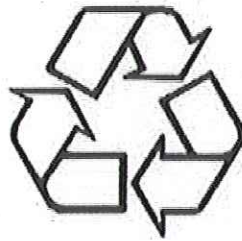


Recycling at the Endeavor



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1. Executive Summary

The purpose of this project was to help the Arcata Endeavor, a primary shelter and food pantry, reduce its waste disposal through an improved recycling and composting system that would be easy and convenient. We went about achieving this goal by installing a recycling scheme in a centralized area that was easy to reach and to use and which clearly differentiated trash and recycling bins. It was also beneficial to make the existing recycling facilities more accessible and to communicate with staff about the importance and benefits of the program. It was important that this system be easy on account of the high turnover rate and the unique characteristics of a large amount of volunteers as well as the majority of the patrons. It is difficult to quantify to what degree we reached our main objective. We had proposed to reduce waste by 25%, but we had no concrete way of measuring the baseline or the changes from it other than through conducting visual waste assessments on a day-to-day basis. We also continually communicated with staff in order to get their suggestions and feedback, all of which was positive. Through this daily monitoring we were able to observe patterns and behaviors and draw our conclusions from them. There was definitely an observable shift in the waste stream, away from the landfill and into the recycling facilities and an overall improved pro-recycling attitude amongst the volunteers. Some of our objectives were not reached on account of the difficulty of working with this type of organization especially while they were going through the process of getting their lease extension rejected and were concerned with problems of that nature.

2. Background

The Arcata Endeavor is a primary shelter which caters to the needs of a large percentage of the underserved community by providing hot lunches three times a week on Mondays, Wednesdays and Fridays as well as offering food boxes containing produce, breads and other donated foods twice a week on Tuesdays and Thursdays. All of the food products are donated from local grocery stores such as Wildberries, The North Coast Co-Op, Brio Bakery, Safeway and Murphy's Market in Arcata and Trinidad. The Endeavor's services are available to families, disabled persons, veterans, seniors and individuals struggling to make it day to day with limited or fixed incomes. The Endeavor also provides services such as employment assistance and training, family services, and other support and access to resources that are necessary for successful life changes.

The Endeavor serves an average of ninety plates of food during its hot lunches and receives an estimated 500 to 700 pounds of food per day, Monday through Friday. Because of the high inflow of products, many of which are prepackaged, a lot of waste is generated. It's important to realize what actually goes into the trash. The City of Santa Barbara's Environmental Services gives a good description of the proportions of different materials that can be found in a business' trash (see Appendix A). Most everything that tends to get thrown in the trash can actually be recycled or composted. According to their webpage "only 15% or so actually needs to go to the landfill". Although an effort to recycle and compost is made at the Arcata Endeavor, much more than 15% of generated waste goes to the trash. In order for the waste management practices to be improved, an

appropriate program should be developed and implemented which maximizes waste diversion through reusing, recycling, and composting.

3. Benefits of Recycling

There are tons of reasons and benefits of recycling (an extensive list can be found in Appendix B) but the main ones are nicely described by the Washington State Department of Ecology and are the following:

1. Recycling conserves natural resources. Each ton of solid waste diverted from disposal, whether reused, recycled or composted, is one less ton of solid waste requiring disposal. The value of reusing, recycling and composting solid waste is clear when you consider the amount of disposal space required to accept that material. By implementing other waste-management strategies (as well as resource-management strategies), we reduce our dependence on incinerators and landfills. And when using recycled materials in place of trees, metal ores and minerals, there is less pressure to expand forestry and mining production.

2. Recycling provides environmentally preferable sources of raw materials. It is more than a waste-management strategy; it is also an important strategy for reducing the environmental effects of industrial production. Supplying industry with recycled materials, instead of "virgin" resources extracted from forests and mines, is preferable because it saves energy, reduces dangerous air and water pollutants, such as greenhouse-gas emissions, and because it conserves scarce natural resources.

3. Recycling saves energy and reduces greenhouse-gas emissions because a great amount of energy used in industrial processes and in transportation involves burning fossil fuels. The energy required in the manufacture paper, plastics, glass and metal from recycled materials is generally less than the energy required to produce them from virgin materials. Additionally, providing recycled materials to industry (including collection, processing and transportation) typically uses less energy than supplying virgin materials to industry (including extraction, refinement, transportation and processing).

4. Recycling can significantly reduce the amount of pollution entering the air and water. Less fossil fuels are used, and thus emissions are kept from entering the air. Recycling keeps materials out of landfills, where they can introduce contaminants into groundwater systems. Recycling also keeps materials out of incinerators, which can pollute the air and create ash residue. Twenty-seven different types of air and water pollutants are reduced when companies recycle instead of use virgin resources in manufacturing and disposing of the waste products.

4. Problem Statement

In addition to there being a large quantity of waste generated at the Arcata Endeavor,

many of the people who benefit from the services of the Endeavor are not what would be considered fully functional. This makes it difficult for a program to be designed and followed. There is also a very high turnover rate for volunteers; this makes it difficult for training to take place and for proper disposal of waste to occur. Currently, two dumpsters of landfill waste are generated and disposed of per week; it must be physically packed down so it doesn't become three. The main areas where waste is generated (and where we will be focusing mainly) are the dining room area, the kitchen and dishwashing area. Waste is generated during hot lunches and food boxing services Monday through Friday. The current conditions and the main problems that have been observed at the Arcata Endeavor are the following:

4.1 During hot lunches

A) In the dining room:

- There is no compost bin on account of health code reasons; because of this food scraps go into a main waste bin instead of being composted.
- There are no recycling bins in which plastic containers and other recyclables can be collected (milk and orange juice jugs are collected manually).

B) In the kitchen and dishwashing area:

- There is one point source for collection, a large trash can (located near the hand washing sink). Everything is disposed into it unless physically taken outside to the recycling bins in the (cage) dumpster area. This is never done.
- Food waste generated in the kitchen is collected in a separate bin, but is sometimes neglected.
- Heavy cardboard is recycled inconsistently. There is a large dumpster behind the facility into which large cardboard boxes are disposed, but not paper or other types of light cardboard.

4.2 During food box distribution

A) In the dining room:

- A composting bin is available to dispose of produce that has begun to decay or is too wilted for use. Somehow small quantities of unwanted produce will still make it into the trash bin.
- All leftover produce is potentially used in the following day's hot lunches. Out of date packaged products are discarded.

5. Goals and Objectives

5.1 Goal

To help the Endeavor reduce waste that is disposed of in the landfill.

5.2 Objectives

1. Reduce waste stream by 25% by April 20th.
2. Enhance pro-recycling behavior through placement of disposal points and proper sign postings (will measure by checking bins 2+ times per week and record compliance with new system/ change system to meet unseen patterns in disposal).
3. Create two new volunteer positions. One will be collecting plates from the dining area and scraping leftovers into the compost bin. The other will sort/take out recycle bins from the kitchen to the collection point outside the building.
4. Write a new volunteer "Duties" sheet to standardize what the new positions entail and to ensure consistency.

6. Project proposal

Updated Waste Management System

6.1 Actions to Reduce Waste

6.1.1 In the kitchen

- Remove the large "catch-all" trashcan and replace with smaller ones. Possibly move it to new location (further) to prevent the habit and the ease of disposing of all items in it.
- Add three new labeled recycling bins (glass, plastic and metal) locate them in the area in-between the dishwashing room and the storage room. They will preferably be closer to the waste generation area than the trashcan.
- Have a composting bin (closer than the "catch-all" trashcan) for disposing of all the food scraps created during meal preparation.

- Create a new volunteer position to empty the recycling bins as well as sort the recyclables that were unintentionally thrown into the trash.
- Increase the number of recycling dumpsters to accommodate increase and organize them so that they are readily accessible.

6.1.2 In the dining room

- Instead of having each person scrape their leftover food into the trashcan (a compost bin is not allowable in the dining room according to CA's Health Code), have the dishwasher scrape food items into the compost bin (which is allowable in dishwashing room), while collecting the plates. To compensate for the excess work, more than one volunteer could separate tasks during the busiest times.
- Recyclable items (e.g. yogurt containers, milk and orange juice jugs) would be collected by a volunteer. The trashcan should be checked periodically and kept free of recyclables as well.

