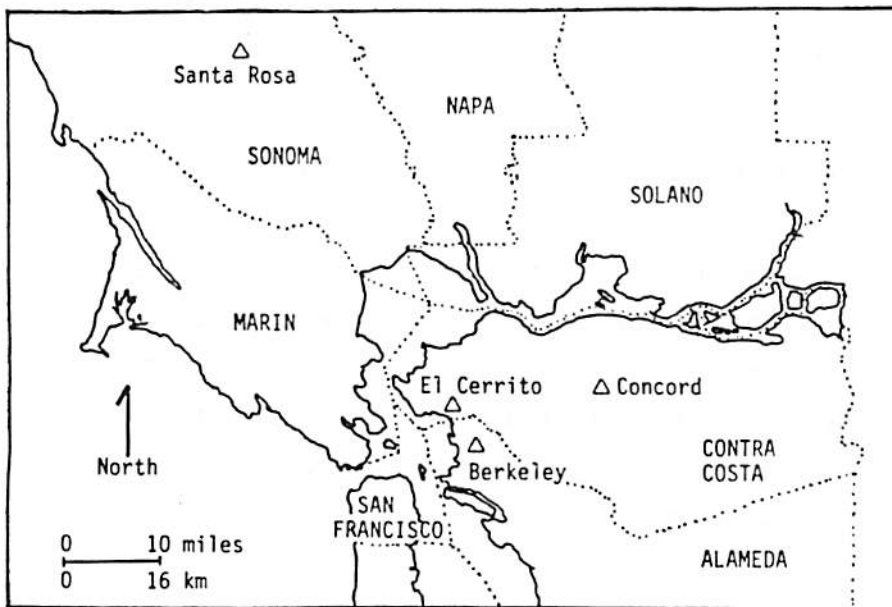


Chapter 1  
POTENTIAL REVENUES OF A CURBSIDE RECYCLING PROGRAM IN CONCORD

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Introduction

Over the last 20 years, Concord (Map 1) has seen the development of towering buildings, numerous housing tracts and its own airport. Along with these changes, the population in Concord has increased dramatically. Planners' projections of continuing population increases raise the issue of ever-growing volumes of municipal waste and suggest the future importance of recycling. Currently Concord has a handful of small recycling centers, each of which collects only a few recyclable materials. If a centralized recycling program existed, a much higher level of recovery could be achieved.



Map 1. Bay Area Region

Recycling programs commonly collect items such as paper, glass and metal and process them for later reuse. Some programs diversify by recycling other products, such as oil, batteries and yard litter. Various methods of collection exist; they range from drop-off centers to on-call collections to curbside collections. Curbside service allows minimal effort on the part of the participants.

It eliminates the need to deliver the materials to a collection center and requires less advance planning than an on-call collection system, in which the participants must themselves schedule the pickup. Because a curbside program is more convenient, it has a high level of participation, which in turn makes for a more successful operation.

This paper estimates the potential revenues of a hypothetical curbside program in Concord. To accomplish this evaluation, operational characteristics of three existing successful programs in the Bay Area are analyzed. These programs suggest what a successful program in Concord might expect to receive in revenues. Future population growth in the city is factored into the analysis and estimates for future possible revenues are presented.

#### Past Studies

The U.S. Environmental Protection Agency (EPA) published two relevant booklets. EPA (1979) contains information on different types of recycling programs and on aspects of marketing, economics and environmental education. EPA (1980) gives descriptions of collection and processing systems which together make up a complete recycling program, and it provides in-depth data on established curbside programs around the country. City of Berkeley (1986) has information on current market values as well as information on its local recycling programs.

#### Methodology

Collection statistics for the areas served by Berkeley's Ecology Center (a non-profit organization), the City of El Cerrito and Santa Rosa's private, for-profit Redwood Empire Disposal Company are presented. Factors such as the number of households participating, frequency of collection and amounts collected are used to arrive at an average collection amount per household. Two participation levels of 25 and 33 percent are assumed to be achievable by a future curbside program in Concord. The numbers of participating households represented by these levels are multiplied by the average collection values per household to calculate potential revenues of such a program in Concord today. The possible future tonnage and revenues as a result of demographic growth are also presented.

