AGENDA
Special Meeting

BOARD OF DIRECTORS

Monday, February 2, 2015, 8:30 a.m.
128 Sun Street, Suite 102, Salinas, CA 93901

CALL TO ORDER

TRANSLATION SERVICES AND OTHER MEETING ANNOUNCEMENTS

PLEDGE OF ALLEGIANCE

ROLL CALL

Board Directors

County:	Fernando L. Armenta
County:	Simon Salinas, *Alternate Vice President*
Salinas:	Gloria De La Rosa
Salinas:	Jyl Lutes, *Vice President*
Salinas:	Tony R. Barrera
Gonzales:	Elizabeth Silva, *President*
Soledad:	Richard J. Perez
Greenfield:	Avelina Torres
King City:	Robert S. Cullen

Alternate Directors

County:	John Phillips
Salinas:	Joseph D. Gunter
Gonzales:	Scott Funk
Soledad:	Christopher K. Bourke
Greenfield:	Raul C. Rodriguez
King City:	Darlene Acosta

PUBLIC COMMENT
Receive public comment from audience on items which are not on the agenda. The public may comment on scheduled agenda items as the Board considers them. Speakers are limited to three minutes at the discretion of the Chair.

CLOSED SESSION
Receive public comment from audience before entering into closed session:

1. Pursuant to **Government Code Section 54956.8** to confer with legal counsel and real property negotiators General Manager/CAO Patrick Mathews, Diversion Manager Susan Warner, and Legal Counsel Tom Bruen, concerning the possible terms and conditions of acquisition, lease, exchange or sale of 1) Salinas Valley Solid Waste Authority Property, APNs 003-051-086 and 003-051-087, located at 135-139 Sun Street, Salinas, CA; and, 2) Waste Management, Inc. property located at 1120 Madison Lane, Salinas CA

RECONVENE

2. STRATEGIC PLANNING WORKSHOP

- Review of Strengths and Accomplishments since the July 31, 2014 Retreat
- Discuss Key Questions and Develop Six-month Objectives for 3-Year Goal B (2013-16):
  Goal B. Complete Development of Salinas Valley Area Station/Materials Recovery Center
  a. **Presentation by Global Organics Energy, Clean Fiber Recovery System** (autoclave and organics to electricity)
- Review/Discuss Proposed Six-month Objectives for the following 3-Year Goals (2013-16):
  Goal A. Develop a Three-year Finance Plan to Fund 75% Diversion
  Goal C. Develop a Use Plan for Jolon Road/Crazy Horse/Lewis Road Landfills
  Goal D. Increase Public Involvement/Engagement
  Goal E. Develop Johnson Canyon Landfill Operations Plan (Post Recology)
- Consider/Discuss Proposed Six-month Objectives for Proposed New 3-Year Goal (2013-16):
  Goal F. Promote and Maintain a High Performance, Efficient, and Flexible Workforce

ADJOURNMENT

This agenda was posted at the Administration Office of the Salinas Valley Solid Waste Authority, 128 Sun Street, Suite 101, Salinas, and on the Gonzales Council Chambers Bulletin Board, 117 Fourth Street, Gonzales, **Friday, January 30, 2015**. The Salinas Valley Solid Waste Authority Board will next meet in regular session on **Thursday, February 19, 2015.** Staff reports for the Authority Board meetings are available for review at: ▸ Salinas Valley Solid Waste Authority: 128 Sun Street, Ste. 101, Salinas, CA 93901, Phone 831-775-3000 ▸ Web Site: **www.salinasvalleyrecycles.org** ▸ Public Library Branches in Gonzales, Prunedale and Soledad ▸ City Halls of Salinas, Gonzales, Greenfield, King City & Soledad.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in the meeting, please contact Elia Zavala, Clerk of the Board at 831-775-3000. Notification 48 hours prior to the meeting will enable the Authority to make reasonable arrangements to ensure accessibility to this meeting (28 CFR 35.102-35.104 ADA Title II). Spanish interpretation will be provided at the meeting. *Se proporcionará interpretación a Español.*

SALINAS VALLEY SOLID WASTE AUTHORITY
STRATEGIC PLANNING RETREAT
Monday February 2, 2015 – 128 Sun Street, Suite 102, Salinas, CA

8:00 Continental Breakfast

8:30 Welcome, Purpose of the Retreat and Introduction of the Facilitator and Recorder
– Liz Silva, Board President

- **Public Comment, Closed Session, Reconvene, Report Out,**
- **Role of the Facilitator, Recorder, Group and Public; Strategic Planning Elements; Agenda –** Marilyn Snider, Facilitator – Snider and Associates
- **Introductions of the Group**
- **Salinas Valley Solid Waste Authority:**
  - **Mission/Purpose Statement**
  - **Vision Statement**
  - **Core Values/Guiding Principles**
  - **Three-Year Goals (2013-2016)**
- **What Are the Strengths and the Accomplishments of the SVSWA since the July 31, 2014 Strategic Planning Retreat?**
- **Select Six-Month Strategic Objectives Proposed by Staff for Four of the Five Three-Year Goals (2013-2016) (how the goals will be addressed - by when, who will be accountable for what specific, measurable results)**

Goal B: COMPLETE DEVELOPMENT OF SALINAS VALLEY AREA STATION/ MATERIALS RECOVERY CENTER

- **Presentation by Global Organics Energy, Clean Fiber Recover System (autoclave and organics to electricity)**
- **Discuss Key Questions**
- **BOARD: By Consensus, Identify Six-Month Strategic Objectives for the Goal Based on the Key Questions**

Goal A: DEVELOP A THREE-YEAR FINANCE PLAN TO FUND 75% DIVERSION

- **Review/Discuss the Proposed Objectives**
- **BOARD: By Consensus, Affirm or Revise (including additions), if Needed, the Proposed Objectives**

Goal C: DEVELOP A USE PLAN FOR JOLON ROAD/CRAZY HOURSE/LEWIS ROAD LANDFILLS

- **Review/Discuss the Proposed Objectives**
- **BOARD: By Consensus, Affirm or Revise (including additions), if Needed, the Proposed Objectives**

Goal D: INCREASE PUBLIC INVOLVEMENT/ENGAGEMENT

- **Review/Discuss the Proposed Objectives**
- **BOARD: By Consensus, Affirm or Revise (including additions), if Needed, the Proposed Objectives**

Goal E: DEVELOP JOHNSON CANYON LANDFILL OPERATIONS PLAN (POST RECOLOGY

- **Review/Discuss the Proposed Objectives**
- **BOARD: By Consensus, Affirm or Revise (including additions), if Needed the Proposed Objectives**

Proposed NEW Goal F: PROMOTE AND MAINTAIN A HIGH PERFORMANCE, EFFICIENT, AND FLEXIBLE WORKFORCE

- **Review/Discuss the Proposed Six-Month Strategic Objectives:**
- **Board Reviews and Determines, by Consensus, Whether or Not to Add the Sixth Goal and Strategic Objectives to the SVSWA Strategic Plan (2013-16)**

Next Steps/Follow-Up Process (including setting a date in 6 months to update the strategic plan)

Summary of the Retreat

Closing Remarks

1:30 Adjourn

Please come for informal conversation and continental breakfast at 8:00. The meeting will begin promptly at 8:30 a.m. Lunch will be provided during the retreat. Please limit use of cell/smart phones, tablets and laptops to the breaks.

PLEASE BRING YOUR CALENDAR.

SALINAS VALLEY SOLID WASTE AUTHORITY

SIX-MONTH STRATEGIC OBJECTIVES

July 31, 2014 through January 31, 2015

AS OF JANUARY 15, 2015

THREE-YEAR GOAL: ***FUND AND IMPLEMENT 75% DIVERSION OF WASTE FROM LANDFILLS***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. Dec. 31, 2014	Diversion Manager	Meet with all Authority staff to receive input on how the interim Materials Recovery Center at Sun Street can be improved. Develop a prioritized list of suggestions that will improve diversion and efficiency.	X			List completed December 29, 2014.
3. Nov. 30, 2014	Diversion Manager	Apply for grant funding and develop a plan for converting the green waste chip and grind operation at Johnson Canyon to include composting.	X			5 of 51 applications were funded. The Authority's was unfortunately not among them.
4. Dec. 31, 2014	Diversion Manager	Partner with the Salvation Army to create a free clothing distribution outlet in Gonzales as a precursor to development of a second hand merchandise retail outlet for salvaged materials as part of the Salinas Area Materials Recovery Center.			X	Board approved revised project on 12/18/14. Salvation Army has not yet executed the lease agreement
5. ~~Dec. 31, 2014~~ Feb. 19, 2015 Board meeting	Finance Manager	Create five- and ten-year budget/rate projections to facilitate achieving 75% diversion, and include in all future budget documents.			X	Long Term projections will be included in the preliminary budget, scheduled to be presented at the February meetings.

THREE-YEAR GOAL: ***COMPLETE DEVELOPMENT OF THE SALINAS AREA TRANSFER STATION AND MATERIALS RECOVERY CENTER (MRC)***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. Aug. 21, 2014 Board meeting	Diversion Manager – lead, General Manager and Authority Engineer	Present to the Board for consideration authorization to proceed with CEQA analysis on the combined Salinas area Materials Recovery Center and GOE (Global Organics Energy) project.	X			Agreement approved at the 9/25/14 meeting. Kick off meeting held with URS on 10/2/14. Draft site plan developed.
2. At the Aug. 21, 2014 Board meeting	General Manager	Recommend to the Board for action initiation of the CEQA process for the combined project.	X			Agreement and scope of work approved on 9/25/14 meeting
3. By the ~~Sept. 2014~~ Oct. 16, 2014 Board meeting	General Manager	Have the Sun Street and Madison Lane properties assessed and report the results to the Board.	X			Appraisals have been completed and were presented in closed session at the 10/16/14 meeting.
4. At the Oct. 16, 2014 Board meeting	General Manager, working with the City of Salinas and the county	Report to the Board how the City of Salinas and the County could support Madison Lane as the site for the combined project.	X			Verbal update provided 9/25/14. Report will be provided 10/16/14 Monthly progress updates will continue
5. Dec. 31, 2014	General Manager	Meet with all Authority staff to receive input on how the Materials Recovery Center should be designed for optimal customer and employee access and efficiency. Incorporate suggestions into the facility design.	X			

SIX CRITICAL QUESTIONS

Discussion of some of these critical questions resulted in Strategic Objectives under this goal.

