Creating Closed-loop Economies Through Reuse, Recycling and Bioproduct -Based Economic Development

Site Assessment for Southern Willamette River Valley

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1. Introduction

This report assesses opportunities for stimulating closed-loop economic development in the Southern Willamette Valley region based on the reuse and recycling of: (1) materials in the municipality, (2) agricultural and forestry waste streams, as well as (3) local government infrastructure improvements.

Prepared by The Center for Watershed and Community Health (CWCH) at Portland State University and Self Reliance, Inc. (SRI), this assessment is part of a multi-year initiative to identify the policies, programs and practices needed to stimulate closed-loop waste-based economic development in the Pacific Northwest.

The collaboration on this initiative between CWCH and SRI capitalizes on CWCH's extensive experience in watershed management, sustainable development and conservation, and SRI's extensive experience in economic development through the diversion of municipal solid waste and agricultural and forestry wastes. The sharing of skills and insights between these two organizations is an integral part of the project design.

The principal researchers are Bob Doppelt and Robin Hawley, both of CWCH and Neil Seldman of SRI.

The researchers used the following methodologies in the first phase of this project:

- gather preliminary data;
- visit communities to hold meetings with government officials, agriculture, forestry, community and environment leaders;
- research and analyze recent technical innovations and current business conditions appropriate for unique needs of the community;
- make survey calls to environmentally sound enterprises interested in locating in the Southern Willamette Valley region;
- prepare this draft report;
- get feedback from citizens interested in the draft report;
- visit communities a second time, involving workshops and meetings to determine top priorities;
- issue and distributing a final report;
- provide on-going technical assistance, due diligence, business site specification and financing plan leading to implementation of business enterprises.

The St. Vincent de Paul Community Development Corporation co-sponsored this assessment, greatly enhancing the effort. In addition, members of the Oregon Department of Economic Development and others voiced interest in our findings. More than thirty individuals from the Southern Willamette Valley area (including government officials, community leaders and business representatives) shared their time, experience and expertise with research staff in the preparation of this report (see Appendix B).

2. Background on Southern Willamette Valley

In 1991, the Oregon state legislature set a statewide 50% material recovery goal by the year 2000, and set individual county recycling goals for the year 1995. The Department of Environmental Quality (DEQ) set Lane County's 1995 goal at 30%, which was exceeded by 9% in 1996. Lane County has the second highest recovery rate in the State of Oregon after the Portland Metro area (41%).

Figure 1.

County	**Population**	**Total Annual Garbage Generated (in tons)**	**Recovery Goal**	**Recovery Rate**
Lane County	306,862	393,153	30%	39%

**Population based on 1996 census data. Annual tons generated, recovery goal and rate are based on 1996 data compiled by the Oregon Department of Environmental Quality and presented in the draft 1996 Oregon Material Recovery Survey.*

Extensive closed-loop activity is taking place in Lane County. The county has (1) material recovery facilities, (2) transfer sites, (3) companies sharing and using recyclable materials as feedstock, and (4) nonprofit organizations that are recycling and reusing materials. The following descriptions are representative of the activity in reuse and recycling:

> **St. Vincent de Paul.** St. Vincent de Paul is a nonprofit organization that collects, refurbishes, sells and recycles products and materials in Lane County. The items they collect are dropped off at either their stores, at the Lane County Glenwood Transfer Site, or are picked up by St. Vincent de Paul at designated locations. The materials and products range from items that are recycled (e.g., metals, paper, cardboard, tires, and motor oil) to

items that are resold (e.g., appliances, furniture, and CFC's). St. Vincent de Paul services reuse centers in other communities.

BRING Recycling. BRING is a highly successful grassroots nonprofit organization providing recycling services, education, and a reuse facility. The reuse operation occupies two acres of land and handles about 40 tons of materials each month (or almost 500 tons per year). Lane County's Glenwood Transfer Site generates about two-thirds of the facility's materials (by weight); the remainder comes primarily from contractors and homeowners. The facility's top three sales items (by dollar amount) are windows (all types), doors (wood and aluminum) and used lumber. BRING accepts about 45 different reusable items **except** appliances, furniture, textiles, tires and carpeting (most of the exceptions currently are accepted by St. Vincent de Paul).

BRING Recycling's Deconstruction Program. BRING began its deconstruction program in February 1997, and, to date, has completed deconstruction of three houses. The dismantling of each structure utilized a board-by-board and nail-by-nail approach. Most of the material is stored and sold on site. BRING estimates that it will end up with a total of 62 tons of material with an 85% recovery rate from the three projects. BRING has a goal of deconstructing six houses per year, about 15% of the houses petitioning for demolition in the Eugene area each year. This leaves approximately 85% of recyclable

or reusable materials from demolition that ends up in landfills.

BMEX (BRING Material Exchange). BRING recycling has also started a materials exchange program for the Lane County area. The exchange allows businesses that are creating a waste material to exchange the waste with a business that can use it. This is a concept that is gaining popularity. The idea started from a larger exchange in Seattle called the IMEX or Industrial Materials Exchange.

Forest Products. Rexius Forest Products (Rexius) and Lane Forest Products are the two largest forest product recyclers in Lane County. Rexius takes material solely from the Willamette Valley area. They recover about 10% of the area's agricultural waste (e.g., chicken, dairy, and horse manures, spent mushroom compost, and mint straw residual), which they turn into soil amendments products. They recover approximately 30% of the Eugene area's green wastes (yard debris), which they grind, compost, screen and market as a soil blend. They recover about 5% of the wood

waste, and recover almost 10% of land clearing materials each year. Mostly these materials are sold as hog fuel.

