



State of California • Department of Corrections

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**MARKET IMPLICATIONS  
OF  
CORRECTIONAL RESOURCE RECOVERY FACILITY  
MATERIALS**

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U.S. Department of Justice  
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## BACKGROUND

This report is an element of the interagency project formed by agreement between the state Prison Industry Authority (PIA) and California Integrated Waste Management Board (CIWMB). The objective of the interagency project is to transfer technological experience acquired through the full-scale implementation of a Correctional Resource Recovery Facility (CRRF) processing the City of Folsom's wastestream.

The CRRF material recovery and composting operation utilizes state prison inmate labor to process the wastestream of client municipalities. The foremost unique feature of the operation is the unprecedented level of labor applied to the separation process. PIA expects to separate the entire wastestream into distinct categories, with further "high-grading" according to market requirements for material sales. Along with this level of separation, the concept calls for other unique technologies, particularly the anaerobic composting of separated organic wastestream fractions.

PIA's objective is the application of this concept and these technologies around the state of California. The CRRF concept is believed to hold particular promise in rural and remote areas where prisons are often sited. As a state agency, PIA also has special capabilities to assist local governments in achieving state waste diversion mandates. Ultimately, it is hoped that application of the lessons learned by the Folsom experience will be available to California communities striving to reduce their disposed wastestream.

Toward that end, the CIWMB has assisted funding a range of demonstration activities and facilities, research and special topic reports relating to the Folsom CRRF project. Among these are the following:

- "Issues in Anaerobic Digestion." A report on the efforts to implement municipal-scale, high-solids anaerobic composting at the Folsom site, including theoretical research conducted by University of California Davis, as well as design progress, material handling, operating and other related issues.
- Learning Lab. The Folsom CRRF facility includes a dedicated room to provide seminars and other activities which will transfer the facility's technologies while providing immediate access to observation of the technologies. The Learning Lab is anticipated to be used by local government officials, waste management professionals, CIWMB staff and researchers.
- Demonstration projects. The CRRF facility is designed to incorporate the integrated approach to waste management set forth under AB 939, the state's Integrated Waste Management Act of 1989. As such, it will test the integrated of unique source separation activities and the facility's material handling approaches.
- Market development approaches. The facility is unique in the range of materials separated. PIA operates a variety of secondary manufacturing and enjoys a special preference in marketing its products to state agencies. PIA is investigating new manufacturing roles utilizing the separation of raw materials from the wastestream. This is addressed in the report to CIWMB, "Identification of PIA and State Markets."

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## Objectives and summary

This report, "Market Implications of CRRF-Separated Materials," entailed an investigation into the marketing of the materials to be produced by a Correctional Resource Recovery Facility, illustrated with the wastestream of the City of Folsom, the inaugural CRRF municipality.

The CRRF process is expected to produce the entire range of wastestream material components. The form in which they are produced holds high promise-- the manual separation is hoped to greatly increase the volumes and quality over that typically culled from the municipal wastestream. The need for a comprehensive evaluation of how these materials will be marketed is the focus of this report.

The report includes discussions of the following:

- The implications of materials quality in marketing, including methods to improve quality. A high degree of separation is possible with inmate labor. Other facility operations features have material market implications.
- An understanding of typical material volumes, based upon the projections for the City of Folsom wastestream. The Folsom wastestream is typical of medium-sized California municipalities which might utilize the CRRF concept.
- Identification of a total marketing strategy for municipalities to market the entire range of recyclables possible from a CRRF facility, including an identification of the possibilities for PIA to work with local governments in developing end markets for materials recovered.

## Unique considerations of CRRF recovery

Several issues make the marketing of materials from the CRRF process unique. These are considerations which relate to the unprecedented level of manual material separation, reparation and processing available to the process. The experience of the City of Folsom in marketing these materials offers guidance in the marketing, and development of additional markets for CRRF-derived materials generated as the concept is applied at sites around the state of California.

Two conditions in particular will receive greater understanding through the experience of the Folsom CRRF. These two unique conditions are:

- Unique Material Types. Several types of materials will be recovered by the CRRF process in significant quantities which are unlikely to be generated from any other material recovery or collection process.

These materials will include several not typically recovered from the municipal wastestream through source separation programs or central processing. The most prominent, by share in the wastestream, are mixed plastics, organics such as food waste and mixed grades of paper. These are also materials which are currently the key challenge in recyclables marketing.

- Unique Potential End Uses. Because of the nature of the Prison Industry Authority's mission, several avenues for marketing of CRRF-separated materials may become opportunities. The existence of PIA industries, the availability of state lands to PIA and the agency's growing research and development of recyclables marketing may make this possible. Throughout the report such opportunities are addressed.

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## TYPES AND QUANTITIES

### Introduction

The PIA recovery facility has been designed to accept from 100 to 300 tons per day of municipal waste materials. The materials is dumped on a tipping floor, presorted, then conveyed up to and along an elevated sorting line worked by inmates from the City of Folsom Return to Custody Facility (RTC). The RTC is a City-operated facility providing incarceration to state penal inmates on a reimbursement basis.

Through unprecedented levels of labor application and extensive primary and secondary sorting, the facility is designed to divert the majority of entering materials for recycling, composting or other alternative end- uses.

Nearly the entire volume of organic material sorted from the line and from presorting will be directed to anaerobic composting. This is the fraction largely composted of food, wood and yard waste and nonrecyclable papers. Materials recovered for recycling will be baled and otherwise processed as appropriate for marketing. Material unable to be diverted will be transported within 48 hours to disposal by the City of Folsom.

### Description Of Process

The PIA recovery facility is a key feature of City of Folsom strategies to meet state mandates to cut in half, by the turn of the century, the waste it disposes in landfill. In addition, the City has adopted an aggressive approach to source separation and source reduction of generated waste materials. These programs have been integrally designed with the operation of the recovery facility to maximize material quality.

A detailed description of these programs is featured in the City of Folsom's Source Reduction and Recycling Element. Highlights of those programs are as follows:

### Source separation programs

These programs entail developing effective methods to provide residents and businesses with opportunities to separate recyclable from non-recyclable materials. Key features of such efforts will include:

- Regular collection of recyclables from Folsom residences.
- Convenient separation of recyclables at commercial locations.
- Maximum recovery of other collected materials, including opportunities for drop-off and buyback recycling.

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## **Programs addressing special generator types**

Several waste types present special needs and are addressed in the context of the City's comprehensive effort to recycle the entire City wastestream. These special categories include the following:

### **Multifamily units.**

Source separation opportunities will be provided through dropoff collection at multifamily. Buyback center locations will also be encouraged to locate, to the greatest extent possible, to serve residents of multifamily units.

### **Commercial and industrial generators.**

A program will be developed to separate "wet" putrescible waste from "dry" waste with a higher percentage of recyclables. Dry waste would be required to be processed for recyclables at the CRRF. Special "differential rates" will encourage participation in the separation program.

### **Self-hauled and privately collected materials.**

Salvage and dropoff programs will be directed to recovery of these materials, which are currently taken directly to the landfill by private waste haulers and individual residents and businesses. Such activities may address such generators as construction debris.

## **Facility Operations**

With the start-up of the CRRF, the City's solid waste collection vehicles will transport waste directly to the facility, rather than to the County landfill on Kiefer Road.