#1: Should SVR proceed with the advanced waste recovery system proposed by Global Organics Energy as part of the combined project for CEQA review?
Board consensus: Yes

#2: Should SVR continue providing franchise waste transfer services for the County and Salinas?
Board consensus: Yes

#3: Does the Sun Street Operation have to relocate?
Board consensus: (Decision delayed)

#4: Should Work Street be selected as the preferred option?
Board consensus: No – remove from consideration as preferred site, alternative option

#5: Should the Hitchcock Road site be studied?
Board consensus: No – remove from consideration as preferred site, alternative option

#6: Should the Madison Lane site be studied?
Board consensus: Yes

THREE-YEAR GOAL: ***UTILIZE JOLON ROAD, CRAZY HORSE AND LEWIS ROAD CLOSED LANDFILLS TO GENERATE REVENUE***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. Dec. 31, 2014	Authority Engineer and the Diversion Manager, with input from stakeholders around each landfill	Develop and present to the Board for action a budget for a consultant to develop a scope of work for generating revenue, including identification of funding.	X			Budget for this item approved 9/25/14 meeting
2. Dec. 31, 2014	General Manager	Actively participate in the Monterey Bay Economic Partnership and report the results to the Board.		X		SVSWA is now formally enrolled as a member, periodic updates to follow
3. March 1, 2015	Authority Engineer and the HR/Organizational Development Manager	Start the procurement process to hire a consultant with possible student intern support and/or local college/university participation in business development planning.			X	Delayed procurement process to allow Monterey Bay Economic Partnership to be involved.

THREE-YEAR GOAL: ***INCREASE PUBLIC ACCESS, INVOLVEMENT AND AWARENESS OF SVR ACTIVITIES***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. Dec ~~Nov. 30~~, 2014	HR/Organizational Development Manager	Prepare a plan for expansion of Spanish outreach and present to the Board for consideration.	X			To be presented to Board at December 18, 2014 meeting
2. Dec. 31, 2014	HR/Organizational Development Manager	Grow email/social media distribution lists by 50%.		X		Combined Resource Recovery's email distribution to increase list.
3. Dec. 31, 2014	HR/Organizational Development Manager	Expand connections with local special interest organizations (e.g., Chambers, Rotaries, Legion, and environmental sustainability groups) by providing at least six (6) presentations on Authority activities.		X		Continuing and ongoing.
4. Dec. 31, 2014	HR/Organizational Development Manager	Develop and implement a plan for conducting large public meetings through webinars.		X		Marketing committee working with staff and Ad Manor on this project.
5. Jan. 31, 2015	HR/Organizational Development Manager	Create pre-recorded informational/how-to videos to reduce, reuse and recycle for distribution through electronic media and website.		X		Working with staff to record any upcoming presentations to the public and post on website.
6. Jan. 31, 2015	President Silva (lead) Each Board member	Attend at least one event and distribute information about SVR goals and activities.		X		Several Board members have already participated in outreach activities. A final report on Board member participation for this period will be presented in Feb 2015

THREE-YEAR GOAL: ***REDUCE COSTS AND IMPROVE SERVICES AT THE JOHNSON CANYON LANDFILL AND OTHER SVR FACILITIES***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. Nov. 30, 2014	Operations Manager	Complete all temporary improvements at the Sun Street Transfer Station to provide for 2-3 years of added operational life and present to the Board necessary approvals.	X			Pavement work and roof repairs completed November 9, 2014.
2. By Jan. 15, 2015	Operations Manager	Complete all necessary equipment purchases, staff hiring and training to commence Authority operations at Johnson Canyon Landfill on January 1, 2015.	X			Staff has been hired and initial training has taken place. Final orientation will take place on Dec. 21, 2014. All equipment has been purchased.
3. Jan. 15, 2015	Operations Manager Diversion Manager	Evaluate alternatives for optimal recovery of recyclable materials (glass, plastic, cardboard, paper, carpet, film plastic, wood, organics, metal, construction debris, and textiles) at the Johnson Canyon Landfill. Develop a plan for receiving, storing and marketing the materials.	X			Alternatives discussed, preliminary plan for site improvements developed. New employees instructed on salvage and diversion practices.

SALINAS VALLEY SOLID WASTE AUTHORITY

PROPOSED - SIX-MONTH STRATEGIC OBJECTIVES

February 2, 2015 through July 31, 2015

THREE-YEAR GOAL (2013 - 2016): ***FUND AND IMPLEMENT 75% DIVERSION OF WASTE FROM LANDFILLS***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1) By 6/30/15	Diversion Manager	Facilitate completion of plans, specifications and permit applications for the Demonstration Autoclave unit.				
2) By 6/30/15	Diversion Manager	In conjunction with the Salvation Army, open the clothing closet donation center in Gonzales.				
3) By 6/30/15	Finance Manager	In conjunction with the taking over of Johnson Canyon Operations, shift costs associated with material recovery to AB939				
4) By 7/30/15	Finance Manager/ Diversion Manager	Implement equalization of Greenwaste fees.				

THREE-YEAR GOAL: ***COMPLETE DEVELOPMENT OF THE SALINAS AREA TRANSFER STATION AND MATERIALS RECOVERY CENTER (MRC)***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1) April 16, 2015 Board Meeting	General Manager	Provide an option agreement for the Madison Lane Transfer station property acceptable to Waste Management and the Authority Board.				
2) April 30, 2015	General Manager	Participate in the drafting of a Memorandum of Understanding concerning the construction of the Rossi Street extension.				
3) May 21, 2015 Board Meeting	Diversion Manager	Facilitate the preparation of the Notice of Determination and Initial Study for Board consideration.				
4) June 18, 2015 Board Meeting	Diversion Manager	Facilitate the preparation of the Scope of Work and Agreement with URS to prepare the environmental review documents and public scoping meetings contingent upon completion of Items 1, 2, and 3.				

THREE-YEAR GOAL: ***UTILIZE JOLON ROAD, CRAZY HORSE AND LEWIS ROAD CLOSED LANDFILLS TO GENERATE REVENUE***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
1. June 15, 2015	Authority Engineer and the HR/Organizational Development Manager	Develop planning document and/or proceed with projects with possible assistance with local student interns				
2. June 15, 2015	General Manager/CAO Authority Engineer	Evaluate Ameresco project structure to deliver electricity from Crazy Horse Landfill Gas Power Project to Monterey County under PGEs Net Energy Metering and facilitate project discussions with County staff				

THREE-YEAR GOAL: ***INCREASE PUBLIC ACCESS, INVOLVEMENT AND AWARENESS OF SVR ACTIVITIES***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
6) By May 31, 2015	Recycling Coordinator	Develop the 2015-16 Marketing Work Plan.				
5) By June 30, 2015	Recycling Coordinator	Implement a plan to measure and evaluate marketing campaigns utilizing statistics and surveys.				

THREE-YEAR GOAL: ***REDUCE COSTS AND IMPROVE SERVICES AT THE JOHNSON CANYON LANDFILL AND OTHER SVR FACILITIES***						
WHEN	**WHO**	**WHAT**	**STATUS**			**COMMENTS**
			DONE	ON TARGET	REVISED	
By 7/31/15	Operations Manager	Complete plans for Materials Recovery Center at the Johnson Canyon Landfill				
June 30, 2015	Operations Manager	Exceed previous contractors diversion percentage at Johnson Canyon Landfill				
June 30, 2015	Authority Engineer	Develop Planning Documents to improve JCLF Flare Station				
June 30, 2015	Authority Engineer	Develop Planning/Design Documents to relocate JCLF Leachate Tank				
June 30, 2015	Authority Engineer	Update SWPPP for all facilities				

PROPOSED NEW GOAL

THREE-YEAR GOAL: ***Promote and Maintain a High Performance, Efficient and Flexible Workforce***

WHEN	WHO	WHAT	STATUS			COMMENTS
			DONE	ON TARGET	REVISED	
By May 31, 2015	HR/Org Manager	Develop a customer service survey plan to include monthly surveys throughout the year.				
By June 30, 2015	HR/Org Manager	Streamline classification levels and benchmarking for job descriptions				
By March 31 2015	HR/Org Manager	Develop safety goals and objectives for 2015-16				
By June 30 2015	HR/Org Manager	Develop a career development process to incorporate with performance reviews				
By June 30, 2015	HR/Org Manager	Complete recruitment for a records clerk to assist in the development, implementation, and maintenance of an agency-wide comprehensive Records and Information Management Program.				

Papermaking Properties and Morphology of Cellulose Fiber Recovered from Municipal Solid Waste

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Abstract

The potential of using cellulose fiber recovered directly from Municipal Solid Waste (MSW) by a steam autoclave process for papermaking is investigated. It is found that the drainage rates of this fiber source (as measured by freeness testing) are unusually high, and superior to those exhibited by fiber from recycled old corrugated containers (OCC). The cause of this freeness increase does not appear to be a removal of fiber fines, but rather a structural reforming of the fiber in the recovery process. This is further examined by utilizing both light and scanning electron microscopy to probe the morphology of the MSW fiber and contrast this with a comparable OCC fiber source. MSW fibers appear to be less collapsed and fibrillated, which is one possible reason for their high drainage rates in a fibrous network. Handsheets made from MSW fiber after refining yield strength values approximately equal to commercial corrugating medium, and substantially greater than those from 100% OCC fiber. Sheet samples produced on a Noble & Wood pilot papermachine indicate that 100% MSW fiber is at least equal to, if not better, than a sheet made from 100% OCC in strength properties. A blend of 50/50 MSW and OCC fiber resulted in a sheet with the best overall balance of strength properties germane to corrugating medium production. The potential economic benefits of utilizing MSW fiber in paper production can be combined with the societal benefit of substantially reducing the amount of municipal waste sent to landfills each year.

