disposal

- A diversion rate based on disposal provides information about general trends, but not about diversion per se, and certainly not about particular diversion programs. Annual diversion rates provide only aggregated information; they do not distinguish between programs that are performing well and ones that are not.

Qualitative Monitoring

- All interviewees recommended collecting qualitative as well as quantitative information when monitoring programs.

3.4 Findings and Recommendations on Diversion Measurement

There are several measurement options available for use by the City. They are highlighted in Table 3-4. Table 3-5 provides recommendations about the specific commodities to be included / excluded from the computations. Finally, Table 3-6 provides draft estimates of the diversion metrics of interest (highlighted in yellow).

Table 3-4: Summary of Preferred Measurement Approach(es)

Material	Status/Discussion	Recommendation
Program-specific	Used in most communities; valuable program-specific feedback on operations	Use, be certain to gather program-specific data where available
Landfill disposal diversion measure	Used in California. Good info on overall performance (including impacts from source reduction and education efforts), and reasonably easy to collect data (relatively few respondents needed). Past baseline issues can be complex. One fatal flaw is impacts from economic and related variations.	Do not use; baseline and normalization difficult
Per-capita	Adjusts for some of impacts from economic variations. Could be program-based, generation-based, or landfill disposal based.	Use; generation-based approach

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Material	Status/Discussion	Recommendation
Combined per-capita disposal based measure of diversion	May address advantages and disadvantages of the 2 previous measures – likely recommendation. Need to determine appropriate way to count student population.	Use, as described
Set out surveys	Useful – provides information on behaviors, non-recycled but eligible recyclable materials; can be inexpensive. Recommend at least every other year.	Use, conduct every other year
Detailed composition studies	Detailed composition studies *a la California* (many materials) are excessive and expensive. More abbreviated approach – with more limited materials sorting – is sufficient. Some recommend conducting every 5 years; others recommend 10.	Use, conduct every 5-7 years

Table 3-5: Materials to be Included in Diversion Computations

Material	Status/Discussion	Recommendation
Tires	Most communities exclude	Important target in area, include in disposal and diversion
Vehicles	Exclude	Exclude from disposal and diversion
Bulky items	Most DO count this. Oregon only counts it if delivered to drop-off sites – does not count if delivered to scrap dealers	Include all in disposal or diversion as appropriate
Electronics	No consensus, but should be counted in baseline if the city is interested in a program in the future	Include in disposal or diversion as appropriate
Construction & Demolition	EPA says NO because not in MSW definition; however, many communities include because it is a program focus	Include – important to programmatic goals
Alternative Daily Cover (ADC)	California counts by specific exemptions if YW. Not counted in Oregon. California communities recommend NOT counting as diversion because it is essentially buried.	Do not count as diversion
Sludge	Not counted as recovery in most cases	Do not count as diversion
Asphalt	Seldom discussed	Include and exclude – provide both metrics

The formula for computing diversion percentage is generally:

$$\text{Diversion percentage} = \frac{\text{(tons recycled + tons composted + other "counted" diversion + tons source reduced)}}{\text{(tons disposed +tons recycled + tons composted + other "counted" diversion + tons source reduced}^{23})^{24}}$$

The computation methods for the other indicators are provided in the column headings of Table 3-6.

[23] If this can be estimated: Estimates are available for PAYT (See Skumatz, 2001, *Resource Recycling*). Otherwise, it may be able to be estimated based on program accounting, using statistical methods, or by use of landfilled tonnage statistics. If comprehensive landfilled tonnage data can be developed for the City, landfill diversion rates can be computed, which will provide a diversion estimate that incorporates source reduction.

[24] In the tables below we are counting "diversion" as the denominator of this equation.

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Table 3-6: Computation of Fort Collins Diversion Percentage and Per Capita Estimates – DRAFT RESULTS – TABLE BEING REVISED Metrics for tracking highlighted in yellow.

Units or sector	A. Disp TPY	B. Recy TPY	C. YW/Other TPY	D. "Units" - HHs/Busin	E. Generation / "unit" (A+B+C)/D	F. Disposal/ "unit" (A/D)	G. Diversion /"unit" (B+C)/D	H. Percent Diversion G/(F+G)
Residential	72,353	17,126	1,327	56,859	1.60	1.27	0.32	20.3%
Comm'l (businesses basis)	66,424	4,477	12,371	2,000	41.64	33.21	8.42	20.2%
Employees basis				78,086	1.07	0.85	0.22	20.2%
Other (asphalt)			99,400	2,000	91.34	33.21	58.12	63.6%
TOTAL COMPUTATIONS								
TOTAL	138,777	21,603	13,698					20.3%
Per household value				56,859	3.06	2.44	0.62	20.3%
Per capita values				142,547	1.22	0.97	0.25	20.3%
TOTAL with Asphalt	138,777	21,603	113,098					49.3%
Per household value				2,000	136.74	69.39	67.35	49.3%
Per capita values				142,547	1.92	0.97	0.94	49.3%
Note: number of businesses uncertain. Based on employment and average employees per firm from survey, may be 1,575.								

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4 SUMMARY OF RESIDENTIAL AND BUSINESS FEEDBACK

One of the key objectives for the project was to gather feedback from key actors that could be used in developing and "sounding out" the program ideas. As a result, several efforts were undertaken – some planned up-front, and others added as the project proceeded. The efforts, described in this chapter and referenced appendices, include, in roughly chronological order:

- **Steering Committee:** The City established this committee at the start of the project. The Steering Committee was composed of stakeholders, interested citizens, and professionals with knowledge and input regarding recycling and waste management in Fort Collins. They were used as a sounding board throughout the project.
- **Public Access Channel Broadcast and Web site feedback:** The City arranged for a public access station talk show to discuss the fact that the City was undertaking a new solid waste planning process, and solicited feedback. The City also established a location on their web site for comments to be gathered regarding the recycling plan development and options.
- **Public Open House and comment cards:** On December 1st, 2005, the City held an open house in the public meeting space at the New Belgium Brewery. This event, organized by InterMountain Corporate Affairs, was widely publicized, and had more than 60 attendees who heard summaries of draft program options, and were invited to fill out comment cards. (See Appendix A for the open house report and Appendix B for the comment card results.)
- **Small-scale Commercial Survey:** The project included a very small-scale commercial survey, which collected data from 32 randomly selected Fort Collins businesses. The survey asked about business type and size, garbage volumes and behaviors, attitudes regarding recycling and City recycling goals, current recycling, problem / remaining materials, preferences regarding a variety of hypothetical / proposed programs, and willingness to pay for program costs (see Appendix C for detailed results). The survey was designed and fielded / analyzed by Skumatz Economic Research Associates.
- **Large-Scale Residential survey:** The project included a large-scale residential survey, which collected data from hundreds of randomly selected Fort Collins Households. The survey asked about garbage volumes and behaviors, attitudes regarding recycling and City recycling goals, current recycling, problem / remaining materials, preferences regarding a variety of hypothetical / proposed programs, and willingness to pay for program costs. This survey provides a wealth of information for the City for current and future program planning, materials needs, current / benchmarked behaviors, and other data (see Appendix D for detailed results). The survey was designed by Skumatz Economic Research Associates, and fielded / analyzed by Corona Research.

The key results from the open house / comment cards, and residential and commercial survey efforts are summarized below. Details and methodology are provided in the Appendices, as referenced. The results of these processes were invaluable in assuring that the project ideas were vetted by a stakeholder group, and that the development of the options was made with input and preferences of the affected parties, including stakeholders, citizens, and businesses.

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4.1 Summary of the Open House

The City was interested in significant input from the public. In response (and in compliance with the RFP that outlined the scope of this project) a public involvement process was developed to "maximize opportunities for public participation" and "optimize meaningful, community-based input." InterMountain Corporate Affairs organized the event.

On Thursday, December 1st, 2005, the City and its project team hosted an open house to present the public and other stakeholders with an overview of the recycling strategies under consideration. The event was held from 4:30-7:00 p.m. in the conference room of the New Belgium Brewing Company at 500 Linden St. in Fort Collins, and there were over sixty attendees. The event began with a 45-minute open house format, in which attendees were free to review display materials on the various recycling strategies while engaging project team members in one-on-one or small group discussions. The materials were arranged around three distinct "stations," one for each of the three recycling strategy packages being proposed – including "low", "medium" and "high" diversion packages. Each station consisted of a discussion table and presentation displays on easels for easy viewing.

The event then segued into a 30-minute PowerPoint presentation by project team leaders Susie Gordon and Lisa Skumatz. The presentation took place in a classroom-style setting in the middle of the New Belgium conference room. Following the formal presentation, City Environmental Planner John Armstrong facilitated a dynamic question-and-answer session in which several attendees made pointed inquiries and provided valuable insights. In addition, comment forms were made available for those who wished to offer additional feedback in writing. Thirteen comment forms were turned in, one letter mailed, and an additional eighteen comments collected from the City website.

Following the Q&A period, attendees were free to revisit the three display stations. Breakdown of the displays began after most visitors had departed around 7:00 p.m.

The highlights of the comments received are listed below.

- Of those who indicated their top choice, all but one picked the #3 (high diversion) conceptual package.
- Package #3 was preferred primarily because it had the highest diversion rate.
- All respondents were in favor of increasing recycling efforts and felt the City of Fort Collins needed to do more in this area.
- Many respondents would like to see larger receptacles for recyclable materials, preferably the same size as the garbage containers with wheels.
- A few respondents did not want to see their fees increased.
- Respondents wanted rewards, recognition, or rebates for those who recycle a great deal.
- Almost all respondents would like to see more emphasis on educating the public about recycling – including in the school system.
- Some respondents would support districting or going to a municipal system in order to attain the desired diversion.
- Many respondents would rather see encouragement than increased fees or penalties.

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4.2 Feedback from Residential and Commercial Phone Surveys

As mentioned, the City placed a high emphasis on gathering citizen and business feedback to incorporate into the development and assessment of program options. This was accomplished through three main efforts:[25]

- **Comment cards:** Written feedback was gathered from 32 of the 60 plus attendees at the open house that was conducted in early December 2005. Detailed information on these results is included in Appendix B.
- **Commercial survey:** A phone survey was conducted with 32 businesses in the City. The businesses were selected randomly from a list supplied by the Chamber of Commerce. Additional detail on the results is provided in Appendix C.
- **Residential survey:** A phone survey was conducted with 403 households located within the City of Fort Collins. The households were selected as a random digit dialed sample. Detailed information on this survey is provided in Appendix D.

A brief summary of key results from the residential and commercial surveys and the public hearing process are presented below.

These findings are focused on several key areas that are most important to the design and assessment of programs for the City. These areas include:

- Materials recycled and remaining in the waste stream;
- Most preferred/rejected program concepts; and
- Willingness to pay for additional diversion-related programs and services.

The commercial and residential surveys also collected considerably more information, and these results are included in Appendices C and D, respectively. Other topics addressed in the surveys include:

- Attitudes about recycling, and support for the City's diversion goal;
- Amount they recycle and divert;
- Satisfaction with rates and fees and current services;
- Demographics / firm-o-graphics, and other information.

4.3 Materials Recycled and Remaining in the Waste Stream

Both commercial and residential respondents were asked about the materials they are currently recycling, and the materials they most want or need to recycle "next." Materials that are already commonly recycled by the commercial sector of Fort Collins include:

- Paper
- Cardboard
- Glass & metal containers
- Plastic containers

[25] In addition, the City created a Steering Committee to provide feedback from industry stakeholders. They provided feedback at a number of stages of the project.

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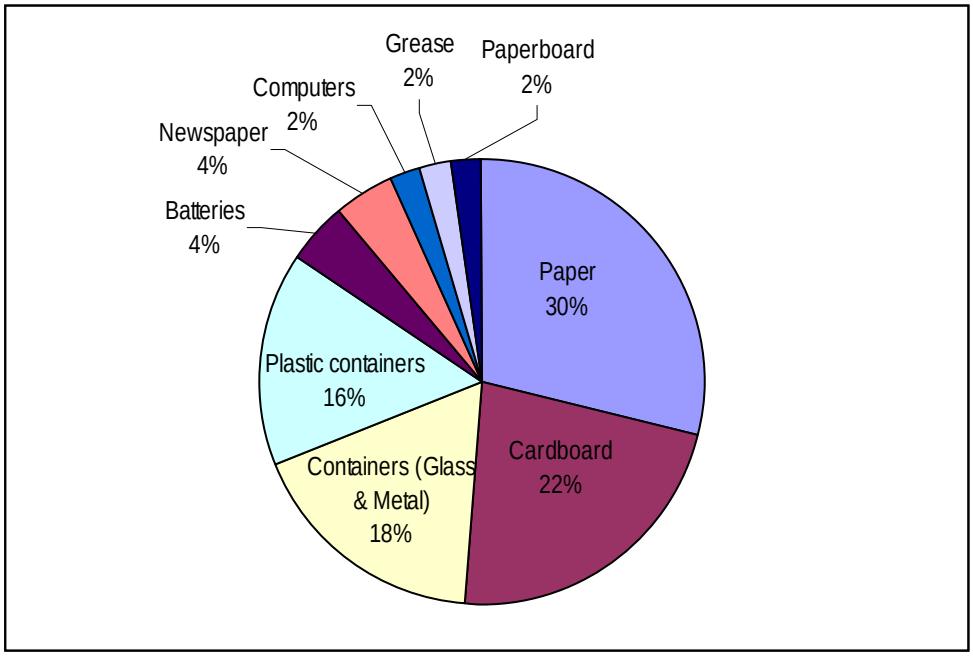
Figure 4-1: Commercial Sector Most Commonly Recycled Materials



Common materials that still remain in the residential waste stream include:

- Cardboard
- Paper
- Cereal box-type packaging (Paperboard)
- Plastic containers
- Food Waste