Lane Forest Products recovers yard waste, which they compost and resell to landscapers, homeowners, etc. They also recover construction wood waste. The clean wood is sold to the particle board industry and the rotted wood is sold as hog fuel.

Organic food waste. Cafe Zenon and West Brothers BBQ restaurants have taken an innovative approach to recycling food waste. They have partnered with pig farmers in the local area to use the food waste as pig feed. Cafe Zenon purchases pork from farmers; in return, the pig farmers pick up the food waste daily to use as feed for the pigs.

BRING has collected food waste from the Saturday Market, Art & the Vineyard and the Eugene Celebration. The food waste has gone to Urban Farms at the U of O and Food for Lane County.

Roof Gone asphalt roofing recycler. Roof Gone has been in operation for less than six months, and is showing success. Presently, they are the only company in Lane County that recycles asphalt roofing materials. An estimated 11 million tons of roofing material were disposed of at landfills last year in the United States. Roof Gone estimates they will capture 20,000 tons (10% of the total waste stream) of roofing material this year in Lane County. Roof Gone currently has a local enduse market; they contract with a company in Florida which sells the ground up material as Roof Rap Pavement (RRP), a low-cost ground cover alternative to rock or gravel, to markets outside the state.

Lane County Waste Management Division (LCWMD). LCWMD operates 16 transfer sites**;** 11 are located in rural areas. 11 standard recyclable items are available for recycling at all the transfer sites. Another 6 recyclable items are available only at the Glenwood station. Currently, yard debris can be dropped off at 4 locations. Lane County is unique in that they accept #1-7 plastics at their transfer sites.

Wood Pallet Recycling. Phoenix Pallet collects a large percentage of pallets in the Lane County area. The pallets are shipped back to California for reuse (these tend to be the more valuable 48-40 pallets), used as repair parts, or sent to a wood recycler to be ground up. Additionally, there are other smaller pallet recyclers in Lane County.

Economic Situation in Lane County

Lane County's economy is strong and remains stable. The county went through a period of rapid growth in the last several years, primarily due to an influx of people moving to the area, which created a boom for the housing development and real estate industries.

Economic forecasters had predicted more than 4,000 jobs in Oregon would be lost by 1994 due to logging restrictions; however, because of the increased migration to the area and the need for more housing, only 200 jobs were lost between 1992 and 1994. In the Eugene/Springfield area, high-tech investment companies (Sony and Hyundai) opened new facilities, boosting the local economy by creating more than 3,000 jobs.

Lane County's unemployment rate is extremely low (5.8%), which is slightly higher than the national average. The number of jobs increased by 20,000 between 1993 and 1995. The Oregon Employment Department reported that the number of jobs has grown more rapidly than the number of people to fill those jobs. If not managed properly, this could have detrimental effects on the economy in the future. However, with the increased migration trend, Lane County should continue to see a promising economy.

Eugene's New Yard Debris Requirements

The City of Eugene has amended its Administrative Rule R-3.250. The new rule states that solid waste collectors must provide residential yard debris service curbside to their customers. This program is targeted to start in two to three years, and will make a large dent in the amount of waste ending up in landfills. It is estimated that yard debris waste is the largest material ending up in landfills that could be recovered.

Tipping Fees

The Lane County Waste Management Department has always been an active supporter of recycling efforts; however, because the department is completely dependent on tipping fees to finance its programs (landfill operations, recycling special and household hazardous waste and rural transfer operations), the diversion of waste from the landfill has the consequence of reducing revenue. This contrary situation must be resolved through some difficult decisions to improve waste recovery. There is currently a conflict with its goal to divert waste from the waste stream. When less waste goes to the landfill, less revenues come into the department.

DEQ has indicated that tonnage at the Short Mountain Landfill in Lane County fell by almost 8,000 tons in 1996. On the surface this suggests that 8,000 tons are being diverted from the waste stream, but when the other landfill's totals are taken into consideration, it is apparent that those tons of waste are merely being transferred elsewhere.

Lane County also faces competition from the privately operated Coffin Butte Landfill north of Corvallis. This site charges $18 per ton for disposal. Lane County charges $45 per ton. Some waste haulers have begun to drive their wastes to Benton County to take advantage of the lower rates.

Watershed Councils

The State of Oregon recognizes watershed councils in the five river basins: the McKenzie, the Middle Fork of the Willamette, the Coast Fork of the Willamette, the Long Tom and the Siuslaw for the purpose of addressing the goal of sustaining natural resources and protecting and enhancing watersheds. These new entities could provide leadership in efforts to establish waste-based economic development through reuse, recycling and bioproduct based businesses because these enterprises can reduce the amount of virgin material that must be extracted from watersheds (e.g. wood, minerals, metals, water), prevent land and water contamination, help restore aquatic ecosystems, and create environmentally sound jobs that can reduce pressure for jobs that may be environmentally harmful.

3. The Job Potential of Closed-Loop Waste-Based Economic Development

Enterprises which reuse and recycle materials are labor intensive and can make a significant contribution to expanded employment and entrepreneurial opportunities. Processing and sorting recyclables alone sustains 10 times more jobs on a per-ton basis than landfilling or incineration. Making new products from the old offers the largest economic development benefits in the recycling loop. Recycling-based manufacturers can create more than 20 times more jobs than disposal; these jobs often represent high-paying, skilled industrial jobs. About 20% of the nation's municipal solid waste consists of reusable items. Some reuse operations create 200 jobs for every one job at a disposal facility. Thus, waste-based recycling and reuse jobs can be a significant employment growth sector for Lane County.