Introduction

As of 1996, an estimated 70% of all municipal solid waste (MSW) generated in the United States was sent to landfills, which amounts to approximately 209 million tons of waste per year **(1)**. As a direct result of this situation, landfill space is continually being depleted. Highly populated areas, such as metropolitan New York City and Los Angeles, regularly need to ship their waste to other parts of the US, and have gone so far as to ship MSW to other countries due to a lack of landfill space. As the population continues to increase, so will the amount of generated waste. Simultaneously, the amount of space available for landfilling continues to decrease. The growing enormity of this problem is all too obvious.

Despite the technological revolution in information transfer that has taken place in recent times, the use of paper and paper-related products is still an enormous part of our everyday lives. In areas where there is no separation of waste material, as much as 50% of the MSW sent to landfills is composed of paper products. If this fiber was instead reclaimed and processed such that it had market value in the form of a raw material for papermaking operations, this would present a huge opportunity for reduction in waste bound for landfills. One potential process for the recovery of papermaking-quality fiber from MSW is the "steam autoclave process" developed by *Comprehensive Resources, Recovery, and Reuse* **(2)**. This process is capable of reducing the mass of solid waste sent to landfills by approximately 2/3. In addition to recovery of papermaking fiber, the steam autoclave process also offers the potential to produce a "biogas" mixture of methane and CO_2 via anaerobic digestion of the waste liquor **(3).**

Preliminary tests performed on cellulose fiber produced by this process (by an equipment manufacturer **(4)**) yielded results that showed striking differences in some physical properties compared to other comparable forms of recycled fibers, such as old corrugated containers (OCC). For example, the water drainage rate of this fiber (as measured by the Canadian Standard Freeness method) was found to be significantly higher than that of OCC. In an attempt to both corroborate and expand on these previous findings, the present research was designed to explore the fiber characteristics of MSW fiber produced by the steam autoclaving process, to compare these characteristics to those of a typical recycled OCC sample, and to explore the MSW fiber's physical properties under papermaking conditions. Underlying this goal was the question of why MSW fiber had a consistently higher freeness value than a representative OCC sample.

In order to pursue this objective and to investigate the freeness question, a combination of techniques was employed to ascertain as much information about the fiber as possible. These included pulp properties, handsheet testing, and pilot papermachine runs. Various forms of microscopy were employed to specifically investigate the morphological characteristics of MSW fiber.

Methods and Materials

Canadian Standard Freeness (CSF) was measured for unrefined samples of both OCC and MSW following TAPPI standard methods **(5)**. In order to determine the "fines" fraction of each sample, both OCC and MSW were passed through a Bauer-McNett fiber classifier (screens of 26, 48, 100 and 200 mesh) following TAPPI standard procedures

(6). The CSF of the long fiber caught on the 26-mesh screen was then measured for each of the two fiber types.

In an effort to characterize the morphological properties of MSW fiber, two forms of microscopy were employed. Hydrated samples of both MSW and OCC were freeze-dried so that the fibers would retain the shape possessed when suspended in water. This was done to ascertain whether the shape of the fiber had any effect on drainage. For example, some of the fiber lumens may be more expanded than others in the hydrated state.

Following the freeze-drying step, portions of each sample (MSW and OCC) were embedded in an epoxy and cross-sectional slices were cut using a microtome. These slices were affixed to microscope slides so that the fiber cross-sections could be examined with a light microscope to ascertain whether the lumens were collapsed or expanded. This was accomplished by simply counting the number of expanded (or circular) lumens and the number of those collapsed. The remaining fiber was examined under a scanning electron microscope (SEM) to evaluate the nature of the two fibers' surfaces.

Finally, two different studies were performed to determine the papermaking properties of MSW fiber. The first study was designed to examine whether fine screening of MSW fiber had any effect on its strength in a sheet. For this work, MSW fiber was screened in a Valley Flat Screen using warm (~35 °C) water. Three sizes of screens (0.010, 0.006, and 0.003 inch slots) were used to achieve different levels of contaminant removal. In addition, the accepted fiber from the 0.003 inch screen was refined to a CSF value of ~450ml using a Sprout-Waldron disc refiner in order to assess the fiber strength under "papermaking-like" conditions. TAPPI standard handsheets **(7)** were made for each sample. Following handsheet formation, tensile, burst, stiffness, short-span compression, and flat crush strength tests were performed on the MSW sheets. Sheets were also formed from OCC and a commercial corrugated medium to serve as comparisons.

The second study was performed on paper produced on a Nobel and Wood "Formar" laboratory papermachine. The goal of this particular study was to produce a simulated corrugating medium consisting of MSW and OCC in the following amounts:

1. 100% OCC
2. 75% OCC/25% MSW
3. 50% OCC /50% MSW
4. 50% OCC/25% MSW/ 25% ONP
5. 100% MSW)

This was done under conditions as close as possible to those found in a production mill. The trial conditions and additives were chosen to mimic those of typical corrugated medium. Cationic starch (at 7 lbs/ton) was added for strength enhancement. Tensile, burst, short-span compression, and stiffness tests were performed on the paper samples after they were conditioned according to TAPPI standards **(8)**.

Results and Discussion

A. Fiber characterization

Table 1 gives the CSF values for *unscreened* MSW and OCC. As these data show, the MSW pulp sample exhibits a freeness value of between 100 and 150 points higher than OCC. This freeness gain is typical of recycled fiber recovered from MSW by this particular process. It is, however, somewhat surprising when one takes into account the fact that MSW is composed of virtually every type of pulp fiber imaginable (i.e. corrugated boxboard, newsprint, foodboard, xerographic waste, tissue, etc.), many of which are refined to a significant extent. This suggested to us that there might be a fundamental difference in either the furnish composition (a disproportionate amount of long fiber, or a lack of fines) or in the inherent fiber properties themselves.

One theory considered was that since the MSW fiber was processed on a 0.020 inch sidehill screen (at the pilot production facility), the fines fraction of the fiber was mostly being washed out in a rejects stream. However, as **Table 2** shows, the fines fraction found in the MSW fiber sample (before any fine screening was performed) was actually *greater* than that of OCC comparison sample (16.5 v. 14.8%). Also significant is the fact that the CSF value of the long fiber fraction (that retained on the 24 mesh screen) was only 40 points greater than the complete furnish **(Table 3)**. These observations seemed to indicate that the freeness elevation was not simply due to a lack of fiber fines, and suggests that perhaps the higher CSF value of MSW fiber is the result of a physical change to the fiber that occurs during steam autoclave processing. The alternating pressurization and vacuum treatment that the fiber is subjected to in this process could actually be reforming the fiber in some way.

After the question of fiber fines level was explored, this investigation focused on the physical shape and surface of the MSW fiber. More specifically, there were two possibilities we chose to explore:

1) The steam autoclave portion of the MSW reclamation process "re-inflated" the lumens of the fibers, making them coarser and freer draining.
2) The MSW fiber had less surface fibrillation than other recycled fiber sources, again resulting in higher drainage rates.

Point 1 was tested by using a microtome to obtain cross-sections of freeze-dried fiber samples of both MSW and OCC. Examples of cross-sections of OCC are shown in **Figures 1-2,** and for MSW in **Figures 3-4**. Table 4 shows the results of the cross-sectional analysis in terms of the *percentage of expanded fibers*. These data indicate that there was between 8 and 15% more lumen expansion occurring in the MSW fiber. This suggests that perhaps some portion of the CSF elevation in MSW fiber is due to an increased amount of open fiber lumens, and thus a more open, faster draining fiber network.

The second point was tested by generating scanning electron micrographs of freeze-dried samples of MSW and OCC and then comparing the extent of surface fibrillation. While this test is qualitative only in that we attempted no real numeric measure of fibrillation, close examination of these images revealed that MSW tended to be less fibrillated. **Figures 5-6 and 7-8** are sample micrographs at different

magnifications showing the relative fibrillation of both OCC and MSW samples, respectively. It is well known that fiber fibrillation caused by refining is a major cause of the reduction in drainage rate of the pulp (i.e. freeness). While not dramatic, it does appear that the extent of fiber fibrillation for MSW is somewhat less pronounced. This may also account for some of the elevated CSF exhibited by MSW fiber.

B. Sheet properties

1. Handsheet testing

Since an overall objective of this research was to determine whether or not MSW fiber could be successfully substituted for OCC in the production of corrugating medium, it was relevant to measure the physical strength properties of sheets composed of various levels of MSW. **Table 5** shows the results of the strength study performed with handsheets of corrugated medium, OCC and various forms of MSW fiber. Three different forms of MSW fiber were used in making handsheets:

1) Screened: 0.010" slots
2) Fine screened: 0.006" slots
3) Ultra-fine screened; 0.003" slots + refining

Both TAPPI standard (60 g/m^2) and medium weight (140 g/m^2) basis weight sheets were evaluated. Physical strength tests germane to corrugating medium were performed on these various handsheets.

As the data in **Table 5** show, screening seemed to have no real effect on the strength of the MSW sheets. When compared to the medium sample, screened but unrefined MSW handsheets were weaker in all strength tests. However, after refining to 475 ml, MSW sheets were within 20% of medium strength in tensile and burst, roughly equal in flat crush and short span compression, and significantly better in Gurley stiffness.

Compared to the OCC sample available to us, MSW sheets were stronger, even without refining (refining improved these values even further). It is surprising that the MSW sheets were close in strength to a commercial medium sample, which would likely contain starch and possibly other strength additives. Overall, handsheets made from refined 100% MSW fiber compared reasonably well in strength to either medium or OCC. This result was encouraging for consideration of a pilot papermachine trial where MSW and OCC could be blended together. It seemed entirely possible that acceptable strength properties could be obtained from a blend of between 25 and 50% MSW fiber with OCC.

2. Pilot papermachine trial

Strength data for paper made on the Noble & Wood laboratory papermachine are shown in Table 6, where CD designates the cross-machine direction and MD the machine direction. For selected sheet furnish compositions, data are also shown in graphically in Figures 9-11. Again, conditions were selected to mimic those of a 125 gsm sheet, the most prevalent basis weight of corrugating medium grades. Wet end starch was added at 7 lbs./ton as a dry strength aid. Both OCC and MSW were refined slightly for this trial, to values of 570 and 600 ml, respectively. It should be noted that these strength values are not representative of the actual strength that would be attained on a full sized, commercial papermachine. This is primarily because the Noble and Wood papermachine used for this study does not have a true wet pressing section, thus limiting wet

compaction and sheet density. However, we can compare the data against a sheet made from OCC pulp under the identical conditions. While the actual sheet basis weight varied somewhat from the target of 125 gsm, all of the strength tests except for tensile energy absorption (TEA) are indices normalized for basis weight. In one trial, we incorporated deinked old newsprint (ONP) at a 25% level along with MSW and OCC.