At this time, routing of the City collection vehicles is not expected to change with use of the CRRF. However, important to the material quality received at the CRRF is the lack of compaction by City trucks. This will result in a greater number of vehicle trips to the facility than are currently made to the County landfill. However, because the CRRF is much closer to the City than is the County landfill, no net routing impact is expected.

The approximately 15 truckloads a day will be transported to the CRRF via an access road off East Natoma Street in Folsom. Once a truck-load is collected and transported to the CRRF, the load is tipped on the facility's presorting floor. It then returns to its route.

At the sally-port entrance to the facility, full waste vehicles will be weighed to assess the tipping fee and then proceed to the enclosed receiving area. The MSW will then be unloaded onto the tipping floor. Here the waste will be spread over the presort area and visually inspected. At this point, oversized, bulky items such as tires, carpet rolls and white goods will be removed and taken for further processing.

Any plastic bags containing source-separated material will also be removed in the presort phase and taken directly to the secondary sort picking lines for high-grade processing. Items identified as hazardous material will immediately be removed wherever they are found in the CRRF process. The hazardous material will immediately be collected for disposal by a licensed hazardous waste hauler.

Primary sorting will take place next. Material will be conveyed to an elevated picking line attended by prison inmates. The inmates will then meticulously pick and sort the materials into general types. Recyclable materials sorted by the primary process will then be taken to secondary picking lines for separation into market categories such as newsprint, white paper or mixed paper.



Recyclable materials will then be baled or further prepared for marketing. A large percentage of organic material will be separated into categories such as food waste, yard waste and non-recyclable paper. This material will be taken first for shredding and size reduction and then to the CRRF's anaerobic digester composting system, located on the site.

It is possible that other generation sources will eventually use the facility. City buyback or dropoff of recyclables and yardwaste may be brought to the CRRF. These may arrive by drop-boxes or roll-off containers. Depending upon the nature of the materials they contain they will be directed to the appropriate level of sorting.

## Description Of Wastes

The wastes to be accepted represent almost the entire generated City of Folsom wastestream. This wastestream is specifically and thoroughly detailed in the Waste Generation Study presented with the City of Folsom's Source Reduction and Recycling Element.

The types and quantities of materials addressed by the Folsom CRRF project are were analyzed for their market implications. First is a presentation of the annual City of Folsom wastestream as included in the City's Source Reduction and Recycling Element. It represents materials from all generators including residential, commercial, industrial, and "other" (largely parks and the state prison). The "tons disposed" is based upon a total annual disposal of 32,510 tons.

### ANNUAL MATERIALS FROM FOLSOM CRRF PROJECT

1. Paper		Percent	Tons	4. Metals		Percent	Tons
a. Corrugated	13.2	4298	a. Aluminum cans	0.5	166		
b. Mixed paper	6.5	2097	b. Bimetal containers	0.0	0		
c. Newspaper	7.0	2263	c. Ferrous, cans	1.9	624		
d. High-grade ledger	1.8	582	d. Nonferrous	0.3	94		
e. Other paper	16.8	5465	e. White goods	0.3	91		
			f. Other metals	1.1	361		
2. Plastics		Percent	Tons	5. Yard Waste			
a. HDPE containers	1.0	335		18.7	6066		
b. PET containers	0.1	42					
c. Film plastics	4.1	1336	6. Other organics		Percent	Tons	
d. Other plastics	3.9	1252	a. Food waste	11.1	3596		
			b. Tires and rubber	0.4	143		
3. Glass		Percent	Tons	c. Wood wastes	1.5	478	
a. Refillable bev.	0.0	0		d. Agr. crop residue	0.0	0	
b. CRV glass	0.9	293		e. Manure	0.0	0	
c. Other recycl.	2.4	770		f. Textiles, leather	2.0	650	
d. Other nonrecycl.	0.2	59		g. Other organics	0.1	36	
			7. Other wastes		Percent	Tons	
			a. Inert solids	3.2	1040		
			b. HHW and containers	1.1	364		
			c. Other other	0.0	0		

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## **Market implications of categories**

The materials presented in the categories above generally conform with the categories expected to be performed by the CRRF. Some further separation will occur: "other metals" will be separated into types such as copper and scrap aluminum; textiles will be separated from leather.

Each individual participating municipality must account for its marketing of materials. However, because of AB 939 disposal and diversion accounting, market grades and categories will need to be identified as subcategories of the municipality's Waste Generation Study categories. These categories are determined by state regulation. These categories are found in California Code of Regulations Title 14, Article 6.1, section 18722(j).

Although hazardous waste is not accepted at the CRRF facility, municipalities using the CRRF process must still dispose or recycle the materials; they must be addressed by municipalities utilizing the CRRF concept. The individual characteristics of CRRF-separated materials will be addressed in the categories under which they are analyzed.

Most of the individual types of materials referenced in the table above will be found under the "Existing Markets Category." However several other significant and problematic types are found under the "Potential Markets Category" and the "Organic Materials Market Category." These include materials types such as yardwaste, mixed paper and mixed and film plastics, which present some of the greatest challenges to any facility attempting to separate and market the entire municipal wastestream.

## **Process impacts on quality and marketability**

Several aspects of the CRRF process impact on the quality of materials. Several of these impact are typical: tipping of waste incurs breakage, as may other movement of materials. Other impacts are unique: lower labor costs makes a higher grading of materials such as glass, paper and plastic more economical. Following are some of the prominent anticipated impacts of the CRRF process on market quality of materials.

### **City collection techniques.**

The City of Folsom has made several significant changes in its operations to maintain the market value of the materials and to maintain material integrity through collection and separation. Chief among these operational changes is modified compaction techniques and reduced collection vehicle weights. Further experience anticipated from City source separation programs, such as bagged collection of residential and commercial recyclables, will also be used to increase material quality through the CRRF process.

Reduced compaction is particularly important to commercial collection. Commercial route vehicles collect twice the weight of residential collection vehicles. Commercial vehicles are planning to reduce tipped volumes compared to landfilled materials. Both commercial and residential collection vehicles plan to reduce volume per truck by one third.

The City's source separation programs include a broad array of attempts, implemented with a designed flexibility, which will bring materials to the CRRF in a variety of stages of separation. Commingled recyclables will be collected from homes and businesses.

Organic materials such as yardwaste and food waste will be collected separately. Special attempts will be made at select generators such as City landscape contractors, large institutions and cardboard generators. Many of these

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activities are demonstrations to be monitored and reported for the CIWMB under an interagency agreement with PIA.

### **Advantages of CRRF separation.**

The unprecedented levels of labor applied to processing the materials received will improve material qualities. Total practical effort will be applied to high-grading and quality control of the materials separated. This will be unique from other facilities which are typically mechanized or lower degree of labor application.

Materials tipped at the CRRF will be put through a totally positive sort. That is, all categories of waste types will be pulled, largely by manual picking. This initial step will create the volumes of materials not typically recovered from municipal recycling programs, particularly mixed and film plastics, food waste and other special types such as rubbers and textiles.

Beyond the primary sort, material categories will also receive a high level of secondary sorting into market grades and specifications. The presence of available labor will make it possible to undertake such processing as glass color sorting, paper grading, plastic resin separation and other high grading which is uneconomical in typical central material recovery facilities.