7. Alternatives to Proposal

The proposed project would install three recycling bins in the kitchen for sorting metals, plastics and glass. Kitchen volunteers are required to dump the filled bins in the cage located behind the kitchen entrance and engage in minimal sorting if it is required. For example if a plastic is accidentally thrown in the glass bin, the volunteer would sort then. The large trashcan in the dining area will be inspected for any recyclables that may have been disposed of erroneously, especially after lunch has been served. Volunteers should collect recyclables (such as orange juice and milk jugs) from tables. Compostable materials (people's leftovers from lunch) will be collected by the dishwasher through the window located in the dining room. Some alternatives to this proposal include:

7.1 Alternative 1

One large recycling bin in the kitchen that requires 100% sorting by volunteers
 Volunteers collect recyclables from dining area tables
 Compost collected through the window in the dishwashing room

7.1.1 Pros

Potentially all recycling and compost would be dealt with by volunteers and patrons eating at the facility wouldn't have any responsibilities. In this case it would be less likely

for there to be mix-ups and mistakes made and overall recycling and composting would increase.

7.1.2 Cons

If there are lots of people trying to clear their plates at the same time it may become overly hectic for the dishwasher and be difficult to deal with the pile up. It would take a lot more effort for volunteers to sort (if they do at all) and collect recyclables than if there were marked bins for each. Patrons don't learn about the ease and benefits of recycling.

7.2 Alternative 2

One large recycling bin in the kitchen that requires 100% sorting by volunteers
One recycling bin in the dining room that would be sorted by volunteers
A bin for composting in the dining area

7.2.1 Pros

There are a certain amount of responsibilities for everyone. Patrons are responsible of distinguishing between recycling and trash and aren't required to do much with their compost material other than leave it on their plate. Patrons may learn from this experience and continue this practice elsewhere.

7.2.2 Cons

Patrons may not learn from this experience and the recycling bins could get filled with compostables and the compost bin may get filled with recyclables. This would make the task more difficult for volunteers.

7.3 Alternative 3

Three recycling bins located in the kitchen for volunteers to empty in cage
One recycling bin in the dining area for volunteers to sort
Compost collected through the window in the dishwashing room

7.3.1 Pros

Everyone participates. Volunteers don't have to sort kitchen recycling and patrons are only responsible for disposing of their recycling (everything into one bin). Compost is taken care of by the dishwasher so there shouldn't be a mess of food. There is less chance of there being confusion as to which bin is for what. Nice simple plan, volunteers are only expected to empty recycling in kitchen when necessary and sorting the recycling in the dining room after the meal.

7.3.2 Cons

It's still possible for patrons to be confused and throw compost in the recycling bin or in the trashcan as was the custom. Dishes may pile up and create a mess for the dishwasher.

7.4 Alternative 4

Three recycling bins located in the kitchen for volunteers to empty in cage
Three recycling bins located in the dining room for patrons to use accordingly.
A bin for composting in the dining room

7.4.1 Pros

Volunteers are not required to perform sorting, instead of wasting time doing that they can empty bins more frequently and periodically check to make sure that everything is running smoothly. The person in charge of washing dishes need not worry about there being a pile-up.

7.4.2 Cons

There is a high probability that there will be a mess. Most responsibility is placed on patrons, many of which are not fully functional and cannot necessarily be expected to comply with a design.

8. Starting a Program

What Makes a Successful Environmental Program?

Designing a successful environmental program is a complicated task. There are copious aspects to consider. Miss one and your program will most likely fail. "...if environmental programs are to be effective, we need to be able to deliver programs that remove barriers and enhance benefits for large segments of the population." (McKenzie-Mohr and Smith, pg. 3). There are eight aspects one must consider when designing a program that is a community-based social marketing strategy:

1. Way to change behavior of the actor

It is a good idea to identify ways in which behavior can be changed. Ophuls (Gardner and Stern, pg. 27) identifies four basic approaches to changing antienvironmental behaviors:

1. The use of government laws, regulations, and incentives to encourage proenvironmental or prosocial behavior.
2. Educational programs aimed at changing people's behaviors and attitudes towards a certain topic.
3. Nongovernmental social processes that operate in small social groups and communities (the community management approach).
4. The use of religious, moral, and/or ethical appeals to change people's behavior.

2. Build commitment into the program

Numerous studies have shown that people are more likely to agree to a larger request if they have already agreed to a smaller one. There are speculations as to why people behave this way. One reason might be that people want to appear consistent to others. "Those who behave inconsistently are often perceived as untrustworthy and unreliable." (McKenzie-Mohr and Smith, pg. 48). Working commitment techniques into a program is

a worthwhile endeavor. Written commitments are more effective than verbal (McKenzie-Mohr and Smith, pg. 53). An excellent example of how commitment can influence recycling behavior comes from an experiment by Pardini and Katzev (1984). 27 households were asked to recycle paper. Nine were asked impersonally: they were given information about the pick up dates and how the program worked. Nine were asked to join the program personally, but only committed to the program in an oral agreement. The last nine were asked to make a "strong commitment" and signed a statement saying they would participate in the recycling program. The two commitment groups recycled three times as much paper. For the strong commitment group, the recycling effect lasted two weeks after the program ended.

3. Uncover barriers and benefits

While designing a project, one needs to research what actually inhibits the action they are trying to promote. Speculation needs to be set aside. A literature review of relevant material should be the first step to uncovering the barriers and benefits of the proposed project. This review should uncover research by focus groups and observational studies. These studies will be useful when preparing a survey. A survey given to the participants prior to project design will aid in exposing the hidden benefits and barriers for that particular project's circumstances.

4. Use prompts

The simple human characteristic of forgetting can lead to unsustainable behavior. The reason a person does not use a refillable water bottle might not be an aversion to it, but the simple fact that they forgot to bring their Nalgene or Kleen Kanteen. A prompt is either a visual or auditory aid that reminds people to carry out a certain behavior. Signs are the classic example of a prompt. They can be useful for one time behaviors and at maintaining repetitive behaviors. Prompts need to be noticeable, easy to understand, be presented as close in time and distance as possible to where the behavior is to take place. It is also useful to make prompts that encourage positive behavior rather than telling them to avoid a negative behavior (wording is the key).

5. Change social norms

People look to the behavior of people around them to determine how they should respond to a situation (McKenzie-Mohr and Smith, pg. 72). These social norms have a huge impact on the sustainable (or unsustainable) behaviors adopted by a population. A successful program integrates norms. Norms affect behavior in two ways: compliance and conformity. Compliance is the changing of one's behavior in order to receive a reward or to avoid punishment. Once these rewards and punishments are removed, the gains from the program will be lost. Conformity, on the other hand, has long lasting effects because the behavior change is voluntarily. To promote sustainable behaviors through norms, the norm must be visible. This allows for more people to see the behavior (curbside recycling with a big blue box outside the houses in your neighborhood) and possibly adopt it. It is also important to communicate through accepted behaviors. This

ties in with staying in the tolerance zone of the participants.

6. Use communication effectively

Communication can be effective when it is used in a persuasive manner. If done correctly, this can exact influence over attitudes and behaviors. When information is presented in a vivid, concrete and personalized manner, it is more effective at getting your point across and grabbing the actors' attention. The key is to make the information you have stand out beyond the everyday background noise. Know the target group and use credible sources when presenting the message of the program. The presentation itself should be framed in a positive way.

7. Use incentives

Incentives can be an enticing motivation to change behavior. Incentives can be monetary or social approval. To effectively incorporate them into an environmental program the incentive must be paired closely with the targeted behavior. The closer in time the incentive is presented to the behavior occurs, the better. The incentive should reward positive behavior, and be visible. The size of the incentive needs to be determined. It needs to be big enough to be taken seriously, but after a certain size you receive diminishing returns.

8. Remove external barriers

During the literature review external barrier should be discovered. Barriers include perceived inconvenience, expense, and corporate and social institutions. Each situation is different, and thus the solutions for removing external barriers are varied.