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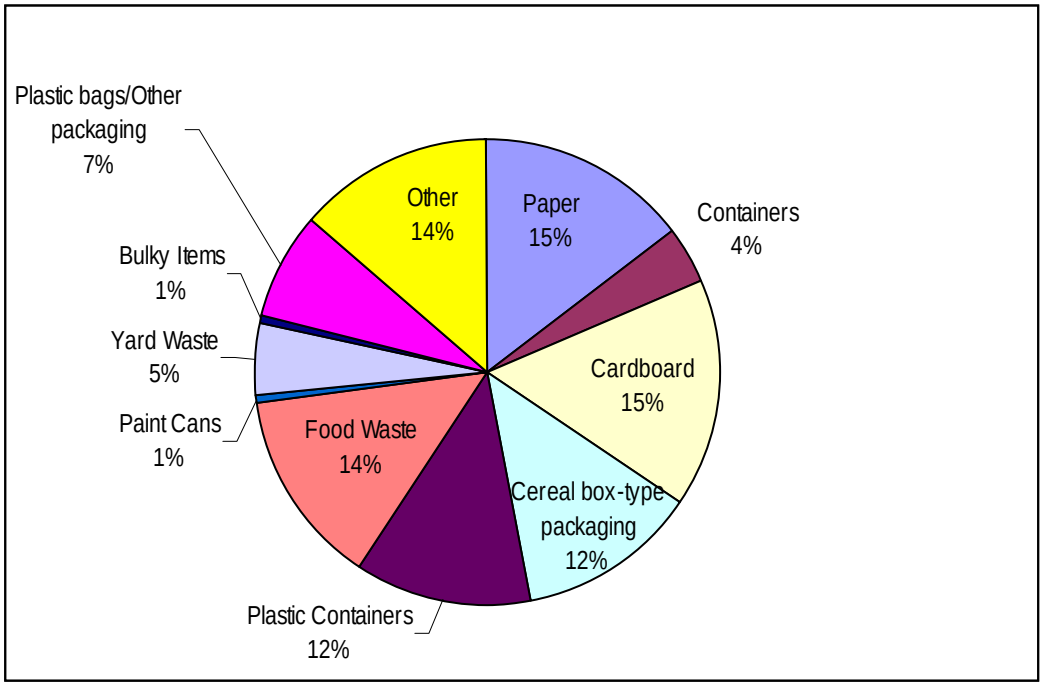
Figure 4-2: Residential Sector Most Common Materials Still in Waste Stream



Common materials that still remain in the commercial waste stream include:

- Cardboard
- Plastic & other packaging
- Paper
- Food Waste

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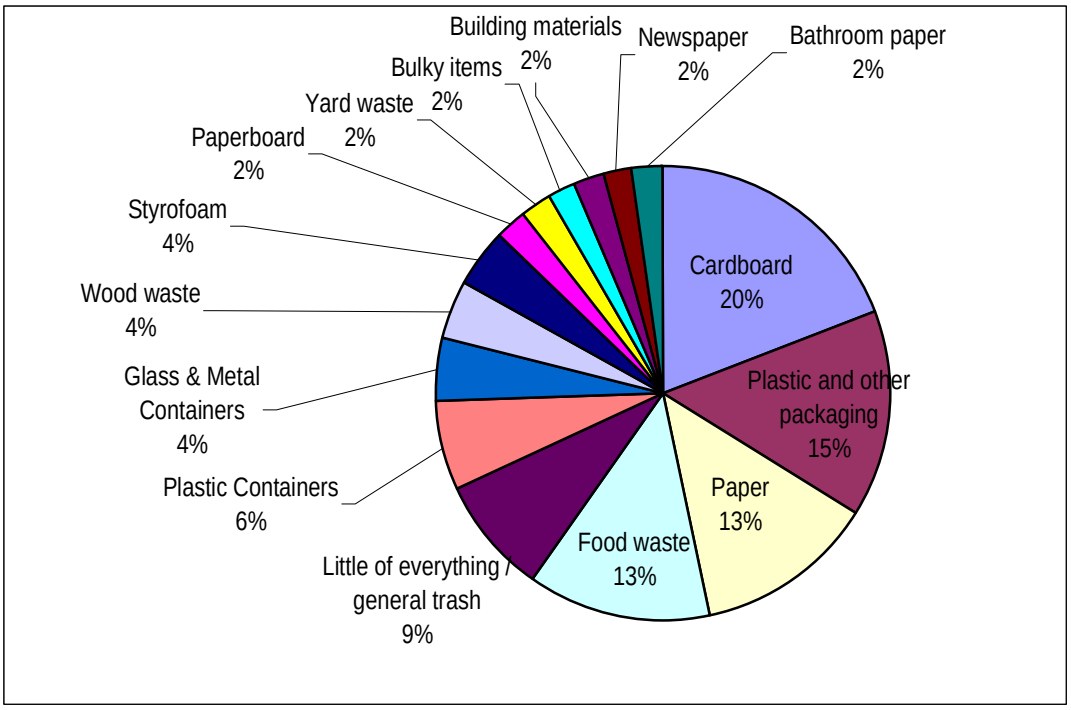
Figure 4-3: Commercial Sector Most Common Materials Still in Waste Stream



4.4 Preferred/Rejected Programs

The residential and commercial survey respondents were asked about their preferences among individual program concepts. The attendees at the open house heard presentations about three "packages" of programs – labeled 1 (low diversion), 2 (medium diversion), and 3 (high diversion). Comment card respondents favored the #3 conceptual package because it had the highest diversion rate.

4.4.1 Yard and Food Waste

When asked about program concepts one-by-one, the residential sector was in favor of most yard waste programs, except for banning yard waste from the landfill.

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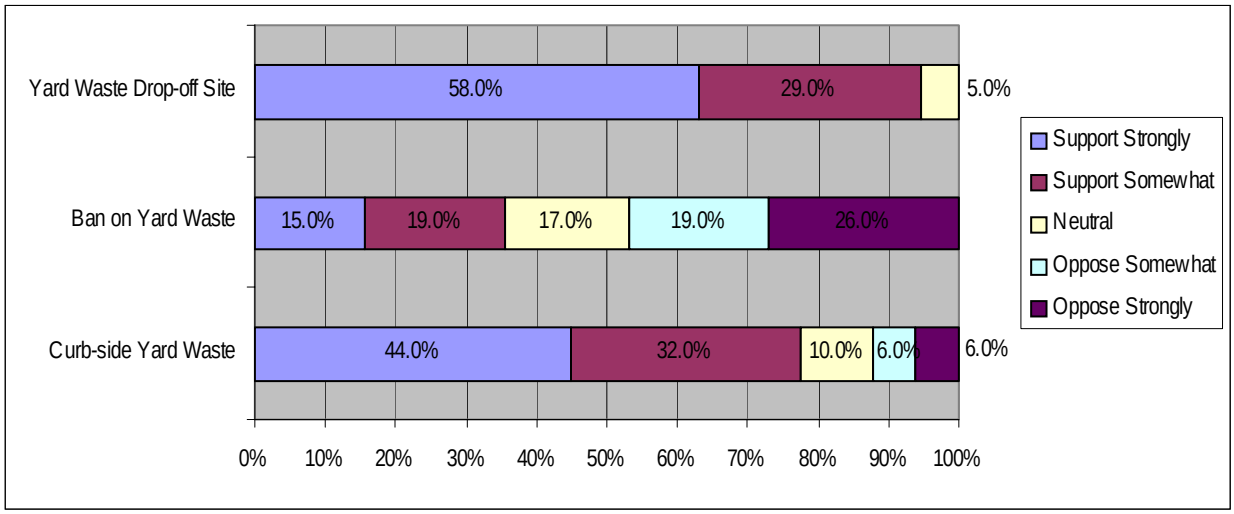
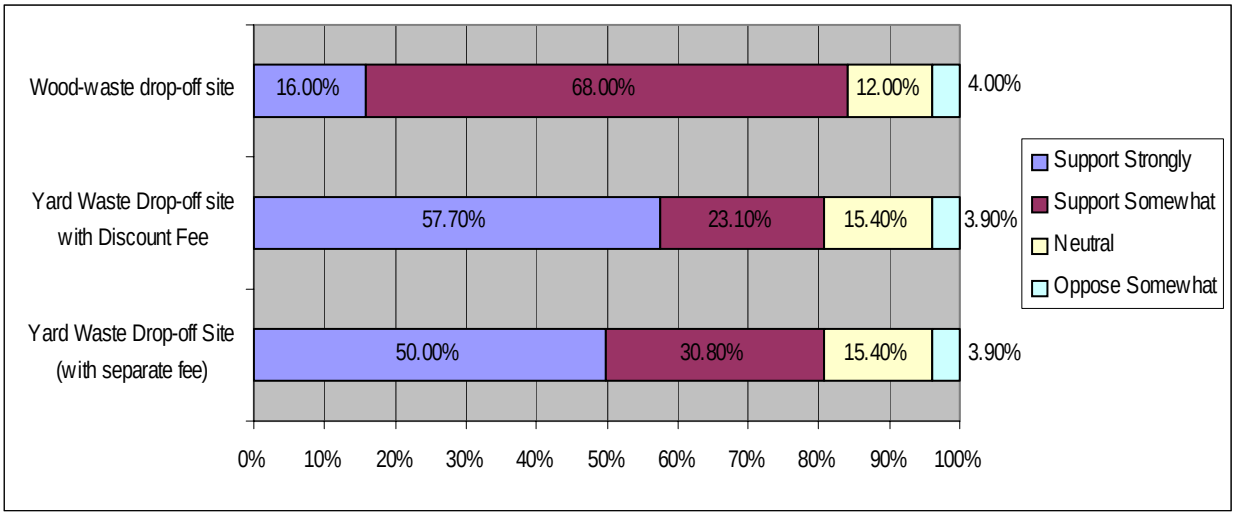
Figure 4-4: Residential Support for Yard Waste Programs



The commercial sector was also in support of most yard waste programs.

Figure 4-5: Commercial Support for Yard Waste Programs



There is general support among the commercial community for food waste programs.

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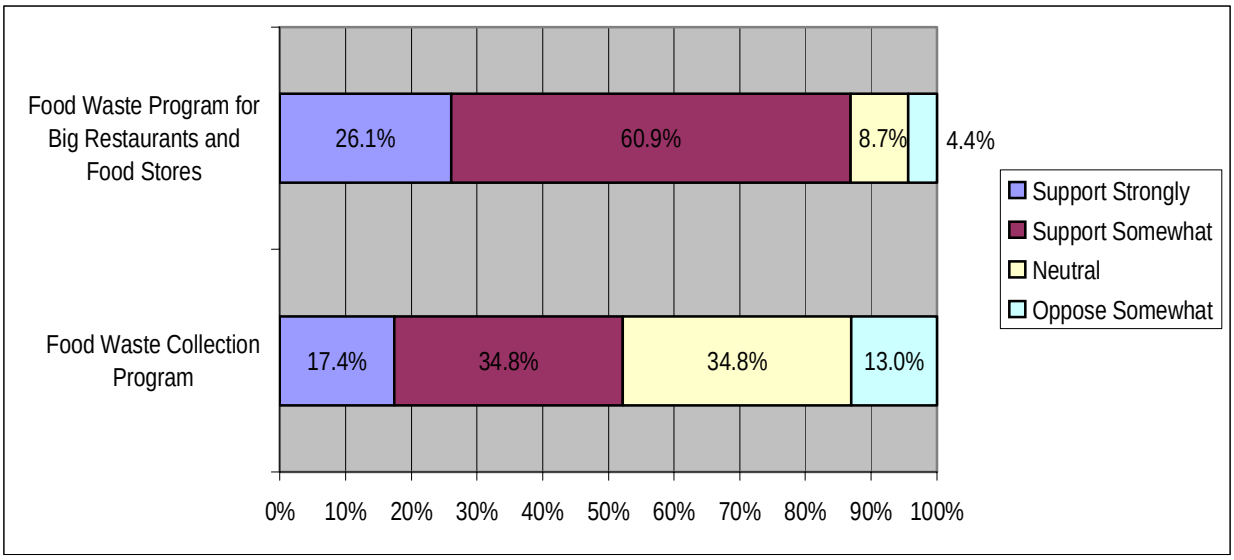
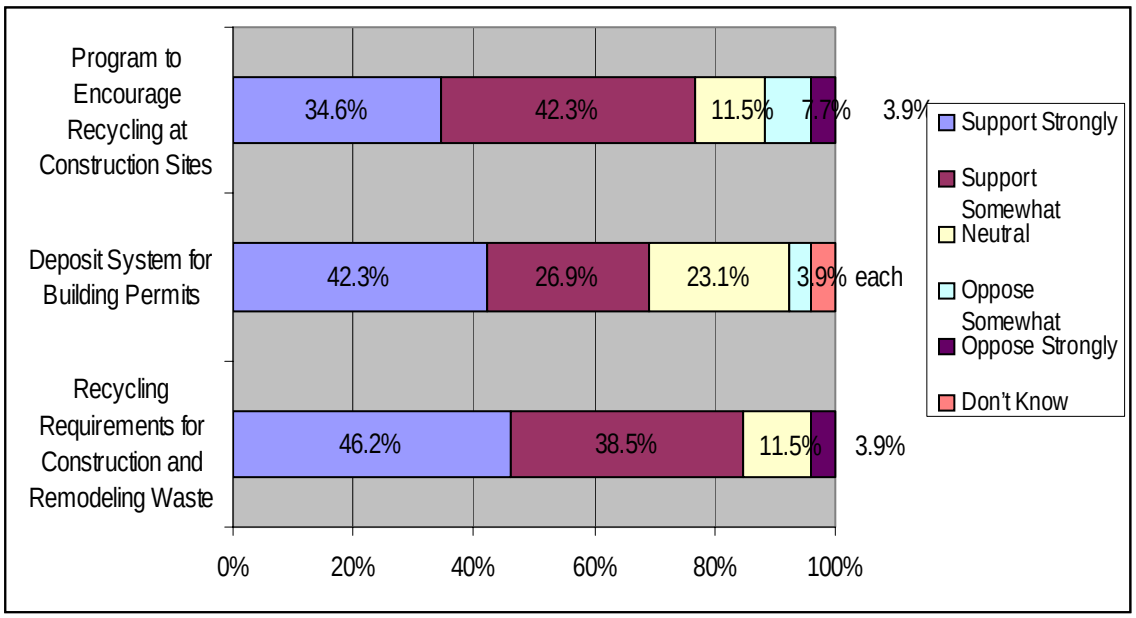
Figure 4-6: Commercial Support for Food Waste Programs



4.4.2 Construction and Demolition

The residential sector is in favor of requirements for recycling of construction and remodeling wastes: 34.6% were in strongly support of it, 42.3% were in somewhat support of it, 11.5% were neutral toward it, and the remainder either opposed it or did not know. The commercial sector also harbors support for construction and demolition programs.

