

# **Government Policies for Increasing the Recycling of Construction and Demolition Debris**

Prepared by:

Kimberly Cochran, Stephanie Henry, Brajesh Dubey, and Timothy Townsend  
Department of Environmental Engineering Sciences  
University of Florida, Gainesville, Florida 32611

Prepared for:

Clay County Solid Waste Division  
3545 Rosemary Hill Road  
Green Cove Springs, Florida 32043

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## Table of Contents

Preface.....	3
Introduction.....	4
Policy Options for C&D Debris Recycling.....	6
Policies Implemented in the US.....	8
Policy Discussion for Florida.....	14
Summary and Conclusions.....	16
References.....	18

## Preface

This document is one of the deliverables of an Innovative Recycling Grant Awarded to Clay County by the Florida Department of Environmental Protection. Clay County contracted with the Department of Environmental Engineering Sciences at the University of Florida to study policy options for recycling construction and demolition debris. Alan Altman was the project officer for Clay County. The intent of this document is to provide Florida municipalities with an overview options that they may have available for promoting construction and demolition (C&D) debris recycling. Also as part of this work, the project team worked with the Hinkley Center for Solid and Hazardous Waste Management to develop another deliverable of the project, a web site on C&D debris recycling that can be used as a state-wide resource ([www.constructiondebris.org](http://www.constructiondebris.org)). This website also contains other information regarding other activities associated with the Innovative Recycling Grant.

# Introduction

## Background

Recycling is often proposed as the best management method for solid wastes. In many locations, however, recycling is not the chosen method of management by the generators of the waste. The reasons for the lack of recycling are varied, but include economics, convenience, markets, and current mindset. Government agencies interested in promoting recycling of solid waste for the greater environmental benefit often introduce legislation (in the form of specific regulations or as policies) meant to overcome those barriers. A variety of different governmental initiatives have been explored, with varying degrees of success.

One component of the municipal waste stream that has received renewed attention in recent years as a candidate for recycling in construction and demolition (C&D) debris. Typical components of C&D debris include concrete, wood, drywall, asphalt shingles, asphalt concrete, metal, and other structural materials. As a broad waste category, C&D debris differs from other waste streams in that the makeup of the debris varies tremendously depending on the source of the debris (e.g., demolition versus construction, residential versus commercial). This has created the situation where some parts of the C&D debris stream are already very well recycled (concrete from the demolition of large buildings) while other parts are not (mixed debris from residential construction).

Because of the large magnitude of this waste stream (a 1996 estimate projected building-related C&D debris to account for 145 million tons in the US); some governments are placing more emphasis on C&D debris as a material that should be recycled. In general most of the components can be recycled. But also in general, the value of these materials on the market (especially as compare to other recycled commodities from household waste) is low. Since the markets do exist, yet are often not lucrative enough to encourage new businesses to enter this arena, government incentives have the potential to play a large role in promoting C&D debris recycling on a much larger scale than currently practiced.

In this document, regulatory initiatives for promoting C&D debris recycling are described. Policies that can be used to encourage C&D debris recycling are defined, locations in the US where these policies have been enacted are identified, and the lessons learned from these experiences are discussed. Policies were evaluated based on the potential for increasing the recycling rate and potential costs. In addition to reviewing the existing literature, a survey was used to obtain this data from state, city, and county governments.

## Barriers to C&D Debris Recycling

Several barriers exist to recycling of C&D debris. Economic issues are major barriers to C&D debris recycling. In many US states, including Florida, C&D debris may be disposed of in unlined landfills (Clark et al., 2006). Many states that do require liners only require natural clay liners and do not require landfill leachate to be collected. Thus, disposal in these areas can be relatively cheap compared to the

cost associated with recycling. For effective recycling, the debris components must first be separated from one another. This practice can occur at the construction site, but the waste handling and collection process is more expensive than simply hauling all of the waste to a landfill. In some areas, mixed C&D debris processing facilities can receive the entire waste stream from a C&D job, and separate the materials into commodities. These facilities charge a tipping fee; they are generally only economically viable where landfill tipping fees are high enough to warrant the effort spent in separating and processing the materials. Thus for many areas of the US, it is more cost effective to the contractor to collect and process the massive amount of concrete from the demolition of a large building, but it is more cost effective for them to dispose of mixed construction debris in a landfill.