9. Case Studies

When developing a new program it's useful to look at the approaches that have been used in similar projects in order to see what tactics were successful and get more ideas for improving yours. It's difficult to find examples of waste minimization programs that occur at food banks and organizations like the Arcata Endeavor because for the most part, when it comes to a waste minimizing program, the food banks are the last step in the minimizing process. They take everything that cannot be disposed of for a profit from businesses, restaurants and groceries stores, and theoretically find a use for it. This is obviously not the case, because if it were there would be no need for our program at the Endeavor. In lieu of a case study of waste minimization at a food bank we have taken note of the approaches implemented at recycling programs in offices and other public areas and implemented some of their tactics.

9.1 Overview of Case Studies

Following are two case studies from the California Integrated Waste Management Board that illustrate the benefits and the methodology behind implementing a new recycling program based on simple tactics of eliminating a one-waste collect everything bin and replacing it with a smaller trash bin and recycling bins. The reasoning behind this approach in the San Jose case study was that if an employee had to personally empty their wastebasket every time it became full they would have a larger incentive to recycle in order to reduce the amount of trips to the waste disposal area. Apparently it worked, in the San Jose case study the city reduced garbage service by 50% at its two largest administrative facilities. Garbage service decreased from 60 cubic yards per week to 30 cubic yards per week, saving \$11,000 a year on garbage collection at these locations alone. The Ontario Case Study deals with a similar approach to increasing office recycling as the San Jose Case Study, but provides additional exemplary approaches that resulted in an 80-88 percent diversion rate of waste.

9.2 Case Study 1: San Jose Recycle at Work Program

9.2.1 Program Description

Prior to June 1997, the City of San Jose's general services department provided recycling collection service to approximately 4,000 city employees in more than 50 city facilities. Employees source-separated materials into seven categories. Service frequencies varied by location from once per week to once every three weeks. As of May 1997, the recycling rate was approximately 20 percent.

Staff from the city's general services department and environmental services department decided to improve the recycling system. In 1996 the city released a request for proposals for recycling collection service and devised a new indoor trash and recycling collection system. The San Jose Conservation Corps (SJCC) won the bid to provide recycling services.

Under the new program, which began in May 1997, the city provides recycling service to approximately 8,000 city employees in 72 facilities located throughout the city's 173 square miles. These facilities range in size from small community centers to the San Jose International Airport. The following buildings participate in the program: city hall, buildings located in the civic center complex adjacent to city hall, the police administration building, the Martin Luther King Main Library, the San Jose McEnergy Convention Center, all community/senior centers, and branch libraries.

Materials collected are newspaper, white and mixed paper, cardboard, computer paper, and mixed bottles and cans. Service frequencies vary by location from once per week to once every three weeks.

The heart of the new program is replacing employees' deskside 5-gallon trashcans with a 3.5-quart mini can (manufactured by Kaeser and Blair Inc.). The mini can is designed to discourage the disposal of paper. All employees are required to empty their own mini cans into centralized 23-gallon trashcans, just as they empty their own recyclables into centralized recycling containers. There is one centralized 23-gallon trashcan for every 10 to 15 employees. The centralized containers are typically located along a central corridor or in a copy room area.

Under the new program, sorting recyclables was simplified to just four categories: white paper, mixed paper (including newspaper and paperboard), mixed containers (bottles, cans, and plastics), and corrugated cardboard. Libraries have so much newspaper that they separate that too.

To encourage recycling, employees have a choice of three sizes of deskside recycling containers for their mixed paper and their white paper. Employees typically bring their discarded glass and plastic bottles and cans to centralized recycling bins, which are Rubbermaid Slim Jim plastic containers in either 16- or 23-gallon size.

The picture below shows a City of San Jose employee emptying paper into centralized recycling containers.



Custodians pick up from central locations once or twice a day. Custodians use carts with three sections to collect all recyclables. They use a 55-gallon trash can to collect trash. They transfer both trash and recyclables from inside the buildings to outside storage containers, which the trash collection and recycling contractors provide.

The SJCC provides 96-gallon carts for recyclables at all locations. Refuse storage is usually in 1-cubic-yard to 6-cubic-yard front-loader bins with some very small facilities getting residential-style service (garbage carts and stacking bins).

Custodians no longer provide desk-to-desk trash service. This change required working with the custodial staff to provide the additional recycling service. However, providing

recycling service does not require additional custodial time due to eliminating the time-consuming task of emptying each employee's trash.

The SJCC collects recyclables with varying frequencies, from once per week to once every three weeks depending on the generation rate of the site. The corps subcontracts with two of the solid waste and recycling companies franchised by San Jose for commercial service.

One subcontractor collects cardboard using a front-loader at locations that generate a significant amount of cardboard. The second hauls cardboard in roll-off compactors from the airport. GreenTeam of San Jose collects trash under contract with the city. The environmental services department manages these contracts.

The city has been able to reduce trash service by 50 percent at its two largest administrative facilities-city hall and the police department's headquarters. Trash service was reduced by 60 cubic yards per week, saving \$11,000 a year on trash collection at these locations alone. In a 12-month period, 540 tons of materials were recycled, and the average monthly growth rate is 6.3 percent. Since the program began, more than 1,200 tons of materials have been recycled.

To make this program a success, the city developed a comprehensive outreach and education program. Also essential to its success has been support at the highest levels of city government. The program began with support from the city council. The city manager's office conveyed information about the program to all members through a memo distributed with paychecks. Council members were among the first to try out the new program, and recycling receptacles are now present in all council offices including the council chambers and dais.

The city held more than 100 training sessions to explain the program, answer questions, and recruit department area recycling coordinators. Coordinators in each building serve as one point of contact and can help decide where to put centralized containers (in conjunction with custodians). At introductory meetings, a city staff person gave employees a choice of recycling boxes. Directly after the presentation, she would go to each desk exchanging the trash can for a mini bin. That's when the program would start.

In addition, articles in the employee newsletter CityLine kept all employees up to date on the new program and its successes. Displays in the city hall lobby showcased old and new containers. A local television station captured the unique program on an evening news segment. To reinforce the recycling ethic, outreach continues through daily interaction of program staff with employees.

During Earth Week 1998, the city distributed reusable commuter mugs to all city employees and provided free coffee at the cafeteria to those using their new mug. Currently coffee is offered to all employees at 50 percent off the regular price if they use their mug. To date, more than 12,415 cups of coffee have been served.

Recently, a cubicle placard was designed as a quick reference guide explaining what materials should be placed in the deskside containers for mixed and white paper, both to increase diversion and reduce contamination.

To recognize the efforts of the program and raise awareness about materials saved from the landfill, staff members plan to hold a recycling area coordinators' recognition lunch and distribute an imprinted candy with a recycling message. During the 1999 Earth Day event, city employees received a cloth napkin imprinted with the Recycle@Work logo for use in place of disposable napkins.

9.2.2 Costs, Economics, and Benefits

One full-time staff member currently manages the program. This person oversees trash and recycling programs at all 72 city buildings. A staff person from the city's general services department also provides program support by collecting materials from the few leased buildings, distributing supplies as needed, and maintaining the supplies inventory.

Ongoing non-personnel costs are \$60,899 per year. Most of this money pays for supplies and any hauler costs. Currently the city has a no-cost agreement with the San Jose Conservation Corps (SJCC) to collect recyclable materials from city buildings. In turn, the SJCC retains any sales revenue. The city expects to provide some regular compensation for collection in order to be sure that service quality continues to improve. Approximately \$25,000 a year is available for advertising and printing brochures and posters and for other promotional campaigns.

Initial start-up costs were approximately \$45,000. These costs covered deskside recycling containers, the mini trash bins, carts for custodians, and promotional materials. Of the \$45,000 initial amount, \$3,660 was spent on special containers for the convention center (see Table 1 below.)

General service staff reports custodial costs have remained constant after the new program took effect. The time saved in emptying trash containers at each desk is now spent moving recyclable materials from the centralized collection areas to the 96-gallon carts for storing recyclables.

The city has reduced garbage service by 50 percent at its two largest administrative facilities-city hall and the police department's headquarters. Garbage service decreased from 60 cubic yards per week to 30 cubic yards per week, saving \$11,000 a year on garbage collection at these locations alone.