4. Waste Streams Identified

Based on our preliminary analysis, the following are a list of materials either not being recovered or being minimally recovered. This extensive list was compiled by the individuals CWCH researchers interviewed:

Appliances:	These "white goods" cannot go into the landfill and St. Vincent de Paul can only take those that can be refurbished. They recover around 300 appliances per month.
Asphalt roofing material:	Roof Gone is only capturing an estimated 10% in and around the Eugene/Springfield area. They estimate they can collect 20,000 tons of material per year, which leaves at least 150,000 tons that are not being recovered.

China cups, plates, bowls:	There is no market for broken china and no estimation of quantities landfilled.
Computer parts:	It was suggested that there is not a large enough market to accommodate the amount of computer parts that are disposed of each year.
Construction and Deconstruction Waste:	BRING estimates that there are enormous amounts of construction and deconstruction waste that could be captured. They are only capturing 15% of the residential deconstruction materials; this is a minuscule amount compared with all the construction and commercial demolition generated. BRING's deconstruction on three houses recovered 62 tons of material, which leaves approximately 800 tons of material that is being landfilled each year from houses that are permitted for deconstruction. In 1996 there were approximately 1400 new single-family dwellings and 700 new multi-family constructed in Lane County.
Drywall:	Multiple individuals indicated that there are virtually no markets in Lane County for drywall reuse and that most, if not all, is ending up in the landfills. Sanipak indicated that there is an over abundance of this material in Lane County and that their facility could handle 300 tons if a market existed. There is one company in Portland which is recycling drywall and Portland Metro reported recovering over 11,000 tons (17 lbs per capita) of gypsum wallboard in 1996.
Fiberglass insulation:	The only use for insulation is reuse and this is not done frequently, if at all. There are no reported or estimated quantities of this material in Lane County.
Fluorescent lights:	There is little market in Lane County for this material. They are accepted by Northwest Firefighters in Springfield (800-942-4614) However, there is a company called Ecolights out of Seattle that recycles fluorescent bulbs. There are no reported or estimated quantities of this material in Lane County.
Food waste:	WMO in Portland is involved in a pilot project with Metro and 36 Safeway stores to compost discarded food waste. Food waste constitutes 40% of grocery store's waste and a large amount of restaurant and residential waste. In 1996, it was reported that 3,000 tons (4.59 lbs per capita) of food waste was

	recovered in the Portland Metro area. Additionally, as state previously, two restaurants in Eugene have started food waste programs.
Furniture/ carpet/ mattresses:	St. Vincent de Paul recovers mattresses. If an item received is too damaged it is disposed of. They are recovering about 100-200 mattresses per month. There are no reported quantities on furniture or carpeting either recovered or landfilled.
Glass:	Sanipak currently recovers approximately 600 tons of glass per year through their recycling program. Lane County reported recovering over 7,000 tons of glass per year. It seems cheaper for manufacturers to make new glass out of virgin materials, in part because glass must be separated by color and the process is time consuming and expensive. Some mixed colored glass is being ground up and made into road bed. St. Vincent de Paul has recently installed a glass remanufacturing plant which holds great promise to create jobs for low income populations while eventually utilizing tons of used glass. A number of individuals interviewed indicated the need for more markets and ideas to be developed for the use of recycled glass.
Hazardous materials:	There are no reported quantities in DEQ's material recovery survey for Lane County. Lane County officials indicated that this is a highly problematic material classification for them to deal with.
Landclearing materials:	Only a small portion is presently being captured and a large amount is landfilled. Rexius Forest Products indicated they capture an estimated 5,000 tons per year. They did not know what percentage is being captured, but they estimate it is only a fraction of what is generated.
Lithium batteries:	These are currently being incinerated and there is no reported or estimated quantities being recovered.
Low quality fabric:	St. Vincent de Paul recovers about 220,000 pounds per year of low quality textiles and 23,000 pounds of high quality textiles. They ship the low quality textiles to Third World countries.

	There is an opportunity for a firm to use this material for a variety of end products. Preliminary research on these companies has been conducted by St. Vincent de Paul.
Plastics:	Sanipak estimates they recover about 700 tons of plastics per year. They indicated the only marketable plastics were #2 HDPE and #5 polypropylene. Presently, the plastics market is so volatile that there are very few companies or organizations that will take it. The Garten Foundation in Salem takes a large percentage of the plastics currently. However, this is not a stable situation, because of the low resale value for plastics. Additionally, the American Plastics Council is reducing Garten's subsidy of their MRF which could prove harmful to Garten. The plastic that Garten can't take mostly is shipped overseas to Korea, Taiwan and China.
Plastic wrap (visquin):	Currently, there is little market for plastic wrap and it is not included in the Oregon Material Recovery Survey. Premier Distributors of Eugene does handle plastic or shrink wrap (541-688-6161). Sanipak indicates that this material is problematic because to make recycling profitable they would have to collect large amounts of it, which could take a year and valuable space to do so.
Porcelain:	There is currently no market in the Lane County area. Other areas use these materials as fill on construction projects after they are crushed. ODOT recently rewrote their road building specs to allow crushed glass as road building material. The only county in Oregon that reported recovering porcelain was Jackson County which in 1996 recovered 8.9 tons (.108 lbs per capita) of the material. There are no estimations on the amount of porcelain generated in the Lane County region.
Rye grass/wheat straw:	There is an excess of these materials in Washington, Oregon, and Idaho (it is estimated that there is an excess of 10 million tons of rye grass straw per year in this region).