Political barriers can occur when policies that are currently in place inhibit recycling programs. Waste collection franchises can be a good example of this if recycling is not stipulated in a franchise contract. Since the waste hauler is being paid to collect the waste, they often do not have any incentive to recycle it. Many waste haulers own the landfills that they take their waste to and recycling the debris would mean a loss of revenue. Psychological barriers to C&D debris recycling persist as it is difficult to change the current mindset towards disposal. People are comfortable with the current system and are resistant to change, especially when they perceive no reason to change. They often do not understand how their actions can impact the environment.

Markets are often cited as a problem, and this is true in some parts of Florida. In many cases, markets do not currently exist but have the potential for development. Gypsum drywall, for example, has been demonstrated in previous Innovative Recycling Grants to be recyclable from a market and processing standpoint, yet other barriers have resulted in no prolonged drywall recycling activities. Additional barriers, most notably economic barriers, have continued to make C&D debris recycling difficult in much of the state. Although these barriers do exist, it is important to acknowledge that recycling of these materials has been successfully implemented in some areas of the country. In some cases, recycling becomes feasible because of regional economic differences, but in other cases specific actions by government officials and policy-makers have made C&D debris recycling becoming more attractive.

### **Scope of Document**

In the following section, policy options for recycling C&D debris are reviewed in general, followed by a summary of specific initiative enacted in the US. The policies are then discussed with specific regard to potential application to Florida. The document ends with a summary and conclusions.

## Policy Options for C&D Debris Recycling

As indicated earlier, a variety of different policies may be used to encourage the recovery and recycling of solid wastes, including C&D debris. A literature search was performed to assess the potential policies that could be used to encourage C&D debris recycling. Table 1 provides a list and description of policies encountered. In general, the types of policies used for promoting waste recycling can be group as: (1) direct regulation, (2) market incentives, and (3) education (Barron and Ng, 1996).

### Direct Regulation

Direct regulations require or encourage waste diversion by the generators. Disposal controls, percentage and material recycling requirements, green building requirements, recycling goals, and salvage requirements are all examples of direct regulation. As discussed in the opening chapter, since landfill economics plays such a large role in determining whether C&D debris recycling is feasible, a government action that limits C&D debris from being disposed in landfills or that makes the landfilling of that debris more expensive (e.g., liner requirements) can have a major impact. As will be discussed in the next section, direct government action, with California and its municipalities being the most notable example, can have a major impact on C&D debris recycling amounts.

### Market Incentives

Market incentives make waste diversion more appealing by making it a more economical option. Disposal taxes, subsidized recycling, business development, and advance disposal fees/deposits/rebates are examples of market incentives. These are all examples of approaches classically used by governments to promote recycling of municipal waste components. Bottle bills are one example: some states (not Florida) require an advance deposit on certain beverage containers which can be redeemed at an appropriate recycling facility.

### Education

Education policies spread information to the public to make them aware of recycling opportunities. Most US states, and many local governments have programs in place to educate businesses and the public on recycling of C&D debris. The US EPA Office of Solid Waste, for example, maintains a webpage that provides information to interested parties on reducing, reusing and recycling C&D debris components (<http://www.epa.gov/epaoswer/non-hw/debris-new/reducing.htm>). Many states and other organizations have developed guides that describe how to develop programs for recycling debris at the construction site, that show how new businesses can participate in the recycling industry, or how new technologies such as deconstruction can be employed.