Overall the city's savings are more modest than would otherwise be expected because collection fees are very favorable and the city pays no charge for disposing of city wastes.

Funding for the mini bin program comes from the Integrated Waste Management Fund, an enterprise type fund that receives money from various sources including IWMA fees levied on commercial generators and city facilities for waste generation.

Table 1: City of San Jose Start-Up Costs

Mini trash bins	\$6,984
Liners for mini bins	452
Medium deskside recycling boxes	3,725
Large deskside recycling boxes	3,500
Centralized recycling containers	15,853
Trolley for custodians	4,767
Rollaways for convention center	3,660
Caps for custodial staff	3,959
Keychain knives for promotional giveaway	1,710
Total	\$45,000

9.3 Case Study 2: Ontario Government Max Green Mini Bin Program

9.3.1 Program Description

In 1991 the Ontario Government introduced the Green Workplace Program (GWP) to its government offices. This program set waste reduction targets of 35 percent by 1992 and 50 percent by 1995. After reaching these goals well before the target dates, the government established the Maximum Green Program (Max Green) in 1992 to reduce waste further. Max Green introduced some major new elements:

- Accepting all grades of office paper mixed together.
- Replacing individual trashcans with small desktop receptacles and a large centralized trash bin.
- Where possible, establishing food discard collection.

The three Ontario government buildings that piloted the program in 1993 saw total diversion rates of 80 to 88 percent. By 1998, Max Green was in place in 52 Ontario government buildings involving approximately 24,000 employees. The program has reduced waste in these buildings 75 to 95 percent and saved nearly \$1 million on annual waste disposal costs. Potential savings are even higher on renegotiated custodial contracts.

9.3.2 Program Characteristics

The Max Green program has three main elements:

- All paper types are accepted, including glossy paper and kraft envelopes. This eliminates confusion about what is accepted and encourages employees to recycle all their paper. Directors at GWP have found that in Toronto, revenue from higher paper tonnage and savings in disposal costs more than make up for revenue lost by not supplying only high-quality office paper. (They have found that accepting

all types of paper increases participation and fiber recovery as compared to sorting and accepting only certain grades of paper.)

- Tenants receive new tools to deal with their office waste. Deskside trashcans are removed and replaced by desktop mini trash containers. Employees themselves empty these containers into central trash bins. Custodial workers no longer go desk-to-desk emptying trashcans. Employees become responsible for deciding whether to put their trash into the recycling or trash bin.
- Communications, education, and training are extremely important to the success of the program. Well-informed tenants, building management, and service contractors make for a successful Max Green program.

Employees empty their trashcans as needed into larger central containers. Some employees in Ontario empty their mini trashcans less than once a week. The picture below shows centralized containers for recyclables and trash in Ontario's Max Green Program.



Although the GWP diverts mostly office paper, employees can also place their discarded glass and plastic bottles, metal food cans, polystyrene, and newspaper in centralized recycling containers. Employees have a desktop paper recycling container, which they empty into a centralized paper recycling bin. Individual paper containers are bigger than the mini trashcans. This encourages paper recycling and allows employees to store paper for a while before bringing it to the central collection bin. Recycling paper is easier than throwing it away.

Custodial workers pick up trash and recyclables from the central containers as opposed to emptying containers at each employee's desk. Max Green staffers produce posters and pamphlets informing office workers about the program. They make presentations, answer questions, and train a "green team" in each building to answer questions and troubleshoot.

In Canada, Max Green has been adapted successfully by banks, electrical engineering companies, universities as well as the Canadian Federal Government and other local government bodies.

9.3.3 Costs, Economics, and Benefits

In Ontario, the payback period on equipment through savings in trash costs was less than one year.

9.4 Conclusions from Case Studies

The biggest challenge in implementing a mini trash bin program is getting employees to buy into the concept. Some think it is okay to carry recyclables to a central location, but not their trash. Some people think the bin is too small. Program critics tend to be in the minority.

Recycling coordinators in the United States and Canada have all been confronted with surprise, negative reactions, and disbelief when introducing the mini trash bin. However, as soon as people realize they can recycle so many more materials, they realize they do not need a bigger trashcan. They settle down when they begin to realize the mini trash bin is sufficient. Employees learn that they need only empty their mini trash bins once a week or once every two weeks.

A great benefit of mini trash bin programs is that they can help employees who previously did not recycle to begin recycling, because no one is supporting their bad habit. By getting individuals to take responsibility for their trash, mini trash bin programs are opportunities to change behavior.

The California Integrated Waste Management Board compiled a list of replication tips that were developed from the case studies these can be found in Appendix C and can be of great use for developing similar projects.

10. Lessons Learned from Successful Environmental Programs

Useful lessons can be drawn out of successful programs from the past. Some have already been discussed in the What Makes a Successful Program section, such as internal and external barriers. Thus these topics will be briefer and touch on facets not already mentioned. Gardner and Stern offer eight areas that the designer(s) of an environmental program should incorporate.

1. Use multiple interventions to address the factors that limit behavioral change

The use of multiple intervention types is needed to address the factors that limit behavior change. As Gardner and Stern explain: "Because there is often more than one barrier to any proenvironmental behavior, programs that combine different types of intervention tend to work better than those based on a 'single cause' theory." Limiting factors are nearly unlimited, and include: technology, attitudes, knowledge of the subject, lack of money, convenience, and trust. To add to the complication, these factors vary from individual to individual, situation to situation, and over time. Thus what worked in the 1970s might not work now, even if the situation is extremely similar. Lastly, limiting factor often interact in unexpected and unpredictable ways.

2. Understand the current situation from the actor's perspective

It is also essential to understand the situation from the actor's perspective. This is because the actors "are in the best position to identify the barrier they face." (Gardner and Stern,

pg. 165). One way to understand the actors' perspective is to conduct surveys and/or experiments. It can be an informal face to face survey, or a more formal, written one. The participatory approach to program design also maximizes an understanding of the actor. This includes surveys at periodic intervals to assess the program and change it accordingly.

3. For limiting factors that are psychological, understand the human choice process

People have limited attention spans and information processing abilities. Get the actors' attention, but don't make excessive cognitive demands. Make the intervention simple and straightforward. This will decrease the actors' effort to assimilate to the program. And remember: find creative ways to let social processes and interaction do the work. People sometimes respond to friends' experiences better than some expert.

4. Address the "antienvironmental" conditions that are beyond the individual

The conditions that are beyond the individual that constrain proenvironmental choice should also be addressed in any successful program. By addressing the actions of the government, corporations, and social institutions that constrain and dictate individual behavior, a long-term solution can be achieved. Unfortunately, there are often forces and opposition too large to be handled by the individual. Still, it remains a very effective way to change behavior.

5. Have realistic expectations

The next aspect to successful programs is to have realistic expectations about the outcomes. Patience and the realization that everything might not go to plan is key in order not to despair and cut the program short. The desired outcomes at the start of the program might be altered. Limiting factors are often only uncovered by trial and error, and thus patience is needed. Also, flexibility is needed as the program evolves and changes from the one initially perceived.

6. Monitor responses and adjust the program

Monitoring is also a key to successful programs. It is important to monitor at the end of the program as well as in intervals during the duration in order to adjust the program according to the responses from the participants. It is difficult to uncover all of the interactions of the limiting factors from the start.

7. Stay in the actor's tolerance zone with the interventions

One must also be careful to stay within the bounds of the participant's tolerance for the intervention. Make sure to inform, but not patronize. If the actors resist the program it can result in an ineffective and counterproductive program. In order to identify the actors' limits, participatory methods should be employed.

8. Use participatory methods in the decision-making processes

The last lesson to be learned from successful environmental programs is to use participatory methods of decision-making. "The need to understand the actor's perspective, attract people's attention and gain their commitment, monitor and adjust programs, and design interventions that are within people's limits of tolerance all point to participatory processes as a solution (Gardner and Stern, pg. 169)." People are more likely to follow rules and objective set by them. Keep the precipitant involved in every step of the program that directly affects them.

11. Implementation

Our project can be broken up into five stages of implementation. First stage is scoping, followed by installation, monitoring, program adjustment, and evaluation. We tried to integrate the "Lessons Learned from Successful Environmental Programs" ideas into each stage.