Telephone/TV cables:	No market and no estimations on quantities. They come from deconstructed or demolished homes and commercial buildings.
Tires:	Lane County is recovering tires, but there is little indication that they are being recycled or reused. Ecosort ships tires to Portland at a cost to them. It is reported that almost 6,000 tons of tires are collected in Lane County each year.
Window glass:	BRING estimates that all broken window glass is landfilled because there is no market for it. Additionally, there is no reported estimates on quantities for window glass.
Wood waste:	There is a small amount of wood waste recovered in Lane County, according to interviewees. Rexius reported capturing about 5,000 tons per year, about 5% of the amount generated. Sanipak also captures about 5,000 per year. And Lane County estimated that Lane Forest Products captures about 30,000 tons per year, which is still only 30% of the total amount generated.
Yard debris:	The Eugene yard debris program will not be fully operational for approximately 2-3 more years. Even when Eugene residences are able to recycle yard debris, there will continue to be an excess of yard debris material not being recovered in the rural areas of Lane county. Rexius reported recovering approximately 11,000 tons (about 30% of the total amount) of yard debris each year. Sanipak reported recovering approximately 4600 tons per year.

5. New Business Opportunities for Closed-Loop Waste-Based Economic Development

Based on the review of waste-based economic development activities in the southern Willamette Valley region, the following enterprises are recommended for a recruitment and/or expansion program. Infrastructure changes which can increase participation in waste-based economic development programs are also recommended. **(All companies are real. They are identified by letters simply to provide privacy).**

A. Expansion of Existing Operations

BRING Deconstruction Enterprise. Bring has been deconstructing houses and buildings in the Southern Willamette River Valley for the past year. Four trained workers are involved. Materials recovered from deconstruction are sold through Bring's reuse yard located at 86641 Franklin Blvd.. Deconstruction carried out on a project-by-project basis. There is room to expand this operation as a full-scale enterprise which can capture a significant portion of the demolition market in the region.

The company needs an investment to cover costs of a new warehouse, and a marketing staff for bidding on jobs. The warehouse can serve Bring's existing reuse enterprise and building deconstruction projects.

Company A. This company receives roofing asphalt from demolition projects in the Southern Willamette River Valley and sells material locally for roadbed and related projects. The company is slowly building its volume of materials handled. The company can expand with investment for more rolling stock, marketing and development of higher end use markets. **Company A** can become a regional company serving other metropolitan areas from a base in Lane County.

Company B is a non-profit Community Development Corporation (CDC) that is a highly sophisticated reuse and resale enterprise. They are involved with waste-based economic development activities locally, throughout the west, and are developing business relationships with CDCs nationwide (such as in Baltimore MD. and in the State of Ohio). They can expand operations with below market rate loans or grants that allow for more trailers, increased warehouse space and other equipment. For example, CWCH arranged for **Company B** to receive a $20,000 loan which allowed the group to purchase additional trailers and hire 7 additional workers to serve programs in several counties that are anxious for **Company B** to set up collection programs. This CDCs ability to stimulate waste-based economic development and jobs for low income populations across the nation seems constrained only by the funds and resources it can generate.

Forest Products. Two firms already process yard debris materials into compost, hog fuel and construction board material. Over the next few years the city of Eugene will require that garbage haulers provide yard debris collection services to their curbside clients. Loans and/or grants to the existing firms could be timed so that when the materials become available, the companies will have the expanded capacity to handle this material.

Wood Pallet Reuse. There are a number of pallet repair and reuse operations in the region. Yet for many reasons they only recover an estimated 10% of the available wood pallets in the waste stream. Loans and grants to these firms could allow them to capture more of the waste wood available. At least two firms can be approached, **Company C** from California , and **Company D** from New York City, to establish enterprises in the area in joint venture with the existing wood pallet companies. These firms manufacture end products, floorings and furniture, from the highest quality wood found in pallets. These operations are very compatible with pallet operations and could be recruited as joint ventures with existing firms to extend their product lines.

Regional economic development agencies should meet with these firms to discuss how timely loans would be able to expand the amount of materials they each handle, expand the number of jobs in the local economy as well as divert more materials from area landfills.

B. Recruitment of New Companies

1. HDPE Plastics Recycling

An HDPE processing and manufacturing plant could be attracted to the region. **Company E** is one such company that has been operating at a profit from a rural location in Spickard, Missouri. The company imports baled, post-consumer HDPE bottles (milk and water jugs).

Company E just developed a new product line of recycled plastic for treatment of docks and waterfront infrastructures. The company uses three production technology lines: extruding, vacuum forming, and rotational molding.

Company E uses a system that efficiently grinds the plastic into flakes, washes and dries them, and then stores the flakes for later use or for sale to other manufacturers. End-products are made using one of three technologies: (1) vacuum forming, (2) extrusion, and (3) rotational molding. These products are sheets of plastic that are used as a substitute for wood in pallets and a variety of building applications.