**Table 1. A summary of policy options for promoting solid waste recycling**

Name	Description
Disposal ban	A law or ordinance that specifically bans the disposal of certain waste materials from being disposed of in a landfill or restricted to certain landfills that have increased protection of the environment, such as RCRA Subtitle D or C landfills.
Disposal tax	Artificially inflating the cost of disposal to make recycling or reuse a more economical option to the public.
Subsidized recycling	Artificially decreasing the cost of recycling in order to make recycling or reuse a more economical option to the public.
Percentage recycling requirement	A law or ordinance that requires that a percentage of the waste stream is recycled.
Material recycling requirement	A law or ordinance that requires certain waste materials to be recycled.
Deposit/Advanced disposal fee (ADF)/ Rebate	A law or ordinance that requires the public to pay for disposal before waste generation (generally at the time that the building permit is applied for). This fee is returned if proof is given that the material is recycled.
Government waste recycling requirement	A law or ordinance that says that all government agency construction activity that produces waste (including C&D debris) must recycle or divert from the landfill some portion of that waste.
Government recycling purchasing requirement	A law or ordinance that requires government agencies to purchase materials that have some recycled content.
Business development	Finances that are provided from the government to businesses to help develop recycling.
Education	Educational efforts performed by the government to increase recycling awareness specifically for C&D debris.
Recycling Goal	Legislation that provides a recycling percentage goal.
Green Building	A regulation or legislation that encourages green building in the region.
Salvage requirement	Demolition contractors are required to post notice of an impending demolition to allow anyone to salvage materials from the building.

# Policies Implemented in the US

## An Investigation of US Policies

The methodology used here is similar to that used by Barron and Ng (1996) and Townsend et al. (2001). Barron and Ng listed many policies and ranked them according to cost, effectiveness, monitoring/enforcement, ease of implementation, cost, flexibility, economic impacts, ecological impacts, environmental justice, and economic efficiency. Townsend et al. listed policies and their positive and negative characteristics.

The C&D debris policy analysis simplified the Barron and Ng (1996) list by evaluating total cost, recycling rate, and regional characteristics. Data about each policy were gathered by surveying cities, counties, and states that have implemented a C&D debris policy that may encourage recycling. These governments were found by a literature and internet search. The survey was conducted by telephone and persons completed the survey were directly involved with the administration, implementation, and/or enforcement of the policy.

The city and county survey collected data including costs to administer the program, enforce the program, and for purchasing needed recycling equipment. Additionally, data on revenues made from advanced disposal fees or deposits were collected. Counties and cities were also asked about the amount of C&D debris recycled and disposed of before and after the program was implemented.

While legislation has been enacted in some states, their implementation has been too recent to obtain results. Many states, however, have recycling goals that have the potential to encourage C&D debris recycling. States known to encourage C&D debris recycling and states that issue the most residential construction building permits were investigated to determine the amount of C&D debris recycled in the state, the recycling goal, the actual recycling percentage, and the effect that this goal has on the amount of C&D debris that is recycled.

## Local Policies

Six counties and 12 cities were contacted that had some sort of legislation that encourages C&D debris recycling. Of the 18 contacted, 14 responded. Those that did not respond were still evaluated from diversion data provided on the California Integrated Waste Management Board (CIWMB) website (2006). These cities and counties were found by contacting states known to be progressive in C&D debris recycling or reported by the US Census Bureau as issuing large amounts of residential building construction permits (2005). Additionally, periodicals that publish updates on new C&D debris legislation were consulted, such as Construction & Demolition Recycling Magazine. Table 2 presents the government agencies that were surveyed and some of their characteristics, such as population, number of residential building permits issued in 2004, and the average tipping fee for C&D debris. Not all counties had C&D debris facilities and, thus, average tipping fees of the counties that surrounded them were used. Tipping fees that were reported in dollars per cubic yard were converted to dollars per ton. Tipping fees ranged from \$30 to \$44/ton in the areas surveyed.

Table 2 shows that the surveyed cities and counties have a population range of 7,000 to 1.5 million. The number of residential construction building permits issued ranges from 0 to 6,500 per year. While it may seem superfluous to have a C&D debris policy in a location that does not issue many permits for residential construction, many of these areas are already built up and renovations are the primary C&D activity that occurs. Renovation data are not typically collected by a central source and, therefore, cannot be easily accessed. Tipping fees in these areas range from approximately \$30/ton to \$44/ton, which means that these areas do not have the most expensive tipping fees in the US for C&D debris. Some areas of the Northeast US have tipping fees of up to \$100/ton (William Turley, Construction Materials Recycling Association, personal communication). Most of these C&D debris ordinances are in California. While many states have recycling goals, California has a mandated diversion amount. This has prompted many cities and counties in California to target C&D debris to increase their total solid waste diversion rate.

