Ulster County

DRAFT

Solid Waste Management Plan

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TABLE OF CONTENTS

4. TECHNOLOGY EVALUATION

- 4.1 CURRENT STATUS OF MATERIALS RECOVERY FACILITY
- 4.2 SINGLE STREAM RECYCLING
- 4.3 MUNICIPAL RECYCLING DROP-OFF CENTERS IMPROVEMENTS
- 4.4 TRANSFER STATION IMPROVEMENTS
- 4.5 CONSTRUCTION AND DEMOLITION DEBRIS PROCESSING
- 4.6 LANDFILL EXPORT
- 4.7 ALTERNATIVE TECHNOLOGIES (including 1. Anaerobic Digestion and Waste-to-Ethanol, 2. Pyrolysis/Gasification/Plasma Technology, 3. Enhanced Composting, including MSW Composting and 4. Waste-to-Energy)

5. COMPREHENSIVE SOLID WASTE MANAGEMENT SYSTEM

- 5.1 SYSTEM GOALS
- 5.2 SYSTEM COMPONENTS
  - 5.2.1 REDUCTION AND REUSE - EVALUATION OF DIVERSION OPPORTUNITIES
  - 5.2.2 PUBLIC EDUCATION AND RECYCLING PROGRAM ENHANCEMENT STRATEGIES (including 5.2.2.1 EPP and recycled content procurement policies, 5.2.2.2 Commercial, Institutional, Industrial and Multi-family Building Recycling (CIIM), 5.2.2.3 Enforcement Efforts)
  - 5.2.3 MATERIALS RECOVERY FACILITY (including 5.2.3.1 Dual-steam Recycling, 5.2.3.2 Single-stream Recycling)
  - 5.2.4 HOUSEHOLD HAZARDOUS WASTE , PHARMACEUTICAL WASTE AND ELECTRONICS RECYCLING
  - 5.2.5 COMPOSTING DIVERSION OPTIONS
  - 5.2.6 CONSTRUCTION AND DEMOLITION DEBRIS RECYCING
  - 5.2.7 MUNICIPAL RECYCLING DROP-OFF CENTERS
  - 5.2.8 TRANSFER STATIONS
  - 5.2.9 LONG DISTANCE HAULING
  - 5.2.10 PRIVATE LANDFILL DISPOSAL
- 5.3 SYSTEM OPERATING COSTS AND FINANCING
  - 5.3.1 SYSTEM OPERATING COSTS
  - 5.3.2 FINANCING
- 5.4 COMPREHENSIVE RECYCLING ANALYSIS
- 5.5 COODRINATION WITH LOCAL GOVERNMENTS AND THE PRIVATE SECTOR

6. ADMINISTRATION OF SYSTEM

- 6.1 AGENCY AS PLANNING UNIT AND SYSTEM PROVIDER
- 6.2 ADMINISTRATIVE STRUCTURE
- 6.3 SOLID WASTE SERVICE AGREEMENT
- 6.4 MUNICIPAL AGREEMENTS
- 6.5 PRIVATE SECTOR CONTRACTS
- 6.6 LEGAL
- 6.7 PUBLIC PARTICIPATION

7. IMPLEMENTATION SCHEDULE

INTRODUCTION

The Ulster County Resource Recovery Agency (hereinafter defined as the "Agency" or "UCRRA") is a public benefit corporation of the State of New York which is empowered by Chapter 13-G of the Public Authorities Law to manage solid waste and recyclables in the County of Ulster, New York (the "County"). It has been designated by the County Legislature as the County's solid waste planning unit (the "Planning Unit"), and has previously developed and issued the Ulster County Solid Waste Management Plan, the County's local solid waste management plan ("SWMP"), which was approved by the New York State Department of Environmental Conservation ("NYSDEC") in December, 1991. A copy of the original SWMP is available from the Agency, and the original SWMP is incorporated by reference into this document.

The Agency administers the SWMP pursuant to an agreement with the County entitled the Solid Waste Service Agreement (the "Service Agreement"). Pursuant to its designation as the County's solid waste planning unit and the Service Agreement, and as required by NYSDEC, the Agency has prepared this 2011 update to the SWMP (the "Plan Update").

The Agency manages solid waste consistent with the policies set forth in the New York State Solid Waste Management Plan. New York State has established solid waste management policy objectives under a "preferred hierarchy" that is generally described as follows (in order of descending preferences):

 First, to reduce the amount of waste generated within New York State.

 Second, to reuse material for the purpose for which it was originally intended or recycle material that cannot be reused (composting is considered a form of recycling).

 Third, to recover, in an environmentally acceptable manner, energy from solid waste that cannot be economically and technically reused or recycled.

 Fourth, to dispose of solid waste that is not being reused or recycled, or from which energy is not being recovered, by land burial or other methods approved by the NYSDEC.