Company E also extrudes plastic profiles in the sizes 1" x 2" and 2" x 4," with varying lengths. It also fabricates these profiles into a variety of products, including furniture. With its rotational molding equipment, **Company E** has the capacity to produce over 30 products, including gas tanks, water reservoirs, animal feeders, dog houses, buckets, helicopter seats, pans, 18-gallon curbside containers, and 2-cubic yard dumpsters.

Company E needs between 500-1,000 tons per year of baled post-consumer HDPE to operate at a profit. The Southern Willamette Valley area generates about 465 tons per year of this material. According to conversations with solid waste officials in Portland and with the Garten Foundation of Salem, ample materials would be available for a plant in the target region. Alternatively, a plant in another region of the state would support an expanded recovery of the material in the Lower Willamette Valley area.

Capitalization for the construction of **Company E's** plant is estimated at $750,000, not including land and building costs. About 30,000 square feet under roof and another two acres for outside operations would be needed. **Company E** would make its technology available and provide start-up, management and market development assistance to an enterprise if there were a local partner to invest in this plant. Approximately 8-10 semi-skilled and skilled machine operator positions would be created.

Below is a profile of **Company E:**

Company E	
Feedstock Used	HDPE (milk and water jugs)
Amount of Feedstock Used	500-1,000 tons per year
Feedstock Cost	21-22 cents per lb.
Location of Facilities	Midwest
Sales (current year)	$2 million
Maximum Capacity (1 plant/1 shift/1 year)	750 tons
Minimum Capacity for Positive Economics	500 tons
Capital Investment (w/o lot and buildings)	$800,000
Operating Expenses	N/A
Number of Jobs per Facility	10-12
Types of Products	sheeting, molded products, vacuum formed products
Prices of Product Sold	$1-2 per lb. of recycled plastic
Expansion Plans	Interested in new rural sites

2. Pyrolysis of Old Tires

Company F. This company has developed a tire pyrolysis process which treats chipped tires and produces industrial end products. The plant is small-scale, requires less than 3 acres and processes 5 million pounds of tires per year.

The Southern Willamette Valley area has a disposal problem with old tires. **Company F** has obtained the U.S. rights to a tire pyrolysis process developed by a major Asian manufacturing conglomerate. The tire pyrolysis system processes the old tires, then chemically treats the feed stock to produce a variety of industrial products. The system costs under $5 million and has the capacity to handle up to one million tires annually. **Company F** is interested in selling the technology to a local business or undertaking a joint venture with local investors. Since the publication of our Hood River/Columbia Gorge draft report in June, 1997, CWCH and SRI have helped link this firm with a local tire producer and discussions concerning potential partnerships have ensued.

Below is a profile of Company F:

Company F	
Feedstock Used	car and truck tires
Amount of Feedstock Used	5 million pounds per year
Feedstock Cost	tip fee required
Location of Facilities	Asia
Sales (first year)	$1.5 million
Maximum Capacity (1 plant/1 shift/1 year)	5 million pounds per year
Minimum Capacity for Positive Economics	3.5 million pounds per year
Initial Capital Investment (without lot and buildings)	1.5 million
Operating Expenses	$1 million
Number of Jobs per Facility	8-10
Types of Products	natural gas, industrial polymers
Prices of Product Sold	competitive with published commodity markets value
Expansion Plans	100 facilities within the continental U.S. over next 20 years

3. Organics Waste

Company G processes vegetable wastes, manners and yard debris and other organic waste materials into a high valued animal feed product. A plant in the Eugene/Springfield area would allow large generators of food waste to dramatically reduce waste flow to landfills at cost-effective rates.

Below is a profile for Company G:

Company G	
Feedstock Used	Organic Waste (food, sewage, manure ,yard debris)
Amount of Feedstock Used	300 tons per day
Feedstock Cost	Receives minimum $35 per ton (tip fee)
Location of Facilities	Hamilton, Ontario
Sales (first year)	N/A
Maximum Capacity (1 plant/1 shift/1 year)	300 tons per day
Minimum Capacity for Positive Economics	250 tons per day
Initial Capital Investment (without lot and buildings)	$10 million
Operating Expenses	N/A
Number of Jobs per Facility	20
Types of Products	Animal Feed
Expansion Plans	Looking for new plants. Need access to raw materials.

4. HDPE and PET Plastics Recycling

Company H. This company makes a series of industrial products from recycled HDPE and PET for industry, e.g., engineered resins, strapping, sheeting, high viscosity blends. The plant employs over 100 workers and recycles over 10,000 tons of plastic annually. The company could be a major market for plastics in the state. Recruiting a plant like this would be timely as the Garten Foundation which has been recycling plastics for many communities in the state is threatened with loss of plastic industry subsidies and may have to close its doors; thereby stranding plastic recycling in the Southern Willamette Valley and the state. The company estimates that a plant that focuses on cleaning and flaking material for the overseas market would need from 6,000-10,000 tons of material annually and require a $1.5 million investment. As markets for higher value end products are developed additional capital and jobs would be needed.

Below is a profile for Company H:

Company H	

Feedstock Used	HDPE/PET
Amount of Feedstock Used	6,000 to 20,000 tons per day
Feedstock Cost	$0.05 per pound
Location of Facilities	Frockville, Pennsylvania
Sales (first year)	N/A
Maximum Capacity (1 plant/1 shift/1 year)	70 tons per day
Minimum Capacity for Positive Economics	20 tons per day
Capital Investment (without lot and buildings)	$2 to $10 million
Operating Expenses	N/A
Number of Jobs per Facility	110
Types of Products	Industrial plastics for auto manufacturing
Expansion Plans	Looking for new plants. Need access to raw materials. Markets are firm.