**Table 2. Characteristics of Target Municipalities Surveyed**

City	County	State	2004 Population (thousands)	2004 Residential Building Permits (#)	Average C&D Debris Tip Fee (\$/ton)
Berkeley	Alameda	California	102	195	32.75
Castro Valley	Alameda	California	57	0	32.75
Pleasanton	Alameda	California	66	210	32.75
Oakland	Alameda	California	398	1,225	32.75
Brawley	Imperial	California	22	0	34.11*
Santa Monica	Los Angeles	California	88	437	33.17
Laguna Hills	Orange	California	32	1	29.95
La Habra	Orange	California	60	28	34.11
Atherton	San Mateo	California	7	31	44.00*
Burlingame	San Mateo	California	27	29	44.00*
Palo Alto	Santa Clara	California	57	163	40.90
San Jose	Santa Clara	California	905	2,775	40.90
Cotati	Sonoma	California	7	0	45.20
	Alameda	California	1,449	2,467	32.75
	Contra Costa	California	1,018	6,464	40.00**
	San Mateo	California	700	724	43.68*
	Tulare	California	411	591	35.00
	Orange	North Carolina	118	1,018	41.00

\*No C&D debris-specific tipping fees reported from disposal facilities within the county. These tipping fees are averages of the C&D debris-specific tipping fees reported by surrounding counties.

\*\*Calculated using the reported tipping fee of \$20/cubic yard and a conversion factor of 0.5 tons/cubic yard.

Cities and counties were surveyed by telephone. . All costs listed are incurred by the government, except for “direct costs to the public,” which are created by the government and imposed on haulers,

contractors, or other persons. Average tonnages are averages throughout the program. California does not track C&D debris specifically and estimates C&D debris generation using waste composition data and total waste generation.

Results from the survey were varied and somewhat incomplete. Many locations in California do not track the amount of C&D debris recycled and estimates must be used. California estimates their diversion (including recycling) by using statewide composition studies and disposal data. Many cities and counties did not know exactly the amount of money spent on their policies, but estimate based on the amount of time that is spent administering the policy. Each city and county surveyed is discussed below by policy type implemented.

**Disposal Restriction.** Only one county, Orange County in North Carolina, had implemented a disposal restriction. They restricted wood, pallets, cardboard, metal, and land clearing from being disposed of in their landfill. The county owns and operates its own C&D debris landfill and recycling the materials required purchasing equipment. Additionally, people were needed to oversee the program. To encourage recycling, they also reduced the tipping fee for these materials to \$0/ton, thus, losing tipping revenues. All of these items resulted in a cost for the county. They did accrue some revenue for hauler licenses that were required for all haulers in the area; however, this revenue did not compensate for the incurred costs. While the state has a recycling goal of 40%, the county's own recycling goal is 60%. This policy allowed the county to achieve a 22% C&D debris recycling rate and a 63% total recycling rate.

**Green Building Requirements.** This is a requirement that city or county buildings obtain a green building certification. Green building certification is attained in the US through the US Green Building Council. Certifying a building as "green" means that the buildings have excelled in five areas: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. While use of recycled C&D debris materials and recycling of generated waste is promoted in this certification process, it is possible to become certified without performing these tasks. These are not often implemented to increase recycling and, therefore, recycling success is not widely tracked for these policies.

**Deposits/Advanced Disposal Fees/Rebates.** Five cities and counties, ranging in population from 7,000 to 900,000, required deposits or advanced disposal fees or provided rebates for recycling. They generally required a fee when a building permit is issued and offered the reimbursement of that fee if it is proven that a certain percentage of the debris is recycled. This often results in revenue for the city or county because the contractor does not return to obtain the reimbursement. The governments surveyed stated that they rarely turned down a reimbursement when the paperwork was turned in. It was not in the contractor's interest to put the time in for the reimbursement, especially if the cost is passed onto the consumer. Some governments stated that the number of renovations, especially roofing replacements, in their region is high. There was a lack of significant markets for roofing shingles; therefore, the renovation contractors were not able to recycle enough to receive a sizable return. Demolition contractors, however, often use the program and receive significant returns.