The Agency is responsible for compliance with State and Federal laws, rules and regulations regarding the management and long-term obligations of closed solid waste management facilities and currently operating facilities under its direct control. The Agency's responsibilities also include education and public outreach efforts to encourage, support, and foster participation by the public with respect to reducing, reusing, and recycling portions of the existing solid waste stream. Historically, the Agency's solid waste programs have relied on both public and private participation to manage a variety of waste streams and recyclable products. These efforts have resulted in the current recycling rate of 41 percent.

In sum, the mission of the Agency is to provide its constituency with a comprehensive program for managing solid waste, which is consistent with New York State's Hierarchy for solid waste management, in an economically sound and environmentally safe manner. To this end, potential program expansion elements under this Plan Update will build off of the following existing efforts:

 Safe and reliable disposal of municipal solid waste (MSW).

 Recyclables acceptance and processing through contracts with private companies for single stream recycling.

 Continued efforts and promotion with local municipalities (MRDCs) and private haulers for residential MSW and recyclables.

 Yard waste composting.

 Periodic household hazardous waste collection for residents and small businesses.

 Periodic electronics recycling for residents and small businesses.

 Development of guidelines and educational materials in support of the Agency's programs, including updating the web site.

 Public outreach and assistance to businesses and institutions to assist in setting up recycling programs.

 Purchasing and distributing recycling bin containers.

 Assistance with backyard composting, including compost bins for sale and distribution.

 Tracking and monitoring of recycling participation through mailers, surveys and reports.

1. PLANNING UNIT

1.1 LOCATION

The Agency's jurisdiction as Planning Unit includes all of Ulster County, which is located in the Mid-Hudson Valley region of New York State, approximately 90 miles from New York City and approximately 50 miles from Albany. It is bordered on the East by the Hudson River, on the north by Greene County, on the west by Sullivan and Delaware Counties and on the south by Orange County. It is comprised of 1,142.8 square miles. Within the County are a variety of recreational, commercial, educational, residential and cultural facilities. The County includes a large part of the Catskill and Shawangunk Mountains. A substantial portion of the County is located within the Catskill State Park and the New York City watershed. These areas are sparsely

populated and subject to extensive land use restrictions. A map showing the location of the County is annexed as Exhibit 1.

1.2 POLITICAL SUBDIVISIONS

All political subdivisions within the County are covered by the Planning Unit. They are:

Towns

Denning	Hurley	Marlborough	Rochester	Shawangunk
Esopus	Kingston	New Paltz	Rosendale	Ulster
Hardenburgh	Lloyd	Olive	Saugerties	Wawarsing
Gardiner	Marbletown	Plattekill	Shandaken	Woodstock

Villages

Ellenville	New Paltz	Saugerties

City

Kingston

The communities of the County reflect great diversity: Kingston is the County seat and service center, and is located on the Hudson River; immediately north of Kingston is the Town of Ulster, the retail/commercial center of the County; Woodstock is an art colony and cultural center located in the deeply wooded area slightly northwest of Kingston; New Paltz is the location of a State University of New York liberal arts college and is situated on the Wallkill River, 20 miles south of Kingston. The seventeenth century homes and churches along Huguenot Street in New Paltz comprise a national historic site; Saugerties, a Hudson River town is 10 miles north of Kingston. Phoenicia is a hunting and fishing center 24 miles northwest of Kingston in the Catskill Mountains and is a year-round resort and residential area; Hurley, one of the oldest communities in the County, is dotted with rugged, seventeenth-century stone homes, and is an agricultural and residential center; Highland is the center of the Hudson Valley wine industry with apple, peach and grape orchards and a growing manufacturing and retail base tied closely with the Poughkeepsie urbanized area on the east side of the Hudson. The southern tier of the County is experiencing residential growth pressure from neighboring Orange County. Ellenville is a vacation center and home of the County's mountain resort hotels and is a recreational and trading center for several counties.

1.2.1 EDUCATION

Elementary and secondary education facilities are provided by 15 school districts. Seven of the districts are completely within the County and an additional eight are partially within the County. Higher education facilities are available at the State University of New York at New Paltz offering undergraduate and graduate degree programs in the liberal arts, business administration, and sciences, the fine and performing arts and education. The 257-acre campus has an enrollment of approximately 8,250. Ulster County Community College at Stone Ridge is a two-year college offering programs in liberal arts and sciences, nursing, fire protection technology, water quality monitoring, GIS and Computer Technology and business and secretarial courses.

1.3 DEMOGRAPHICS

1.3.1 POPULATION

According to the U.S. Census Bureau, the population of the County was 177,749 in 2000 and 182,493 in 2010, a growth rate of 2.7%. Extending the rate of population growth to 2021, the end of the planning period, it is estimated that the population of the County should increase from 182,493 to 184,200. See Table 1. In light of the above, it is highly unlikely that population growth during the planning period will have a significant impact on solid waste management.