5. Computer Reuse

Company I. Numerous computer reuse companies have started in the last few years, and selected success models can be recruited to replicate their enterprises in the Southern Willamette Valley area. A survey of major government agencies, university departments, health care facilities and private sector firms (such as Hyundai, Sony) should be completed to determine their current computer handling systems and their current costs. This data can provide the information needed to determine the feasibility of establishing or recruiting the proper firms. A related small business is toner and cartridge recycling and reuse. Companies have developed service contracts with government agencies and universities to provide reused cartridges to their clients at costs less than the cost of new equipment.

6. Grass Straw Reuse

Company J. This entrepreneur proposes to build an insulation plant that processes straw/grass straw for use as blown insulation material. CWCH and SRI have met with this individual and suggested ways to improve the preliminary business plan to attract capital for the required research and development to be completed.

7. Garnetting of Used Textiles

A garnetting plant reprocesses post consumer textile waste or their by-products (discarded second hand clothing and other products that consumers no longer need and decide to discard due to wear, damage etc.) into the original product stream or into new useful end uses. Because the production of nonwoven fabrics require less fiber, labor, equipment, time and money that the production of woven or knitted fabrics, most reclaimed fabrics are use in nonwovens rather than reconstructed into woven or knitted products. Textile companies have found nonwovens to be a profitable way of reusing used fiber.

Company K is a non-profit Community Development Corporation which contracted for a feasibility study on the potential of establishing a garnetting factory. Their intention was to establish their own company somewhere in the Willamette Valley. The study found that the current markets for recycled fibers are just beginning to blossom and the increased public awareness of environmental issues and conservation of resources is certain to increase the interest in and value of the use of recycled materials for many products.

The **Company K's** feasibility study identified five product areas that they consider suitable for application of the secondary fibers that **Company K** has access to: carpet cushions, home insulation, polyester stuffing for pet products, clean-up products and mattress pads. The study recommended that due to the characteristics of the recycled fibers and the current market, it is better to use the secondary fibers in a variety of fiber applications rather than focusing on a single product. After the materials are collected and transported to the factory, the clothing is shredded and used in any of these five products.

To operate a garnetting factory profitably, it is important to have a reliable and efficient collection and transportation system, and to operate the factory in a systematic and organized manner. Due to the nature of their business and long history of success in the collection and reprocessing/reuse/recycling of products from across the west, these are attributes that Company K provides extremely well.

A complete garnetting plant would cost between $2 to $3 million, depending on the type of equipment purchases etc., and create 15-20 jobs.

At this point however, **Company K** is not interested in operating this facility. They are therefore willing to partner with or sell the business proposal to the a non-profit organization or a local entrepreneur in exchange for the following:

a. **Company K** is hired to provide the consulting services needed to aid in the set up. This includes an initial feasibility study to determine the likely success of a garnetting facility in the Hood River/Columbia Gorge Area, the number of jobs it would create, a land/facilities site assessment etc. **Company K** would prepare the information for the community to review before moving forward with full blown business planning. Costs

for this will be $10,000 to $12,000. These funds could be secured through a grant or others sources.

b. **Company K** would have the right of first refusal to supply the raw material for the plant.

c. **Company K** would have the right of first refusal to be able to contract for the rights to distribute the end products and to use the materials in their own stores and housing operations.

C. Infrastructure Changes

A number of infrastructure changes may be beneficial to improve closed-loop economic development.

1. Variable Can Rate. This approach requires households to pay for their solid waste disposal costs on a per bag or per can basis. Recyclables are collected for free, thus giving households an incentive to reduce, recycle and compost as much as possible. Recent data from Worcester, Massachusetts, a city of 165,000 which is roughly the size of the population in the Southern Willamette Valley, points to the potential success of variable rate programs. The city has achieved a 52% recycling rate with no increases in per household expenditures.

2. Commercial Recycling Regulations. Several cities have expanded their recycling programs to include commercial enterprise recycling. Cities such as Roanoke, Virginia provide commercial recycling services. Other cities such as Philadelphia make commercial recycling mandatory, but also allow businesses to contract with private haulers for recycling services.

Recycling requirements can be targeted to certain types of businesses. For example, restaurants can be required to establish separate food waste programs such as the one established by Cafe Zenon and West Brothers BBQ which send their food waste for pig feed. The restaurant industry could establish its own composting or vermi-composting (worms) facility, or contract with a company like Thermo Tech which would process the materials into an animal feed. The swere department can provide economic incentives for

these restaurant programs based on savings at the waste water treatment facilities due to the diversion of material that is traditionally disposed of through the sewer system. This program can be extended to all institutions that have cafeterias; e.g., universities, prisons, public and private schools, churches, athletic stadiums, government buildings. An entire series of programs can build upon a food waste recovery/reuse initiative (see Appendix C).

3. Deconstruction Regulations. The cities and county can adopt a deconstruction requirement for all planned demolition projects. The city of Cotati, California passed such an ordinance in an effort to divert as much construction waste from its landfills as

possible. In order to get a permit the demolition company must demonstrate its plan to maximize deconstruction and recovery of building materials (see Appendix D).

Oregon House Bill 3456, having recently passed the state legislature, requires that public contracts for demolition must require salvage and recycling of construction and demolition debris, if feasible and cost effective.