11.1 Scoping

The first step in the process was to consult with John Shelter, the director of the Arcata Endeavor. He was very enthusiastic to approve our recycling project. Next we observed the operations at the Endeavor during the two main waste generating programs: the food box distribution for people with low incomes and the hot lunches. We noted the amount and the sort of waste that was being dumped in the large dumpster in the cage outside the back kitchen door. We decided where there was room for the bins in the kitchen area, as that was assessed to be the area in which most waste generation took place. We measured how large the area was.

11.2 Program Design

This was the stage where we applied most of the "Lessons Learned from Successful Environmental Programs" ideas discussed above and the "What Makes a Successful Environmental Program?" section. We tailored the program to the circumstances at the Endeavor. The following are our observations we made before designing the program.

11.2.1 Multiple interventions that address limiting factors to behavior change

The limiting factors in our project were the lack of knowledge (most people were not aware of all the materials that are recyclable in the first place), lack of technology and know-how (no recycling bins were made available in the kitchen) and convenience (green city recycling cans were located in the cage outside, but to use this one needed to walk to it each time one wanted to throw something away). Our approach was to place recycling bins in the kitchen as a collection point. The idea of prompts was integrated into the project design: we posted signs telling what materials are recyclable, and talked to volunteers about recycling. This face-to-face communication built commitment into our program. We

incorporated incentives by suggestion that the money collected from the CRV be used for a volunteer BBQ or baseball game as an incentive. Thus the multiple interventions we employed were financial incentives, an altered waste management system, improved technology, information, and an improved the convenience for dumping recyclables.

11.2.2 The current situation from the actor's perspective

We spent several visits informally asking volunteers and staff what they saw as a barrier to recycling. They identified the inconvenience of the location of the recycling bin (some didn't know they even had one). We asked and observed where the generation of waste took place. The actors' did not seem to be against the idea of recycling. Indeed, the Endeavor recycled in the past, with some success. Again, we tried to use effective communication to build commitment into our program.

11.2.3 Who the actors are

The people who use the Endeavor's services and the volunteers are disadvantaged in many aspects. Some are rehabilitated and recovering drug addicts. Others are just unlucky and have lost their jobs and homes. The last thing they want is yet another person telling them what they should do or how they should do it. When limiting factors are psychological, it follows that the design of the program needs to make choices simple and straightforward and attract attention of the audience (Gardner and Stern, pg. 166). We made simple adjustments to the way volunteers already disposed of waste: the new bins were close to where the old large trashcan was. We limited the amount of new signage and removed old recycling signs that were still up from when the Endeavor used to recycle.

11.2.4 The "antienvironmental" conditions that are beyond the individual

The conditions at the Endeavor prevented the individual from recycling. The only thing that was recycled was cardboard, and it was recycled nearly 100%. It was apparent that volunteers were able and willing to recycle, they just needed an opportunity to do so.

11.2.5 What are realistic expectations

We decided a realistic expectation was to reduce the current waste (through recycling) by 25%. This figure is based on the expectations the director of the Endeavor expressed in a meeting we had early on in the program.

11.2.6 The actor's tolerance zone with the interventions

We tried to stay in certain bounds, taking into account that some of the volunteers might have never recycled in their lives (either because of a life style choice or

because of a lack of recycling opportunities). We thought the easier the program is for the actor, the more likely it will be in their tolerance zone.

By making these observations, we hoped to design the most effective program for the Endeavor.

11.3 Installation

The physical installation started with purchasing the materials. The largest bin, that still fit the allotted area in the kitchen, was 51 liters and stood about mid thigh in height. We met with John who approved our decision and then drove to Eureka to purchase three of them. Each cost about \$12 and were paid by the Arcata Endeavor.

The labels to denote which bin was for metals, plastic and glass were printed on different colored paper, which cost 5 cents each. We made one label and one sign (to place overhead on the wall above each bin) for each recyclable.

We laminated the colored the signs and the labels and taped the labels to the bins. We were unable to get the signs up because of the material the wall was made out of (it was nonstick, which made tape useless). We cleared the space in the kitchen where we decided to place them. The cage outback was organized and cleaned up to allow for easy access to the recycling cans when the bins from the kitchen are dumped.

12. Monitoring and Program Adjustment

We went to the Endeavor an average of three times a week for three weeks. We noted the quantity (1/2 full, 3/4 full etc.) and quality (10% recyclables in dumpster ect.) of trash in the recycling bins in the kitchen, main dumpster, cardboard dumpster, large recycling bins in the cage, the large trashcans in the dining area and kitchen and the compost cans. We also talked to volunteers and staff about their thoughts of the program. We noted where improvements could be made, and where current situations prevented optimal recycling. The following is what we came across:

12.1

Compost and recycling were not being collected from the dining area all the time. They could not have two volunteers in the dishwashing room when they were short staffed. When there were enough volunteers, Laurie, the kitchen manager, removed the large trashcan (as suggested) and placed two people in the dishwashing room. Thus, the program worked as long as there were enough volunteers.

12.2

The recycling bins in the kitchen were not being dumped regularly in the first week. This was attracting ants into the kitchen. Laurie suggested it was not being emptied because the volunteers were not used to it. After regular reminding for the first week, the bins started to be dumped on a steady base.

12.3

We noticed little glass was being generated, however, large volumes of plastic was. As a result, plastic was overflowing into other bins. We replaced the glass label on one bin with the leftover sign we had for plastic. Thus we altered the program to two bins for plastic, one for metal and none for glass.

12.4

Waste was being diverted from the main dumpster and it took longer to fill than normal. John and Laurie both said they could see a marked change in the amount being thrown away (they didn't have to stomp down the trash anymore). However, the recycling bins in the cage were receiving the extra recyclables, and the Endeavor had no mechanism for steady pick-up. The current method to dump recyclables is a pick-up once a week from a mentally handicapped man. He does the recycling in return for a food box for his family. The city of Arcata does not offer recycling pick-up service for businesses. We contacted Redwood Recycling, a private company who offers pick-up service, and found out they charge \$25 a week for services. John opted to stick with current, infrequent pick-up service. We suggested the use of their food pick-up van for dumping of overflow recyclables when the man doesn't show up. The suggestion seemed to be well received.

12.5

We were so focused on the kitchen, that we neglected the Endeavor's office space in the back. Currently, there is no mechanism for paper recycling. It is collected in a cardboard box in the office and dumped in the regular dumpster. The Endeavor does not have space to purchase another green recycling can in cage. We suggested collecting the paper from the office and giving it to the recycling man when he comes on Thursday.

13. Evaluation

The best way to evaluate how the program went is to compare our objectives to our outcomes. There are things that didn't go the way we planned, and others ways for improvement. There were also barriers to implementing the most effective recycling plan we intended at the beginning of the project.

Objective 1:

The first objective was to reduce waste (through recycling) by 25% by April 20th. The most glaring omission was the fact that we had no way to weight, or quantify our data. We could only "eyeball it" and estimate the reduction. Problem with that approach is that we didn't have baseline data to compare it to. We were under time constraints to start quickly, and didn't have time to conduct a baseline study. Given our lack of equipment to weight how much waste was or wasn't reduced and diverted, and our lack of baseline data, the best way to evaluate this objective was to ask the people best able to judge the difference in the flow of trash.

We asked Laurie (kitchen director) and other volunteers if they noticed a difference in the waste stream. Laurie said she noticed an immediate difference in the volume of trash in the main dumpster. She said that she no longer had to have people compact the trash by

stomping it down. The problem now was that there was so much recyclables, that those cans were now overflowing. We only observed the dumpster full on Wednesdays (the day before it is dumped). 78% of the time we categorized the dumpster as ½ full or less (see Appendix E). In contrast, the recycling cans (in the back cage) were empty 22% of our observations, and classified as "overflowing" 67% of the time.

In the end, we cannot say if the objective of a 25% reduction was met, but we can point out the trend of a shift in the waste stream away from the landfill and into the recycling facilities.