Figure 4-7: Commercial Support for Construction & Demolition Programs



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4.4.3 General Recycling

According to the comment cards received from the public hearing process, all respondents are in favor of increasing recycling efforts. Some of the comment card respondents also wanted to possibly see some type of reward, recognition, or rebate for those who recycle a great deal.

The programs Fort Collins residents favored the most are, in descending order:

- Rebates for households that recycle a great deal
- More recycling drop-off centers
- Requirements for commercial and multi-family buildings to recycle
- Center for electronics and other hard-to-recycle materials with a small fee

The programs Fort Collins residents favored the least are, in descending order:

- Alternate recycling and yard waste collection
- Collect recycling every other week
- Extra landfill fee
- Ban on some recyclables

The programs Fort Collins commercial businesses favored the most are, in descending order:

- Encourage sharing recycling containers for neighboring small businesses
- Rebates for businesses that recycle a great deal
- Three months free recycling with year sign-up
- Center for electronic and other hard to recycle items with a small fee

The programs Fort Collins commercial businesses favored the least are, in descending order:

- Ban on yard waste at landfill
- Ban on some recyclables at landfill
- Require businesses to fill out and file a recycling plan

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Figure 4-8: Residential Support for General Recycling Programs

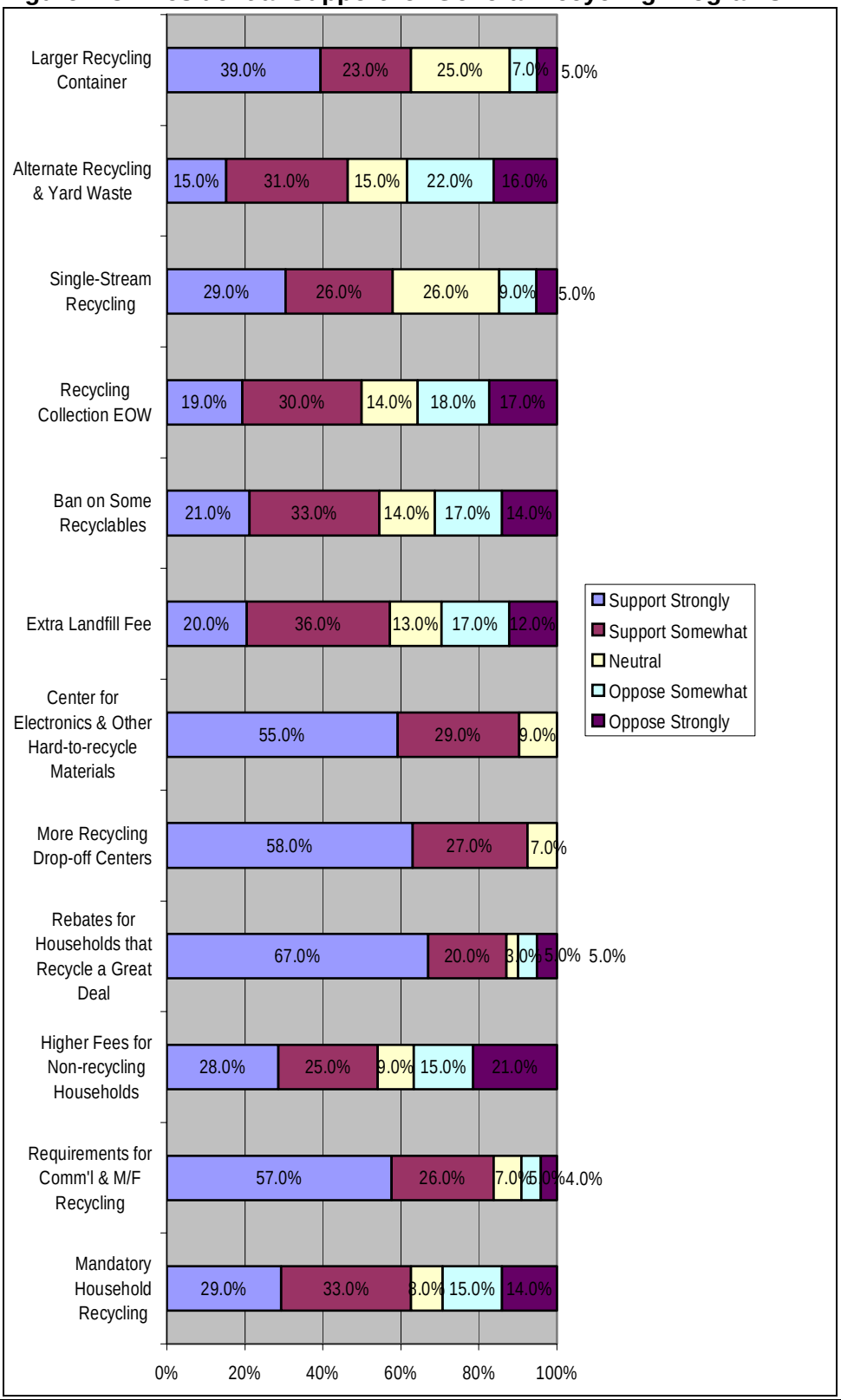

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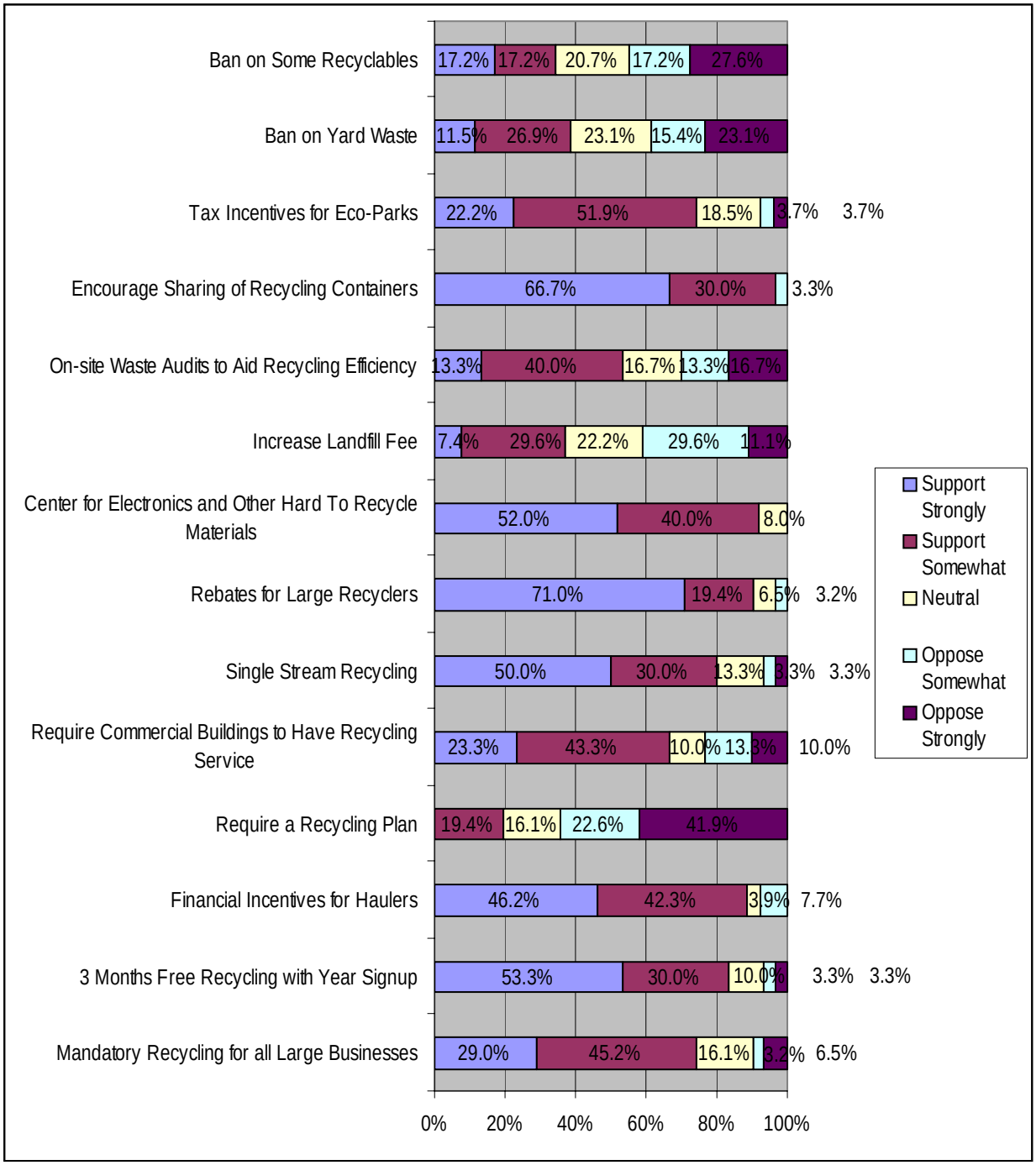
Figure 4-9: Commercial Support for General Recycling Programs



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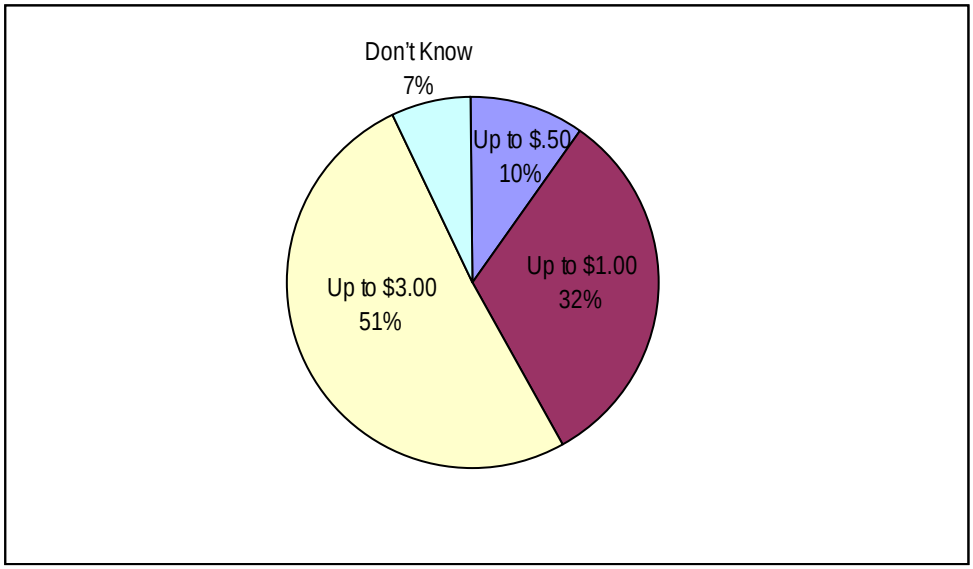
4.5 Willingness to Pay

In addition to their general reaction to programs (favorable and unfavorable), respondents to the residential, commercial, and comment card survey were asked about their willingness to pay extra for additional program opportunities. A few of the comment cards from the public hearing process stated that the respondents did not want to see their fees increased.

Conversely, residents of Fort Collins who responded to the telephone survey seem to show some price flexibility for increased services.

- A total of 82 percent of households believe that their current charges for garbage and recycling are reasonable, and 78 percent would be willing to pay "a bit more" to achieve the City's recycling goal.
- Half of respondents would pay three dollars more per month, while 93 percent would be willing to pay an additional 50 cents per month.

Figure 4-10: Residential Willingness to Pay per Month to Increase Recycling & Diversion
Responses are shares of the 78% of overall respondents that are willing to pay extra…



Commercial businesses in Fort Collins also seem to show some price flexibility for increased services.

- Of twenty-six business that responded to whether or not they would be willing to pay a bit more for services in order to reach the City's diversion rate goal, 88.5% said yes.
- At a 5% cost increase, 76.7% of the businesses responding that they were willing to pay something extra were willing to pay (68% overall); at a 15% cost increase, 58.6% (52% overall) of the businesses interviewed were willing to pay.
- Almost 14% (13.8% of respondents; 12% overall) were willing to pay 25% more in rates and fees, and another 3.5% of respondents (3.1% overall) were willing to pay more than 25% extra to fund additional recycling and diversion opportunities.

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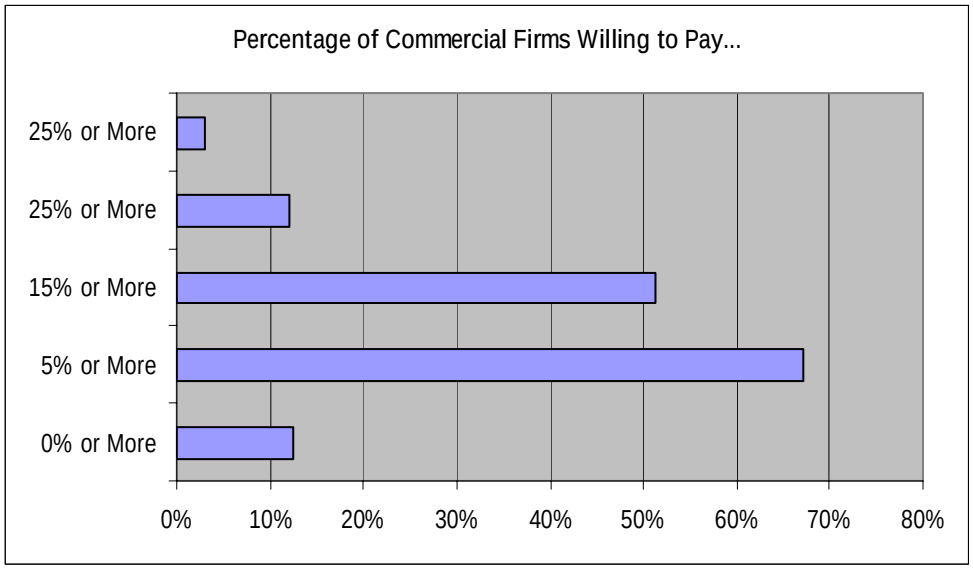
Figure 4-11: Commercial Willingness to Pay to Increase Recycling & Diversion



4.6 Summary and Implications

The residential and household feedback provided information that was useful in the work to design, prioritize, and analyze program concepts (described in the previous chapter). The feedback indicates residents are interested in:

- Yard waste options,
- Rewards or rebates for recycling,
- Additional drop-off recycling opportunities,
- Construction and demolition (C&D) program options, and
- Options for electronics and other hard-to-recycle materials.