### **Material processing for markets.**

The CRRF must process an entire range of materials from the municipal wastestream for market. It has many special features to achieve this. The facility includes a material shredding and grinding systems to reduce materials first to two inches and then to quarter inch sizes. A baling system will be capable of processing to meet the needs of CRRF separated materials.

Further processing capabilities are anticipated in CRRF facilities depending on the arrangements with the participating municipalities. Capital costs for equipment such plastic shredding, pelletizing and extrusion, or for glass crushing are negotiated in the agreement with PIA, depending upon the municipalities marketing strategy. These arrangements can vary according to the marketing strategy and the processing needs to meet it.

### **Organic recycling**

An important feature of the CRRF concept is the aggressive use of composting to process significant portions of the municipal wastestream. Several unique aspects of the overall process impact on the processing of these materials. The organic materials to be composted include a far greater range than the yardwaste typically addressed by municipal composting programs. The product will vary from that typically resulting from other programs.

The collection process of the Folsom CRRF is evolving and highly integrated system of feeding source separated materials to the facility. In addition, the high degree of labor on the line is expected to produce a much higher quality "post-waste" material from the mixed stream into the facility. Typically, CRRF operations, almost by definition, will typically have a highly controlled, separate stock of foodwaste from the nearest penal institution.

The other unique feature of the CRRF composting operation will be the in-vessel, high-solids, anaerobic composting technology to be applied. Initially the CRRF will use the feedstock described above to demonstrate the second, aerobic-drying stage of the high-solids process. This is expected to demonstrate issues of material quality and composting operations. Eventually, the anaerobic vessels will be used. The gas captured by the anaerobic operations is expected to generate revenue from the facilities.

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## MATERIAL SPECIFIC APPROACH

In order to best develop a strategy to meet the unique requirements of finding markets or end uses for the entire municipal wastestream, this section presents an approach based upon organizing materials into four marketing categories. Following are the four categories, presented with City of Folsom estimates for the tonnage involved:

1. Existing local markets: Materials for which traditional markets already exist. These are materials such as glass and paper for which local buyers can be found by any municipality near a major urban area. Total planning volume: 1,082.58 tons per month.
2. Potential markets: Materials for which alternative markets or end uses can be developed. These are materials such as mixed plastic. The markets for such materials may need to be actively developed by the local municipality or PIA. Total planning volume: 715.81 tons per month.
3. No markets: Materials for which new markets or end uses must be found. These are materials such as film plastics and nonrecyclable glass. New technologies or creative use of these materials is necessary in order to be diverted from landfilling. Total planning volume: 101.83 tons per month.
4. Compost markets: Materials which can be composted. This includes not only the traditionally composted materials such as yardwaste, but also, potentially, foodwaste and contaminated paper. Total planning volume: 1,303.4 tons per month.

### Qualifications on Strategy Findings

The following section provides detailed descriptions of the four marketing groups, the materials which comprise them and the types of market options upon which the groupings are based. As would be expected, the "Existing Markets Group" provides the City with the greatest volumes and the greatest revenues. However, it is *very important* to realize that one of the most uncommon materials in the wastestream, aluminum, represents by far the single greatest dollar contribution to expected revenues.

This calls for a strong disclaimer on the projections of revenues which will be used to illustrate and evaluate a strategy for marketing material from the CRRF municipal wastestream. With such a low incidence in the wastestream and high value, aluminum revenues are very hard to predict. Yet aluminum could easily represent *half* of the total value of all CRRF materials marketed.

Two of the other market groups, Potential Markets and Organic Materials Markets, each are near the tonnage of the Existing Markets Group. These two other groups represent very distinct types of materials to be marketed. Developing markets for these groups may be the greatest CRRF marketing challenge. This report attempts to evaluate separate strategies for all of these groups, and thus provide a approach to the entire wastestream.

## EXISTING LOCAL MARKETS

This survey of existing local recycling operations, manufacturers and end users is intended to provide an understanding of the typical markets for recovered materials. For CRRF operations around the state, such opportunities will provide the most immediate market options.

The following table provides an estimated projection of the volumes and revenues should all the materials be marketed at the suggested target prices. This may not be the case in many instances; contamination and separation obstacles may reduce the volumes or quality.

These target prices are estimated by PIA based upon a variety of sources and surveys, including national prices, Northern California markets and end-user prices. Some prices, such as those for glass, PET and bimetal containers, are determined by state price controls. Prices cited are generally on the low side of historical prices. The prices do not include transportation and other selling costs. Market prices are always subject to change.

### EXISTING MARKETS GROUP

MATERIAL	TONS/MONTH	TARGET PRICE	REV./MONTH
Corrugated	358.17	\$10	\$3581.70
Mixed Paper	174.75	\$5	\$873.75
Newspaper	188.58	\$10	\$1,885.80
High-grade ledger	48.50	\$20	\$970.00
HDPE containers	27.91	\$100	\$279.10
PET containers	3.5	\$800	\$2,800.00
CRV glass	24.42	\$80	\$1,953.28
Other recyclable glass	64.17	\$10	\$641.66
Aluminum cans	13.83	\$1,400	\$19,366.20
Bimetal containers	0	0	\$0
Ferrous cans	52.00	\$10	\$520.00
Nonferrous metals	7.83	\$10	\$783.00
White goods	7.58	\$10	\$758.30
Other metals	30.08	\$5	\$150.40
Tires and rubber	11.92	\$0	\$0
Textiles, leather	54.17	\$5	\$270.83
BOP (1)	15.17	\$0	\$0
<b>TOTAL</b>	<b>1,082.58</b>		<b>\$28,492.49</b>

(1) Includes recyclable batteries, oil and paint, calculated as half of disposed HHW and containers category.

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## **Characteristics**

Each of the material types addressed in this CRRF category will have the characteristics of those materials marketed from any other program. It is not expected that the level of contamination will be markedly different from the materials collected by other recycling programs.

The material types given here do not necessarily correspond to the general grades and specifications for the materials which exist in current processing and manufacturing purchase of the materials. For example, boxboard, colored ledger, white ledger and other paper subgrades are not identified under the general category heading of "mixed paper," and "high-grade ledger." Another category which does not present the actual marketed grades or types includes "nonferrous metals" which can include copper and brass, besides aluminum scrap.

## **General Approach**

For many of the materials in this group, there already exists a well-established infrastructure of grading, processing, brokers, shipping and remanufacture. This may be the case more for some materials than for others. Aluminum has had decades to create a sophisticated system of collection and remanufacture. This is less so with plastic grades. Preparing a market approach for these materials entails identifying local opportunities. The challenge before PIA and CRRF municipalities will be to develop the CRRF process to best prepare the materials for these markets.

In general, the strategy for the municipal marketing of the materials in the "Existing Markets Group" will be to contact local processors, end users and brokers. During operations phase-in, as recyclables from the CRRF facility are generated in small but increasing volumes, the municipality will seek to sell to as diverse a range of vendors as possible, using a system of tracking and reporting to generate the ultimate sales strategy.

This approach was prepared for the Folsom CRRF with an initial survey of local processors. A standardized form was used to record key initial information, including estimates of offered local prices. Additional vendors can be added to the list as the marketing effort gets underway. Spot marketing to these buyers will generate a sales history which will be tracked and recorded.