1.3.2 EMPLOYMENT

The level of Employment in the County is depicted in Table 2. The percentage of employment in the various fields of endeavour is depicted in Table 3. As indicated, private, non-farm employment is heavily weighted toward the retail, hospitality and service sectors. Government employment (including education, health care and corrections) makes up a significant share of the County workforce. Farm employment, while declining over the prior planning period, is a factor, as well. There is limited heavy industry, and high-tech manufacturing plays only a minor role.

1.3.3 ECONOMIC GROWTH

While the County actively pursues economic growth initiatives, the County's economic growth strategy document predicts only a small increase over the next planning period. See Table 4. Tourism and agriculture are important contributors to the economy of the County. The County offers easy accessibility from the NY City metropolitan area and a variety of seasonal activities, including skiing, hiking, wine tours and trout fishing. Major hotels include Mohonk Mountain House, Hudson Valley Resort Spa & Conference Center, Super 8, Holiday Inn, Courtyard by Marriott, Rocking Horse Ranch, Quality Inn, Comfort Inn, Pine Grove and Emerson Inn and Spa. Additional hotels include the Hampton Inn, Minnewaska Lodge, Howard Johnson Hotel and Ramada Inn. The tourism industry also generates significant sales tax revenues, and continues to be a major growth sector for the County. For 2009 visitor spending in Ulster

County is estimated to be $420 million with direct labor income estimated to be $257 million. The tourism industry generated an estimated $26.0 million in sales and bed tax revenues County wide.

The County is able to offer a variety of seasonal activities, including skiing, hiking, wine tours and trout fishing. Race-horse breeding has become a major industry as the County is host to over 50 horse facilities of which 10 are used for breeding race horses (Source: Ulster County Horse Facilities). The County is the State's largest producer of fresh market apples and sweet corn. Agricultural sales have been steadily increasing with a total now estimated in excess of $50 million dollars. The County has over 70,000 acres within State certified Agricultural Districts to help protect this valuable industry.

New York State and institutional employers are also major components of the County's economic base. The State University of New York at New Paltz currently employs 1,500 persons. New Paltz, with its proximity to New York City and Long Island is steadily increasing in enrollment. Ulster County Community College currently employs 300 persons. Its enrollment is expected to continue to increase at approximately 2% per year for the next 5 years.

The State Correctional Department operates four major detention facilities in the County. There are two such facilities located in Napanoch. One is the Eastern Correction Facility (maximum security), which employs approximately 650 people, the other is the Ulster Correctional Facility (medium security) which employs approximately 422 persons. The State Correctional Facility (Shawangunk, mixed security) presently employs approximately 397 persons and the Wallkill Correctional Facility presently employs approximately 278 persons. In addition, the New York State Unified Court System employs approximately 50 judiciary employees within Ulster County. The State also operates a youth residential facility in Highland that employs approximately 219 persons.

The hospitals in the County are also major employers as well as providing important services. The three hospitals in the County are Benedictine with approximately 940 employees, Kingston Hospital with approximately 950 and Ellenville Community with approximately 175. Skilled nursing facilities are also located in the county and the recently completed life-cycle community of Woodland Pond in New Paltz represents an investment of over 94 million dollars and has created 80 full time jobs.

The County is a retail center, not only for its own residents but also for sections of neighboring counties. Large shopping centers serve the area; five in Kingston; two in New Paltz; one in Saugerties; one in Highland; three in rural areas of the County of Ulster and two near Ellenville. Major chains such as Sears Roebuck & Company, Wal-Mart, Sam’s Club, Lowes, Home Depot, Target, J.C. Penney Co. Inc., Macy’s, Best Buy, Barnes & Noble, Sports Authority, Modell, H & M and Kohl’s are represented as are a wide range of specialty shops and restaurants (Starbucks,

Ninety-Nines, Ruby Tuesdays, Texas Roadhouse and Applebee's). Various retail chains continue to open operations in a variety of towns throughout the County.

Finally, the County has been able to utilize its geographic location, cost advantages, quality of life issues, associated with its open spaces to attract a solid base of small, highly successful knowledge based companies, the so called "creative economy". These are exemplified by companies like Sono Tek, Woodstock Percussion, Se'Lux, Fala Technologies, Venture Information Systems, and 721 Media Center. Overall manufacturing provides approximately 3,500 jobs with a direct payroll of $183 million and an approximate average pay of $45,000 and are further buttressed by traditional arts and culture businesses. The County has also developed a significant cluster in green energy (solar) manufacturing that has resulted in an increase in average wages.