More than three-quarters (78%) of households report they are willing to pay more for recycling. Over half of those willing to pay more, report they are willing to pay up to $3 more per month to help fund additional diversion opportunities, and 93% of the respondents would pay 50 cents per month. The survey respondents note they currently pay about $16 per month for garbage and recycling services. More than half are willing to pay $3 extra. Three dollars more per month would represent about 19% more than current costs. The overall average amount households are willing to pay can be estimated as $1.60/month.

Businesses were most interested in:

- Construction and demolition (C&D) options,
- Programs making it possible to share recycling containers (for smaller businesses or those without space),
- Rebates for recycling,
- Programs offering three months free for businesses signing up for one year of recycling, and
- Options for hard to recycle materials.

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The vast majority of businesses (88.5%) are also willing to pay more than current rates and fees to fund additional recycling and diversion opportunities. Three quarters of those willing to pay more would be willing to increase rates by 5%; almost 60% are willing to pay 15% more, and almost 14% are willing to pay 25% more. A few (4%) are willing to pay more than 25% extra. The responses from this survey indicate that the average business estimated they paid about $290 per month for service. This was a small sample, and the results ranged from small businesses that paid $14.50 per month to large businesses that paid about $2,000 per month. To provide a scale, this indicates that an additional fee of 15% (which more than half are willing to pay) would mean a willingness to pay about $44 per month extra for additional program opportunities.

The surveys explore many additional topics and issues. The large-sample residential household survey, in particular, provides a great wealth of data on recycling and solid waste behaviors, attitudes, needs, satisfaction, and cost information – which can be linked with demographic factors. The City can use these data now and in the future to explore additional program options, benchmark satisfaction and examine behaviors, and many other applications.

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5 FORT COLLINS DIVERSION PROGRAM OPTIONS ANALYSIS

5.1 Background and "Situation"

The analysis of the City of Fort Collins' "gap" between current diversion and the Council-adopted goal is about 26% -- the difference between the 50% diversion goal and current performance estimated as 24%. Using data from the City, from the landfill, and other sources, the analysis of the current diversion by the City is presented below. Clearly, target materials include:

- Paper, representing 25% of the (combined) remaining waste stream;
- Yard waste, comprising 22% of (combined) disposal; and
- Construction and demolition debris (C&D) which represents about 20% of (combined, mostly commercial) disposal

Other disposed materials include:

- Currently recyclable materials, representing about 6% of the waste stream.
- Note that food waste comprises about 15% overall disposal.

These represent the focus of the modeling efforts described in the remainder of the chapter.

Figure 5-1: Estimated Disposal in Fort Collins: Residential

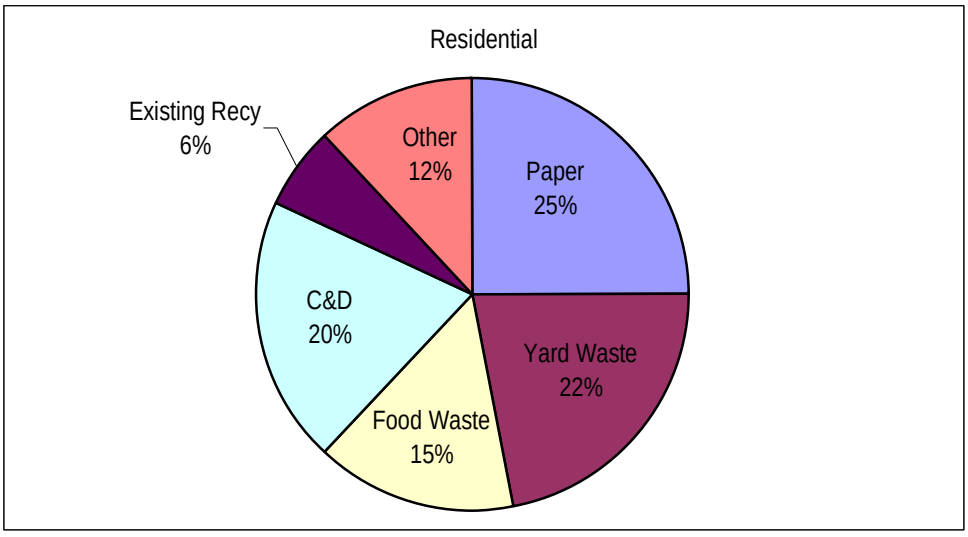

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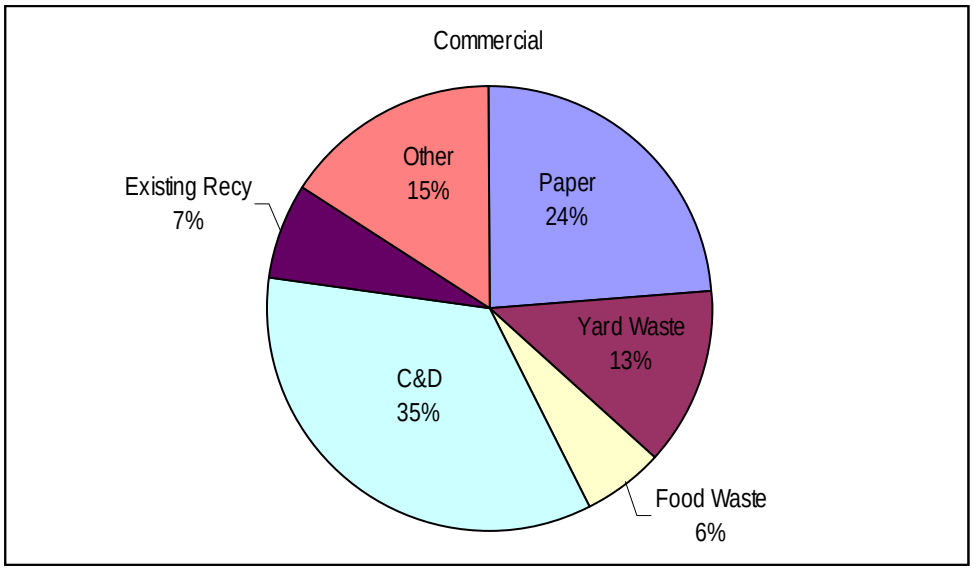
Figure 5-2: Estimated Disposal in Fort Collins: Commercial



5.2 Approach to the Development of Program Strategies

To assess which initiatives or programs may be most appropriate for helping the City reach its 50% diversion goal, SERA conducted a "gap" analysis to identify existing shortfalls in opportunities for recycling and reduction. SERA followed with development and analysis of a range of diversion strategies to construct "packages" of strategies that showed greatest promise for reaching 50% diversion cost-effectively. This work was conducted in several steps:

- SERA worked with the City to understand the programs that were already in place, seemed infeasible due to past analysis, had legal concerns, or led to other concerns or issues. SERA discussed current programs and services available to single-family residential,[26] multifamily residential, business, and institutional groups in town.
- SERA reviewed available programs and services for the City's main customer groups / sectors – to identify which groups had many diversion opportunities and where there were gaps. Based on the gap analysis, SERA worked to identify a set of cost-effective strategies (incentives, policies, etc.) – not just programs – that will help the City continue progress toward its 50% diversion goal. SERA reviewed strategies that had been implemented or proposed in other cities around the US or internationally. After initial review, SERA provided a list of option "concepts" for review and "voting" by City and the Steering Committee. This input was considered in the program / strategy development process.
- SERA constructed an Excel® spreadsheet model that would support estimation of the diversion and costs of candidate strategy concepts. The model initially addressed diversion and City costs. After discussion with the Steering Committee, it was agreed SERA would add capabilities to the model (and the extensive associated primary research) to add a consideration of "user" costs as well. SERA designed these costs to

[26]SERA specifically looked at options for low income customers as well – sometimes programs are available but are too expensive for practical participation by disadvantaged households.

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reflect either household or business costs; hauler or other intermediate costs were not considered because we assumed all costs would ultimately be passed on to the user.

- SERA analyzed several sources of information to estimate the approximate diversion, City cost, and user cost associated with the diversion strategy. The primary data source was information from:
    - SERA's in-house database of information on residential and commercial programs and initiatives;
    - Review of reports and program planning documents regionally and across the nation; and
    - Interviews with cities and knowledgeable professionals regionally and across the nation.
- SERA modeled the draft strategies and constructed several "packages" of programs and initiatives. Feedback from the draft findings of the residential survey was considered in the development of the draft scenarios. Three packages were initially constructed, and reviewed with the City, the Steering Committee, and at the public open house.
- Feedback was reviewed, and revised packages were developed as recommendations to the City.

5.2.1 Leveraging by Diversifying Programs and Responsibilities

As Fort Collins examines options for moving diversion forward, there are several points that are important in considering options and designing / selecting program concepts.[27]

- **Beyond residential, but tougher:** To date, the City had focused largely on residential programs and incentives, and the largest gains have been achieved on this front. Therefore, the largest remaining potential is likely to be achieved by shifting the focus to other programs, and addressing other generators, actors, and sectors. They represent large shares of the MSW stream. However, progress in these groups is more difficult because of:
    - Lower level of responsibility / control by City,
    - Less homogeneity, so programs may need more "tailoring" and aren't "one size fits all", and
    - Actors have financial stake as well as responsibility.

- **Beyond recycling to SR/WP:** One important key to making inroads in recycling is to avoid focusing totally on recycling, or recycling and yard waste, but to encourage source reduction (SR) or waste prevention (WP) / minimization through a variety of strategies and incentives. We need to think *beyond* recycling.

Most cities concentrate on expanding residential curbside opportunities as a focus of their program efforts. They may also consider several commercial options. However, it is critical to take a very diversified approach to designing diversion packages if the strategy is to be successful.

[27] See "Moving Beyond Curbside: Incentives and Strategies to Energize Commercial, Multifamily, Business, and Residential Recycling", Skumatz and Green, by Skumatz Economic Research Associates, SERA Research Paper 00-12, 9/2000, updated; Superior, CO; highlights also in Skumatz, *Resource Recycling*, 2000. Attribution/citation requested if used.

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This means diversifying program approaches. It is important to not just develop "programs", but to also identify creative incentives, regulatory options, and other strategies that can encourage and provide an improved climate for diversion.

- **Diversify strategies to succeed:** A *crucial* component is to avoid leaning on any one or two actors for responsibility in recycling, and to spread the responsibility and burden across all of the actors. This strategy helps assure:
    - **Efficient and Lower cost:** The greatest gains can be achieved at lower overall cost – getting 100% from any sector is likely to be more expensive and difficult than getting 25% from each of a variety of sources.
    - **Include options that are not City responsibility:** Diversifying can also result in lower cost (to City) because the City is not responsible for all costs.
    - **Risk avoidance:** Recycling gains will not be completely undermined if progress in one sector is eliminated through mergers, court rulings, or other changes.
    - **Participation / cooperation:** Spreading the responsibility helps get greater participation and cooperation from each of the sets of actors because all of the responsible parties can feel they are only affected partially, there is a level playing field for all similar actors, and because responsibility is shared more equitably among all the actors.
    - **Leveraging:** Bits of progress in several sectors can compound into significant progress overall. In addition, as one sector /actor changes practices to make progress, it may make it easier for other sectors / actors as well.

- **Multiple actors:** Diversifying the responsibility for recycling to multiple agents or actors is critical to getting cooperation. Cooperation is improved if one actor does not feel like they are carrying a disproportionate share of the responsibility (and cost / burden) for recycling.
    - By spreading the responsibility to a number of entities, the City is provided several advantages:
        - Greater chance of achieving goals – and lower risk should circumstances (e.g., an unfavorable court ruling or a buyout) affect one key actor or set of actors.
        - Greater leveraging of recycling / program impacts.
        - Continuing progress and evolution in several sectors.
        - Diversification in case a program is not as successful as hoped.
        - Greater cooperation if responsibility is shared – balance and "buy-in."
        - Greater efficiencies and lower "social cost" of achieving the recycling / diversion goals.[28]

- **Diversify actors affected:** Diversify (responsibility for) strategies to multiple actors / sectors with roles in generation or management of solid waste. This includes several key groups:
    - Generators, including:
        - Developers and builders,
        - Commercial and multifamily buildings and generators,
        - Residential recycling.
    - Haulers,

[28] As a simple (extreme) example, trying to reach 50% recycling from only the residential sector would require 100% recycling of the 50% of MSW generated by residents, which would be much more expensive (and high risk) than getting some from each of several actors.

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- Facility owners / disposal sites,
- Recycling businesses and charities, and
- City and counties.

SERA examined and considered for Fort Collins a variety of programs, incentives, and options for increasing diversion from actors including:

- Builders and developers, to avoid lost opportunities in the near and longer term;
- Commercial and multifamily generators, through improved rates, lower barriers, better access, and other strategies;
- Residential generators, through efficiencies, conveniences, and incentives;
- Haulers, to help provide better access to programs, better incentives and cost-effectiveness, help level playing fields, and help align their goals to the City's;
- Facilities, to provide an environment for improved infrastructure and focus on diversion;
- Recycling businesses, to reduce barriers and close the loop; and
- City/county through work on codes and becoming leaders in "walking the talk."

After identifying a wide variety of potentially feasible options, SERA discussed these in a meeting with the City and Steering Committee so that a better sense of unknown barriers or issues could be identified up front. We discussed the types of considerations that would be used to "select down" the list – including filling service gaps, diversification, target materials, diversion, costs, and other factors. After discussion, updated modeling, and additional feedback, SERA reduced the list to the final subset and developed preferred packages and alternatives. The steps to develop priority programs and "packages" of recommended programs are discussed in more detail in the following sections.