Overall, a comparison for sheets of 100% OCC vs. 100% MSW reveals that the MSW sheet is equal to OCC in burst strength, and somewhat better in tensile, TEA, and SSC (Table 6 and Figures 9, 10). The sheet composed of 50% MSW and 50% OCC appears to yield the most favorable strength properties overall. The data in Table 6 show that this 50/50 blend of fiber had greater test values in MD tensile and both CD/MD SSC index than either source in its pure state. This 50/50 OCC/MSW blend produced superior strength properties than the other 3 blends listed in Table 6, and would be a reasonable fiber mixture for a commercial corrugating medium mill to use.

In addition to the encouraging strength properties shown by MSW fiber incorporated into a simulated corrugating medium sheet, it should be noted that these properties were achieved without extensive refining. The MSW stock was refined to a CSF of ~ 600ml, and the OCC to ~ 570 ml. Typically, OCC is refined to a CSF level of between 400-500 ml for use in either medium or linerboard. This suggests that if the strength values achieved in this study are acceptable, some energy savings in the form of reduced refining would be realized by using MSW fiber. On the other hand, an increase in sheet strength could be produced by further refining of MSW fiber without an excessively detrimental effect on sheet drainage.

Conclusions

Cellulose fiber reclaimed from municipal solid waste by the steam autoclave process developed by *Comprehensive Resources* appears to have unusually high freeness properties, even though the heterogeneity of fiber types present should be enormous. This freeness increase does not appear to be simply the result of fines removal by fiber fractionation. Examination of MSW fiber by both light and scanning electron microscopy indicates that fibers tend to be both less collapsed and fibrillated than a comparable sample of recycled OCC fiber. This results in a coarser fiber that produces a freer draining network, which is evidenced by the higher freeness values measured. It is speculated that the alternating pressure and vacuum treatment cycles of the steam autoclave could be reforming fiber into this state. Further work using laboratory simulation of the autoclave vessel is planned to firmly establish the existence of this apparently beneficial effect. Regardless of its origin, higher freeness values of recycled fiber used for either corrugating medium or linerboard production are certainly desirable from an economic and performance standpoint.

Handsheet and pilot papermachine experiments revealed that MSW fiber compares very favorably with either commercial corrugating medium or OCC in terms of basic strength properties germane to medium. A 50/50 blend of MSW and OCC used on a Noble and Wood Formar pilot papermachine produced a favorable combination of strength properties, and superior to a sheet made from 100% OCC. The use of MSW fiber in paper and board products where it adds value will facilitate the adoption of processes such as

those developed by *Comprehensive Resources* which offer the potential of significant reductions in waste being sent to landfills.

Acknowledgements

The authors appreciate the assistance of *Comprehensive Resources, Recovery, and Reuse* and the *Weyerhaeuser Technology Center* in carrying out this study. In particular, we would like to thank Joseph Anderson and David Bozzi of CR^3, and Ron Zarges of WTC.

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Table 1: Canadian standard freeness for unscreened fiber samples

	MSW	OCC
Average	661.5	509.3
Standard deviation	22.2	29.4
High	697.5	578.0
Low	627.0	466.0
95% confidence	11.2	14.9
Coefficient of variation	0.034	0.058

Table 2: Bauer McNett fiber classification for each fiber sample

MSW		OCC	
screen	percentage	screen	percentage
26	57.57	26	56.45
48	19	48	17.26
100	3.78	100	4.78
200	3.14	200	8.7
fines	16.51	fines	14.81

Table 3: Canadian standard freeness for long fiber fractions of each sample

	MSW	OCC
Average	703.1	704.6
Standard deviation	18.0	13.7
High	725.0	720.0
Low	675.0	685.0
95% confidence	12.5	9.3
Coefficient of variation	0.026	0.019

Table 4: Results of microtome analysis

	OCC	MSW
Percent expanded	27.73	36.04
Standard deviation	6.67	2.11

Table 5: Strength data for handsheet trial

Basis Weight	Sample ID	Tensile Index (Nm/g)	Burst Index (kPa*m2/g)	Stiffness Gurley (mg)	Flat Crush (psi)	Short Span Compression (kN/m)	CSF (ml)
1.2 (g/m^2)	Corrugated medium	38.92	2.79	108.23	17.20	1.26	~500
	10-cut	12.89	1.87	63.27	15.67	0.97	~720
	6-cut	11.94	1.43	77.48	16.80	1.02	~700
	3-cut + refined	31.47	2.31	142.75	16.40	1.31	~475
2.8 (g/m^2)	OCC	4.98	0.55	406.53	25.67	0.96	~500
	10-cut	15.04	1.05	690.38	13.00	2.43	~720
	6-cut	20.01	1.39	1727.16	13.00	2.78	~700
	3-cut + refined	35.27	2.34	100.46	15.90	1.04	~450

Table 6: Strength data for papermachine trial

SAMPLE NAME:	Basis Weight	Burst Index	CD Ten. Index	MD Ten. Index	CD TEA	MD TEA	CD SSC index	MD SSC Index
100% OCC	**148.96**	**1.77**	**40.28**	**75.86**	**48.30**	**64.80**	**8.77**	**14.50**
100% MSW	**130.01**	**1.80**	**50.00**	**84.61**	**64.20**	**86.80**	**9.97**	**16.88**
75% OCC / 25% MSW	116.66	1.24	30.86	66.01	30.00	27.50	11.04	16.96
75% OCC / 25% MSW + starch	117.51	1.56	40.00	82.55	40.90	36.60	8.58	13.96
50% OCC / 50% MSW	**119.08**	**1.78**	**46.19**	**104.13**	**52.20**	**56.60**	**11.00**	**17.80**
50% OCC / 25% MSW / 25% ONP	158.45	1.15	33.45	73.84	32.50	34.60	7.39	13.30