Tracking and recording volumes and sales will be more important for some materials than others. Because of the CRRF's unprecedented degree of separation less common materials such as textiles will be generated. The ability to market these materials should be carefully documented, with attention to volumes produced, end user requirements and condition of the material recovered by the CRRF separation process. This ability is provided in the market tracking and recording system produced for CRRF materials.

There must be close cooperation between CRRF operations and the effort of the participation municipalities to market the materials. Regular feedback must be made on quality of materials and other suggestions for adjustments to improve marketability of materials. Necessary improvements to CRRF operations may require capital equipment modifications, the costs of which must be negotiated between PIA and the municipality.

## **Existing Local Processors**

The basis to the marketing approach for "Existing Markets Category" materials is the initial survey. Following is a sample of the opportunities found in the survey for the City of Folsom CRRF. The Source Reduction and Recycling Element, for most communities, may list local recycling enterprises. The California Integrated Waste Management Board compiles recycling activities by county. The state Department of Conservation also has information. The Yellow Pages of the local phone book is a good place to start.

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Existing processors of recycling materials include facilities which collect recyclables from a wide variety of sources. These existing recycling activities might include the general public which brings materials to the processor and is paid a price for materials such as aluminum; they might include regular accounts which are collected by the processors such as office white paper accounts; they might include other collectors of recyclables such as drop-off glass collectors.

A processor has the facilities, equipment and personnel to bale, compact, shred or otherwise process the material to make its acceptable for purchase by the end user. The end user will remanufacture or otherwise prepare the material for sale or end use. Thus processors have the equipment necessary to prepare the materials for market, while serving as brokers to the end users. As brokers they are the entity which will typically pay for the materials.

Following is a list of potential local processors of materials to be collected by the Folsom CRRF. The market tracking and reporting program developed for the CRRF marketing strategy, included with this document, includes the initial list of potential vendors to purchase CRRF recyclables. The forms used to compile this list will continue to be updated and new vendors added as they are found. Initially the surveyed vendors and their initial prices paid will form the basis for the marketing strategy and revenue projections.

The use of the market tracking and reporting program is detailed later in this document. Here, however, is a sampling of the major local processors and buyers available, with descriptions of the nature of the buyer, location and materials handled.

### **Smurfit Recycling Company**

Smurfit is the processor which handles all the materials from the County of Sacramento's curbside recycling program. It pays, at the door of its two Sacramento facilities, competitive prices for most of the typically recycled materials and is set up to handle commingled recyclables.

### **Weyerhaeuser Paper Company**

This company is one of the country's major producers of paper products, including many recycled paper products. The firm has a major recycling plant in West Sacramento and sources from many locations, including office buildings, recycling programs and the public. Firm representatives surveyed say that the best prices are paid for bailed, full truckloads. The firm is strict about quality and grading.

### **C & C Paper Recycling**

This company recycles several hundred tons per month of paper, metal and glass recyclable materials. Located in Sacramento, C & C representatives say that the company will work with collectors to provide collection and processing equipment. The City of Folsom currently uses C & C to market paper from City offices.

### **A & A Salvage**

This Sacramento company buys recyclable metals such as aluminum scrap, copper, lead and brass. It also buys demolition steel and can provide roll off boxes to transport materials.

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## **Pacific Coast Waste Paper**

This company recycles the typical recycled grades of paper. The firm is located on 14th Avenue in Sacramento. Prices quoted are for materials delivered to the door.

## **Schnitzer Steel**

This sizeable plant is located near Folsom in Rancho Cordova. Located on a rail line, Schnitzer buys and ships large amounts of recyclable metals in many forms, including white goods (with compressor removed). The company has several municipal clients. Schnitzer will provide roll off boxes for steel. The Rancho Cordova facility also buys some paper grades and glass, selling them to local brokers for shipping to final end markets.

## **Atlas Metals**

This Sacramento company handles beverage containers as well as many forms of recyclable metals. However, the firm does not recycle ferrous metals. The firm will consider longer term contracts, has municipal clients and has equipment which can be provided for a price.

## **A-1 Metals**

Ferrous and nonferrous metals are bought by this Rio Linda company. According to company representatives contacted, the company does not enter into long term purchasing contracts. No more than 500 pounds of aluminum can be bought by the company from individuals.

## **Reynolds Aluminum**

This major end user of aluminum also has two Sacramento locations for collection and shipping of recycled aluminum. The firm also pays California Redemption Value (CRV) for CRV glass and plastic containers. The company is not particularly strict on contamination and will also purchase aluminum foil and other aluminum. Company representatives suggested flattening rather than baling aluminum cans to bring a higher price. The company can provide a flatter and trailer.

## **C & C Metals, LMC Metals**

C & C, with a location in Rancho Cordova, is owned by Sacramento-based LMC. However, the two entities offer different prices. LMC claims to provide the best ferrous prices, while C & C offers the best nonferrous prices of the two. C & C has containers and trucking available for a price.

## **A & A Recycling Systems**

This firm was recently bought by Circo Glass, a major collector and beneficiary of cullet statewide. A & A's plant on Richards Boulevard buys a wide range of recyclables, including glass, nonferrous metals, magazines, chipboard and paper. The firm has for several years handled restaurant glass recycling in the Sacramento area.



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## **Existing End Users**

End users include the actual factory or remanufacturer which will transform the recyclables into the end product. It is important to distinguish between collectors or processors of recycled materials and those entities which will become the end destination of the materials. The end destination of CRRF materials may be a factory, a landscaper, a road construction contractor or a state agency.

Folsom's opportunities to access end users of materials recovered by the CRRF is especially good. It is close to major state agencies which may be required to purchase PIA products manufactured from CRRF materials. The Sacramento metropolitan area is a growing economy with the potential for the location of several very significant end users.

This may be the fortuitous instance particularly for recycled paper grades. Progress is being made toward siting a 1,500 tons-per-day recycled paper mill in West Sacramento. Another major asset to the marketing of materials in the "existing markets" category would be the establishment of a plastic recycling plant in the area. The Sacramento area is almost always mentioned as a potential location for plastic recycling by users of many plastic resin types.

Beyond the immediate area, the regional marketplace within economical transportation distance, features a variety of the end users. This includes the San Francisco Bay area, with the presence there of many recycled product manufacturers including plastic and glass. It is also the port to the immense Pacific Rim markets for recycled paper fiber and other manufacture.

Broadening the remanufacturing infrastructure and opportunities for recycled materials will be especially important to CRRF marketing success due to the wide variety of materials separated. CRRF marketing will benefit from the development of end uses for such materials as tires, paint, mixed glass and mixed paper.

## POTENTIAL MARKETS AND END USES

This section addresses those materials for which markets can be found but are not available, and those materials for which no market or end use exists, but for which new markets can be created. In the case of both types, PIA and the local jurisdiction participating in a CRRF facility must work actively to acquire or create avenues for marketing or otherwise diverting the materials from landfill. PIA can assist in creating products and markets. Secondary manufacturing of CRRF-derived materials by PIA may be possible. PIA can market products to state agencies. These options are, however, long-term and require considerable preparation.