5.2.2 Obtaining Feedback on Strategies

To support the City's interest in having feedback from the public and interested parties on the strategies, SERA worked with the City to design several feedback opportunities:

- Discuss strategies with Steering Committee. This stakeholder group included local haulers, facility owners, and non-profit or other recycling businesses, among others.
- Incorporate questions into the residential phone survey work. In addition to feedback on proposed program concepts, the surveys addressed current practices, awareness of program options and recyclable materials, biggest materials still being disposed, "problem" materials, needs / interest / preferences in recycling options, barriers, and decision-making.
- Incorporate questions into the commercial phone survey work. In addition to feedback on proposed program concepts, the surveys addressed current practices, awareness of program options and recyclable materials, biggest materials still being disposed, "problem" materials, needs / interest / preferences in recycling options, barriers, and decision-making.
- SERA prepared presentations and display materials for the public open house organized by InterMountain Corporate Affairs. This session was organized to allow feedback individually, via comment cards, and as part of the main presentation.
- Review previous surveys of haulers and large entities in Fort Collins (previous SERA project with the City) on services available and tonnages.

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5.2.3 Program Options Development / Modeling

SERA developed two models for the City to be used for planning purposes. One is a simplified model that provides the greatest flexibility and ease of use for City staff. This model – the "Waste Diversion Planning Model" -- has the following capabilities:

- Models 60 programs and strategies, and allows for construction of up to 10 program packages through easy "selection" by the City;
- Provides estimated diversion rate for the program, and allows the user to modify these estimates;
- Estimates City and User costs for the program, and allows the user to modify these estimates to examine sensitivity of the results to these assumptions; and
- Automatically updates summary materials to present.

In addition, SERA modified its proprietary Waste Diversion Assessment Model (WDAM) for the City.[29] This Excel® based solid waste program analysis spreadsheet provides separate sheets for the following computations:

- Forecasts of tonnage by sector for 20 years – sectors include SF residential, multifamily, commercial, institutional, and self-haul.[30] Forecasts of diversion for current programs are also included on this sheet. Forecasts[31] were tailored based on Fort Collins data.[32]
- Waste composition by sector – based on City data, or using default data from other locations.
- Program planning module – allowing the user to design up to 25 programs or incentives. For each program, the user selects the sector and materials affected, the timing of implementation (and the speed to full-scale), the "capture" of the materials, and cost information. SERA used information from its field data on hundreds of programs nationwide to input reasonable and defensible impact and cost data into the program-planning module to develop "packages".
- Scenario settings page – which allows the user to select "in or out" specific programs, select high or low economic conditions, modify costs, modify growth assumptions, and many other factors underlying the modeling work. SERA worked with the City to assure that the model incorporated key "settings" that the City requires for its current and future modeling efforts.
- Summary page reporting tonnages disposed by sector, disposal material, and diversion levels for current and "new" programs, costs, and budget needs.

SERA used the Diversion Planning Model to construct "packages" that move the City toward its diversion goal. The programs were selected based on an assessment of:

- High diversion;
- Limited cost / rate shock to customer groups;

[29] And provided the City with a license for use by City employees.
[30] For some clients, construction and demolition (C&D) material has been measured separately.
[31] Due to significant budget constraints, we worked with the City to identify a simplified method for "trending" the tonnage – rather than constructing detailed econometric forecasts.
[32] Although where time series data are not sufficient to support new modeling, default equations from other communities can be used.

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- Low (City) cost;
- Diversifying responsibility/sectors;
- Avoiding lost opportunities;
- Success in other jurisdictions;
- Addressing target / high priority materials; and
- Other factors.

In consultation with the City, SERA constructed three initial "packages". They were discussed with the City and Steering Committee, and presented as part of the public process. SERA developed simplified graphics and tables and other supporting materials suitable for the public involvement process and conducted additional analyses needed to respond to questions or comments from the public and stakeholders. During the public meeting, SERA staff summarized the method and results on options / packages, and answered questions. Feedback from the residential and commercial surveys, from the public open house, from City staff and the Steering Committee, and other data were considered in developing the recommended program packages. These programs and packages are described in the following section.

5.3 Program Modeling

There were several steps to developing the final program recommendations. SERA developed a list of several dozen program concepts or areas that might be suitable in Fort Collins. This list was discussed with the Steering Committee, and City staff and members of the Steering Committee were asked to provide feedback on:

- Suitable programs for Fort Collins on a 1-3 scale (1=low, 3=high). Those scoring a "2" or higher, on average, are presented below. The average score for City staff (2 voters) is also presented separately. Those programs that rated lower than a "2" on average but a 2.5 or higher by City staff are also included in the table.
- Programs that were not suitable – and may be illegal, already being implemented, or otherwise "off the table." These are designated in the "not suitable" column. The types of programs that Steering Committee members or others noted in this column related to rate and rebate incentives, space for recycling, and a few others.

The list of those program concepts that received the most votes from the review by City staff and the Steering Committee is provided in Table 5-1.

Table 5-1: List of Highest Ranked Program Concepts by Steering Committee

Strategy / Concept	AVERAGE	Avg City	Not Suitable
PAYT / Variable Rates (R1)	3.00	3.00	0.00
Recycling Program Efficiency Improvements (R2)	2.82	3.00	0.00
Material Disposal Bans (R3)	2.64	3.00	0.00
Material Disposal Bans (F7)	2.60	3.00	0.00
Provide contract incentives or preferences for C&D jobs using preferable practices (D7)	2.55	3.00	0.00
Material Disposal Bans (C16)	2.55	3.00	0.00

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Strategy / Concept	AVERAGE	Avg City	Not Suitable
Tax benefits or other financing for recycling parks, infra-structure (B10) (B9)	2.50	3.00	0.00
C&D program	2.50	3.00	0.00
Rate Incentives for Recycling (C2)	2.45	3.00	1.00
Education, and traditional approaches (R4)	2.45	3.00	0.00
Encourage recycling cooperatives (C10)	2.40	3.00	0.00
Traditional Market Development (B5)	2.40	2.50	0.00
Organics program	2.40	3.00	0.00
C&D Deposit Incentive (D1)	2.36	2.00	0.00
Require space for recycling (D3)	2.36	3.00	1.00
Goal-dependent grants (C1)	2.33	2.00	0.00
Add small businesses to curbside recycling (C13)	2.30	2.50	0.00
Specific market development assistance (B4)	2.30	2.50	0.00
Disposal surcharge to adjust economics (C2)	2.30	2.50	0.00
Provide Lower permit fees for C&D companies or jobs if use certain practices (D6)	2.27	2.50	1.00
Discounted or free shipping of materials to market (B2)	2.22	3.00	1.00
Rate Incentives for Efficiency (C1)	2.20	2.50	1.00
Contract incentives to meet recycling goals (H6)	2.20	1.50	0.00
Grants dependent on meeting goals (H7)	2.20	2.50	0.00
Financial incentives to meet recycling goal (H1)	2.18	3.00	0.00
Rebate incentives	2.11	2.50	1.00
Developer Incentives (D2)	2.09	2.50	0.00
Traditional approaches and efforts to address individual barriers (C17)	2.00	2.00	0.00
Standard disposal surcharges (F1)	2.00	2.50	0.00
Increase environmental standards for landfills (C3)	1.90	2.50	2.00
Multi-resource audits (C5)	1.80	3.00	0.00
Require haulers to meet recycling / diversion goals (H8)	1.80	2.50	0.00
Require areas for recycling or require recycling service on-site (F4)	1.80	2.50	2.00
Provide land and act as landlord for Recycling Parks (B8)	1.80	3.00	2.00
Require leases with recycling clauses (C7)	1.60	2.50	1.00

These programs were considered when SERA conducted the modeling work. The expanded list of programs modeled is provided in Table 5-2. Each of the 50 general program "concepts" is described briefly in the table. The columns at the right denote the approximate ranges for diversion, City cost per ton, and user cost per ton.

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SERA used data from its in-house models, augmented by literature review, modeling work, and detailed interviews locally, regionally, and around the country to develop estimates of the likely values for each of these key indicators of program performance. The key to translate these ranges into dollars is provided in Table 5-3.

Table 5-2: Programs Modeled for Fort Collins

ID	*"Conceptual" Program Idea*	*Diversion, Cost calc info*	*Diversion Range*	*City$/ton Range*	*User$/ton Range*	*Estimated NEW / Add'l Diversion Percent*
1	Res- Weekly single stream recycling	3-4% of residential; savings in collection	Lo	VL	VL	0.4%
2	Res-Drop-off yard waste program / encourage use of facility with City subsidizing half of fee for residential; commercial users receive no discount	25% of res Yard Waste (none comm'l) (Com'l can use at full fare); 1/2 cost to City, half to user	Med	Lo	Lo	1.1%
3	Res- Curbside yard waste collection weekly, optional sign-up	30% signup, 80% capture; additional cost / participating household	Med	VL	VH	1.0%
4	Res - Curbside Yard waste coll'n mandatory	75% capture, additional cost for all households	Hi	VL	VH	3.2%
5	Res- Curbside Yard waste coll'n with food waste, weekly - optional sign-up	30% sign-up, 80% capture; add 1-3% for yard waste; additional cost/participating household	Med	VL	VH	1.1%
6	Res-Curbside Yard waste and food waste weekly, mandatory / cost embedded	75% Yard Waste capture, plus 1-3% more for food waste, additional cost for all hh's	Med	VL	VH	1.3%
7	Res - Curbside Yard waste and Single stream recycling Alternate Weeks, services provided for all residents, rates embedded; Yard waste collection 6 months per year	75% capture of Yard waste, plus additional 2-4% for Single stream, reduce 1-3% for alternate weeks; small additional cost for all hh's	Hi	VL	Lo	3.3%
8	Res- Contract with 1 hauler city wide - reduces cost per ton for other recycling programs	Assumed savings from coll'n may be used to make additional recycling feasible	VL	N/A	N/A	0.0%
9	Res - Enhanced education push 1st year	3% of residential stream; cost to city to implement	Lo	Med	VL	0.6%
10	Com'l - Commercial food waste for largest candidate firms	1-2% diversion overall; small share of businesses participate; net cost added for participants	Lo	VL	Lo	1.0%
11	Com'l - Hauler financial benefit for achieving 25% from comm'l customers; increased fee for those haulers NOT reaching goal; city cost to administer	25% comm'l from about 20% of sector, net costs added for participants	Hi	VL	Hi	2.2%
12	Com'l - 3 months recycling free to business / City funding	Pull about 33% from small number of businesses; net	VL	Med	Med	0.1%

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ID	"Conceptual" Program Idea	Diversion, Cost calc info	Diversion Range	City$/ton Range	User$/ton Range	Estimated NEW / Add'l Diversion Percent
		costs added for participants				
13	Com'l - Technical assistance / waste audits; takes several years to ramp up	Recovers about 2% comm'l; cost for audits about $50/ton; assume businesses save 50% as much	Lo	Hi	VL	0.9%
14	Com'l - Require recycling fee embedded in rates - recycling paid for by all	Recovers 20% comm'l stream; costs about 15% more than gbg service alone; all businesses pay net increased costs	VH	VL	Hi	8.8%
15	Com'l - Recycling container mandatory for businesses with more than 10 cu yd disposal weekly	Recovers 33% from participating businesses; 15% of businesses eligible / pay	Hi	VL	Lo	2.9%
16	Com'l - Recycling mandatory for all businesses	Recovers 33% from about 1/2 of businesses; all businesses eligible / pay	VH	VL	Hi	7.3%
17	Com'l - Recycling plans required of all businesses	Recover about 1-2% of commercial; 10% implement programs. Costs include net recycling costs (for some) plus preparation costs (for all)	Lo	Lo	VH	0.7%
18	Com'l - Single stream "push" for smaller / non-recycling businesses; no change to current recyclers to maintain stream quality	Recover about 1-3% of comm'l, 2-4% of businesses participate; net costs added for participants	Lo	VL	Lo	0.9%
19	Com'l - Drop-off for clean yard waste, not discounted	Tons diverted currently; landscapers bring to drop-off (embedded in Res YW drop-off program)	VL	N/A	N/A	0.0%
20	Com'l - Recycling cooperatives / share recycling coll'n for small businesses	About 20% new recycling from about 1-3% of businesses; participants pay net increase for recycling	VL	Hi	VL	0.1%
21	Com'l - Service standards for recycling, other - (priority options modeled elsewhere)	Priority options modeled elsewhere	VL	N/A	N/A	0.0%
22	C&D (construction & demolition) - Deposit system for threshold "jobs" (exclude 1/3 for smallest jobs and "roofing only" jobs) Infrastructure needed, but program will help assure stream.	Refundable deposit varies by job (about $400 average per San Jose); about 2800 permits/yr; assume 1/3 efficiency; processing cost included	Hi	VL	Med	4.4%
23	C&D (construction & demolition)- Contract preferences for City jobs	Minimal tons; minimal cost -- important to "walk the talk"	VL	VH	VL	0.0%