1. Major Employers

In addition to the larger employers previously discussed, the following business concerns, each with approximately 100 or more employees, are located in the County.[1]

Non-Retail Businesses

Name	Employees	Product	City
County of Ulster	A	Government	Kingston
State Correctional Facilities	A	Correctional Services	Wallkill/Napanoch
SUNY New Paltz	A	Educational Services	New Paltz
Bank of America, N.A.	B	Finance	Kingston
Benedictine Hospital	B	Health Services	Kingston
Kingston Hospital	B	Health Services	Kingston
Mohonk Mountain House	B	Resort/Hotel	New Paltz
SUNY Ulster	B	Educational Services	Stone Ridge
BOCES	C	Educational Services	New Paltz/Port Ewen
City of Kingston	C	Government	Kingston
Hudson Valley Resort & Spa	C	Resort/Hotel	Kerhonkson

Kingston Consolidated School District	C	Educational Services	Kingston
Northeast Center for Special Care	C	Health Services	Lake Katrine
Ten Broeck Commons	C	Health Services	Lake Katrine
The Fallsview	C	Resort/Hotel	Ellenville
Ulster Savings/Ryan Insurance	C	Finance/Insurance	Kingston
Ametek Rotron	D	Electrical Manufacturing	Woodstock
Brooklyn Bottling Company	D	Machinery Manufacturing	Milton
CH Energy Group	D	Utility	Kingston
Ellenville Central School District	D	Educational Services	Ellenville
Elna Magnetics	D	Electrical Manufacturing	Woodstock
Empire Merchants North LLC	D	Whole Distribution	Kingston
Fair Rite Products	D	Electronic Manufacturing	Wallkill
Fala Technologies	D	Electronic Manufacturing	Kingston
Gateway Community Industries	D	Miscellaneous Manufacturing	Kingston
GHI Insurance	D	Insurance	Lake Katrine
Highland Central School District	D	Educational Services	Highland
HUCK International	D	Metal Manufacturing	Kingston
Marlboro Central School District	D	Educational Services	Marlboro
Mid Hudson Family Health	D	Health Services	Kingston
Mid-Hudson Valley Federal Credit Union	D	Finance	Kingston/Saugerties/Highland
New Paltz Central School District	D	Educational Services	New Paltz
NY City DEP	D	Government	Kingston
NYS Bridge Authority	D	Government	Kingston/Highland
NYSDEC	D	Government	New Paltz
Onteora Central School District	D	Educational Services	Boiceville
Partsearch Technologies	D	Wholesale	Kingston
Precision Flow Technologies	D	Metal Manufacturing	Saugerties

Rocking Horse Ranch	D	Resort/Hotel	Highland
Rondout Valley School District	D	Educational Services	Marbletown
Saugerties Central School District	D	Educational Services	Saugerties
Se'lux	D	Electrical Manufacturing	Highland
Simulaids	D	Miscellaneous Manufacturing	Saugerties
Sunwize Technologies	D	Electrical Manufacturing	Kingston
The Children's Annex	D	Educational Services	Lake Katrine

Non-Retail Businesses - Continued			
Name	Employees	Product	City
The Emerson	D	Resort/Hotel	Mount Tremper
Tower Products/Markertek	D	Electronic Manufacturing	Saugerties
Ulster Greene ARC	D	Specialized Health	Kingston
United Cerebral Palsy	D	Specialized Health	Kingston
Verizon	D	Utility	Kingston
Vertis	D	Commercial Printing	Saugerties
Viking Industries	D	Wood/Paper Manufacturing	New Paltz
VirTis	D	Bio-Pharma Manufacturing	Gardiner
Wallkill Central School District	D	Educational Services	Wallkill
Wingate at Ulster	D	Health Services	Highland
Zumtobel Staff Lighting	D	Electrical Manufacturing	Highland
Retail Businesses			
Wal-Mart	B	Retail – All	Kingston
Hannaford	C	Retail - Grocery	Kingston (2)/Highland / Plattekill
Adams Fairacre Farms	D	Retail – Grocery/Garden	Kingston
Home Depot	D	Retail – Home Supply	Kingston
Kohl's	D	Retail – Department Store	Kingston
Lowes	D	Retail – Home Supply	Kingston/Highland
Price Chopper	D	Retail – Grocery	Saugerties
Sam's Club	D	Retail – All	Kingston
Shop Rite	D	Retail – Grocery	Kingston/New Paltz

Target	D	Retail – Department Store	Kingston

Key
A Greater than 1,000 employees
B 500-999 employees
C 250-499 employees
D 100-249 employees
1 Source: Ulster County Development Corporation and Commerce Register Inc.

2. Recent Economic Developments

While the national economy has seen decline, the County's economic picture continues to be relatively stable. The County's labor force has decreased to 90,400 as of August 2009, from 92,700 in 2006, a decrease of approximately 2.5%. According to the New York State Department of Labor, the County lost 200 private sector jobs from August 2007 to August 2008. The unemployment rate at 7.4% (September 2010) is below the State average of 8%. Total Non-farm jobs are up 300 from September 2009 to 61,500 and private sector employment rose 600 during the same period.