#### Data

The importance of recycling becomes apparent when the potential amounts of recyclable materials in residential waste are considered. Table 1 shows the typical composition of residential waste. Note that roughly 50 percent and potentially as much as 75 percent of this waste is recyclable.

Table 2 presents collection statistics on the curbside programs in Berkeley, El Cerrito and Santa Rosa. These statistics include the number of participating households, the materials collected and their tonnage and the frequency of collection. In all three cities newspaper constitutes about 50 percent and glass about 25 percent, by weight, of the materials. Dividing the tons collected by the number of households in the area gives the average amounts collected per household. These calculations

<u>Material</u>	<u>Weight Percentage of Total Waste</u>
Paper	30-40
Newspaper	9-15
Other	21-25
Glass	13.5-26
Clear	9-15
Green	3-7
Brown	1.5-4
Metal	3.7-9
Aluminum	0.2-2
Ferrous	3.5-7
Nonrecyclable Refuse	25-52.8

Table 1. Recyclable Material as Percentage of Total Residential Waste

Source: EPA, 1980.

Location/ Operator	Participating Households	Frequency of Collection	Materials Collected	Tons Collected per Month	Pounds Collected per Household per Month
Berkeley/ Ecology Center <sup>1</sup>	6,600	1/month	Newspaper Glass Aluminum	125 69 1 <hr/> 195	37.9 20.9 0.3 <hr/> 59.1
El Cerrito/ City of El Cerrito <sup>2</sup>	9,400	1/week	Newspaper Glass Aluminum	68 32 1 <hr/> 101	14.5 6.8 0.2 <hr/> 21.5
Santa Rosa/ Redwood Empire Disposal <sup>2</sup>	23,000	1/week	Newspaper Glass Mixed Metal	112 68 21 <hr/> 201	9.7 5.9 0.3 <hr/> 15.9
Average	13,000	-	-	<hr/> 166	<hr/> 32.2

Table 2. Collection Data for Three Curbside Programs

Sources: 1. City of Berkeley, 1986.  
2. EPA, 1980.

yield an average of 23.2 pounds per month per household for newspaper, 11.2 pounds per month per household for glass, and 0.28 pounds per month per household for aluminum.

Table 3 gives market values for newspaper, glass and aluminum. These figures were averaged and rounded to the nearest dollar, yielding values for newspaper of \$70 per ton, glass at \$28 per ton, and aluminum at \$660 per ton.

Table 4 presents ABAG's demographic projections for Concord's future total population, persons per household, and the number of households from 1985 to 2005. The table shows a steady increase in total population from 107,400 to 114,900. The number of households also increases, from 40,430 to 47,110, resulting from an assumed slight decrease in persons per household from 2.63 to 2.41 over the 20-year span.

<u>Material</u>	<u>Market Value per Ton</u>	
	<u>Range</u>	<u>Average</u>
Newspaper <sup>1</sup>	\$69.58	\$70
Glass <sup>2</sup>		\$28
Crushed, color sorted	\$30-\$40	
Crushed, color mixed	\$15-\$40	
Aluminum <sup>1</sup>	\$620-\$700	\$660

Table 3. Market Values of Recycled Materials

Sources: 1. City of Berkeley, 1986.  
2. Brown et al., 1981.

<u>Year</u>	<u>Population</u>	<u>Persons per Household</u>	<u>Households</u>
1985	107,400	2.63	40,430
1990	110,600	2.56	42,770
1995	112,900	2.48	44,830
2000	113,000	2.42	45,900
2005	114,900	2.41	47,110

Table 4. Demographic Projections for Concord

Source: ABAG, 1985.

Table 5 presents two scenarios of 25 and 33 percent participation in a hypothetical program in Concord. The number of households participating is calculated by multiplying the projected number of households by 25 percent and 33 percent. The potential tons collected per month are derived by multiplying the average amounts collected per household (in pounds) by the number of households participating, and dividing by 2000. These tonnage values translate into potential revenues per month by multiplying the tonnage per month with the correlating market values from Table 3. The revenues are then totalled and multiplied by 12 to acquire projected yearly revenues.