**Percent Recycling Requirements.** These programs require that the contractors submit waste plans for their developments and show that they will recycle a percentage of their waste stream. Cities and counties that have implemented this type of policy range in population from 20,000 to 1.5 million. Many of the cities and counties required a fee during the permit process to cover the administrative costs of this program. While the policy allows the government to enforce the program, enforcement is rare. Instead, many cities and counties rely on the contractors to follow through with their plan. Some locations require their recycling facilities to be certified and, thus, required to recycle as much C&D debris as possible. The waste management plans, therefore, are a backup method of ensuring recycling.

**Government Recycling Requirement.** This policy requires that before the construction, renovation, or demolition of a government building the contractor must develop a plan to demonstrate that a percentage of the waste will be recycled. While private construction, renovation, or demolition waste is not required to be recycled, this type of legislation may encourage C&D debris recycling programs to be developed to satisfy the government need.

**Summary of Local Policies.** Once the data were gathered, they were compiled by policy type. Average recycling successes and costs were found. Table 3 displays the results of this analysis. This table shows that the deposits have the fewest costs per ton recycled. In fact, revenue can be accrued. It also had the highest increase in C&D debris recycling rates. This policy can be seen as the best for costs and recycling rates. Some locations, however, complained that costs were often passed on to the consumer.

All numbers presented in Table 3 were determined as an average of the survey results. Thus, applications to other regions must take into consideration the characteristics of the regions surveyed. Additional information from new policies implemented in other areas will increase the accuracy of these estimates.

## **State Policies**

In 2005, Florida issued the most residential construction building permits of all states in the US. Texas, California, Georgia, and North Carolina round out the top five residential building permit states. These states are the most likely to face problems associated with growth. Although all states in the US have been growing in population over the past 15 years, not all states encourage C&D debris recycling or track the amount recycled in their state.

Recycling policies within states have generally consisted of recycling goals, recycling requirements, recycling grants, and disposal restrictions (bans). New legislation has been enacted in Massachusetts to ban unprocessed C&D debris from disposal to specifically encourage C&D debris recycling. Ohio recently enacted stricter regulations on their C&D debris landfills that may make recycling more appealing. As shown in the previous section, the state with the most local government activity with respect to C&D debris recycling initiative is California. It should be noted that the local government interest is very much a result of statewide recycling policies. Every jurisdiction recognized by the California Integrated Waste Management Board (CIWMB) must meet a 50% recycling goal by a specified time. Failure to meet this goal can result in fines by the CIWMB of up to \$10,000 per day. Since C&D debris is such a

large component of the waste stream and one that is relatively easy to recycle, many municipalities have aggressively targeted C&D debris.

**Table 3. Summary of Local Municipality Survey Results**

Policy Type	Disposal Restriction	Green Building	Deposit/ADF/Rebate	% Recycling Req.	Govt. Recycling Req.	Total/Average
#of locations implemented	1	2	5	8	1	17
Ave. cost/person/year	\$3.90	\$ -	\$(0.51)	\$0.38	\$-	\$0.75
Ave. cost/ton recycled	\$51.83	\$ -	\$(8.75)	\$ 0.16	\$ -	\$9.00
Ave. total recycling rate increase	23%	9%	10%	7%	9%	12%
Ave. total lbs recycled/person/year	150	300	25,000	3,000	250	5,700
Ave. cost/residential construction building permit issued	\$400	\$ -	\$(7,300)	\$66	\$ -	\$(1,400)
Ave. tons recycled/residential construction building permit issued	8	30	4,200	240	266	120

Many states commonly use recycling goals to encourage recycling of any solid waste, but primarily MSW. In some cases, C&D debris is included. The states were reviewed to determine which had recycling goals and how successful those goals have been in encouraging C&D debris recycling. Table 4 shows all of the states evaluated, their recycling goal, the actual amount recycled and the amount of C&D debris recycled.