We tried to solve the problem of overflowing recycling bins in the cage. We found an independent company that would make a regular recycling pick-up (since current pick-up is not completely regular). However, the cost was not in the range the Endeavor was willing to pay and they decided to keep with their current disposal method.

Objective 2:

We tried to meet the second objective (enhancing pro-recycling behavior) by placing the recycling bins (inside the kitchen) closer to the waste generation point and the main "catch all" trash can further away. We also labeled the recycling bins with colorful basic laminated signs. We observed recyclable material in the kitchen trashcan 78% of the time. Mostly, the proportion of recyclables was small (<5-10%). On a positive note, the recycling bins were well sorted. Not one observation noted the failure to sort out the plastics from glass.

Pro-recycling behavior was enhanced, since it did not exist before the program started. The change was immediate, although improvements can still be made. Overall, the idea of recycling was well received from staff and volunteers.

Objective 3:

We did not meet the third objective. We intended to create two new volunteer positions. One would take out the recyclables from the kitchen out to the cage. The second one would help us meet a goal of recycling dining area trash and compost (see Objectives section). We do not have the power to create new positions, only to suggest them. The Endeavor is short staffed most of the time. Thus, they decided to get the program implemented the way that worked best for them.

The trash can and recycling bins in the kitchen were dumped on a voluntary basis. There is no "trash dumper" position. At first, the recycling bins were not being dumped. However, Laurie started getting on their cases, and bin dumping has not been a problem since. The second volunteer position could not be filled all of the time. Thus, dining area trash was not recycled or composted 100% of the time. When there were extra volunteers available, Laurie did place one of them in the dish room. Thus, this objective was met for the first volunteer duties, but only part of the time for the second volunteer position.

Objective 4:

We did not meet the fourth objective. We did not write a new volunteer position "Duties" sheet. Volunteer responsibilities are passed on by word of mouth from old volunteers and Laurie. Upon further consideration, we decided that this objective was unnecessary.

Final Thoughts:

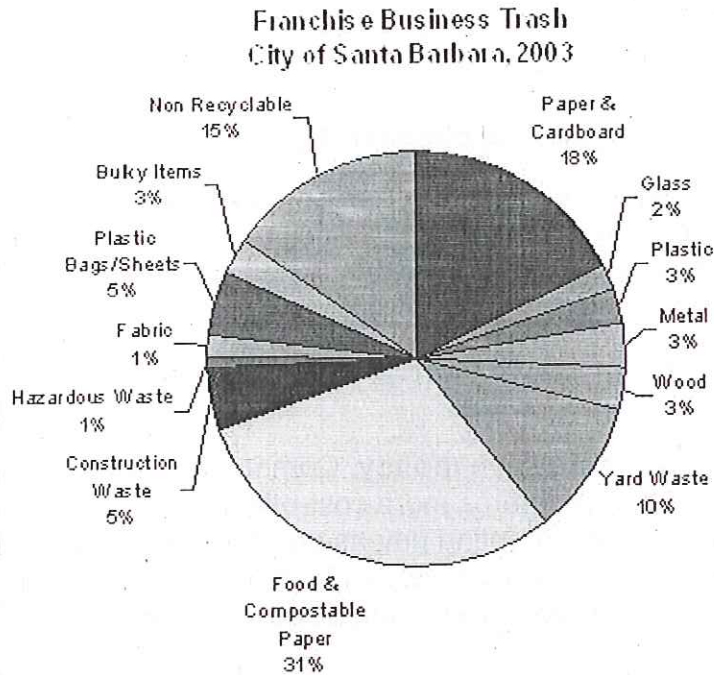
We are thankful to the Endeavor for being receptive to our ideas and implementing them the best they could. The Endeavor was going through some difficulties while the recycling program was being installed, and thus was not able to make all scheduled appointments. This delayed some of the program aspects and made others unattainable at this time. The Endeavor is on the track to continue the recycling program in their new residence because of an increase in proenvironmental behavior.

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<<http://www.ciwmb.ca.gov/LGLibrary/Innovations/MiniBins/LocalGov.htm#Tips>>

Appendix A: General Overview of What's In America's Trash



It's important to realize what actually goes into the trash. From the City of Santa Barbara's Environmental Services: recycling and trash information, this chart gives a good description of the proportions of different materials that can be found in a business' trash. According to their webpage "the chart includes only materials that are currently left in the trash, and not the materials that are currently in the recycling and greenwaste containers. Most of the items in color can be diverted through recycling composting, or reuse. Only 15% or so actually needs to go to the landfill".

City of Santa Barbara Environmental Services. (2005) *Recycling & Trash Information*. Accessed: 29 April 2008 <http://www.santabarbaraca.gov/recycling-trash/businesses_garbage.htm#characterization>

Appendix B: Recycling Benefits and Facts

Economic Recycling Benefits and Facts

information supplied by: National Recycling Coalition

- ♻️ Well-run recycling programs **cost less** to operate than waste collection, landfilling, and incineration.
- ♻️ **The more people recycle, the cheaper it gets.**
Two years after calling recycling a \$40 million drain on the city, New York City leaders realized that a redesigned, efficient recycling system could actually **save the city \$20 million** and they have now signed a 20-year recycling contract.
- ♻️ Recycling helps **families save money**, especially in communities with pay-as-you-throw programs.
- ♻️ **Well-designed programs save money.** Communities have many options available to make their programs more cost-effective, including maximizing their recycling rates, implementing pay-as-you-throw programs, and including incentives in waste management contracts that encourage disposal companies to recycle more and dispose of less.
- ♻️ **Recycling creates 1.1 million U.S. jobs**, \$236 billion in gross annual sales and \$37 billion in annual payrolls.
- ♻️ Public sector investment in local recycling programs pays great dividends by **creating private sector jobs**. For every job collecting recyclables, there are 26 jobs in processing the materials and manufacturing them into new products.
- ♻️ Recycling **creates four jobs** for every one job created in the waste management and disposal industries.
- ♻️ Thousands of U.S. **companies have saved millions of dollars** through their voluntary recycling programs. They wouldn't recycle if it didn't make economic sense.

Environmental Recycling Benefits and Facts

information supplied by: National Recycling Coalition

- ♻️ Recycling and composting **diverted nearly 70 million tons of material away from landfills** and incinerators in 2000, up from 34 million tons in 1990-doubling in just 10 years.
- ♻️ Every **ton of paper** that is recycled **saves 17 trees**.
- ♻️ The energy we save when we recycle **one glass bottle** is enough to **light a**

light bulb for four hours.

♻️ Recycling benefits the air and water by creating a net **reduction** in ten major categories of **air pollutants** and eight major categories of **water pollutants**.

♻️ In the U.S., processing minerals contributes almost half of all reported toxic emissions from industry, sending 1.5 million tons of pollution into the air and water each year. **Recycling can significantly reduce these emissions.**

♻️ It is important to reduce our reliance on foreign oil. **Recycling helps us do that by saving energy.**

♻️ Manufacturing with recycled materials, with very few exceptions, **saves energy and water** and produces less air and water pollution than manufacturing with virgin materials.

♻️ It takes 95% less energy to recycle aluminum than it does to make it from raw materials. Making recycled steel saves 60%, recycled newspaper 40%, recycled plastics 70%, and recycled glass 40%. These savings far outweigh the energy created as by-products of incineration and landfilling.

♻️ In 2000, recycling resulted in an annual energy **savings equal to the amount of energy used in 6 million homes** (over 660 trillion BTUs). In 2005, recycling is conservatively projected to save the amount of energy used in 9 million homes (900 trillion BTUs).

♻️ A national recycling rate of 30% **reduces greenhouse gas emissions** as much as removing nearly 25 million cars from the road.

♻️ Recycling **conserves natural resources**, such as timber, water, and minerals.

♻️ **Every bit of recycling makes a difference.** For example, one year of recycling on just one college campus, Stanford University, saved the equivalent of 33,913 trees and the need for 636 tons of iron ore, coal, and limestone.

♻️ Recycled paper supplies more than 37% of the raw materials used to make new paper products in the U.S. Without recycling, this material would come from trees. Every ton of newsprint or mixed paper recycled is the equivalent of 12 trees. Every ton of office paper recycled is the equivalent of 24 trees.