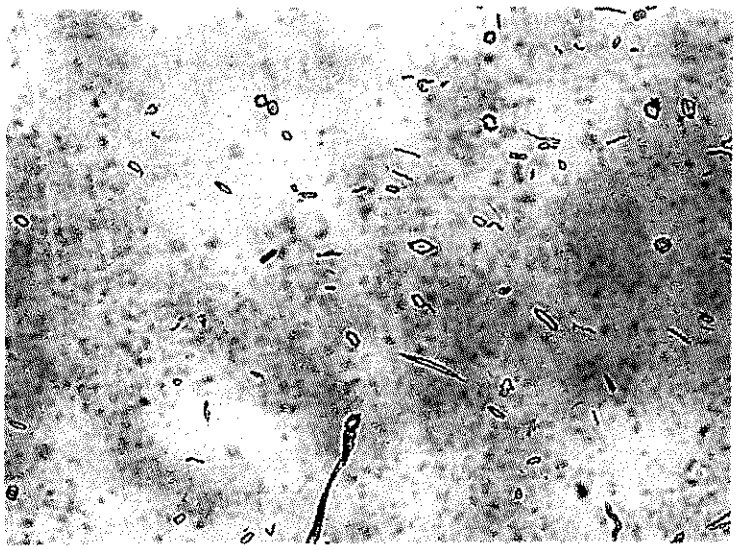

Figure 1: Micotomed fiber cross-section for OCC

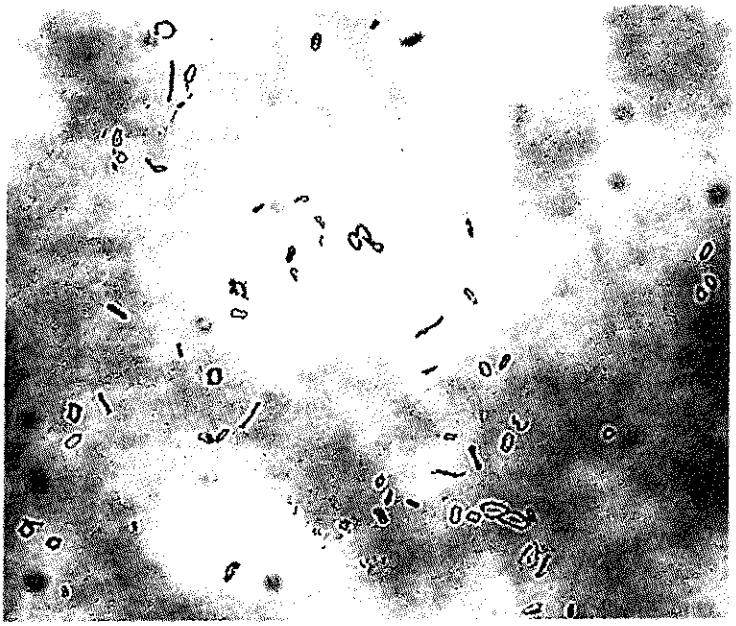

Figure 2: Microtomed fiber cross-section for OCC

Figure 3: Microtomed fiber cross-section for MSW

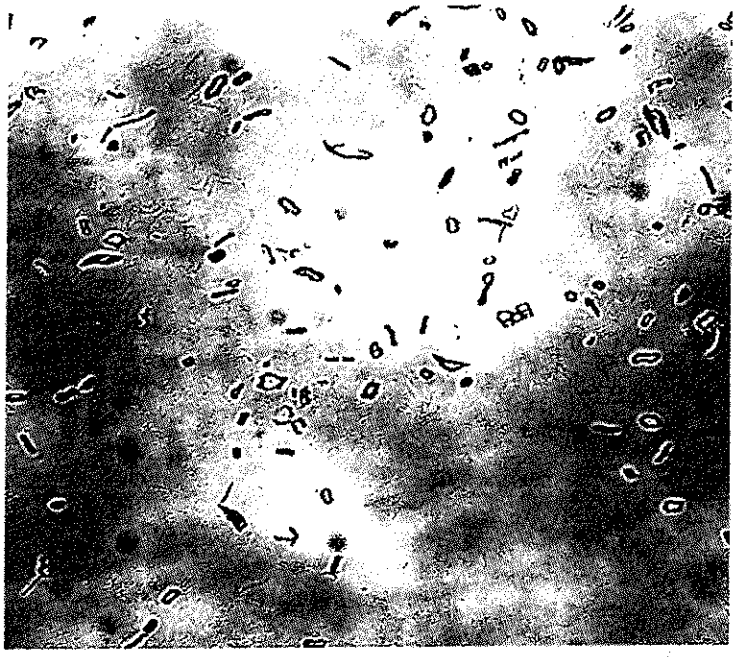

Figure 4: Microtomed fiber cross-section for MSW

Figure 5: Electron-micrograph of OCC fiber

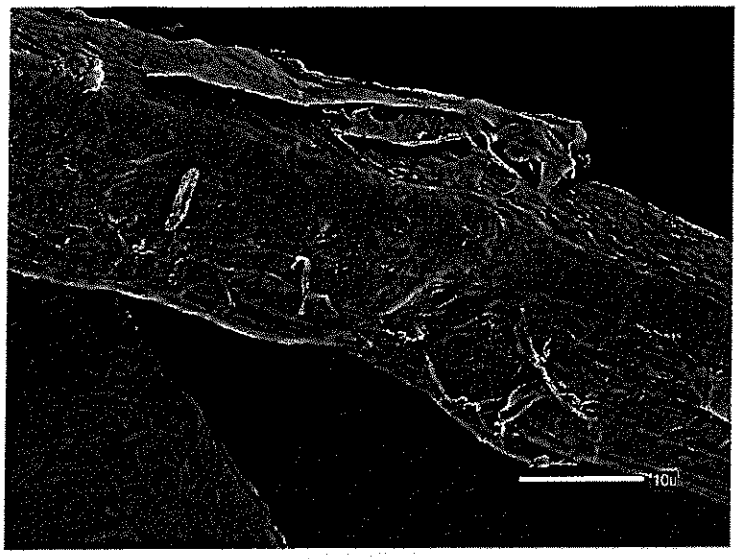

Figure 6: Electron-micrograph of OCC fiber

Figure 7: Electron-micrograph of MSW fiber

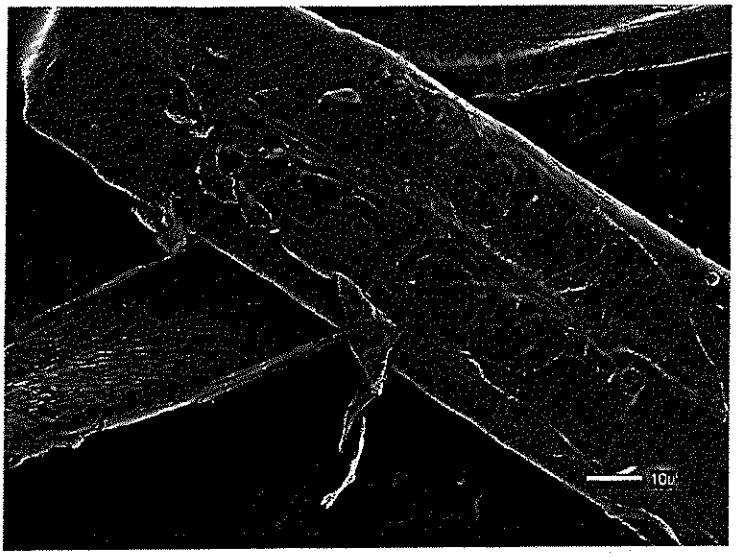

Figure 8: Electron-micrograph of MSW fiber

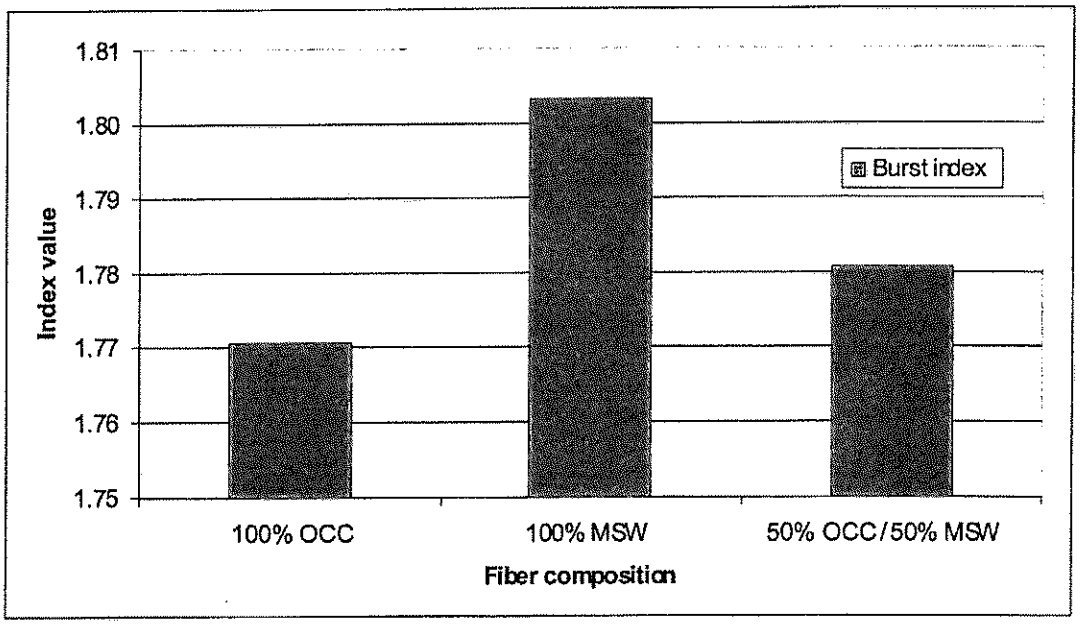

Figure 9: Comparison of the burst index values for the given fiber composition

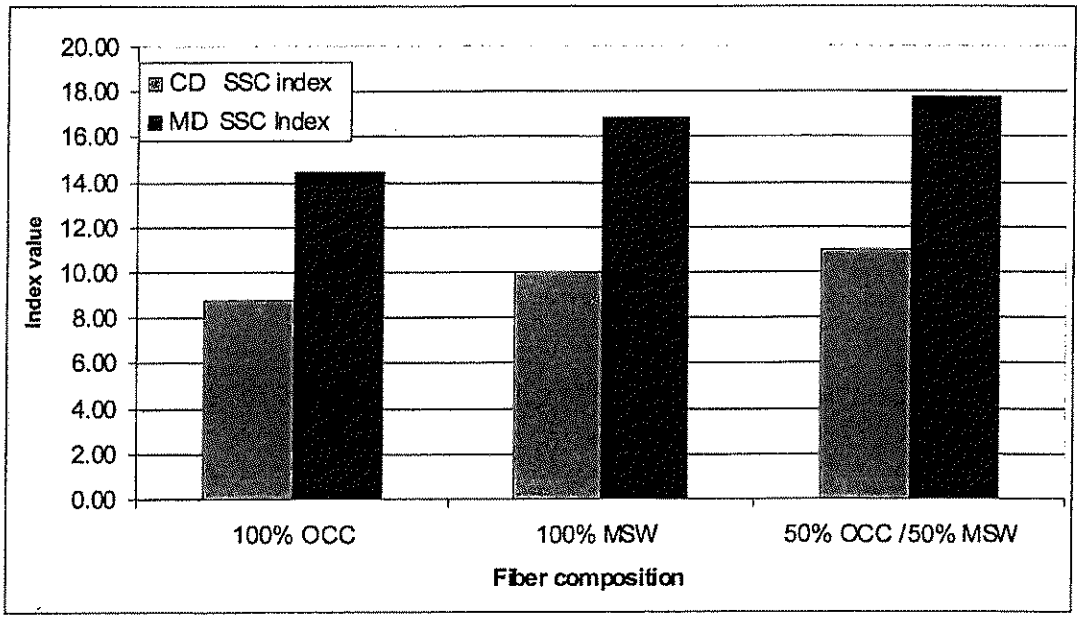

Figure 10:Comparison of the short-span compression index values for the given fiber composition

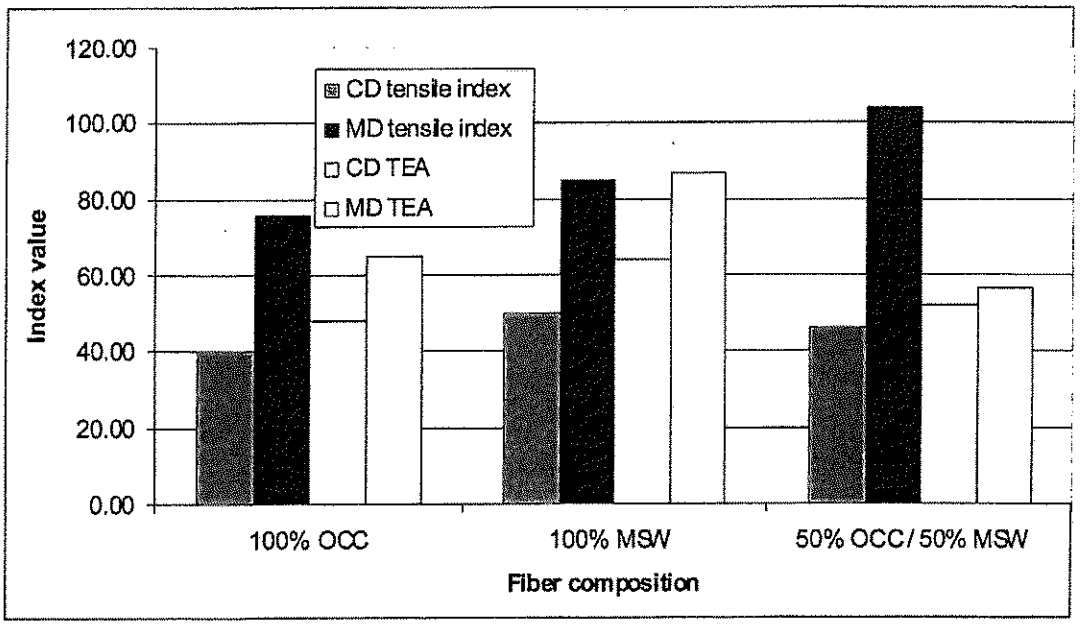

Figure 11: Comparison of the tensile index and TEA values for the given fiber composition

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SALINAS VALLEY SOLID WASTE AUTHORITY
An Economic Impact Analysis of CONSTRUCTING AND OPERATING AN AUTOCLAVE

THIS PROJECT IS SUPPORTED IN PART BY
THE CALIFORNIA ASSOCIATION FOR LOCAL ECONOMIC DEVELOPMENT

Prepared by:
Solution Mountain, Inc.
A CALED Technology Partner
December 2011

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General Project Description

The following economic impact analysis has been prepared on behalf of Salinas Valley Solid Waste Authority (SVSWA). The SVSWA Board has been investigating alternatives to landfill disposal of solid waste. The goal, reaffirmed in August 2010, is to achieve 75% diversion from landfills.