The target prices identified for the materials in the table below are rough estimates. The \$5 per ton figure for wood and paper is convenient because it compares with the (low) per-ton amount estimated for compost sales under the "Organic Materials Market Group." Because "other paper" and "wood waste" are addressed in both groups, the interchangeable price also simplifies calculations and projections. The \$5 figure for plastic is less than half the price charged by current manufacturers of recycled plastic lumber. The price for nonrecyclable glass is zero, based upon its use free-of-charge for glasphalt or similar potential markets.

### POTENTIAL MARKETS GROUP

MATERIAL	TONS/MONTH	TARGET PRICE	REV./MONTH
Other paper	455.42	\$5	2277.08
Film plastics	111.33	\$5	556.66
Other plastics	104.33	\$5	521.66
Wood waste	39.83	\$5	199.16
Other nonrecyclable glass	4.90	\$0	0
<b>TOTAL</b>	<b>715.81</b>		<b>\$3,554.56</b>

### Characteristics

The material types addressed in this group are mixes of the materials. For example, "other paper" is a catch-all for paper which can not be recycled for reasons such as coatings or contamination. It might include magazines, fast food wrappings, aseptic packaging such as milk cartons, or book covers.

"Other plastic" is largely durable plastics such as pails, patio furniture or discarded office equipment. It can include almost the entire range of plastic resins. "Film plastic" is also a combination of resin types, but is predominantly low-density polyethylene (LDPE).

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"Other nonrecyclable glass" includes light bulbs, window glass and ceramics which cannot be recycled like container and other recyclable glass.

Woodwaste, as indicated in the discussion below, is woodwaste which has not been treated chemically or in other fashions which would restrict its use in transformation such as composting and biomass fuel. It could include relatively clean lumber scraps, demolition waste and landscaping or household wood scraps.

Also, the materials in these categories may have higher levels of contamination than "mixed paper," the category used in the Existing Markets Group. "Other paper" may be more difficult to distinguish by type due to crushing, size, or other impacts on any distinguishing characteristics the materials might have. For this reason, the volumes estimated for these figures may be higher than is actually found in the final segregated quantities of this material.

## **Woodwaste: definitions and marketing considerations**

Woodwaste can be a general term for many subtypes of materials. These would generally include woody brush or yardwaste over more than four-inches diameter, lumber scraps and demolition woodwaste. It might also include wood parts in the wastestream, timber residue and sawdust.

In evaluating a material specific strategy for woodwaste, options are presented in two of the material groups addressed. The "Potential Markets Group" is the first which includes wood waste. It is also included in the "Organic Materials Group."

The market approach for woodwaste under these two groups is different because of the transformation of the material. Under the "Potential Markets Group" approach the wood material remains in its basic form. Under the "Organic Materials Group" it is decomposed by the anaerobic digestion process. Marketing of the humus product which results from the composting process is addressed under the "Organic Materials Group" discussion. Use as a fuel for energy plants is also evaluated in that section.

For the most part, woodwaste may be processed for any of these uses in a similar fashion: the wood received at the CRRF is pulverized, shredded, ground or otherwise processed to reduce the particle sizes to the necessary specifications. The CRRF process features complete equipment capability and capacity to conduct such size reduction.

The anaerobic composting process will blend the woodwaste with other feedstocks. Prior to its use as feedstock, however, other markets are available. Several promising potential end uses for woodwaste have been surveyed for the City of Folsom CRRF materials. These include the following:

- Sale for reuse. Lumber and other wood material which can be sold "as is." This alternative has the advantage of being used for material which may have been painted or otherwise treated but which may still have value for landscaping uses and other home uses.
- Firewood. Wood which has not been treated and which is relatively clean of nails and other impurities may be sold to the general public for firewood. Large yardbrush (greater than four inches diameter) may similarly be used for kindling.
- Landscape material. Larger lumber, of regular and irregular sizes and shapes, may be sold to the public for a variety of landscaping uses. Although cedar, redwood and other moisture resistant species will be preferred, other woods can be used for special structures, gates and trim as well as for many of the uses of longer-lasting species.
- Particle board. Establishing a grading for scrap wood grades may allow the material to be sold for particle board remanufacture and similar pressed wood products.

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A consideration of some of the uses above is provision for storage and for space to market direct to the public. Storage may require waterproof cover, lifting equipment and other equipment or vehicles. Marketing to the public entails considerations including access, display and personnel.

## **General Approach**

A key principal of the CRRF marketing effort is to utilize existing private end uses or markets to the greatest degree possible. This principal will be applied to the "Potential Markets Group" of materials. However, the CRRF will generate a variety of materials, many without established markets. Innovative new products and markets will be required for these materials. The marketing approach to the "Potential Markets Group" of materials should rely on a combination of private, municipal and PIA approaches to developing products and markets. Following are such potential products and markets.

## **Private New End Uses**

For the purpose of this discussion, "private new end uses" would be an application or use of the material which is not now done on any significant scale or on a limited, but unproven, scale. Many private recycling activities which are being developed fall under this category. Many of these are processes struggling to find solid markets or end uses.

Several actions can be taken by the City to stimulate such end uses for the material it generates. These activities might include attracting to the area new businesses which exist expressly to use the materials generated by the CRRF material recovery process.

In order to identify which types of end uses might be feasible for the City of Folsom CRRF, several sources of previous research were utilized. These included interviews with end users and brokers, preliminary analysis by Prison Industry Authority, and existing trade data and information. Based on these sources, the following were identified as potential private end uses for the "Potential Markets Group" of materials:

## **Plastic lumber and other extruded goods**

Prison Industry Authority has conducted preliminary feasibility on the remanufacture of both film plastics and "other" plastics into non-structural plastic lumber. This remanufacture may be conducted by a private entity willing to make the capital investment in the necessary equipment. PIA has identified a primary constraint being an assured supply of adequate volumes to justify the capital expense. Private ventures interested in producing plastic lumber from CRRF materials have expressed concerns about an end market for the product. Competition in price with wood products and uncertainty of public acceptance of plastic lumber have been cited as market obstacles.

A key benefit to plastic lumber development is its suitability to use two resin types generated in large volumes by the CRRF process. These are "other plastics," largely rigid plastics of mixed resin types, and "film plastics" such as plastic bags. Together, the two types account for as much as 8 percent of the entire municipal wastestream.

Very few, if any, current manufacturers of plastic lumber have utilized actual post-consumer film plastics. The plastic lumber process is well suited to using this material. However, because of the cost of separating from the municipal wastestream, is it not available in quantities sufficient to produce plastic lumber. The CRRF process will be the first to make available consistent quantities of post-consumer film plastic for this use.

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## **Roadbed using nonrecyclable glass**

Currently several tests are underway to assess the feasibility of crushed glass mixed with rock to use as base material for road paving. The closest such test is that being conducted by the City of Sacramento in conjunction with Teichert Construction Company and several other government agencies, including Caltrans. That test is studying the use of commingled beverage container glass. Based upon the results of the test, further investigation can be made into using nonrecyclable glass for the same applications.

## **Paper insulation**

Several firms are known to be locating in the Sacramento area which will use recycled paper, including otherwise nonrecyclable contaminated paper to manufacture fireproof insulation materials. The City should contact local redevelopment agency officials to pursue sale of otherwise nonrecyclable paper to such firms.