♻️ When one ton of steel is recycled, 2,500 pounds of **iron ore**, 1,400 pounds of **coal** and 120 pounds of **limestone are conserved.**

♻️ Brutal wars over natural resources, including timber and minerals, have killed or displaced more than 20 million people and are raising at least \$12 billion a year for rebels, warlords, and repressive governments. **Recycling eases the demand for the resources.**

- ♻️ Mining is the world's most deadly occupation. On average, 40 mine workers are killed on the job each day, and many more are injured. **Recycling reduces the need for mining.**
- ♻️ Tree farms and reclaimed mines are not ecologically equivalent to natural forests and ecosystems.
- ♻️ **Recycling prevents habitat destruction, loss of biodiversity, and soil erosion associated with logging and mining.**

Aluminum Recycling Facts

- ♻️ A used aluminum can is recycled and back on the grocery shelf as a new can, in as little as 60 days. That's closed loop recycling at its finest!
- ♻️ Used aluminum beverage cans are the most recycled item in the U.S., but other types of aluminum, such as siding, gutters, car components, storm window frames, and lawn furniture can also be recycled.
- ♻️ Recycling one aluminum can saves enough energy to run a TV for three hours -- or the equivalent of a half a gallon of gasoline.
- ♻️ More aluminum goes into beverage cans than any other product.
- ♻️ Once an aluminum can is recycled, it can be part of a new can within six weeks.
- ♻️ Because so many of them are recycled, aluminum cans account for less than 1% of the total U.S. waste stream, according to EPA estimates.
- ♻️ An aluminum can that is thrown away will still be a can 500 years from now!
- ♻️ There is no limit to the amount of times an aluminum can be recycled.
- ♻️ We use over 80,000,000,000 aluminum soda cans every year.
- ♻️ At one time, aluminum was more valuable than gold!
- ♻️ A 60-watt light bulb can be run for over a day on the amount of energy saved by recycling 1 pound of steel. In one year in the United States, the recycling of steel saves enough energy to heat and light 18,000,000 homes!

Paper Recycling Facts

- ♻️ To produce each week's Sunday newspapers, 500,000 trees must be cut down.

- ♻️ Recycling a single run of the Sunday *New York Times* would save 75,000 trees.
- ♻️ If all our newspaper was recycled, we could save about 250,000,000 trees each year!
- ♻️ If every American recycled just one-tenth of their newspapers, we would save about 25,000,000 trees a year.
- ♻️ If you had a 15-year-old tree and made it into paper grocery bags, you'd get about 700 of them. A supermarket could use all of them in under an hour!
- ♻️ This means in one year, one supermarket goes through 60,500,000 paper bags! Imagine how many supermarkets there are in the U.S.!!!
- ♻️ The average American uses seven trees a year in paper, wood, and other products made from trees. This amounts to about 2,000,000,000 trees per year!
- ♻️ The amount of wood and paper we throw away each year is enough to heat 50,000,000 homes for 20 years.
- ♻️ Approximately 1 billion trees worth of paper are thrown away every year in the U.S.
- ♻️ Americans use 85,000,000 tons of paper a year; about 680 pounds per person.
- ♻️ The average household throws away 13,000 separate pieces of paper each year. Most is packaging and junk mail.
- ♻️ In 1993, U.S. paper recovery saved more than 90,000,000 cubic yards of landfill space.
- ♻️ Each ton (2000 pounds) of recycled paper can save 17 trees, 380 gallons of oil, three cubic yards of landfill space, 4000 kilowatts of energy, and 7000 gallons of water. This represents a 64% energy savings, a 58% water savings, and 60 pounds less of air pollution!
- ♻️ The 17 trees saved (above) can absorb a total of 250 pounds of carbon dioxide from the air each year. Burning that same ton of paper would *create* 1500 pounds of carbon dioxide.
- ♻️ The construction costs of a paper mill designed to use waste paper is 50 to 80% less than the cost of a mill using new pulp.

Plastic Recycling Facts

- ♻️ Americans use 2,500,000 plastic bottles every hour! Most of them are thrown away!

- ♻️ Plastic bags and other plastic garbage thrown into the ocean kill as many as 1,000,000 sea creatures every year!
- ♻️ Americans throw away 25,000,000 plastic beverage bottles every hour!
- ♻️ Recycling plastic saves twice as much energy as burning it in an incinerator.
- ♻️ American throw away 25,000,000,000 Styrofoam coffee cups every year.

Glass Recycling Facts

- ♻️ Every month, we throw out enough glass bottles and jars to fill up a giant skyscraper. All of these jars are recyclable!
- ♻️ The energy saved from recycling one glass bottle can run a 100-watt light bulb for four hours. It also causes 20% less air pollution and 50% less water pollution than when a new bottle is made from raw materials.
- ♻️ A modern glass bottle would take 4000 years or more to decompose -- and even longer if it's in the landfill.
- ♻️ Mining and transporting raw materials for glass produces about 385 pounds of waste for every ton of glass that is made. If recycled glass is substituted for half of the raw materials, the waste is cut by more than 80%.

Solid Waste and Landfills

- ♻️ About one-third of an average dump is made up of packaging material!
- ♻️ Every year, each American throws out about 1,200 pounds of organic garbage that can be composted.
- ♻️ The U.S. is the #1 trash-producing country in the world at 1,609 pounds per person per year. This means that 5% of the world's people generate 40% of the world's waste.
- ♻️ The highest point in Ohio is "Mount Rumpke," which is actually a mountain of trash at the Rumpke sanitary landfill!
- ♻️ The US population discards each year 16,000,000,000 diapers, 1,600,000,000 pens, 2,000,000,000 razor blades, 220,000,000 car tires, and enough aluminum to rebuild the US commercial air fleet four times over.
- ♻️ Out of ever \$10 spent buying things, \$1 (10%) goes for packaging that is thrown away. Packaging represents about 65% of household trash.
- ♻️ On average, it costs \$30 per ton to recycle trash, \$50 to send it to the landfill,

and \$65 to \$75 to incinerate it.

These recycling facts have been compiled from various sources including the National Recycling Coalition, the Environmental Protection Agency, and Earth911.org.

A Recycling Revolution. (2008). *Recycling Facts*. Accessed: April 2008 <<http://www.recycling-revolution.com/recycling-benefits.html>>

Appendix C: Tips for Replication

- Seek support of top office management and custodial workers and management.
- Involve custodial workers from the beginning. Meet with custodians frequently to get their feedback. Consider having custodial workers manage the program in order for them to feel some ownership and have some accountability.
- Research the ability of local recyclers to take all the materials targeted for recycling.
- Conduct a basic waste assessment/audit. A basic and simple visual waste assessment/ audit will provide information that you can use to set targets for the program and to evaluate the program once it's in place.
- Evaluate current contracts (this is especially useful in estimating future savings through the program).
- Walk through each site with key staff and custodial staff to identify how to set up centralized collection centers.
- Place central bins in well-traveled areas.
- Make the program easy and convenient. (Simplifying paper recycling is one way.) Stress the simplicity of the program.
- Make the program clear. People need to know what is and is not acceptable for recycling. Confusion creates problems. When people feel confused, they are liable to ignore the whole program.
- Ensure the program won't cost people money. Provide bins and assure people they won't have additional costs associated with the program.
- Distribute equipment before the program is scheduled to begin. Exchange garbage cans yourself to ensure that every desk gets a mini trash bin and employees do not hide their larger garbage can.
- Give employees a choice of recycling boxes.
- Clearly designate trash and recycling bins. One successful method is to color-code the bins. For example, if mini trash bins are black, make the centralized trash bins black. If desktop paper bins are blue, make centralized paper containers blue as well.
- Constantly communicate and provide feedback and follow-up. Plan on having a lot of meetings. Communications to staff, education of senior management, and training for custodial, property management, and green team members are essential to the program's success. The more people know about and understand the new program, the easier it is for them to support it.
- Be available to answer questions. Once employees feel comfortable with how the program works, they will more likely feel good about participating.
- Provide easy ways for employees to communicate their concerns with you and obtain answers to their questions (such as a dedicated phone number, web site, and/or e-mail address).