The County has also seen an increase in personal income and per capita income. Both levels currently exceed State non-metropolitan area rates of increase. The median family income as estimated by the Department of Housing and Urban Development for 2010 is $70,100, up from $66,700 for 2008 (see also "Wealth and Income Indicators".)

The County's real estate sectors, residential and commercial, continue to be robust. Residential housing prices have doubled in the last six years, with the median price now at $230,000. Rental vacancy rates are at 1.8% as shown in 2007 Rental Housing Survey by the Ulster County Planning Board. The market response to the high demand has been major projects with over 5,900 new units pending approval. These changes have had a dramatic effect on full taxable values within the County which have increased by almost $2.3 billion from 2006-2007. This data does not assimilate recent negative economic conditions and updated figures are currently unavailable.

Additional residential development is expected to continue. Over 4,000 units located in major projects are involved in the development review process. The County Health Department indicates that they have issued more than 800 new permits for single family housing septic systems for units not on central sewers. See also "Building Projects" and "Building Permits" herein. According to the County Planning Department, the average cost of the new condominiums and townhouses is estimated to be in excess of $250,000 and the average cost of a single-family home is estimated to be between $350,000 and $450,000.

Despite the general economic slowdown, there continues to be business expansion in the county. Tech City, a former IBM facility, is being transformed into a niche manufacturing facility with a focus on green technologies. However, even with the positive transformations underway, there has been some other recent news that will affect Ulster County. The Bank of America is ending

its contract with New York State to process income tax returns, potentially jeopardizing hundreds of seasonal jobs in the bank's office at Tech City. Bank of America expects to stop processing New York tax returns at the end of the 2011 tax season, which would be in the spring of 2012, largely because of the upsurge in returns being filed electronically. It is not immediately clear how many people will be affected by the move or exactly how many are employed by Bank of America at TechCity. In 2004, when Bank of America bought Fleet Bank and took over the tax processing operation, its TechCity employment was reported to be 2,000 seasonal workers and500 year-round employees. Losing these employees will be a major blow to TechCity's owners, who have been struggling for 13 years to fill empty space at the former IBM plant. Bank of America currently occupies about 300,000 square feet in a building on the west side of Enterprise Drive. In Saugerties, a new 500 seat conference center with a 47 unit hotel is being developed, and Elna Magnetics, a manufacturing facility, has moved to a new 32,000 square foot building. In Lloyd, skilled nursing facility, shopping center, solar manufacturing projects are underway.

The Ulster County Development Corporation (UCDC) has been involved in many of the above projects totaling millions in committed private sector expansion and start-up capital investments and hundreds of committed jobs in 200 and 2010. These are accomplished through a variety of funds including: Ulster County Revolving Loan Fund, Catskill Watershed Corporation, Town of Esopus Waterfront Development Loan Fund, Town of Lloyd Revolving Loan Fund and Town of New Paltz Revolving Loan Fund.

1.3.4 LAND USE

The major land use in Ulster County is residential, followed by retail, recreation and government uses. The City of Kingston, the Town of Ulster, and the Towns and Villages of Saugerties and New Paltz are the employment and service centers of the County. Kingston, the County's only city, is home to the County government and the County's major healthcare facilities, and is the County's banking center. It is situated on the Hudson River, and its waterfront area has many restaurants and a marina. The Town of Ulster is the location of major retail businesses. The Town and Village of New Paltz is the location of the SUNY New Paltz campus, many retail establishments and a major resort the Mohonk Mountain House. The Town and Village of Saugerties together comprise the largest residential population in the County. The Town of Woodstock is a major art center which attracts thousands of patrons each year. The Towns of New Paltz, Shandaken, Rochester, Olive, Hurley, Woodstock and Gardiner offer recreational opportunities associated with the Catskill Park and Shawangunk mountains. A rail trail presently runs from Gardiner to Lloyd, and now connects to a major tourist attraction, the Walkway over the Hudson, a rebuilt historic railroad bridge which is now a State park. Lloyd also is home to some of the manufacturing companies in the County. The Towns of Marlborough, Plattekill, Shawangunk, Esopus and Gardiner are essentially rural agri-business based communities noted for orchards and vineyards. Esopus is the site of several monasteries along the Hudson River, which, in the main, service as retreat centers. The Town of Wawarsing is home to a State prison

facility and a large resort hotel. The Village of Ellenville is home to major hotels. The Town of Kingston, and the Towns of Denning and Hardenburgh are small communities in the Catskill Park.