## **Municipal End Uses**

In evaluating potential self-created end uses, several municipal uses of recyclable materials were identified. These have the potential particularly for utilizing materials for which it might otherwise be difficult to find end uses. These potential municipal end uses include the following:

### **Roadbase**

In the same manner which material which could be remanufactured and used by a private company, the City of Folsom may be able to require that contractors performing City road projects use specified amounts of crushed recyclable glass in roadbase. Such a requirement would be possible only upon positive results of current tests using roadbased glass.

### **Plastic lumber**

The City could specify that park equipment, fencing and other nonstructural lumber needs be met by plastic. Bids could specify that the manufacturer purchase City recycled plastics. Or the City could extrude its own plastic lumber for its own uses. This might involve a significant capital equipment expense. An analysis of the costs and benefits of this alternative would need to be evaluated.

### **Recycled paint and oil**

By agreeing to use recycled paint for City projects, the City can assure that recyclable latex paint collected by the City will be recycled. The City of Folsom could evaluate acquiring used paint and used oil recycling exchange with existing recyclers or acquiring equipment to recycle materials "in-house."

## **Action Plan for Creating Private and Municipal End Uses**

The following is the suggested steps necessary for the evaluation, selection and implementation of local private and municipal end uses for CRRF generated materials.

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## **Contract private companies**

The City may contract a vendor to process materials generated to the City. The best example of this arrangement is the recycling of latex paint for municipalities. Paint collected by Sacramento area programs is recycled by a private Sacramento company. The participating municipality is required to purchase back the processed paint according to terms arranged in advance.

## **Conduct prototype City programs**

Several materials may be suitable for use by the City, but should be successfully demonstrated in advance of a long-term commitment by the City. An example is mixed glass roadbed use. Demonstration use in City projects may clear technical obstacles to large-volume applications.

## **PIA Potential Markets**

Prison Industry Authority may be able to play a key role in developing the products and end markets use of recycled materials from the "Potential Markets Group." Statutory constraints on PIA's ability to sell on the open market limit these options. This barrier and recommendations to overcome it are described in detail further in this report.

Still, PIA's own industries and the purchasing power of other state agencies provide the potential to absorb significant quantities of materials from the following processes. These and additional PIA market opportunities for CRRF-generated, municipal, post-consumer materials are addressed in the report *Identification of PIA and State Markets* prepared for the California Integrated Waste Management Board. The following are the most immediate potential PIA and state markets.

### **Plastic lumber**

PIA has already committed to demonstrating plastic lumber manufacture from the CRRF material stream. The Folsom CRRF is expected to feature a plastic lumber extruder. The extruder would use film and rigid plastics separated from the City of Folsom wastestream

Products from the Folsom extruder may be marketed by PIA to other state agencies. These products may include landscaping and park items, composting boxes for state facilities, and sign poles for Caltrans. Broad use by the state of such items manufactured from postconsumer plastic could be very significant in the development of greater markets for such items. As the greater public becomes aware of use by the state, greater public use of plastic lumber may be encouraged, thus benefitting development of the broader market.

### **Animal bedding**

PIA operates many animal husbandry operations including dairy operations. The "other paper" generated by CRRF operations may be feasibly used for this purpose. Several issues should be considered first however, including pathogen incidence and other contamination features. The capacity of this option for absorbing post consumer paper may not be particularly high. But it is a potential market worth exploring. The greater the number of market options for materials, the more economically secure the CRRF process will be.

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## NO MARKETS GROUP

The No Markets Group of materials includes facility residue and several other materials which have no known markets. The amount of materials in this group is small, just over 100 tons a month compared with more than 1,000 tons per month in the "Existing Markets Group" of materials.

The "No Markets Group" of materials must be addressed as will be other materials for which markets exist. Generally, however, these materials will be landfilled. If an alternative to landfilling the materials can be found this is the preferred management. A survey of alternatives for reducing, diverting or otherwise managing the materials are found after the following table.

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### NO MARKETS GROUP

MATERIAL	TONS/MONTH	TARGET PRICE	REV./MONTH
Inert solids	86.66	0	0
HHW containers	15.16	0	0
<b>TOTAL</b>	<b>101.83</b>	<b>0</b>	<b>0</b>

### Characteristics

Each of the two types identified here have rather broad characteristics. Inert materials; as quantified here, is a generally a mix of the rubble and wood. This category is also a catch-all used in waste disposal characterizations. Materials which cannot be identified because of small size or other reasons may be included in this category.

### Inert solids

Inert solids, as identified here, may also include construction and demolition waste. This waste type contains two distinct subtypes: wood waste and rubble. Rubble is concrete, asphalts, rocks and torn up masonry. According to analyses of such materials, the ratio of wood waste to rubble in C and D waste is about one-to-three.

Wood waste is actually an organic waste, not inert. By some effort at the site of generation, and by crushing, floatation and other devices, much of the wood can be separated from other inerts. However, much of the inerts and wood will be contaminated by previous treatment.

Wood not contaminated by paint and other treatment is identified in the "woodwaste" category under the "Potential Markets Group" of materials and "Organic Materials Group" elsewhere in this document.

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## **Household hazardous waste and containers**

The material types which constitute household hazardous waste are listed in Form 303 issued by the California Integrated Waste Management Board. Included in the "No Markets Group" of materials is the range of toxic hazardous materials generated by households such as pesticide and insecticides, paint, cleaners, motor oil and motor batteries.

A small number of HHW types, motor oil, batteries and latex paint, taken together, account for a large proportion, as much as half or more, of household hazardous waste. These "BOP" materials (for "Batteries, Oil and Paint") are also recyclable. The recyclable HHW is addressed in the "Existing Markets Group." The remaining fraction of pesticides, solvents and other toxic HHW is reflected in the "No Markets Group."

## **General Approach**

Each of the materials listed in the table above must be addressed individually. However, the approach to each is to reduce its generation where possible and properly manage its disposal where this is not possible.

## **Separation of construction and demolition waste**

In order to capture recyclable or otherwise divertable construction and demolition waste the CRRF strives to identify untreated wood and crushable rubble both at the generation site and at facility. Most of the separation at the facility takes place at the tipping floor. However, the City may institute requirements that contractors separate demolition materials, or offer tipping charge reductions by doing so. This option may be more feasible in some municipalities than others. Separation into clean categories of materials such as scrap metal would afford markets available under the existing or potential markets group.

## **Source separation of household hazardous materials**

A key to acquiring marketable, non-toxic batteries, oil and paint is the education and participation of the local residents in the programs for separation of these materials. Only recyclable household hazardous waste will be generated by these programs.

## **Disposal and handling**

The disposal and handling of HHW and containers generated by the CRRF will be the responsibility of the local government. This will be a significant consideration in the operation of the CRRF. The City of Folsom has made agreements with private, licensed firms to manage the collection, storage and disposal of hazardous waste from the CRRF facility.



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## ORGANIC MATERIAL MARKETS GROUP

A group of material types, including much more than just yardwaste, is considered in this marketing group. The CRRF anaerobic digestion technology is expected to compost most of the organic fraction of the typical municipal wastestream, including food waste, wood, paper and other organics. The three main "ingredients"-- yardwaste, other paper and food waste-- represent the three largest fractions, in that order, of the wastestream.