- Devote time to planning and follow-up (this is essential to see what does and does not work so employees know there is human access to the program).
- Occasionally, additional training may be needed for new employees.
- Conduct an annual survey of all key facility staffers to find out how the program contractor and the program in general is working.
- Identify special circumstances and set guidelines for situations where this program is not applicable, and plan accordingly.
- Conduct a follow-up audit and publicize your results. Employees will want to know the outcome of their new way of life.
- In general, continually identify problems and work to remedy them.
- Be flexible and make the program flexible. For instance, if some employees generate more white paper than others, offer them new bins.
- Aim high. Some Max Green offices are diverting 95 percent of their discards to recycling.
- Set realistic, clear goals for the office recycling program based on waste audit results (if you have conducted an audit).
- Make sure employees understand and accept the goals.
- Provide feedback.
- Publicize how well the office is performing in relation to its goals.
- Don't stop at recycling. Consider implementing other waste reduction policies/goals and starting a reuse program.

California Integrated Waste Management Board (2007) *"Innovations" Case Studies: Mini Trash Bins*. Accessed: April 2008
 <<http://www.ciwmb.ca.gov/LGLibrary/Innovations/MiniBins/LocalGov.htm#Tips>>

Appendix D: Email correspondence

Re: meeting times

From: **John Shelter** (johnboy95501@yahoo.com)

Sent: Fri 2/22/08 3:11 PM

To: Roberta Brunkalla (r.brunkalla@hotmail.com)

Thanks for e-mailing me. Your e-mail that I sent to you got kicked back. Tuesday at 2 is great, if you info before that call me at 616-1182. I have been doing alot of meeting going into our city council meeting on the 5th of March for our lease. Keep trying please.

John

Roberta Brunkalla <r.brunkalla@hotmail.com> wrote:

Hi John!

Just talked to Lena, and is Tuesday at 2 ok for you? We can meet earlier (as early as 11.30) if you are doing something at that time. I am writing the proposal right now, but I will need some information from you before it is complete.

Cheers,

Bobbi

RE: Business Recycling Pick-up

From: **Patti Johnson** (pattij@arcatarecycling.org)

Sent: Wed 2/20/08 12:58 AM

To: 'Roberta Brunkalla' (r.brunkalla@hotmail.com)

Hello Roberta,

Here at ACRC we provide free commercial and office paper pick-up for businesses. We do not provide pick-up of any other recyclable items. Arcata Garbage, Eel River Disposal, and Eureka City Garbage provide dumpsters for cardboard. There are a couple of entrepreneurs who provide

pick-up of CRV and glass: Shane Keller, 825-7335 & Ken Kyle, sorry I don't

have his #. Hope that answers your question. If your business would like

to establish office paper recycling with us please let me know.

Also, hope you find the service you are looking for.

Keep Recycling.

Patti Johnson

Public Information Specialist

Arcata Community Recycling Center

(707) 445-4321

-----Original Message-----

From: Roberta Brunkalla [mailto:r.brunkalla@hotmail.com]

Sent: Tuesday, February 19, 2008 3:02 PM

To: info@arcatarecycling.org

Subject: Business Recycling Pick-up

Hi,

I am inquiring about recycling pick-up prices for businesses. I was looking at your website, and I noticed paper is picked up free of charge, but I could not find a pricing list for glass, plastic and metal recycling. Could you please help me?

Thanks,
Roberta Brunkalla

Hi Bobby jo,
I am sorry I missed you to, Let me know when you want to meet?
John

Roberta Brunkalla <r.brunkalla@hotmail.com> wrote:

Hi John!

This is Bobbi Jo. Sorry we missed each other, but I think Lena and I learned a lot today, and we are looking forward to running some test pilots. We would like to run our ideas and alternatives by you first, and see what kind of funding can be used (for the colored bins and what not).

We are currently in the phase of researching the costs and the regulations that have to be met in the kitchen. Hopefully by the end of this week things should be sorted and I will email you a document that lists objectives and feasibility of the up graded waste management system. Can we meet some time around then? You said something about a board of directors. Can we make an appointment with them after we consulted you? Thanks again for working with us. If you have any questions, my number is 822-0482.

Bobbi Jo

Appendix E: Monitoring Observations

Date	Recycling Bins in the Kitchen (3)	Waste Bin in the Kitchen	Waste Bin in Dining Room	Recycling cans In the Cage (3)	Cardboard Dumpster in Cage	Compost	Waste Dumpster in Cage	Comments
04/07 Mon 11 am	Plastic-Full Metal-1/2 Glass-a little	Full-some plastics	Mostly compost, some recycling	Empty	Half full	One 1/3 full	Almost empty, some recyclables	Bins are being used, could improve a bit
04/08 Tues 11 am	All full Plastic overflowing into glass bin	Almost full Lots of newspaper	3/4 full (newspaper and cardboard)	All empty	1/2 full	1/4 full	1/2 full (10% or less were recyclables)	Bins in kitchen not being dumped steadily. Attracting ants. Laurie stated dumpster is markedly reduced
04/09 Wed 12 am	Plastic-Full Metal-Full Glass-Empty	1/2- a little recycling	Only compost 1/4 full	Plastic-full Metal-1/3 Glass-empty	2/3	empty	full	
04/10 Thur 2 pm	Nearly empty (plastic in glass bin)	Food waste, little plastic	nothing	2 full of plastic	Almost empty	1 1/4 can full	1/2 full ~1% recyclable	To get dining area bin removed, extra volunteer is needed. Is removed when they can
04/15 Tue 11 am	Nearly empty	empty	No recyclables	Over flowing	Full	3/4 can full	15% recyclable (paper)	Need regular dump for volume of recyclables
04/16 Wed 2 pm	Plastics and Metal- Full	1/2 full	Full- some recyclables	overwhelming	Full	some	overflowing	Recycling wasn't picked up. Needs to be emptied
04/17 Thur 11 am	2 full 99% plastic	1/3 full ~5% paper	3/4 full >50% recyclable (cereal boxes and some	All full Using crate for overflow	~empty	empty	empty	

04/18 Fri 1 pm						plastic)						1/3 full	Closed due to Humboldt's holiday 4/20
04/23 Wed 1 pm	Plastic- Full Metals- 1/2	Full- lots of compost	Full- some compost	Plastic-full	1/2 full	A small amount in one	full	Lots of new volunteers, possible reason for so much food waste in trash					
04/24 Thur 1 pm	Little metal (1/8 of a bin)	1/4 full (mostly paper)	1/2 full <5% paper <1% compost	2 missing 1 overflowing 2 black trash bags hold overflow	1/2 full	1/2 can	1/2 full mostly office paper and some cardboard (<1%)	Seems to be going well					

Appendix F: Group Meeting Time Sheet

Date	Amount of time	Reason for meeting
1-Feb	30 min	brainstroming
5-Feb	30 min	refining problem, research
7-Feb	30 min	discussed alternatives
12-Feb	30 min	Endeavor vs. campus mugs idea
15-Feb	1 hour 30 min	Observe Endeavor hot lunch serving
19-Feb	2 hours	observed boxing
21-Feb	30 min	researched
25-Feb	1 hour 30 min	meeting with Jon, proposal
29-Feb	30 min	background and statement writing
1-Mar	2 hours	scoped recycling bins
5-Mar	1 hour 30 min	goals and objectives
11-Mar	2 hours	bought bins
25-Mar	1 hour	wrote alternatives
26-Mar	30 min	printed out recycling signs for bin
27-Mar	2 hours 30 min	set up bins in kitchen, cleaned up recycling area outback
1-Apr	30 min	monitor bins
3-Apr	2 hours	outline paper topics, researched
24-Apr	2 hours	put together paper/editing
29-Apr	3 hours	more editing

Appendix G: Pictures



This is the cage with the cardboard recycling dumpster and three recycling cans located out the back kitchen door. Black trash bags are holding the recycling overflow.



This window looks into the dishwashing room. The trash can in front of the window is where patrons deposit their food waste and other waste.



The three recycling bins are located in the kitchen between the dishwashing room (on the right) and a storage room (on the left). The sign for the ^{plastic} metal bin~~s~~ has recently fallen off.