1.4 CURRENT SOLID WASTE AND RECYCLING AMOUNTS

Ulster County

Table 1-1 Municipal Solid Waste (MSW) Detailed Composition Analysis Year - 2010

	MSW GENERATED									
Material	Rural			Suburban			Urban			Planning Unit/ Municipality Percentages
	41.40%			55.30%			3.30%			
	Residential	Com/Inst.	Combined	Residential	Com/Inst.	Combined	Residential	Com/Inst.	Combined	
	60.00%	40.00%	100.00%	55.00%	45.00%	100.00%	58.00%	42.00%	100.00%	100.00%
Newspaper	5.20%	1.90%	3.88%	5.00%	1.90%	3.61%	6.60%	2.00%	4.67%	3.75%
Corrugated Cardboard	6.60%	13.90%	9.52%	6.60%	13.90%	9.89%	6.90%	13.70%	9.76%	9.73%
Other Recyclable Paper										
Paperboard	3.20%	1.10%	2.36%	3.30%	1.00%	2.27%	3.60%	0.90%	2.47%	2.31%
Office Paper	0.80%	3.80%	2.00%	0.90%	4.20%	2.39%	1.10%	5.80%	3.07%	2.25%
Junk Mail	3.00%	0.70%	2.08%	3.20%	0.70%	2.08%	3.50%	0.70%	2.32%	2.09%
Other Commercial Printing	1.70%	2.30%	1.94%	1.70%	2.40%	2.02%	2.30%	2.60%	2.43%	2.00%
Magazines	1.10%	0.90%	1.02%	1.00%	0.80%	0.91%	1.10%	1.00%	1.06%	0.96%
Books	0.50%	0.30%	0.42%	0.50%	0.30%	0.41%	0.60%	0.40%	0.52%	0.42%
Bags	0.50%	0.20%	0.38%	0.50%	0.20%	0.37%	0.60%	0.20%	0.43%	0.37%
Phone Books	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.20%	0.26%	0.30%
Poly-Coated	0.20%	0.30%	0.24%	0.20%	0.20%	0.20%	0.30%	0.20%	0.26%	0.22%
Other Recyclable Paper (Total)	11.30%	9.90%	10.74%	11.60%	10.10%	10.93%	13.40%	12.00%	12.81%	10.91%
Other Compostable Paper	6.80%	6.80%	6.80%	6.40%	6.40%	6.40%	6.80%	6.80%	6.80%	6.58%
Total Paper	*29.90%*	*32.50%*	*30.94%*	*29.60%*	*32.30%*	*30.82%*	*33.70%*	*34.50%*	*34.04%*	*30.97%*
Ferrous/Aluminum Containers										
Ferrous Containers	1.90%	1.00%	1.54%	1.20%	0.70%	0.98%	1.40%	0.70%	1.11%	1.21%
Aluminum Containers	0.70%	0.40%	0.58%	0.60%	0.30%	0.47%	0.50%	0.40%	0.46%	0.51%
Ferrous/Aluminum Containers (Total)	2.60%	1.40%	2.12%	1.80%	1.00%	1.44%	1.90%	1.10%	1.56%	1.73%
Other Ferrous Metals	5.20%	5.40%	5.28%	5.00%	5.80%	5.36%	3.30%	3.70%	3.47%	5.26%
Other Non-Ferrous Metals										
Other aluminum	0.20%	0.30%	0.24%	0.20%	0.30%	0.25%	0.20%	0.30%	0.24%	0.24%
Automotive batteries	0.80%	0.50%	0.68%	0.70%	0.40%	0.57%	0.20%	0.20%	0.20%	0.60%
Other non-	0.50%	0.30%	0.42%	0.30%	0.40%	0.35%	0.40%	0.20%	0.32%	0.38%