The energy and market value of the methane produced by the CRRF anaerobic digestion process is not considered here. Although it may be an economic factor in future CRRF processes, it will not be so at the Folsom facility. The market options for the "Organic Materials Market Group" will be those addressing the organic humus produced by the process.

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### ORGANIC MATERIAL MARKETS GROUP

MATERIAL	TONS/MONTH	TARGET PRICE	REV./MONTH
Food waste	299.7	\$5	\$1,498.50
Agricultural crop residue	0.0	\$5	\$0.00
Manure	0.0	\$5	\$0.00
Other organics	3.00	\$5	\$15.00
Wood waste	39.8	\$5	\$199.15
Other paper	455.4	\$5	\$2,277.50
Yard waste	505.5	\$5	\$2,527.50
<b>TOTAL</b>	<b>1303.4</b>		<b>\$6,517.20</b>

### Characteristics

The characteristics of humus produced by high-solids anaerobic digestion have been analyzed with the assistance of the UC Davis civil engineering department. Using the feed materials types which will be used for the CRRF composting process, Drs. Masoud Kayhanian and George Tchobanoglous found that humus produced from the materials and high-solids digestion was high in plant nutrient value, of very small particle size, with modest thermal energy value.

Based on the humus characteristics presented by UC Davis, Dr. Douglas Williams of the agricultural engineering department of California Polytechnic State University in San Luis Obispo is analyzing the relevance of the humus characteristics to agriculture and related end uses. The results of the UCD analysis are included in the PIA report "Issues in Anaerobic Digestion," to be submitted to the CIWMB under its interagency agreement with PIA.

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## **Paper: recycling versus composting**

A key in evaluating the material specific strategies for CRRF composting is the very unique interrelationships between markets, material types and the operational considerations of CRRF composting and recycling. These interrelationships impact paper more than most other organic materials. The considerations associated with composting paper illustrate the many unique features of CRRF anaerobic digestion.

One of the primary operational considerations of the CRRF "high solids" anaerobic digestion process is the ratio of carbon to nitrogen. The relative content of nitrogen and carbon found in the materials used is key to determining the mix of these materials in the anaerobic composting operations. This mix is largely the "recipe" of yardwaste, food waste and paper. Food waste contains the highest nitrogen, paper has the highest carbon and yardwaste is in between. Food waste is the most volatile (and putresible) and must be combined either with yardwaste or paper in sufficient volumes, in proper ratio.

According to the operational plans for the Folsom CRRF, sufficient paper necessary for anaerobic composting (and for backup material) should be provided by the "other paper" category of paper. This category is the second largest single component of the Folsom wastestream. It is considered largely "contaminated" by moisture, food waste and general condition, historically difficult if not impossible to market.

The anaerobic digestion process functions as the composting bin for contaminated fibers of any grade, but is anticipated to do this especially for the "other paper" category which is considered largely contaminated. Mixed-paper recycling and recycling of less-valued "junk" grades is on the upswing with brokers posturing to source materials for the new generation of recycling plants. In addition, in the "Potential Markets Group" material approach, "other paper" is identified for insulation, bedding and other noncomposting end uses. These options should be pursued. But "other paper" together with other paper grades which have been contaminated will continue to be available for composting.

## **General Approach**

The approach to developing a strategy for CRRF-derived organic materials includes placing a priority on utilizing existing compost markets and end users to the maximum degree possible. These existing companies have established customers and are experienced in market requirements. Additional markets and end uses are identified to assure a depth of opportunities for the large volumes of humus to be produced by CRRF anaerobic digestion.

## **Established markets**

A survey was conducted of area brokers of organic products. The survey revealed several possible brokers or buyers for the humus to be used for sale as a soil amendment or for other landscaping uses. It should be noted however that vendors contacted, while very willing to discuss large-volume purchase arrangements, were pessimistic about prices for materials. This was due to their claims that increasing volumes of green waste composting on the market is impacting prices. Vendors also stressed material quality-- the appearance of quality as well as real value as soil amendment. The size of particles, color, moisture and many other esthetic factors bear on the marketability of compost as a soil amendment.

Another key market for municipally produced compost is direct sale to the public. This is a common practice. The City of Sacramento, for example, receives revenue for its compost sold to the public at its composting site at the city landfill. CRRF municipalities could feasibly institute direct sales on a regular basis of the higher quality CRRF humus product. This should be considered a key market activity for the CRRF municipality.

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## Potential markets

A significant potential market for CRRF-produced humus may be its use as a biomass boiler fuel for power plants. The UC Davis research on the humus characteristics indicates a significant energy content. Very little biomass derived from municipal waste has been used for the cogeneration or biomass fuel energy plants found in the Northern California region centered by Sacramento. Contamination found in emissions appears to be preventing the wide use of municipal organics for fuel.

Biomass fuel produced by the CRRF process, however, may have advantages in meeting emission regulations while supplying fuel. Because of the high degree of prior separation into the material types by the CRRF, better control of contamination is expected. This contrasts with the more-contaminated pelletized fuel produced by the mixed residual of other central processing facilities. UC Davis characterization of the CRRF-produced biofuel identifies contaminant levels. PIA is completing an analysis of the humus's suitability as a biomass fuel. Several CRRF operational options include the following:

- Marketing the material, "as is," to private parties further processing and marketing as a biofuel.
- Drying of the material at the CRRF site in preparation for shipping.
- Drying and pelletizing for shipping using extensive equipment to produce a specific moisture content.

## Biofuel markets survey

A survey was conducted of power plants capable of using CRRF organic materials as a boiler fuel. The range identified is roughly the northern, central valley of California. Key facilities within a 100-mile radius of Sacramento and Folsom were identified. This helps to assess transportation in the economics of producing and marketing humus as boiler fuel.

Essentially, for the purposes of evaluating the transportation of either dry humus or humus with moisture content, it is assumed that the cost per mile of transporting one ton is \$0.20 to \$0.50. This is a industry standard applied to transfer station long-hauling of solid waste. Thus, hauling a ton of dried humus 100 miles to a biofuel incinerator would cost \$20-50. Using the survey, a CRRF facility can evaluate its costs to process the material for shipping, assess the transportation costs and arrange suitable end markets for humus acceptable at biofuel energy facilities.

## Land reclamation and restoration

Many types of land can benefit from the application of humus. Prison Industry Authority, because of its operations at corrections facilities around the state and because of its transportation system, has unique opportunities to identify land, particularly public lands, which can benefit from humus application. PIA is currently in the process of identifying such lands and evaluating their potential for accepting CRRF-derived humus. Again, the same transportation economics that apply to shipping dried humus would apply to humus transported for land application. The humus used for land application would be heavier due to moisture content.

PIA has offered municipalities a compost management plan as a feature of the agreement to participate in a CRRF. This plan would identify state land use of composted material in the event that other end uses were unavailable.

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# STRATEGY

The marketing strategy described in this section is suggested for a community which will be marketing the materials derived from a CRRF operation. The strategy is based upon the volumes detailed above, the markets for materials according to the groups described, upon the initial feasibility of alternatives for materials without existing markets. The adopted strategy must first also consider unique local circumstances which may impact marketing.