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ID	"Conceptual" Program Idea	Diversion, Cost calc info	Diversion Range	City$/ton Range	User$/ton Range	Estimated NEW / Add'l Diversion Percent
24	C&D (construction & demolition)- Require pre-processing of loads / separation before landfilling	Assume 35% capture; city enforcement; processing cost included	VH	VL	Med	6.9%
25	C&D (construction & demolition)- Drop-off / wood waste site	Assume captures 10% of C&D; small processing fee included	Med	VL	Lo	2.0%
26	C&D (construction & demolition) - Hauler incentives to "prospect" for C&D	Assume captures 10% of C&D; processing fee included / city pays half and participant pays half	Med	Med	Lo	2.0%
27	C&D (construction & demolition)- Developer preferences for "green buildings / practices" - not currently modeled	Not currently modeled	VL	N/A	N/A	0.0%
28	Ban C&D (construction & demolition) from landfill - periodic load inspections	Assume 40% capture, load inspections; reduced processing cost because econ of scale, level playing field	VH	VL	Med	7.9%
29	Ban Recyclables from landfill - periodic load inspections	Assume gain 25% of commercial recycling avail; additional costs for keeping loads clean included	Lo	Lo	Hi	0.8%
30	Ban Electronics/computers from landfill (e-scrap)	Assume 0.5-1% overall; assume high cost per ton for diversion	Lo	Lo	VH	0.5%
31	Ban Yard waste from disposal	Assume gain 50% of available tons from all; processing costs attached	VH	VL	Med	5.0%
32	Res - Enhanced "Pay as you throw" (PAYT) residential garbage rate incentive	Gain 1-2 percentage points from residential; minimal to zero additional cost	VL	VL	Med	0.2%
33	Res - Larger recycling containers required as service standard; would already be captured if single stream selected.	Add 1-2 percent; add some cost for set up, containers, or similar	VL	VL	VH	0.2%
34	Res - Rebate for recycling - not modeled / not recommended by cities that used it	Not modeled / not recommended by cities that used to use it	VL	N/A	N/A	0.0%
35	Policy - Grants for infrastructure - Not modeled	Difficult to attribute specific tons; Work with city	VL	N/A	N/A	0.0%
36	Policy - Market development or packaging initiatives - best at national or state level	Few tons - best at national or state level	VL	N/A	N/A	0.0%
37	Com'l - Grants / Technical assistance for waste prevention	Recovers about 0-2% comm'l; cost for audits about $100/ton; assume businesses save 50% as much	Lo	VH	VL	0.4%

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ID	"Conceptual" Program Idea	Diversion, Cost calc info	Diversion Range	City$/ton Range	User$/ton Range	Estimated NEW / Add'l Diversion Percent
38	Com'l - Increase commercial garbage rates / incentive - not modeled - authority?	Difficult to model / authority?	VL	N/A	N/A	0.0%
39	Policy - Landfill surcharge - share of revenues to City to fund programs -- concern about competitive disadvantage to landfill	Assume $1/ton increase, divert 2-3% for incentive; half revenue to City	Med	VL	Hi	1.6%
40	Policy - Incentives / planning for eco parks	No assignable tons; fund of $50K/year	VL	N/A	N/A	0.0%
41	MF (multifamily)- Single stream "push" for MF - make mandatory / include volunteers at complexes	Assume picks up 2-4% from stream (min); costs little; city education / technical assistance	VL	Med	VL	0.2%
42	MF(multifamily) - Hauler incentives for MF recycling - adding complexes; assume those not doing pay more	Assume picks up 3-5% from stream; city financial incentive provided	VL	Med	VL	0.3%
43	MF (multifamily) - Volunteer program/ recruitment for residents of MF bldgs that will help encourage recycling, help reduce contamination/garbage in recycling containers	2-3% of MF tons; city costs for coordination, volunteers, so no cost to bldg	VL	Lo	VL	0.2%
44	SF/MF - Private drop-off paper recycling partnership	Gain 2-4% res recycling beyond curbside; works with schools / churches - target paper	Lo	VL	VL	0.6%
45	Policy - City Procurement guidelines and/or incentives for recycled content	Gain a little; "walk the talk"; incorporates part of staff person to improve procurement guidelines, bidder lists	Lo	Lo	VL	0.6%
46	Policy - Strengthen City Department recycling program; emphasize source reduction;	Add 20% to current recycling; staff time to conduct Climatewise audits on half muni bldgs	VL	VL	VL	0.0%
47	Policy - Incentive rates at Landfill -- cheaper for separated yard waste, recyclables, other	Not modeled	VL	N/A	N/A	0.0%
48	Res - Backyard composting program; already implemented in City	Gain 1-2 percentage points of res yard waste stream; training program; already in place in City	VL	Hi	VL	0.1%
49	Creation of City trash utility		VL	N/A	N/A	0.0%
50	Creation of City "environmental fee"	Assume money from fees used to make add'l recycling opportunities available	Med	N/A	N/A	N/A

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The amount of diversion and cost ranges for the 50 individual strategies are classified into five groupings and detailed in Table 5-3.

Table 5-3: Key for Ranges for Diversion, City, and User Costs

Value		NEW / Add'l Diversion	City $/ton	User$/ton
VL	up to =>	0.3%	$1	$1
Lo	up to =>	1.0%	$10	$20
Med	up to =>	2.0%	$30	$40
Hi	up to =>	4.9%	$75	$100
VH	or above	5.0%	$76	$101
N/A		0%	$0	$0

5.3.1 Diversion Options Modeled for Fort Collins

The model developed for Fort Collins allowed for testing the performance of various programs, and for combining the programs into "packages" that achieved several objectives:

- Helped significantly augment diversion, with a goal of achieving 50% diversion (or about 26% new diversion),
- Addressed key waste streams,
- Diversified the program responsibility to several "actors" or stakeholders involved in generating or managing solid waste, and
- Achieved high diversion with relatively low costs to the City and users.

Of course, programs that were less troublesome to implement (politically or practically) were also considered to be desirable.

Initial modeling work developed three program options, which were displayed and discussed in the public open house. These are included as Packages 1, 2, and 3 in Table 5-4. They were roughly characterized as "low diversion", "medium diversion", and "high diversion". These packages were presented and discussed in the open house. The general feedback from the open house (see Chapter 4) was that citizens were willing to see packages that were "more aggressive" regarding diversion. In addition, the consumer and commercial surveys (also see Chapters 4) were favorable toward residential yard waste options, enhanced recycling, rate incentives, construction and demolition, and other programs. Both surveys also indicated that households and businesses in Fort Collins supported the City's 50% recycling goal and were willing to pay more to support these types of program initiatives to help achieve that goal.

A second round of program and "package" modeling was undertaken. The package design objectives listed above could be achieved through several methods:

- Constructing a "score", weighting program performance in all three performance metrics[33]. When weighted equally (and for fairly broad ranges of weights), the top performing programs could be identified. Selecting these programs (after weeding out programs that overlapped,

[33] Diversion, city cost, and user cost.

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addressing the same waste stream), resulted in the "highest score" program package (see Package 4);
- Including lowest cost programs (see Packages 5, 6, and 7, designed to avoid overlaps);
- Including highest diversion programs (see Packages 8, designed to avoid overlaps);
- Including components of high diversion and low cost (see Packages 9, and 10, designed to avoid overlaps).

The results of all this modeling work are presented in Table 5-4. A "1" listed in the open cell indicates that the program is included in the "package".[34] The models' results are summarized at the top of the Table. The summary includes total diversion, total cost per ton for the City and users, total budget needs for the City, and the "score" for the overall package. Assuming even weights for the diversion the program provides, the cost per ton for the City and the cost per ton for the users, the "score" row is calculated by assigning a 1 for "very low" up to a 5 for "very high" for each individual program and then adding all programs in a package together. Higher numbers would denote better performance. Note that this may be balanced against considerations related to cost, as well as to the total number of programs comprising the package. Greater numbers of programs indicate greater complexity, and potentially greater numbers of staff needed to implement and manage these program initiatives.

The overall modeling information for the 10 packages is included in Table 5-4, which also provides information on the estimated diversion, and cost ranges for each of the 60 programs or strategies considered as part of the project. Diversion estimates are provided; the cost information is presented in one of five ranges from very high to very low.[35]

[34] A value less than one indicates there is overlap with another program, and therefore only a portion of the program's diversion and costs are included in the package.

[35] The values and levels for City costs and User costs were estimated based on detailed analysis of SERA in-house data, interviews, and review of reports.

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Table 5-4: Results from Modeling for 10 Program Packages for Fort Collins

	SUMMARY RESULTS FOR	PKG1	PKG2	PKG3	Pkg 4	Pkg 5	Pkg 6	Pkg 7	Pkg 8	Pkg 9	Pkg 10
	DRAFT PROGRAM PACKAGES	Original - Low Div	Original - Med Div	Original - Hi Div	HiScore	Low/VL cost (1&2,not 4) less overlap	Low/Med cost less overlap 24,28,31, (7 not 1&2)	Low/Med Cost Hi Div+bans	Hi and VH diversion exc. 16,24,28, 31	Hi and VH div + a few lower cost items	VH Div + add'l pgms, no bans
	Number of programs included	11	10	17	13	10	16	20.9	4	11	19
	Pct diverted estimate – NEW/add'l (baseline 24%; goal 50%)	10%	14%	27%	34%	10%	19%	27%	13%	18%	21%
	New Tons diverted estimate (thousands)	36.3	53.3	100.5	128.4	36.0	71.4	100.0	47.7	65.8	79.8
	City cost/ton estimate - New Net costs	$8	$6	$4	$1	$2	$4	$5	$1	$1	$6
	User cost/ton estimate - New Net costs	$6	$10	$24	$27	$6	$9	$16	$20	$15	$14
	City cost estimate (thousands) - New Net Costs	$274	$295	$355	$116	$64	$283	$494	$24	$95	$494
	Total Score - weighted diversion, city cost, and user costs	38	37	62	53	35	57	76	18	42	68
1	Res- Weekly single stream recycling	1.0				1.0					
2	Res-Drop-off yard waste program / encourage use of facility with City subsidizing half of fee for residential; commercial users receive no discount	1.0		1.0	1.0	1.0					
3	Res- Curbside yard waste collection weekly, optional sign-up										
4	Res - Curbside Yard waste coll'n mandatory										
5	Res- Curbside Yard waste coll'n with food waste, weekly - optional sign-up										
6	Res-Curbside Yard waste and food waste weekly, mandatory / cost embedded										
7	Res - Curbside Yard waste and Single stream recycling Alternate Weeks, services provided for all residents, rates embedded; Yard waste collection 6 months/yr		1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0
8	Res- Contract with 1 hauler city wide - reduces cost per ton for other recycling programs										
9	Res - Enhanced education push 1st year	1.0	1.0	1.0			1.0	1.0		1.0	1.0
10	Com'l - Commercial food waste for largest candidate firms		1.0	1.0	1.0	1.0	1.0	1.0			

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	SUMMARY RESULTS FOR DRAFT PROGRAM PACKAGES	PKG1 Original - Low Div	PKG2 Original - Med Div	PKG3 Original - Hi Div	Pkg 4 HiScore	Pkg 5 Low/VL cost (1&2,not 4) less overlap	Pkg 6 Low/Med cost less overlap 24,28,31, (7 not 1&2)	Pkg 7 Low/Med Cost Hi Div+bans	Pkg 8 Hi and VH diversion exc. 16,24,28, 31	Pkg 9 Hi and VH div + a few lower cost items	Pkg 10 VH Div + add'l pgms, no bans
11	Com'l - Hauler financial benefit for achieving 25% from com'l customers; increased fee for those haulers NOT reaching goal; city cost to administer				1.0			1.0	1.0	1.0	1.0
12	Com'l - 3 months recycling free to business / City funding	1.0	1.0	1.0			1.0	1.0			1.0
13	Com'l - Technical assistance / waste audits; takes several years to ramp up	1.0	1.0	1.0				1.0			1.0
14	Com'l - Require recycling fee embedded in rates - recycling paid for by all			1.0	1.0						
15	Com'l - Recycling container mandatory for businesses with more than 10 cu yd disposal weekly	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
16	Com'l - Recycling mandatory for all businesses										
17	Com'l - Recycling plans required of all businesses										
18	Com'l - Single stream "push" for smaller / non-recycling businesses; no change to current recyclers to maintain stream quality	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0
19	Com'l - Drop-off for clean yard waste, not discounted										
20	Com'l - Recycling cooperatives / share recycling coll'n for small businesses		1.0	1.0							1.0
21	Com'l - Service standards for recycling, other - (priority options modeled elsewhere)							1.0			
22	C&D (construction & demolition)- Deposit system for threshold "jobs" (exclude 1/3 for smallest jobs and "roofing only" jobs) Infrastructure needed, but program will help assure stream.		1.0	1.0			1.0	1.0	1.0	1.0	1.0
23	C&D - Contract preferences for City jobs			1.0	1.0						
24	C&D - Require pre-processing of loads / separation before landfilling				1.0						
25	C&D - Dropoff / woodwaste site	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0
26	C&D - Hauler incentives to "prospect" for C&D						1.0	1.0			1.0

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	SUMMARY RESULTS FOR DRAFT PROGRAM PACKAGES	PKG1 Original - Low Div	PKG2 Original - Med Div	PKG3 Original - Hi Div	Pkg 4 HiScore	Pkg 5 Low/VL cost (1&2,not 4) less overlap	Pkg 6 Low/Med cost less overlap 24,28,31, (7 not 1&2)	Pkg 7 Low/Med Cost Hi Div+bans	Pkg 8 Hi and VH diversion exc. 16,24,28, 31	Pkg 9 Hi and VH div + a few lower cost items	Pkg 10 VH Div + add'l pgms, no bans
27	C&D - Developer preferences for "green buildings / practices" - not currently modeled										
28	Ban C&D - periodic load inspections							0.3			
29	Ban Recyclables from landfill - periodic load inspections							0.3			
30	Ban Electronics/computers from landfill (e-scrap)							1.0			
31	Ban Yard waste from disposal				1.0			0.3			
32	Res - Enhanced "Pay as you throw" (PAYT) residential garbage rate incentive	1.0		1.0			1.0	1.0			1.0
33	Res - Larger recycling containers required as service standard; would already be captured if single stream selected.										
34	Res - Rebate for recycling - not modeled / not recommended by cities that used it										
35	Policy - Grants for infrastructure - Not modeled										
36	Policy - Market development or packaging initiatives - best at national or state level										
37	Com'l - Grants / Technical assistance for waste prevention										
38	Com'l - Increase commercial garbage rates / incentive - not modeled - authority?										
39	Policy - Landfill surcharge - share of revenues to City to fund programs -- concern about competitive disadvantage to landfill										
40	Policy - Incentives / planning for eco parks			1.0							1.0
41	MF (multifamily)- Single stream "push" for MF - make mandatory / include volunteers at complexes		1.0	1.0			1.0	1.0			1.0
42	MF(multifamily) - Hauler incentives for MF recycling - adding complexes; assume those not doing pay more						1.0	1.0			1.0

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	SUMMARY RESULTS FOR DRAFT PROGRAM PACKAGES	PKG1 Original - Low Div	PKG2 Original - Med Div	PKG3 Original - Hi Div	Pkg 4 HiScore	Pkg 5 Low/VL cost (1&2,not 4) less overlap	Pkg 6 Low/Med cost less overlap 24,28,31, (7 not 1&2)	Pkg 7 Low/Med Cost Hi Div+bans	Pkg 8 Hi and VH diversion exc. 16,24,28, 31	Pkg 9 Hi and VH div + a few lower cost items	Pkg 10 VH Div + add'l pgms, no bans
43	MF (multifamily) - Volunteer program/ recruitment for residents of MF bldgs that will help encourage recycling, help reduce contamination/garbage in recycling containers	1.0				1.0	1.0	1.0		1.0	1.0
44	SF/MF - Private dropoff paper recycling partnership	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0
45	Policy - City Procurement guidelines and/or incentives for recycled content				1.0	1.0	1.0	1.0		1.0	1.0
46	Policy - Strengthen City Department recycling program; emphasize source reduction;				1.0	1.0	1.0	1.0		1.0	1.0
47	Policy - Incentive rates at Landfill -- cheaper for separated yard waste, recyclables, other										
48	Res - Backyard composting program; already implemented in City										
49	Creation of a City trash utility										
50	Creation of a City "environmental fee" of 25 cents/mo/hh + fee per business										

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5.3.2 Discussion of Program Modeling Results

Key program packages that will be discussed here include:

- Package 3 – initial "high diversion" package, resulting in 27% diversion with 17 programs
- Package 4 – High scoring package, resulting in 34% diversion with 13 programs
- Package 6 – Low costs, resulting in 19% diversion from 16 programs
- Package 9 – High diversion plus several low cost programs, resulting in 18% diversion with 11 programs
- Package 7 – Low cost plus high diversion plus bans, resulting in 27% diversion with more than 20 programs.