aluminum										
Other Non-Ferrous Metals (Total)	1.50%	1.10%	1.34%	1.20%	1.10%	1.16%	0.80%	0.70%	0.76%	1.22%
Total Metals	*9.30%*	*7.90%*	*8.74%*	*8.00%*	*7.90%*	*7.96%*	*6.00%*	*5.50%*	*5.79%*	*8.21%*
PET Containers	1.10%	0.80%	0.98%	0.90%	0.80%	0.86%	1.20%	1.00%	1.12%	0.92%
HDPE Containers	1.10%	0.60%	0.90%	0.90%	0.70%	0.81%	1.00%	0.70%	0.87%	0.85%
Other Plastic (3-7) Containers	0.20%	0.10%	0.16%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.18%
Film Plastic	5.70%	5.90%	5.78%	5.50%	5.80%	5.64%	5.80%	5.80%	5.80%	5.70%
Other Plastic										
Durables	3.10%	3.20%	3.14%	3.00%	3.20%	3.09%	3.20%	3.30%	3.24%	3.12%
Non-Durables	1.60%	1.80%	1.68%	1.60%	1.80%	1.69%	1.80%	1.90%	1.84%	1.69%
Packaging	1.40%	1.10%	1.28%	1.40%	1.10%	1.27%	1.50%	1.10%	1.33%	1.27%
Other Plastic (Total)	6.10%	6.10%	6.10%	6.00%	6.10%	6.05%	6.50%	6.30%	6.42%	6.08%
Total Plastics	*14.20%*	*13.50%*	*13.92%*	*13.50%*	*13.60%*	*13.55%*	*14.70%*	*14.00%*	*14.41%*	*13.73%*
Glass Containers	4.10%	3.80%	3.98%	3.90%	3.80%	3.86%	4.30%	3.80%	4.09%	3.91%
Other Glass	0.50%	0.40%	0.46%	0.30%	0.40%	0.35%	0.40%	0.40%	0.40%	0.39%
Total Glass	*4.60%*	*4.20%*	*4.44%*	*4.20%*	*4.20%*	*4.20%*	*4.70%*	*4.20%*	*4.49%*	*4.31%*
Food Scraps	12.70%	13.30%	12.94%	12.90%	15.50%	14.07%	17.20%	25.20%	20.56%	13.82%
Yard Trimmings	3.10%	1.10%	2.30%	11.30%	9.10%	10.31%	4.20%	1.50%	3.07%	6.75%
Total Organics	*15.80%*	*14.40%*	*15.24%*	*24.20%*	*24.60%*	*24.38%*	*21.40%*	*26.70%*	*23.63%*	*20.57%*
Clothing Footwear, Towels, Sheets	4.60%	3.00%	3.96%	4.40%	3.20%	3.86%	4.80%	2.50%	3.83%	3.90%
Carpet	1.40%	1.30%	1.36%	1.70%	1.40%	1.57%	1.70%	0.90%	1.36%	1.47%
Total Textiles	*6.00%*	*4.30%*	*5.32%*	*6.10%*	*4.60%*	*5.43%*	*6.50%*	*3.40%*	*5.20%*	*5.37%*
Total Wood	*4.10%*	*9.00%*	*6.06%*	*2.90%*	*4.10%*	*3.44%*	*2.00%*	*3.50%*	*2.63%*	*4.50%*
C&D Materials	8.00%	7.60%	7.84%	3.80%	2.70%	3.31%	4.40%	3.80%	4.15%	5.21%
Other Durables	1.90%	1.70%	1.82%	1.60%	1.50%	1.56%	1.90%	1.50%	1.73%	1.67%
Diapers	1.90%	1.10%	1.58%	2.10%	1.20%	1.70%	2.30%	1.10%	1.80%	1.65%
Electronics	1.30%	1.40%	1.34%	1.60%	1.70%	1.65%	1.30%	1.30%	1.30%	1.51%
Tires	1.80%	1.80%	1.80%	1.70%	1.40%	1.57%	0.50%	0.40%	0.46%	1.63%
HHW	0.60%	0.00%	0.36%	0.60%	0.00%	0.33%	0.50%	0.00%	0.29%	0.34%
Fines	0.60%	0.60%	0.60%	0.10%	0.20%	0.15%	0.10%	0.10%	0.10%	0.33%
Total Miscellaneous	*16.10%*	*14.20%*	*15.34%*	*11.50%*	*8.70%*	*10.24%*	*11.00%*	*8.20%*	*9.82%*	*12.34%*
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

See Appendix for Table 1-2 Ulster County Municipal Solid Waste (MSW) Combined Composition Analysis and Projections 2010-2020

1.5 SOLID WASTE AND RECYCLING PROJECTIONS

1.5.1 SOLID WASTE PROJECTIONS

The volume of solid waste received is dependent on several factors. One factor is directly related to the economy. When the economy is strong, the volume of solid waste received will typically be higher than when the economy is weak. Another factor is directly related to population. As the population increases, the volume of solid waste received will typically increase and conversely, when the population decreases so does the volume of solid waste received. However, it is expected that through the continuation of educating the public in solid waste reduction, reuse, and recycling that even if the economy is strong and the population grows, the volume of solid waste received may stay static or even may reduce as more citizens follow these practices.

1.5.2 RECYCLING PROJECTIONS

1. Achieving additional recycling progress

To continue progress in increasing recycling we must address two challenges: first, working with global markets and demand for recyclable materials and second, increasing the supply of recyclable materials that are separated for use in recycling markets.

2. Changes in market demand

Recycling markets have fluctuated widely over the last decade, presenting challenges for the recycling industry and for cities and towns that run recycling programs. After all-time highs in recyclable material values that were seen in 2006 through the first half of 2008, the value of recyclables dropped dramatically in the second half of 2008 along with the global economic recession. Since then, many recycling markets have rebounded. These rapid changes indicate the need to develop recycling programs that are based primarily on diverting material from disposal and the associated cost savings. These programs need to have the flexibility to cope with material values that fluctuate widely over time (rather than relying on expectations of recycling revenue that may or may not be realized). The establishment of new local and regional markets for diverted materials can help to buffer and absorb changes in export markets, which points to the need to develop home-grown industries that will use material diverted from Ulster County's waste.