## **Adopt Material Specific Strategies**

This element of the market strategy entails identifying separate programs to market the material groupings evaluated in the strategy. This can be achieved by using the material grouping presented in this report, by adapting these categories, or by forming other groups or subgroupings.

## **Priority tasks**

Each of the material groupings will have different priorities. However, the Existing Markets Group's priorities will naturally be more immediate. The Potential Markets Group, the Organic Materials Market Group and the No Markets Group will have less immediate priorities. Following are the priorities for each individual group. These priorities are further detailed in the following discussion of specific market strategy steps.

### Existing markets group

- Prepare strategy for sales according to tracking program.
- Begin sales of materials as soon as possible in order to build information base.
- Prepare requests for proposal.

### Potential markets group

- Design and seek funding to demonstrate municipal prototypes.
- Identify PIA market development potentials.
- Solicit private proposals.

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### No markets group

- Implement source reduction efforts.
- Monitor disposal alternatives.
- Research potential market developments.

### Organic materials group

- Evaluate biomass fuel and landsread economics and opportunities.
- Negotiate bulk contracts with private vendors.
- Evaluate direct sales to the public.

## **Solicit bids while using spot markets during phase-in**

The overall strategy for the existing markets materials group will be to sell materials as they are generated for the highest possible price for the volume available. This provides the flexibility to work with the volumes as they increase with the CRRF phase-in.

This phase-in period provides an important opportunity to the municipality. The marketing managers should utilize as great a number of vendors as possible in order to build relationships and understanding. Different brokers should be considered. Local, other domestic and foreign markets should be used if possible.

During this period, as a record of volumes and quality of materials builds, the marketing effort may encourage vendors to submit proposals for longer-term or volume purchase agreements. However, the municipality should avoid locking in any large block of materials for long periods of time. This will preclude taking advantage of changes in the marketplace for materials.

## **Target prices**

The target prices used for the material specific strategy are those generated by the initial survey. As the City begins phasing in volumes of materials it can then use the periodic target prices generated by the tracking program projections.

These target prices should only be used as a starting point, or reference point, in evaluating market prices and terms. As actual sales records are compiled, the target prices generated as projections will better reflect sales goals.

## **Phase In Volumes**

The projections using the tracking database will be used to estimate the projected volumes both initially and ongoing. The projections allow the user to evaluate overall considerations of how, when and where materials will be marketed.

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The objective during the phasing in of volumes from the CRRF will be to generate a track record using various vendors and other market options. Once the generation of materials from the CRRF reaches a consistent level, the marketing effort should seek an established strategy. This strategy will continue to seek diversity and new markets.

## **Existing Markets**

The basis of marketing during the phase in period will be existing markets. Materials generated during demonstration phases and during the ramping up of CRRF operations will be materials suited to common grades purchased by these established markets.

As spot markets are used on a phased in basis, information is generated in the tracking program. This becomes the basis for both longer-term and higher-volume contracts or prices. When consistent volumes of the specific materials are generated, a Request for Proposals may be considered for longer term sales agreements.

## **Brokers**

During the phase in period, brokers may be used to explore broader markets, including foreign export markets. Brokers may provide the municipality with extra flexibility to take advantage of fluctuations which occur throughout the marketplace. Brokers exist for a wide variety of material types. Only a few are listed in the survey conducted for this report. The municipality should continuously seek out other brokers and evaluate marketing of materials through the brokers.

As a cornerstone of this strategy, the municipality should seek to avoid any long-term commitments of material sales to a specific purchaser at the early stages of its marketing program.

## **Equipment**

As volumes become consistent, arrangements can also be made with brokers and vendors for the use of equipment to bale, transport and otherwise prepare the material more efficiently for market. Some brokers will agree to provide the equipment for an adjustment in the market price of materials. Thus, the equipment is capitalized against projected volumes.

## **Implement Potential Markets Plan**

The market plan for the "Potential Markets Group" of materials does not have the revenue potential of the "Existing Markets Group" of materials. Nor is immediate implementation of many "Potential Market Group" activities as critical. However, the eventual success of the "Potential Markets Group" marketing plan is just as critical in the overall success of the CRRF concept. It is the materials addressed in this group which will greatly impact CRRF avoided landfill costs economics. The following steps should be undertaken as soon as possible:

### **Work with state agencies**

Pioneering market development activities are conducted under the potential markets plan. These activities offer great benefit to development of economical applications for particularly difficult components of the municipal wastestream.

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The City should work with state agencies such as the California Integrated Waste Management Board to obtain technical and financial support to develop and demonstrate such pioneering market development activities such as plastic lumber production and end use.

### **Prototype protocol and funding**

The first step to be taken under the "Potential Markets Group" marketing plan is to develop detailed demonstration plans for the testing of the prototype markets under the potential market group plan. Such prototypes can include those to be conducted by the municipality, by PIA or by private industries.

Once the product and market are prototyped and ready for demonstration, public or private funding can be sought.

### **Institute Tracking and Reporting Program**

A program to track and report marketing is important to the success of a marketing strategy for any recycling program. It is even more important in a successful strategy for marketing CRRF derived recyclable materials. Many of the marketing strategies for CRRF materials require adapting to changes in price and other considerations.

A tracking and reporting program is also vital to inform policy makers, elected and managing officials, and other agencies with a role in the municipality's marketing efforts.

To best perform such tracking and reporting, a series of forms-- "Marketmaster"-- was prepared to be used on software spreadsheets in Lotus 123. More information on using a tracking and reporting database is included in the following section, Tools for Market Development.

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## TOOLS FOR MARKET DEVELOPMENT

Human expertise will be a serious limitation/benefit of CRRF marketing. A unique requirement of the CRRF concept is that responsibility for marketing of materials falls upon the participating municipality. Responsibility within the municipality will likely rest with personnel from the City or County's waste management or recycling department.

For middle-sized California cities in the 1990s, this will typically be one person, with perhaps a couple years in the field. It will be this person, usually titled the municipality's Recycling Coordinator, who will be responsible for the million-dollar program of marketing CRRF materials. The marketing program will involve most of the aspects addressed in this report: marketing of the entire spectrum of materials from the municipal wastestream.

Several tools have been developed to assist the municipal staffperson who must find and develop markets for CRRF-generated recyclables. These include a tracking database application, a sample request for proposals and other relevant material. These materials are available to CRRF-participating municipalities through Prison Industry Authority.

### Tracking Database

The tracking database, dubbed "Marketmaster," is intended to provide a simple format for tracking and reporting sales, conducting surveys and making projections. The program uses Lotus 1-2-3 spreadsheet forms. It is designed to incorporate the initial survey forms used to assess existing markets.

A simple spreadsheet to track factors such as material type, volumes, contamination and related factors, price received and customer can assist in the administration of the municipal marketing program. The model tracking database should be flexible enough to provide the following features:

- Tailor reporting periods. Weekly reports can be an asset to spot marketing. Annual reports will assist accountability to municipal administrators.
- Conduct spot surveys. These can be done on a regular basis. Surveys can be conducted for one or more materials types, or a comprehensive survey of all materials can be conducted for a single report. Materials surveyed and the results of the survey are noted in each reporting period.
- Make projections. Projections can be made for weekly, monthly or annual periods as volumes, prices and other factors fluctuate.