This study seeks to understand the economic impacts for constructing a waste autoclave. A waste autoclave is a form of solid waste treatment that utilizes heat, steam and pressure of an industrial autoclave in the processing of waste. Waste autoclaves process waste either in batches or in continuous-flow processes. In batch processes, saturated steam is pumped into the autoclave at temperatures around 160°C. The pressure in the vessel is maintained at 5 bar gauge for a period of up to 45 minutes to allow the process to fully 'cook' the waste. The autoclave process gives a very high pathogen and virus kill rate.

Modern autoclaves, also referred to as converters, can operate in the atmospheric pressure range to achieve full sterilization of pathogenic waste. Super heating conditions and steam generation are achieved by variable pressure control, which cycles between ambient and negative pressure within the sterilization vessel. The advantage of this new approach is the elimination of complexities and dangers associated with operating pressure vessels[1].

Definitions and Methods

The Economic Impact Analysis Report (attached below) is based on data sets that are specific to Monterey County market area. The typical analysis is either supported by data that is specific to the project or one that is based on historical datasets that are related to the project's market and industry sectors. This report uses historical datasets provided by IMPLAN[2]. The report represents a broader view than simply the Project's direct expenditures or employment. For example the analysis measures the economic "footprint" as project dollars multiply inside and outside of the market area and it includes calculations for both direct and indirect impacts.

The results of this report are not gathered from project-specific information but from datasets that are historically-representative of the economic impacts.

---

[1] Reference Wikipedia. http://en.wikipedia.org/wiki/Waste_autoclave

[2] The data sets used in this report are provided by Minnesota IMPLAN Group, Inc (MIG, Inc), the developers of the IMPLAN® economic impact modeling system. IMPLAN® is used to create complete, extremely detailed Social Accounting Matrices and multiplier models of local economies. Implan enables users to make in-depth examinations of state, multi-county, county or sub-county and metropolitan regional economies. Implan is used by more than 1,000 public and private institutions. MIG, Inc. has been developing complex localized databases and serving public and private organizations since 1993.

The Project's analysis includes six categories:

1. Gross Economic Output: The aggregated market value of goods and services produced by businesses and government enterprises in the economy. It is essentially equal to the revenue collected by businesses (including indirect taxes) within the County or impact area.
2. Gross County Product: The total of value added created by the production of goods and services in the economy. It represents the sum of labor compensation, capital type income and indirect business taxes. Gross County Product is best described as new money added to the community as a result of the project.
3. Total Labor Income: The compensation to employees and self-employed proprietors including both wages and indirect payments such as retirement benefits, health insurance and other similar fringe benefits.
4. Total Employment: The number of jobs generated within the impact area including full-time and part-time positions, salaried workers and sole proprietors.
5. Capital Income: The sum of income such as business profits, interest and rental income. Capital Income is best described as non-labor benefits.
6. Indirect Business Tax: Taxes and fees not based in the businesses' income. It may represent sales taxes (if any) levied by the state and county and also property taxes levied against businesses as well as federal, state and local fees.

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Executive Summary

Gross Economic Output: The economic impact report (attached below) summarizes the benefits of both the project's direct investment and the resulting indirect impact. Initial estimates show the project's direct investment will be approximately $26.6 million. This number is derived from information provided by the SVSWA and also estimates that have been calculated by the analyst. SVSWA provided estimated construction costs and operation and the maintenance expenses for selected equipment. The budget for operating the plant was calculated using payroll estimates provided by SVSWA and IMPLAN datasets. The direct impact number includes the costs associated with constructing, operating and maintaining the facility. The value of the direct investment has a multiplier effect as it changes hands. The analysis estimates a direct investment will produce an additional $14.6 million in indirect impacts. The value of the direct and indirect impacts total $41.2 million.

Gross County Product: The gross county product seeks to measure the value-add to the local community. The project's gross economic impact is estimated at 41.2 million, with an estimated $22.6 million of this amount benefiting the local economy. The balance of the impact will typically be distributed in the surrounding counties, the state and nation.

Labor & Jobs: The analysis seeks to measure labor income and job impacts. The total labor income is estimated at $16.7 million. The analysis estimates that 360 jobs (full and part-time) will be benefited. The jobs in this analysis represent both the direct jobs as well as jobs that are indirectly impacted as a result of the project. Approximately 67 jobs are anticipated to be permanently benefited.

Capital Income: Capital Income, including profits, interest and rental income generated from activities associated with this project is estimated to exceed $4.5 million.

Indirect Business Taxes: This analysis estimates the project will produce $1.3 million in indirect business taxes.

Industry Sectors

This analysis is a study of the industry sectors and geographic area associated with this project. The result is a representative analysis with outputs that are based on historical datasets but not necessarily unique to this development. The following describes the industry categories that are associated with the Project. The categories are based upon the North American Industry Classification System (NAICS).

Construct – Autoclave Facilities
Machinery, repair, operation and maintenance
Waste management and remediation services

Summary of Economic Impacts

The Economic Impact Report (shown below) details the Project's economic impacts. In summary, it is estimated that the project activities will produce the following benefits:

- *$41.2 million in Gross Economic Output*
- *$22.6 million in Gross County Product.*
- *$16.7 million in Total Labor Income.*
- *360 total jobs (full and part-time).*
- *$4.5 million in Capital Income.*
- *$1.3 million in Indirect Business Taxes and Fees.*

Ongoing Economic Impacts – 5 Years

This project has the potential to provide both one-time and on-going economic impacts. When the one-time impacts of $33.1 million are combined with five years of the annually reoccurring impacts ($43.2 million) the total is more than $76.4 million.

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About Solution Mountain, Inc:

Since 2003, the principals of Solution Mountain, Inc. have prepared hundreds of economic impact reports for state agencies, cities, counties, economic development districts and private corporations. Each report is based on IMPLAN datasets specific to the project's location and unique industry sectors. Solution Mountain, Inc. is a technology partner for the California Association for Local Economic Development (CALED). Robert Gilmore, the CEO, is the recipient of the Ford Foundation's Award for Innovations in American Government and the Council of State Government's Award for Innovation.

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Economic Impact Report – CONSTRUCTING AND OPERATING AN AUTOCLAVE

Salinas Valley Solid Waste Authority

Gross Economic Output

The aggregated market value of goods and services produced by firms and government enterprises in the County's economy. It is essentially equal to the revenue collected by businesses (including indirect taxes) within the County.

Implan Industry	Frequency	Direct Impact	Indirect and Induced Impact	Total Impact
Construct – Autoclave Facilities	One Time	$21,000,000	$11,634,270	$32,634,270
Machinery, repair, operation and maintenance	On Going	$440,000	$81,421	$521,421
Waste management and remediation services	On Going	$5,200,000	$2,930,624	$8,130,624
Totals:		$26,640,000	$14,646,316	$41,286,316

Gross County Product

The total value added created by the production of goods and services in the local economy. It is analogous to the concept of Gross Domestic Product at the national level. It represents the sum of labor compensation, capital type income (profits, interests and rents), and indirect business taxes (which are mainly sales taxes, but also include property taxes and government mandated fees).

Implan Industry	Frequency	Initial Purchase	Total Impact
Construct – Autoclave Facilities	One Time	$21,000,000	$17,990,034
Machinery, repair, operation and maintenance	On Going	$440,000	$288,046
Waste management and remediation services	On Going	$5,200,000	$4,342,450
Totals:		$26,640,000	$22,620,531

Total Labor Income

The compensation to employees and self-employed proprietors including both wages and indirect payments such as retirement benefits, health insurance and other similar fringe benefits.

Implan Industry	Frequency	Initial Purchase	Total Impact
Other new construction	One Time	$21,000,000	$13,915,861
Commercial machinery repair and maintenance	On Going	$440,000	$187,654
Waste management and remediation services	On Going	$5,200,000	$2,656,921
Totals:		$26,640,000	$16,760,436

Total Employment

The number of jobs generated within the County, and includes: * full-time and part-time positions * salary workers *sole proprietors.

Implan Industry	Frequency	Initial Purchase	Total Impact
Other new construction	One Time	$21,000,000	293
Commercial machinery repair and maintenance	On Going	$440,000	5
Waste management and remediation services	On Going	$5,200,000	62
Totals:		$26,640,000	360

Capital Income

The sum of all property type income (such as business profits, interest income and rental income) generated within the County.