**Table 4. Summary of C&D Debris Recycling for Target US States**

State	Total Recycling Goal	Actual Recycling %	C&D debris Recycling %	C&D debris recycled (tons/year)	C&D debris Recycled (tons/capita)
California	50%	60%	*	*	*
Florida	30%	24%	34%	5,400,000	0.3
Massachusetts	70%	62%	80%	14,000,000	2.2
New York	40%	47%	60%	9,600,000	0.5
North Carolina	40%	19%	0.2%	20,300	0.0
Ohio	25%	23%	*	*	*

\* No data were available for these categories. California calculates the amount of waste diverted by looking at disposal figures and estimating the amount of waste that could have been generated using population and economic trends. They do not track recycling amounts. Ohio does not track the amount of C&D debris recycled in the state.

The highest recycling rates for C&D debris exist in New York and Massachusetts. These regions typically have high tipping fees and recycling becomes a more viable option. In fact, the disposal ban in Massachusetts is estimated to only increase the C&D debris recycling rate from 80% to 89%, increasing the total recycled tonnage by 1,000,000 tons (Tellus Institute, 2003). Much waste from New York and Massachusetts is exported from these states to Ohio, which is why Ohio is becoming more concerned about the effects C&D debris landfills have on the environment and public health (OEPA, 2004). California has a mandated diversion amount, but the contribution of C&D debris to this diversion is unknown.

Florida has given some grants for recycling C&D debris, but most recycling that occurs is a result of market mechanisms. While there is still additional room for recycling in this growing state, the current amount recycled is high compared to other states. As the fact that the recycling goal is close to being attained shows, many cities and counties in Florida take the recycling goal seriously. Since some C&D debris recycling contributes to this goal, some cities and counties attempt to encourage C&D debris recycling. Additionally, the State of Florida encourages recycling through grants and research.

North Carolina's recycling rates are low, both in total and in their C&D debris recycling rates. Their annual report shows that, since the policy is only a recycling goal, many cities and counties do not take it seriously. While significant growth occurs in North Carolina, the amount of C&D debris that is recycled is very low.

## Policy Discussion for Florida

In Florida, while a large amount of concrete and asphalt from large demolition projects of buildings and roadways is currently recycled, a majority of the mixed debris is landfilled. Some mixed C&D debris separation and processing for recycling occurs, but this happens primarily in areas where landfill tipping fees are relatively high. At the state level, an increase in recycling could possibly result from some change in landfill disposal requirement or by some more aggressive requirement such as mandatory recycling objectives. There is no current move in this direction, so local governments interested in promoting C&D debris recycling is left with other options to consider.

Local policies can be implemented quickly, but only with the approval of the government. This can be difficult if public sentiment is not for recycling policies in general. However, a policy that incurs little cost to the government, little cost to the public, and large increases in recycling might be popular. Deposits (or advanced disposal fees or rebates) have positive effects on recycling rates while keeping costs down. Deposits generally appeal more to demolition contractors than to other contractors due to the large return they may get. Other contractors may just pass the costs onto the consumer. Percent recycling requirements and disposal bans, however, can ensure that recycling does occur at minimal cost to the government.

For any recycling policy, recycling facilities are needed. If there are no private recycling facilities the government may need to set up a recycling operation so that the contractors in the area may be able to legally manage their debris. This can be costly, as seen in Orange County, North Carolina. Revenues from marketing the material, however, may offset these costs, but markets should be explored before policy implementation. Government recycling requirements may encourage private C&D debris recycling capabilities in the region.

Other communities looking to implement such recycling ordinances need to determine if similar characteristics exist in their area to be successful. While the population of an area is seemingly irrelevant to the type of policy, costs for programs such as percent recycling requirements and deposits can vary depending on the amount of construction, renovation, or demolition activity that occurs. Table 5 presents questions that cities and counties need to answer to help determine which type of policy will work for them.

In discussions with parties involved with C&D debris in Clay county, haulers had many issues regarding the markets for C&D debris that currently exist in Florida. The consensus was that there were not many places to bring the recyclable material for processing and the cost of recycling was not feasible. The haulers agreed that equipment needed to be purchased in order to maximize the materials load. They went on to say that it was more cost effective and profitable to landfill the materials than to process the materials with their own equipment. The equipment is expensive and the maintenance is costly, these expenditures are not feasible for small companies. Haulers are not willing to buy expensive processing equipment and then pay the cost of trucking the material to the buyer, if the payment for the materials is not enough to balance the costs of the equipment and transporting.