A program with 25 percent participation in Concord will yield revenues of over \$10,000 per month initially and as much as \$12,500 per month by 2005. Similarly a Concord program with 33 percent participation could expect income of at least \$14,000 per month initially and up to \$16,500 per month by 2005. By 1990, the potential annual revenues for such a program are over \$136,000 for 25 percent coverage and over \$179,500 for 33 percent coverage.

Year	25 Percent Participation				33 Percent Participation			
	Households	Potential Tons/Month	Potential Revenues/Month (dollars)	Potential Revenues/Year (dollars)	Households	Potential Tons/Month	Potential Revenues/Month (dollars)	Potential Revenues/Year (dollars)
1985	10,108	N <sup>1</sup> 117 G <sup>2</sup> 57 A <sup>3</sup> 1.4	8,208 1,585 934 <u>10,727</u>	128,724	13,342	115 75 1.9	10,834 2,092 1,233 <u>14,159</u>	169,908
1990	10,693	N 124 G 60 A 1.5	8,683 1,677 988 <u>11,348</u>	136,176	14,114	164 79 2.0	11,461 2,213 1,304 <u>14,978</u>	179,736
1995	11,208	N 130 G 63 A 1.6	9,101 1,757 1,036 <u>11,894</u>	142,728	14,794	172 83 2.1	12,013 2,320 1,367 <u>15,700</u>	188,400
2000	11,498	N 133 G 64 A 1.6	9,336 1,803 1,062 <u>12,201</u>	146,412	15,177	176 85 2.1	12,324 2,380 1,402 <u>16,106</u>	193,272
2005	11,778	N 137 G 66 A 1.7	9,564 1,847 1,088 <u>12,499</u>	149,988	15,546	180 87 2.2	12,623 2,438 1,436 <u>16,497</u>	197,964

Table 5. Projected Potential Revenues of a Curbside Collection in Concord at Two Hypothetical Participation Levels, 1985-2005

- Notes: 1. N = Newspaper  
2. G = Glass  
3. A = Aluminum

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the calculations leading to Table 5, a number of assumptions were made. Despite the fact that Concord's collection amounts per household are over twice as great as El Cerrito and Santa Rosa, Concord's collection amounts per household are assumed to be comparable to the average values for the other cities. One reason for this high participation level at the Ecology Center could be due to the discrepancy in the dates of the source, 1980 versus 1986, but more likely it is due to Berkeley's environmental awareness. Also Santa Rosa's aluminum value is calculated with the assumption that aluminum constitutes 17.7 percent of mixed metal (based on data in Table 1). The market value for glass here is from Brown and others (1981), and may be an underestimate of the current value of glass. Finally, the average market values for all materials are taken to be constant through 2005, ignoring the probability that changes in market values will occur in the future.

These assumed collection averages are higher than would actually occur initially. The reason for this is that a fledgling curbside program will have a substantially lower collection level than an established program. Eventually the collection values would be expected to rise to a level comparable to that of the successful programs of Berkeley, El Cerrito and Santa Rosa.

Unfortunately, Table 5 estimates revenues only and does not address the economic costs of such a program. The calculation of these economic costs is beyond my capability and thus the viability of a curbside program in Concord cannot be accurately judged in this paper. Yet the issue of potential revenues is vital to deciding if a program is worthwhile.

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No final verdict on the potential viability of a curbside recycling program in Concord can be reached here. However, I view recycling as important simply for the sake of the environment. If the recycling of common residential materials can bring a monetary reward as demonstrated in this paper, so much the better. Even if a recycling program shows only a marginal profit, it is still worth the effort environmentally.

I hope that either local Concord government or someone in Concord will initiate a curbside program and thus increase the awareness of the growing problem of solid waste management to the Concord residents. Perhaps state and national governments can assist in the development of the necessary programs in recycling. This assistance can be instrumental in helping recycling programs in Concord and other cities to get established and also raise the environmental awareness of communities.

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