Implan Industry	Frequency	Initial Purchase	Total Impact
Other new construction	One Time	$21,000,000	$3,175,669
Commercial machinery repair and maintenance	On Going	$440,000	$76,094
Waste management and remediation services	On Going	$5,200,000	$1,297,371
Totals:		$26,640,000	$4,549,135

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Indirect Business Tax

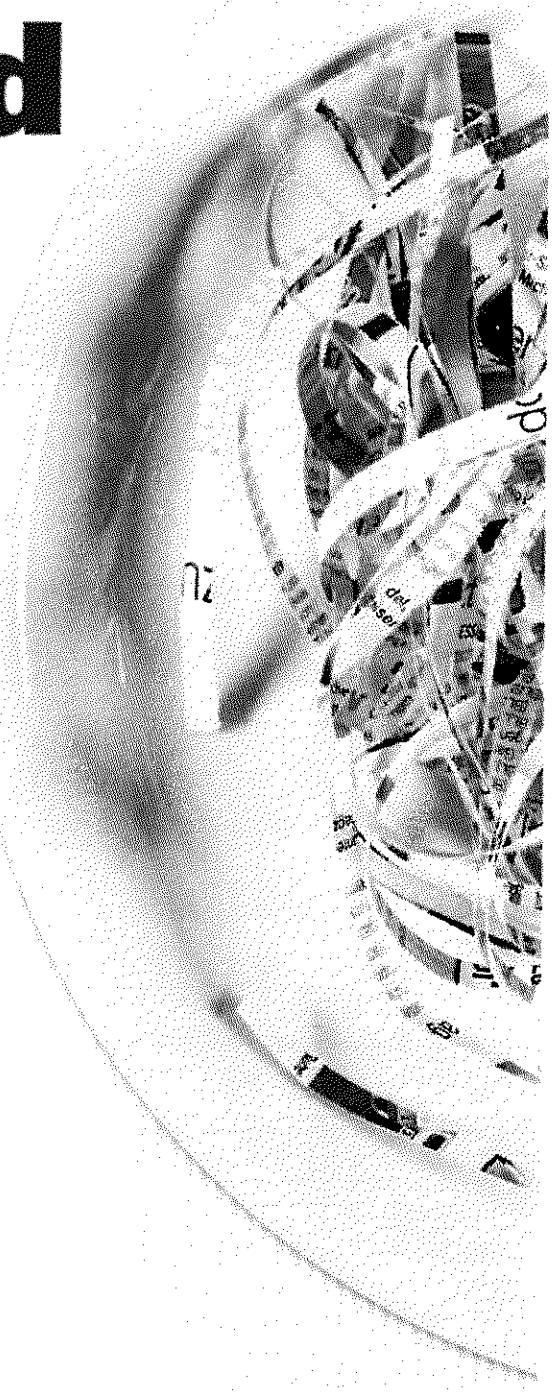
Are taxes and fees that are not based in the businesses' income. For the most part they represent sales taxes levied by the State and the county, but also include property taxes levied against businesses as well as fees imposed by federal, state and local governments.

Implan Industry	Frequency	Initial Purchase	Total Impact
Other new construction	One Time	$21,000,000	$898,310
Commercial machinery repair and maintenance	On Going	$440,000	$24,294
Waste management and remediation services	On Going	$5,200,000	$388,159
Totals:		$26,640,000	$1,310,763

Are We Running Out of Recycled Fiber?

As recovery rates approach the ceiling, near-future global fiber shortages could develop

KEN PATRICK



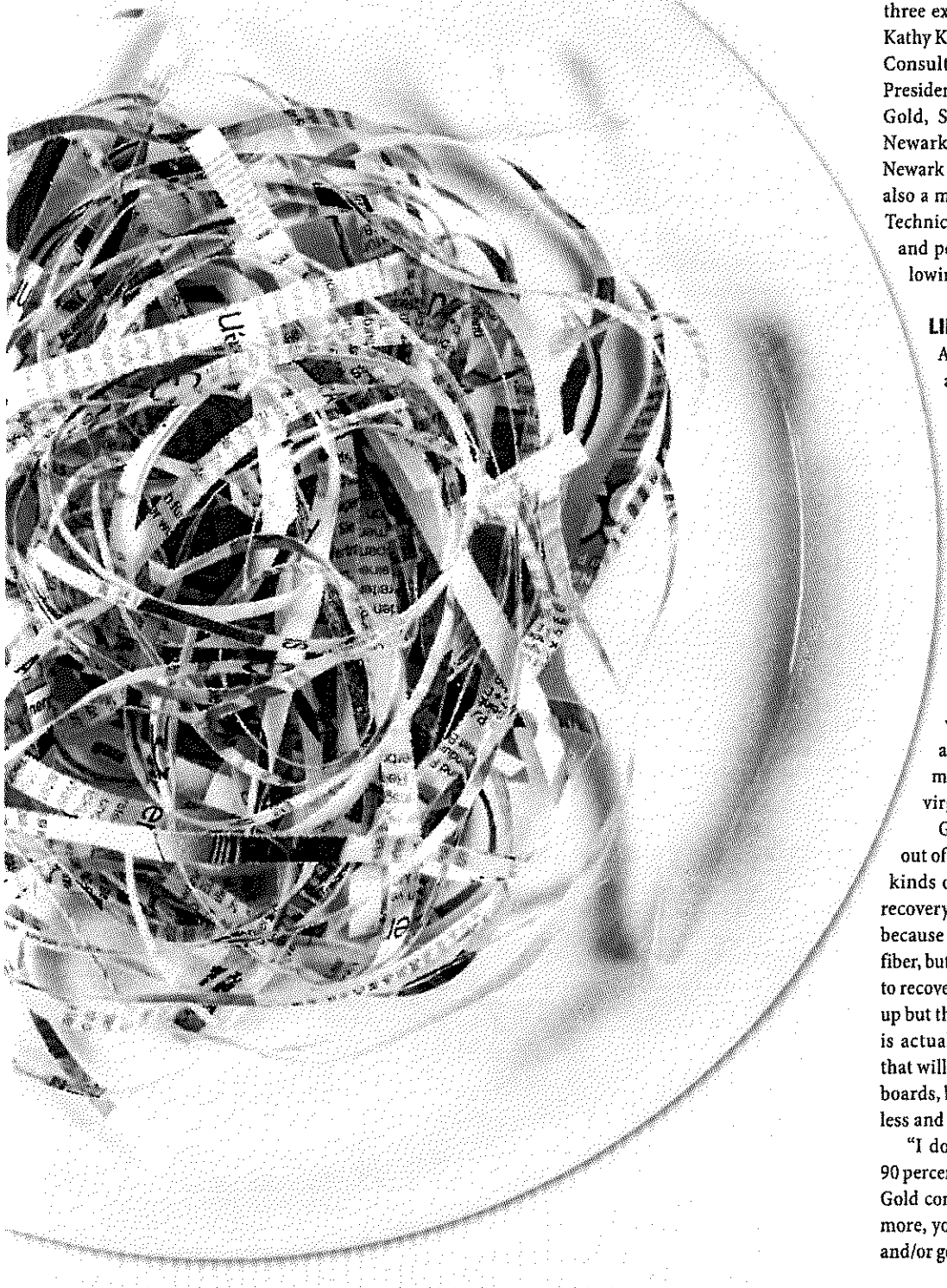
With paper recovery rates in North America creeping up near 70 percent, Europe approaching 75 percent, and Japan nudging 80 percent, there is growing concern that the global paper industry may soon bump against the ceiling of what can be recovered. With recovered fiber demand still rising, periodic shortfalls could be looming on the horizon. The U.S., one of the world's largest exporters of recovered fiber with nearly half of its annual recovered paper stream (40 percent-plus) currently being exported, and some 70 percent of that going to one country—China, is especially vulnerable to global fiber dynamics where demand is growing faster than supply.

The theoretical fiber recovery ceiling differs by country and region, depending on a series of conditions. In the U.S. there is general consensus that the ceiling is, on the average, around 80 percent, though specific grades can vary above or below that. Old corrugated container (OCC) recovery in the U.S., for example, has already exceeded 90 percent, according to some figures. In Japan, with its large urban populations, some see the overall ceiling at 90 percent-plus, while the European ceiling is generally believed to be around 85 percent. The limits to paper recovery are related to quality and collection costs.

Concerns about a recovered fiber shortage are amplified by the fact that more than half of the world's paper and board is now being made with recycled fiber. In the U.S., that figure is near 45 percent. At the same time, the growth rate of global paper recovery has slowed in recent years as major fiber recovering countries push up nearer their practical limits. Currently, global paper recovery (according to Pöyry data) is at 223 million metric tons (collection rate of 56 percent), and by 2025 is projected to rise only five or six more percentage points to 308 million metric tons (61-62 percent collection rate), reflecting a slowdown in the rate of recovery.

Although these figures all point to a nervous tightening of recovered fiber supply in the face of increasing demand, the situation is more complex than that. Especially complicating the situation is the series of stubborn, off-and-on economic slowdowns that continue to plague many countries around the world. Also a factor that has to be considered in the recycling "merry-go-round" is the fact that recycling does wear fiber out. The life span of pulp fiber is typically about

We haven't run out of fiber yet, but we've never had these kinds of recovery levels in the past.



five recycles, then fines begin to increase and quality (drainage, strength, yield, etc.) declines.

To help unravel these complexities and get a clearer view of the recycled fiber dilemma, *Paper360°* recently met with three experts in the recovered fiber arena: Kathy Kneer, Principal, Pöyry Management Consulting North America; Bill Moore, President, Moore & Associates; and Johnny Gold, Sr. VP, Recycled Fibers Division, Newark Recovery and Recycling, part of Newark Recycled Paperboard Solutions, and also a member of the Recycled Paperboard Technical Association (RPTA). Their views and perspectives are included in the following discussion.

LINGERING ISSUES

All three experts agree that currently, at least, there are some recovered fiber availability issues building. "But what's adding some uncertainty is the spotty global recession that has dampened demand and slowed growth in so many regions, including Asia and Latin America," Kneer says. "Right now demand for recycled fiber is less and the pressure isn't as great because manufacturing has slowed, consumption is down, etc. But longer term, we think there will be lingering issues with availability and/or price. Eventually, do mills in the U.S. just start substituting virgin again?"

Gold emphasizes that "we haven't run out of fiber yet, but we've never had these kinds of recovery levels in the past. The recovery levels are higher, not necessarily because we are recovering that much more fiber, but because there is less paper out there to recover. The recovery percentage has gone up but the amount of tonnage in some cases is actually less. There are certain grades that will always be there, such as packaging boards, but printing and writing papers are less and less, for obvious reasons.

"I do get a little concerned about the 90 percent-plus recovery of OCC in the U.S.," Gold continues. "In the future, if you need more, you might have to mine the landfills and/or go to non-traditional places. Already,

▲ More than half of the world's paper and board is now being made with recycled fiber.

we're beginning to see some of that. But I don't really get all that nervous about it because, you know what, we always have virgin. If recycled becomes more costly than virgin in a grade sector like containerboard, then producers obviously will swing to virgin, where we currently do have excess capacity—and globally also. But I don't see that happening, really. I think the real problem we have is that the quality of recovered fiber has gone down."