Recent IRG have shown that collecting recyclables onsite was difficult; however pulling the materials at the disposal site was much more efficient.

**Table 5. Questions of Interest for Municipalities Interested in C&D Debris Recycling**

Item	Question		Recommendation	
1.	Are there C&D debris recycling facilities close by?	Yes – any policy will work	No – any policy will work, but purchasing recycling equipment is necessary. Government recycling requirement may develop recycling programs	
2.	What is the primary activity in your area?	construction - % recycling requirements, disposal bans	Renovation - % recycling requirements, disposal bans	Demolition – Deposits/ ADF/ Rebate
3.	Do you have one or two staff members that will be able to monitor the policy as part of their daily activities?	Yes - % recycling requirements, disposal bans, Deposits/ADF	No – Green building, government recycling requirement	
4.	Do you want to make sure that the program does not cost anything to the government	Yes – Deposits/ADF	No – all other policies	

## Summary, Conclusions and Recommendations

C&D debris represents a promising target for any region or municipality interested in increasing the amount of solid waste being recycled. Not only does C&D debris represent a relatively large waste stream, but it also has well established markets for many of the materials it contains. The market values for these materials are often low, however, and the margins of return after factoring in separation and processing require C&D debris recycling facilities charge a tipping fee in a similar fashion as a landfill. When landfill tipping fees are low, as they are in many areas of Florida, C&D debris recycling facilities cannot always compete economically with landfills. In an effort to promote the other more intangible benefits of recycling, governments can take steps to encourage or require C&D recycling.

In this document, examples of government initiatives that can be used to foster the growth of C&D debris recycling are highlighted. A number of different examples of recycling policies are provided. Two examples of government initiatives that have had the most profound impact on C&D debris recycling are those in Massachusetts and California.

- In Massachusetts, the state government banned the landfill disposal of certain types of C&D debris materials. While much of the debris in the state was already being recycled because of regional economics, this example highlights the impact that regulations and policies that impact landfill disposal can have. As another example, in some parts of Washington the disposal of gypsum drywall is limited; this has contributed to a successful drywall recycling enterprise in this region. Approximately 50% of the states in the US currently require some form of liner for C&D debris landfills. Although these requirements are designed for environmental protection purposes, they have a strong impact on landfill economics and the ability of recycling systems to succeed.
- In California, the state passed legislation that requires that jurisdictions must meet a 50% recycling rate by a specified time; if not met, the jurisdictions may be subject to fines of up to \$10,000 per day. This has resulted in municipalities targeting C&D debris for recycling. A number of different municipalities have enacted C&D debris ordinances that in some manner promote recycling. In some cases, contractors are required to submit waste management plans as part of their permit application, including a description of how recycling will be implemented. In other cases, the permit applicant must place a deposit corresponding to the amount of waste predicted, and they only get this money back if they provide documentation at the completion of the job that the appropriate amount of debris was managed by a licensed C&D debris recycling operation.

In Florida, C&D debris recycling does occur, but it is limited largely to areas where the landfill disposal fees are large (e.g., South Florida). These elevated tipping fees in South Florida are a result of both regional economics as well as local policies (e.g., wood cannot be disposed of in unlined landfills in Dade County). In the rest of the state, including Clay County, landfill tipping fees are relatively low, which has discouraged any significant development of C&D debris recycling infrastructure. Thus lack of markets will prove to be a problem as well. In a workshop held with interested parties in Clay County, the

general consensus was in favor of C&D debris recycling where economically feasible, but that lack of markets would be major limitation.

It is likely that C&D debris recycling will continue to grow in some areas of the state as development continues. It is also very possible that C&D debris recycling rates, especially for materials other than concrete and asphalt, will remain at similar levels as being encountered today. Government initiatives that could result in an increase in C&D debris recycling rates in the future include:

- The requirement for liners at C&D debris facilities. As more data continue to be collected from groundwater monitoring wells at Florida C&D debris landfills, future regulatory action could include the requirement of liner systems. This would change the economics of C&D debris disposal and could thus impact recycling feasibility.
- Actions by local governments to require contractors to implement C&D debris recycling. There is no major push for this currently. The lack of markets could hurt the start of this effort.

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