The performance of these packages is summarized in Table 5-5; the programs included in each of these packages are listed in Table 5-6 below.

Table 5-5: Programs in 5 "Packages" of Diversion "Packages" for Fort Collins

Package	Add'l Diver-sion %	City cost/ton	User cost/ton	Total cost/ton	Number pgms
Pkg 3. Original high diversion	27%	$4	$24	$28	17
Pkg 4. High score	34%	$1	$27	$28	13
Pkg 6 Low cost	19%	$4	$9	$13	16
Pkg 9 New high diversion "plus"	18%	$1	$15	$16	11
Pkg 7 Low cost, High div, +bans	27%	$5	$16	$21	23

Table 5-6: Programs in 5 Key Diversion "Packages" for Fort Collins

Package	Programs included
Pkg 3. Original high diversion • 27% add'l diversion • 17 programs • $28 total cost/ton	2. Residential drop-off yard waste 7. Res curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 10. Commercial food waste for largest businesses 12. Commercial 3 months free recycling to businesses signing up for 1 year 13. Commercial tech assistance audits 14. Require comm'l recy fee embedded in rates 15. Commercial recycling container mandatory for businesses with gbg service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 20. Commercial recycling cooperatives for small businesses 22. C&D deposit system 23. Contract preferences for city jobs for bidders recycling C&D 25. C&D drop-off wood waste site 32. Enhanced PAYT incentives for residential (by ordinance) 40. Incentives and planning for eco-parks 41. Multifamily single stream "push"; make mandatory and recruit volunteers at complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF
Pkg 4. High score • 34% add'l diversion	2. Residential drop-off yard waste 7. Res curbside single stream recycling alternate weeks with curbside yard waste 10. Commercial food waste for largest businesses 11. Commercial hauler financial benefit for achieving 25% diversion from commercial customers 14. Require comm'l recy fee embedded in rates

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Package	Programs included
• 13 programs • $28 total cost/ton	15. Commercial recycling container mandatory for businesses with gbg service > 10 yards 23. Contract preferences for city jobs for bidders recycling C&D 24. Require pre-processing / sorting of C&D prior to disposal 25. C&D drop-off wood waste site 31. Ban yard waste from disposal 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling
Pkg 6 Low cost • 19% add'l diversion • 16 programs • $13 total cost/ton	7. Res curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 10. Commercial food waste for largest businesses 12. Commercial 3 months free recycling to businesses signing up for 1 year 15. Commercial recycling container mandatory for businesses with gbg service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 20. Commercial recycling cooperatives for small businesses 22. C&D deposit system 25. C&D drop-off wood waste site 26. Hauler incentives to "prospect" for C&D 32. Enhanced PAYT incentives for residential (by ordinance) 41. Multifamily single stream "push"; make mandatory and recruit volunteers at complexes 42. Hauler incentives for MF recycling, adding complexes 43. Volunteer program to recruit "champions" at multifamily complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling
Pkg 9 New high diversion "plus", • 18% add'l diversion • 11 programs • $16 total cost/ton	7. Res curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 11. Commercial hauler financial benefit for achieving 25% diversion from commercial customers 15. Commercial recycling container mandatory for businesses with gbg service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 22. C&D deposit system 25. C&D drop-off wood waste site 43. Volunteer program to recruit "champions" at multifamily complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling
Pkg 7 Low cost, High div, +bans, • 27% add'l diversion • 23 programs • $21 total cost/ton	7. Res curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 10. Commercial food waste for largest businesses 11. Commercial hauler financial benefit for achieving 25% diversion from commercial customers 12. Commercial 3 months free recycling to businesses signing up for 1 year 13. Commercial tech assistance audits 15. Commercial recycling container mandatory for businesses with gbg service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 21. Service standards for commercial recycling 22. C&D deposit system 25. C&D drop-off wood waste site 26. Hauler incentives to "prospect" for C&D 28. Ban C&D and monitor with periodic load inspections 29. Ban recyclables with periodic load inspections 30. Ban electronics from landfill 31. Ban yard waste, periodic load inspections 32. Enhanced PAYT incentives for residential (by ordinance) 41. Multifamily single stream "push"; make mandatory and recruit volunteers at complexes 42. Hauler incentives for MF recycling, adding complexes

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Package	Programs included
	43. Volunteer program to recruit "champions" at multifamily complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling

The distribution programs in the 5 Key Diversion Packages, terms of the materials they "target," and the actors incentivized or affected by the programs are evaluated in Table 5-7 below. The numbers indicate the number of "included" programs that affect that material or actor.

Table 5-7: Materials and Actors targeted by the Program Packages

Materials Counts for Program (for overlap) - by package & material	Pkg 3	Pkg 4	Pkg 6	Pkg 7	Pkg 9
Residential Recycling	2	1	3	3.3	1
Residential Yard Waste	2	3	1	1.3	1
Residential Food Waste	0	0	0	0	0
Commercial Recycling	6	3	3	6.3	3
Commercial Yard Waste	1	2	0	0.3	0
Commercial Food Waste	1	1	1	1	0
Multi-family Recycling	2	1	4	4	2
Multi-family Yard Waste	0	0	0	0	0
Construction and Demolition (C&D)	3	3	3	3.3	2
Other	1	2	2	3	2
Infrastructure	0	0	0	0	0
Indicator of Diversity in "Actors" Affected - by Package	**Pkg 3**	**Pkg 4**	**Pkg 6**	**Pkg 7**	**Pkg 9**
Single Family Generator	5	4	4	5.6	3
Multi-Family Generator	2	2	4	5.6	2
Commercial Generator	7	5	4	8.6	3
Hauler	3	4	4	6.6	2
City buildings	1	3	2	2	2
Builders / Developers	3	3	3	3.3	2
Recycling businesses	1	0	0	0	0
Facilities	2	3	2	3.9	2
Other	1	0	0	0	0

5.4 Preferred / Recommended Diversion Option for Fort Collins

A review of the performance of the various packages above leads SERA to a recommendation for a two-phase approach to increasing diversion in the City. The recommended program package for the City of Fort Collins is represented in Table 5-8 by "Package 6", labeled "Low Cost". Although the package requires 16 initiatives (which is more than some of the alternatives), the package affects a variety of actors (see Table 5-9), including residential, multifamily, and commercial generators, haulers, the City, and developers. The package addresses residential yard waste, increases recycling diversion for all sectors, and provides options for C&D and, to a lesser degree, food waste. Finally, the package encourages

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significant diversion with conservative costs and efforts, and leverages changes that are already occurring (or being planned) in the local / regional solid waste management system.

All the work involves developing estimates; in fact, the recommended set of programs may achieve higher or lower diversion than estimated. The goal is higher than 19% diversion; however, this set of programs requires relatively low investment by the City and relatively low cost for users.

Because the estimates are approximate values, because technology and programs are always improving and evolving, and because infrastructure to support all programs is not yet available, the recommendation includes a "Phase II", which the City may elect to invoke should Phase I efforts require additional diversion. The program suggestions for Phase II are included in Table 5-8. The suggestions for Phase II provide sufficient diversion to exceed the City's diversion goal.

Table 5-8: Recommended Diversion Options for City of Fort Collins

Package	Program Elements / Concepts
Phase I – Package 6, Low cost • 19% add'l diversion (new total 43% adding to current 24%) • 16 programs • $13 total cost/ton ($4/ton city, $9/ton user)	7. Residential curbside single stream recycling alternate weeks with curbside yard waste 9. Enhanced residential education push 10. Commercial food waste for largest businesses 12. Commercial 3 months free recycling to businesses signing up for 1 year 15. Commercial recycling container mandatory for businesses with garbage service > 10 yards 18. Commercial single stream recycling push for smaller non-recycling businesses 20. Commercial recycling cooperatives for small businesses 22. C&D deposit system 25. C&D drop-off wood waste site 26. Hauler incentives to "prospect" for C&D 32. Enhanced PAYT incentives for residential (by ordinance) 41. Multifamily single stream "push"; make mandatory and recruit volunteers at complexes 42. Hauler incentives for MF recycling, adding complexes 43. Volunteer program to recruit "champions" at multifamily complexes 44. Private drop-off paper recycling partnership (usually at churches & schools) – for SF and MF 45. City procurement policy favoring recycled content 46. Strengthen city department recycling
Phase II, depending on performance of Phase I (Beyond 50%)	23. City preferences for contracts that promise to recycle C&D (Cumulative results: City $4, User $9, 19%) 2. Consider drop-off yard waste site (Cumulative results: $4, $9, 20%) 29 & 31. Consider bans on yard waste and recyclables, if needed (Cumulative results: $4, $10, 22%) 30. Consider bans on e-waste (Cumulative results: $4, $12, 22%) 10. Consider expanding food waste programs, if successful 24 & 28. Consider mandatory recycling of C&D or bans if and as facilities become available (Cumulative results: $4, $13, 24%) 16. Mandating recycling embedded for all commercial businesses (Cumulative results: $3, $16, 27%)

Table 5-9: Materials and Actors Targeted by Recommended Diversion Package

Materials Counts for Program (for overlap) - by package and Material	Number of Programs in Recommended Package 6	Indicator of Diversity in "Actors" Affected - by pkg	Number of Programs in Recommended Package 6
Residential Recycling	3	Single Family Generator	4
Residential Yard Waste	1	Multi-Family Generator	4
Residential Food Waste	0	Commercial Generator	4
Commercial Recycling	3	Hauler	4
Commercial Yard Waste	0	City buildings	2

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Materials Counts for Program (for overlap) - by package and Material	Number of Programs in Recommended Package 6	Indicator of Diversity in "Actors" Affected - by pkg	Number of Programs in Recommended Package 6
Commercial Food Waste	1	Builders / Developers	3
Multi-family Recycling	4	Recycling businesses	0
Multi-family Yard Waste	0	Facilities	2
Construction and Demolition (C&D)	3	Other	0
Other	2		
Infrastructure	0		

The ranking of each of the individual programs in terms of diversion levels are provided in the following Figure 5-3. In addition, the approximate cost per ton for the programs – both City and User, are presented in Figure 5-4.

Figure 5-3: Diversion by Program in Recommended Diversion Package for Fort Collins