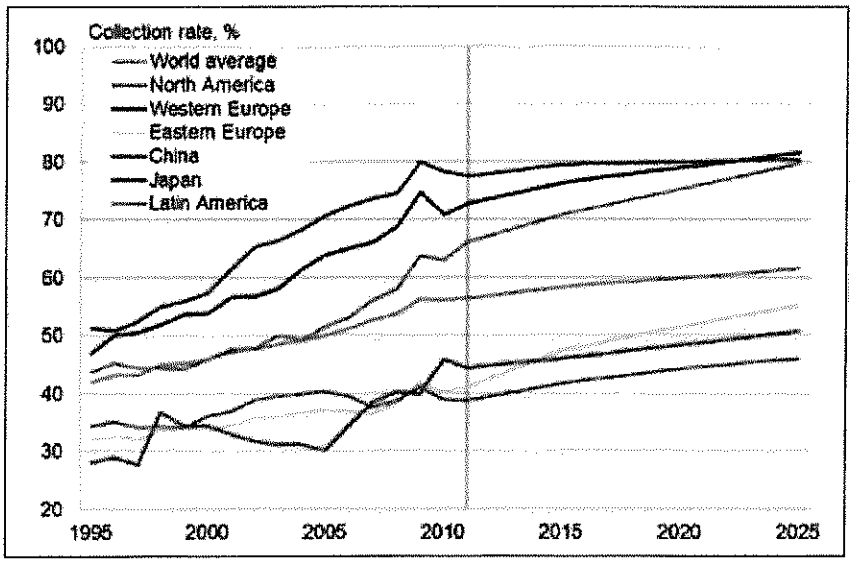
Kathy Kneer, Principal, Pöyry Management Consulting North America

Moore points out that "the U.S. 40 percent recovered fiber export rate has grown dramatically considering that the country was exporting only around 10 percent some 25 years ago. We're still using 60 percent of what we recover here in our domestic mills."

THE CHINA FACTOR

There are numerous market drivers behind the increased collection and use of recovered fiber, but as Kneer explains, three in particular stand out. First is the seemingly insatiable appetite for containerboard in China, which has led to further capacity expansions in that country. Second is the continuing environmental push for recycling, especially in the West, and the increased emphasis on diverting waste from landfill in the public sector, which has helped corral more recovered paper into the market. Third is the pronounced and ongoing decline of the graphics paper industry, removing very high tonnages from the global recycling stream in recent years.

There are other drivers, of course, such as legislation, cost of collection, pulp prices, paper demand, transportation, quality



▲ Recovered paper collection rates, 1995-2025. Source: Pöyry.

deterioration, and the growing share of tissue in the market, just to name a few. But of all the drivers, probably the greatest impact is coming from China, a resource poor country where the vast majority of new mills are focused on importing recovered paper. Kneer points out that China's consumption of papermaking fiber was close to 104 million metric tons in 2011 and is forecast to grow rapidly, reaching 164 million metric ton by 2025. Of this volume, approximately 25 percent is imported recovered paper (the rest being domestic recovered paper, wood pulp, and non-wood pulp).

Moore, as a whole, sees China continuing to import more recycled fiber, primarily for board products, "but the growth rate will slow," he believes. "Right now they have overcapacity in the board grades, and that's helping hold the recovered paper market in check." But China doesn't have a domestic softwood source, he adds, so they will have to import more recovered OCC.

"The Chinese containerboard industry is definitely tied to OCC and, to a lesser degree, to mixed papers—and it will continue to be so," Moore continues. "At the top of the cycle they use some unbleached Kraft pulp, and that's becoming more of a traded commodity—still very small, and mostly used for high-strength outer layers, special products, triple wall, etc." Moore notes that China is increasing its domestic recovery rates—more of their boxes will stay at home as their domestic markets grow in the coming years.

"On the tissue side, China has been virgin fiber oriented for a number of years. From a cost standpoint, why ship recovered office papers out of the West and lose 40 percent yield, when China has ready access to globally traded short fiber pulp?" Moore asks.

"With P&W papers, a few groups have tried using a little recycled paper here and there, but it's just not going to happen in China—even less so than in the West. In newsprint, it's really not happening in China either. Newsprint is 100 percent recycled there, but China has curtailed production of the grade, just as in the rest of the world. They haven't built a new newsprint machine in China in five to seven years," Moore notes.

Bill Moore, President, Moore & Associates

"Overall, when you look at China's official recovery numbers, you have to ask why they don't do a better job. But if you go to their landfills and incinerators, you won't see much if any OCC as you do here in the states. But that's because the boxes are going out of the country; the price of fiber is high, and they're energized to recover as much as possible," Moore emphasizes.

According to Gold, as the Chinese economy grows, Chinese workers will want and get higher pay. "As their standard of living improves and Chinese have more spending money in their pockets, they definitely will buy more goods and pump more paper-based packaging into the domestic market. Their recovery base will swell and their recovered paper rate will increase over time."

Kneer agrees. "We do think that China's recovery rate, especially with OCC, in reality is much higher than 40 percent—more like 60 percent—considering the amount of boxes that go out with exported goods. None of this fiber outflow is available for them to recover, so it's not fair to use containerboard

production as the base in determining recovery rates. Certainly, they have good recovery rates in China because they see value in reuse. However, demand in China will continue to grow and place more stress on the entire global system."

In regard to the emergence of China's domestic markets, Gold sees the possible development of a new, reverse crisis. "As China begins to absorb more into its domestic markets, and thus begins to recover more, they will take less and less from us. As that happens, we won't have the paper mills here to take it all. A surplus situation could build, tending to drive prices down as well as overall recovery rates. In the future, the recycled fiber business in this country could suffer and decline as a result."

QUALITY IN A HAND BASKET

Kneer says that the movement toward sustainability has increased in most regions, and certainly has increased here in the U.S. "As landfill costs have gone up, municipalities have looked to recycling, mainly implementing single stream systems, which does increase contamination levels. This is becoming a bit of an issue."

Johnny Gold, Sr. VP, Recycled Fibers Division, Newark Recovery and Recycling, part of Newark Recycled Paperboard Solutions

Gold is especially emphatic about the continuing decline of recovered paper quality. "Some of the formats we're recycling in now, such as single stream, are designed to make collections easier, but they have definitely undermined the quality. Fiber we get out of municipalities today just doesn't meet the specifications of most mills, with its high levels of out-throws and contaminants. By mixing up so many grades of paper and board, we're creating a sorting nightmare.

"At Newark, we've seen the quality collapse first hand," Gold continues. "We handle quite a bit of residential mixed paper in our own corporate mills. Once, one of our mills taking in 550 tons a day of residential mixed paper was removing close to 70 tons a day out of the trashing systems as cans, glass, plastic, etc. We were paying for that 70 tons, and then paying to get rid of it. OCC isn't bad, but all of the other grades are terrible. There's no doubt that the quality of today's recycled paper—residential mixed paper—has gone in the toilet," Gold concludes.

GOING FORWARD

Moore says that he prefers to look at the North American fiber situation going forward from a grade-by-grade standpoint, "and where I think we will be in terms of balance in fiber, and where it's all going to come from. On the tissue side, I think we have reached the global and U.S. maximum recycled fiber level, and probably will begin to decline. There's a distinct reason for that—we're making less P&W papers, and that's the traditional source of recycled fiber for tissue, especially away-from-home grades.

"As the markets have shifted, use of P&W papers in tissue has become progressively uneconomical," says Moore. "In the

not too distant future, the world's going to be awash in short fiber virgin pulp, chasing P&W paper demand that's just not going to be there. So there's going to be plenty of bleached tropical hardwood pulp available for tissue."

On the P&W paper side, Moore says the penetration has never been more than 10-15 percent recycled fiber. "The economics have never favored it. It's really a specialty thing. And I think, going forward, it will remain so, with very moderate recycled fiber rates. Recycled fiber use in P&W papers is almost uneconomical, but it does occur."

"On the newsprint and mechanical papers (both coated and uncoated) side," Moore continues, "it also has become somewhat uneconomical to use old newspapers (ONP). The cost advantage with these grades today is clearly to TMP and the other mechanical pulps. With newsprint, capacity shutdowns have been biased toward recycled because ONP supply is diminished and also because the quality has diminished so much that it has become uneconomical. What's left of newsprint is being produced more and more with virgin fiber. In North America, we have retreated from a peak of about 45 percent recycled fiber content to around 35 percent today. And even though the fiber quality is poor, nobody complains because the market's good and there's not enough good ONP around.

"The recycled boxboard grades are 100 percent recycled fiber content—and they will continue to be," Moore points out. "Recovered fiber is still an economical furnish to make shoe and cereal box paperboard and many other unbleached, moderate quality products. That's going to continue. The high end pharmaceutical, cigarette, and specialty packaging is going to be bleached virgin paperboard."

The global containerboard sector is a massive user of recycled fiber. "Globally," according to Moore, "we're probably at 55 percent recycled fiber, and in the states we're around 40 percent-45 percent. And that's been stable. We went way up over the past 30 years and now are at a stability point. Like tissue, I believe we are going to see a little bit of shift back to virgin fiber in the states, particularly in the Southeast where we have good Kraft pulping systems and grow an abundance of well managed trees. In the rest of the world, we will start to see a slower market growth in OCC for containerboard, just because pricing at the top half of the cycle will become less competitive with virgin."

Looking again at the ceiling in the U.S., Kneer says that going forward, "in urban areas, collection rates could rise above 80 percent (rough average for all grades) because population density generally leads to higher collection opportunities, at lower cost. However, collection opportunities are lower and are generally higher cost.

"Although collection rates can increase above 80 percent for some grades, other grades can't be effectively recovered," says Kneer. "Tissue grades and some specialty grades, such as cigarette paper, or even food wraps that are contaminated by oil or grease, are examples of papers not available to the collection stream. Overall, there's probably 20 percent that we will never be able to recover. It depends on what you are using as a base."

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