6. Next Steps:

It is our hope that this report serves to stimulate expansive discussion and activity to develop closed-loop waste-based economic development opportunities throughout the Southern Willamette Valley. Indeed, this should be the start, not the end of the process. We intend this report to stimulate further investigation by businesses, governments, non-profits and households about means to create and expand waste-based economic development.

To continue this effort, we recommend the following:

- Given the pioneering nature of waste-base economic development, public agencies should partner to establish an institution that can: 1) provide technical assistance for business start-up and expansion; 2) provide start-up and expansion low interest loans and grants; 3) help entrepreneurs resolve bureaucratic and legal issues; 4) intensively promote local and regional waste-exchanges between entities; and 5) locate and develop markets.

- Cost-effective methods need to be determined to transport recyclable materials to material recovery facilities and reuse operations in rural areas.

- The BRING Waste Exchange should be expanded and a major public education program developed to stimulate broad awareness and use of the entity.

- Funding assistance should be provided to St. Vincent de Paul of Lane County to assist local Community Development Corporations throughout the Willamette Valley and elsewhere to learn how to developed waste-based business enterprises.

- The construction industry should be encouraged to focus on environmentally sound (green) construction and deconstruction. Currently, the building industry throws away enormous amounts of materials that could be recovered. Public policies should be considered that would require the building industry to recycle and reuse materials instead of disposing of them.

- Public/private/academic "steering committees" should be developed at the community, county, and watershed levels to help plan and implement closed-loop waste-based economic development.

New policies should be developed at all levels of government to support these businesses.

- Local news media should be encouraged track and promote not just recycling goals, but the amount of waste diverted from the waste stream, the quantity of differed use of virgin natural resources, increased productivity and profitability, as well as the number of jobs created through waste-based businesses.

- Local governments, business associations and citizen groups should partner to hold a conference on opportunities for closed-loop waste-based economic development through reuse, recycling and bioproduct businesses.

Appendix A. Materials Recovered for Lane County Wasteshed

DEQ

Total Tons of each Material Recovered for the Lane County Wasteshed for 1995

Material	Tons Recovered	Per Capita (lb.)	Population
#1 PET Beverage	959.7	6.358	301,900
#2 HDPE Milk Jugs	343.9	2.278	
#2 HDPE Other	122.8	.814	
#3 Polyvinyl Chloride	4.	.027	
#4 LDPE	201.9	1.338	
#5 Polypropylene	13.4	.089	
#6 Polystyrene	16.6	.110	
Aluminum	1,949.8	12.917	
Animal Waste/Grease	1,454.5	9.635	
Antifreeze	8.1	.054	
Cardboard/Kraft	23,476.6	155.525	

Composite Plastic	19.8	.131	
Container Glass	7,320.8	48.498	
Fluorescent Lamps	2.1	.014	
Glass Other	4.4	.029	
High Grade Paper	4,696.7	31.114	
Lead Acid Batteries	111.	.736	
Magazines	1,853.5	12.279	
Mixed Plastic	90.4	.599	
Mixed Waste Paper	6,520.7	43.197	
Newspaper	12,083.8	80.052	
Paint	48.7	.322	
Phone Books	79.7	.528	
Plastic Bottles	58.2	.386	
Rubber Tire Buffings	435.2	2.883	
Scrap Metal	5,131.4	33.994	
Solvents	12.	.079	
Textiles	7.5	.050	
Tinned Cans	920.7	6.099	
Tires	5,737.1	38.006	
Used Motor Oil	3,394.8	22.489	
Wood Waste	16,871.4	111.768	
Yard Debris	20,967.3	138.902	

TOTAL	**114,918.4**		**301,900**

Appendix C. Food Waste Recovery/Reuse Initiatives

FLETCHER ALLEN HEALTH CARE

Burlington, Vermont

As part of a total waste reduction program, Fletcher Allen Health Care recovers approximately 90% of its pre-consumer food discards. This was 84 tons in 1996. Hospital kitchen staff prepare 4,000 meals a day for cafeteria and patient meals at the 585 bed facility. The hospital housekeeping staff's waste team collects food discards Monday through Friday and takes them to a farm where they are windrow composted. In turn, the hospital receives organic produce at wholesale prices from the farm. A rendering company picks up used kitchen grease. Fletcher Allen also donates edible fruit and vegetables to a local food bank.

LARRY'S MARKETS

Bellevue, Washington

In 1991, as part of an overall plan to run environmentally responsible stores, Larry's Markets instituted a composting program. In 1996, each of Larry's Markets five stores recovered 100 tons--more than 90%--of their food discards. The stores collect for composting: pre-consumer scraps from the in-store cafes and juice bars, wilted and spoiled produce, old flowers and greens from the floral department, and corrugated cardboard. Employees in each department collect and bring compostables outside to a 1 1/2 cubic yard container where a local hauler then picks up and delivers these materials to a topsoil company for composting. Larry's Markets uses topsoil from this process in its landscaping.

MIDDLEBURY COLLEGE

Middlebury, Vermont

Since 1993, Middlebury College (student population 2,000) has been composting approximately 288 tons of food discards, an estimated 75% of the college's total food discards, per year from its five dining halls and three snack bars. The

college composts both pre- and post-consumer food discards as well as waxed cardboard in on-site aerated static piles. Middlebury also composts food discards from special events. In spring 1997, food discards from a 4,000 person graduation picnic were collected and composted. For calendar year 1996, composting cost the college $42 per ton, including trucking, labor, fuel, and supplies. Recycling cost $145 per ton; trash, $137. In total, the college saved almost $24,000.