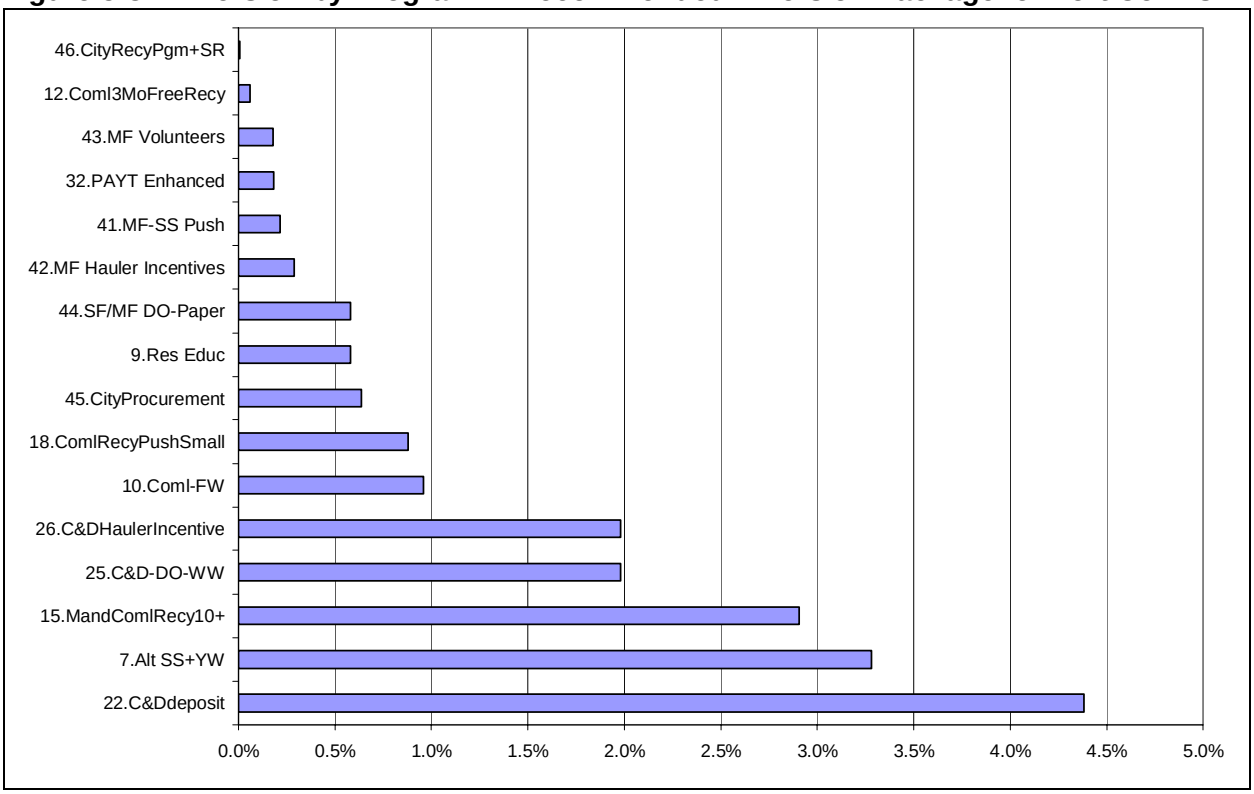

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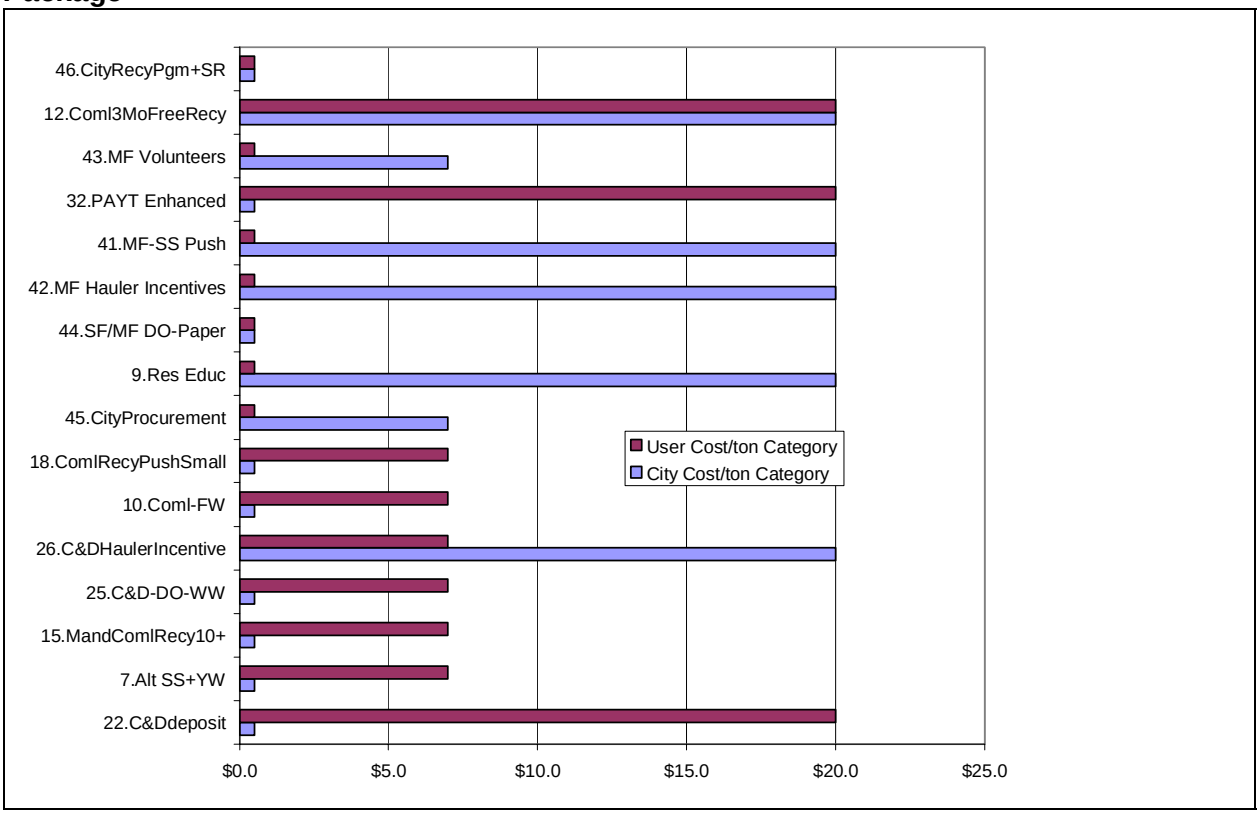
Figure 5-4: City and User Cost per Ton (Categories) for Recommended Diversion Package



The recommended package of programs focuses action in several areas:

- Takes advantage of the opportunities provided by single stream recycling, in bringing forward single stream recycling in the residential sector, alternating cost-effectively with yard waste on alternate weeks.
- Encourages use of single stream as a commercial and MF option, helping address the "space" issue for smaller buildings.
- Provides additional incentives and options for recycling for under-served small businesses through programs offering 3 free months of recycling, and recycling cooperatives.
- Addresses the important (and large) remaining construction and demolition in the landfills by implementing a C&D deposit system, working for a wood waste recycling facility, and providing haulers with incentives to encourage C&D separation at job sites.
- Encourages residential recycling and diversion through improvements to the already-successful PAYT incentive system.
- Calls for an education "push" describing single stream recycling, improved PAYT and other tips for the residential sector.
- Takes advantage of free options by soliciting available private programs for paper recycling.
- Encourages the City as an organization to "walk the talk" through increased in-house recycling and improvements to procurement.

5.4.1 Comparison to Consumer and Business Program Preferences

In the previous chapter, we reviewed the results of the residential and commercial sector surveys. These surveys provided information on the most desired program elements, and the willingness to pay for access to additional diversion opportunities. The results of the surveys indicate the most desired programs, which are highlighted in Table 5-10.

Table 5-10: Preferred Program Options from Residential and Business Surveys

Residential Preferences	Commercial Preferences
• Yard waste options, • Rewards or rebates for recycling, • Additional drop-off recycling opportunities, • Construction and demolition (C&D) program options, and • Options for electronics and other hard-to-recycle materials.	• Construction and demolition (C&D) options, • Programs making it possible to share recycling containers (for smaller businesses or those without space), • Rebates for recycling, • Programs offering three months free for businesses signing up for one year of recycling, and • Options for hard to recycle materials.

The program options in the Recommended Package (#6) incorporate most of these preferences.

- Residential yard waste options are provided through single stream curbside collection alternating with recycling. Although households noted that they were not in favor of alternate week recycling or alternating single stream, the cost benefits to addressing the twin needs of increasing recycling options and providing a comprehensive method of dealing with the large amount of yard waste remaining in the waste stream at little extra cost makes this an attractive program to include. Drop-off recycling options are not specifically expanded in the program package, as the convenience of the curbside option would be expanded with single stream.
- Incentives or rewards for recycling are provided through the enhancements to the existing Pay As You Throw program.
- Options for electronics recycling are only provided through a possible ban implemented in Phase II. Some recycling infrastructure exists in the area; additional use of these facilities would be encouraged with a ban.
- The recommended package includes several programs that address construction and demolition (C&D) debris – a program requested by both the commercial and residential users.
- Two other key programs favored by businesses are incorporated into Phase I of the recommended alternative: 3 free months of recycling and shared containers / cooperatives.
- Options for "Hard to Recycle" materials are not emphasized. These types of programs divert few tons and are expensive per ton.

5.4.2 Comparison to Consumer and Business Reported Willingness to Pay

Another set of questions in the survey asked about the respondents' willingness to pay for additional diversion, and to assist the City in reaching goals. The results showed the following.

Residential Willingness to Pay (WTP) for Additional Diversion

- More than three-quarters (78%) of households report they are willing to pay more for recycling.

- Over half of those willing to pay more, report they are willing to pay up to $3 more per month to help fund additional diversion opportunities, and 93% of the respondents would pay 50 cents per month. This represents a weighted average of about $1.60 more per household on average; and 50% of the households would be willing to pay about $2.72 more.
- The survey respondents report they currently pay about $16 per month for garbage and recycling services.
- Computations based on these figures indicate they are willing to pay about 10%-17% more for additional diversion access.

Commercial WTP for Additional Diversion[36]

- The vast majority of businesses (88.5%) are also willing to pay more than current rates and fees to fund additional recycling and diversion opportunities.
- Three quarters of those willing to pay more would be willing to increase rates by 5%; almost 60% are willing to pay 15% more, and almost 14% are willing to pay 25% more. A few (4%) are willing to pay more than 25% extra. The average percent the businesses are willing to pay is about 12.7%; about 50% are willing to pay 15%.
- The responses from this survey indicate that the average business estimated they paid about $290 per month for service. This was a small sample, and the results ranged from small businesses that paid $14.50 per month to large businesses that paid about $2,000 per month.[37]

Implications

A review of Fort Collins tonnage and household data allows us to generate an approximate number of tons of solid waste generated per household. The data indicates that each single-family household generates about 1.65 tons per year; multifamily households generate approximately 1.5 tons per household. Analysis of the tons per business can be computed two ways. Commercial tons can be divided by the (approximate) number of businesses in the City. Alternately, tons per employee can be computed and multiplied by the average number of employees in the firms that responded to the survey. These results can be used to compute the average amount currently paid per ton, and translated into the extra dollars per ton that households and businesses have indicated they may be willing to pay for additional programs and services. This information is provided in the following tables.

Table 5-11: Derivation of Approximate Tons Per Year for Households and Businesses

	A. Approx. generation (tons/year)	B. Approx. number hh's, businesses	C. Tons per entity/yr (Col A/ColB)	D. Approx. # of employees/business from survey	E. Tons per entity per year (ColC*ColD)
Single family households	61,954	37,499	1.65		1.65
Multi family households	28,852	19,860	1.45		1.45
Businesses	170,118	2,000	85.06		85.06
Employees	170,118	78,086	2.18	49.60	108.06

[36] Note that the results for the commercial sector are based on a small survey sample (30 businesses), so the results must be used with caution.

[37] To provide a scale, this indicates that an additional fee of 15% (which more than half are willing to pay) would mean a willingness to pay about $44 per month extra for additional program opportunities.

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Based on these rough approximations, we can determine whether the estimated "user" program costs associated with the Recommended Package (#6) fall generally within the "willingness to pay" levels reported by the combined business and household respondents. The last piece of information needed to develop the weighted average "willingness to pay" across both groups (residential and commercial) is that the new diversion for the programs is about 70% from the commercial sector and 30% from the residential sector.

The results show that the weighted average of "willingness to pay" for programs was about $6.70 on average, and 50% of businesses and households would be willing to pay about $9.64.[38] The "user" costs for the Recommended Package (Phase I) is about $9 – a figure that is within the range of the mean and median WTP values. Most of the other program packages were considerably more costly to users. Package 6 – and specifically Phase I of the package, may provide significant additional diversion at a cost near the level that survey respondents report they are willing to pay.

Phase II in total or individual elements, can be implemented on an as-needed basis after the performance of Phase I is assessed.

Table 5-12: Derivation of Average Willingness to Pay (WTP) for Diversion Programs

	A. Avg Tons per year (Table X.X)	B. Tons/mo (Col A/12)	C. Rates/mo (Surveys)	D. Cost/ton (current) (Col C/ColB)	E. WTP average (survey)	F. WTP 50% median (survey)	G. WTP/Ton Average (ColD*ColE)	H. WTP/ton median (ColD*ColF)
Per household[39]	1.6	0.13	$16	$120.00	$1.60 (10%)	$2.72 (17%)	$12.00	$20.40
Per business	95	7.92	$290	$36.63	12.7%	15%	$4.65	$5.49
				Wtd avg based on ton share for Pkg 6 (70% comm'l, 30% residential)			$6.70	$9.64

5.4.3 Next Steps and Implementation of Recommended Diversion Package

This research report has provided the City with a conservative, diversified, cost-effective package of diversion programs that can help increase diversion by perhaps 19%. However, the City has several key "next steps" to undertake as a follow-up to the development of this report:

- Review the program recommendation with City staff, and the Steering Committee;
- Provide feedback to SERA on recommended program options and additional modeling that may be required;
- Consider conducting a (cost-effective) set out survey and waste sort (residential, and possibly a drive-by survey of a sample of businesses) to gather additional information to verify program / material needs and program potential;
- Implement the new measurement protocols and definition as suggested, and collect data on an on-going basis to track diversion progress toward the 50% goal;
- Review and refine / define the program concepts;
- Implement the preferred programs.

Once agreed or committed to, implementing these program initiatives will require considerable work by City staff to:

[38] The average across users is within the range; there are some indications that the costs are somewhat higher than WTP for businesses, and somewhat lower than WTP for households. However, all the estimates are approximate.
[39] Used 55% households are single family, and 45% are multifamily.

- Monitor completion of necessary infrastructure and facilities.
- Work to provide lists of available opportunities for C&D recycling / infrastructure and wood waste recycling – and where possible, to encourage development of additional facilities, assistance on grants, etc.
- Meet with the haulers and others affected to discuss the best ways to implement these program initiatives and timing issues.
- Develop a refined and detailed implementation plan, schedule, and responsibilities.
- Modify city ordinances to change service standards for residential recycling to require single stream and alternate-week yard waste.
- Modify city ordinances to change service standards for multifamily and commercial recycling.
- Modify city ordinances addressing the PAYT incentives for the residential sector.[40]
- Develop an education program for the residential sector.
- Work with the building and permits department to institute a C&D deposit system.[41]
- Contact or solicit bids from Abitibi Consolidated, Waste Management, and others for a provide paper recycling program – like Abitibi's Paper Retriever.[42]

[40] The recommendation is to simplify and enhance the incentive. Consider requiring that the total of the residential bill – including recycling – must increase by at least 80% as volume for garbage doubles.

[41] The system should dovetail with the existing permitting system, with the new fees computed and collected at the same time as current permit fees. The fees should vary by the size (square footage) and type of project (new vs. remodel, single family vs. multi-family vs. commercial). The smallest 25% of jobs should be omitted. The city may elect to omit roofing-only jobs. The city should assure that unreturned deposits carry through to the recycling department to assist in funding additional program initiatives and help encourage C&D recycling infrastructure through grants or other investments. Examples of fees and a successful system can be found in San Jose California, and elsewhere in California and Florida, for example.

[42] These should be provided at no cost to the City or to participants, and should revenue-share with the locations or charitable organizations at which the bins are placed.

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