SAN FRANCISCO, CALIFORNIA

From June 1996 through May 1997, the San Francisco Produce Recycling Program (SFPRP) has composted and donated 1,130 tons of food. Thirty-nine businesses participate in the SFPRP, which is a collaborative effort among agencies and companies in and around San Francisco. The program recovers both edible and non-edible produce discards from the San Francisco Produce Terminal and from area supermarkets. The San Francisco Food Bank collects an average of 60 tons of food per month and distributes the edible food, approximately 37 tons per month, to member service agencies. A local farmer collects the remaining non-edible produce, which he uses as feed or sells to other farmers. Since August 1996, non-edible produce not collected by the Food Bank has been windrow composted at a nearby composting facility.

SHOP RITE SUPERMARKETS

Edison, New Jersey

Since 1995, 25 of the New Jersey Shop Rite Supermarkets have composted 80%, or 3,000 tons per year, of their organic discards. The stores compost floral and produce trimmings and spoils, out-of-date bakery items, old seafood, soiled paper products, food spills, and out-of-date dairy and deli products. Typically, staff in each department collect compostables in waxed corrugated cardboard boxes and put the whole box in an in-store compactor. A hauling company takes the compacted organics to a composting site where they are ground with yard trimmings and windrow composted. The nutrient-rich finished compost is screened to remove contaminants and sold to farmers, golf courses, and people involved in land reclamation. Through diversion, stores avoid $15,000-$40,000 in disposal costs per year, depending on the size and location of the store.

UNIVERSITY OF MASSACHUSETTS

Amherst, Massachusetts

From September 1996 through May 1997, the University of Massachusetts in Amherst diverted 195 tons--an estimated 60%--of its food discards to its in-vessel composter, avoiding $55 per ton in tipping fees. Approximately 10,000 students

on the university meal plan eat in four dining halls, which prepare an average daily total of 19,200 meals. University kitchen staff collect pre-consumer food discards from all four campus dining halls and four smaller campus eateries, as well as post-consumer discards from two of the dining halls. Discards are picked up every Monday through Friday and added, along with used animal bedding from the campus horse farm, to the in-vessel unit. Finished compost will be used in university landscaping projects.

WYNDHAM FRANKLIN PLAZA HOTEL

Philadelphia, Pennsylvania

Waste disposal costs at the Wyndham Franklin Plaza Hotel have decreased by 30% since it began collecting organics for animal feed. The hotel began this program in response to a 1995 city mandate to reduce waste. Cooks collect food preparation scraps and all other "wet" garbage except grease and coffee grounds in 30 gallon bins located next to the food prep areas. When full, the bins are brought to the loading dock where a pig farmer picks them up every other day. The hotel also donates leftover prepared meals to Philabundance, a food bank, which distributes food to area homeless shelters.

Appendix D. City of Cotati Resolution 93-91

RESOLUTION NO. 93-91

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF COTATI REQUIRING THAT REUSABLE AND RECYCLABLE MATERIALS FROM ALL STRUCTURES AND CONSTRUCTION MATERIALS TO BE DEMOLISHED SHALL BE MADE AVAILABLE FOR SALVAGE PRIOR TO DEMOLITION

WHEREAS, the City of Cotati is committed to protecting public health, safety, welfare and the environment, and as such, promotes the reduction of solid waste; and

WHEREAS, the City of Cotati is actively seeking ways to reduce the amount of landfilled solid waste; and

WHEREAS, the City Council and the Environmental Advisory Commission have learned that materials from demolished structures are currently deposited in the landfill without the materials being made available for salvage; and

WHEREAS, the City Council and the Environmental Advisory Commission have learned that businesses, organizations and individuals may be interested in reusing or recycling construction materials; and

WHEREAS, salvaging of construction materials furthers Cotati's commitment to reducing waste and complying with AB 939; and

WHEREAS, the City Council and Environmental Advisory Commission recognizes that requiring structures to be recycled and reused may add to the cost of demolition; and

WHEREAS, A $200 deposit shall be required and shall be refunded after proof of reuse, recycling or attempts thereof; and

WHEREAS, the Environmental Advisory Commission has considered and recommended the adoption of this resolution.

NOW, THEREFORE, BE IT RESOLVED that the City Council does hereby require that prior to any demolition, be it public or private, all materials that can be reused or recycled shall be made available for salvage.

BE IT FURTHER RESOLVED that any entity seeking to demolish a structure within the City of Cotati shall make known publicly the intent to demolish the structure and the availability of potentially salvageable materials by:

1. Placing an advertisement, legal or retail, in a newspaper of general circulation with the address of the site and the hours and dates that the materials will be available for salvage, making such materials available for at least 10 days.

2. Mailing or delivering a written notice to all parties on file at the City of Cotati wishing to receive such notice with the address of the site and the hours and dates that the materials will be available for salvage.

3. The City, at its discretion, may choose to take these actions in the place of the entity wishing to demolish the structure.

* * * * * * * *

This resolution was approved on the 10th day of November, 1993 by the following vote, to wit:

CULLINEN YES

BERKEMEIER YES

ELLES YES

MILLER YES

WIRT YES

APPROVED: /S/

Mayor

ATTEST: /S/

Deputy City Clerk