3. Flat supply of separated recyclables

In New York, and most states around the country, recycling rates have remained level or dropped slightly in recent years. The fact that many citizens, municipalities, and businesses have embraced recycling as a way to protect the environment has resulted in tremendous gains. However, many of the initial gains have been made and further recycling advances require new strategies by the public, government, business, and the waste industry to maximize the separation of recyclables from trash. The *Ulster County Solid Waste Management Plan 2010-2020 Plan* includes a series of success stories about municipalities, businesses, and institutions that have

been able to increase their recycling and composting and, in many cases, save money at the same time. Ulster County can make great strides in increasing recycling and composting by learning from and replicating these successful strategies on a broader scale.

2. SOLID WASTE CHARACTERISTICS

The actual and estimated quantities of each category of recyclable materials and solid waste generated in Ulster County are contained in Table 1-2. The following is a general description of how the recyclable and waste materials are generated and which are currently handled through the Ulster County system. This information is based upon actual data collected by the Ulster County Resource Recovery Agency as we operate the Solid Waste Management and Recycling System on a day-to-day basis.

2.1 RECYCLABLES

There are two basic methods for collecting and processing recyclable materials at a Materials Recovery Center (MRF): Dual-stream and single-stream.

Under the dual-stream recycling scheme, the citizen separates paper and cardboard from the cans, plastics and glass, either by using two recycling bins, by placing the papers in a paper bag on the top of the other recyclables in the recycling bin, or by simply placing the papers loose on top of the other recyclables in the recycling bin. The two categories of recyclables are kept separate as they are placed in two separate compartments in the truck picking them up, and the two categories of recyclables are dumped separately at the MRF.

Under the single-stream recycling scheme, all of the recyclables (paper and cardboard, plastic, metal and glass) are mixed in one bin by the citizen, the bin is dumped into a truck with one compartment when they are picked up, then dumped into one pile at the MRF. The MRF then sorts these materials into paper, metals, plastics and glass. The Agency however, does not have the capability to sort single-stream recyclable material since it is a dual-stream facility.

The Ulster County Mandatory Source Separation and Recycling Law requires that all residents recycle materials specified by the County. As explained more fully in Section 3, effective July 1, 2010, the Agency modified its source separation requirements to begin accepting single-stream recyclables in the MRF. Currently in Ulster County, recyclables are being collected and delivered using both systems, single and dual steam. Residential recyclables are either collected at curbside by public or private haulers via single-stream, or they are delivered to one of the 19 County Municipal Recycling Drop-off Centers (MRDCs) in dual-stream form. In both cases, the recyclables are delivered to the County MRF where the material is inspected, gross contaminants are removed, and material is separated in the facility. The dual-stream recyclables are sorted in the MRF by commodity while the single-stream recyclables are loaded in transfer trailers for

delivery to the County Waste Single-Stream MRF in Albany, New York. The Ulster County Mandatory Source Separation and Recycling Law also requires that businesses, industries, and institutions recycle materials specified by the County. However, delivery to the County MRF is optional so long as the generator delivers the recyclables to a facility that provides for the reuse, recovery, or recycling of the recyclable material. Refer to Table 3-5 for the Ulster County Recyclable Material Definitions and Category List.

2.2 GREEN WASTE/YARD WASTE

This refers to the grass clippings, leaves, brush, vegetable, and other similar organic wastes generated principally by residences, although some materials may be generated at commercial establishments. This material is delivered to one of nineteen designated Municipal Recycling Drop-off Centers by residents, collected through a local municipal program, or recovered through simple backyard composting.

2.3 HOUSEHOLD HAZARDOUS WASTE (HHW)

This refers to the wide-range of materials including, but not limited to oil-based paints, cleaners, solvents, pesticides, herbicides, pool chemicals, household batteries, photographic chemicals, laboratory chemicals, lubricating oils and similar materials generated by residents and delivered to the Agency during one of the HHW collection events. It should also be noted that waste oil and electronics are also accepted at the MRDCs.

2.4 PHARMACEUTICAL WASTE AND MEDICAL SHARPS PROGRAM

Home generated medical waste is only a small fraction of Ulster County's waste stream but represents a large potential danger to residents and small children. Sharps – needles, syringes, lancets, and other sharp materials that come in contact with human blood or other body fluid – should be disposed of properly. Hospitals and other health care facilities, which generate medical waste, are strictly regulated, however, residents are not. To assure there are safe places for residents to bring "*SHARPS*" all Article 28 Health Care Facilities in New York are required by law to accept medical waste from residents in appropriate, puncture-proof containers. In Ulster County, the health facilities have coordinated a pre-scheduled collection program. In addition, all of these facilities have agreed to distribute free *SHARPS* containers, which have been donated by Becton-Dickinson, a medical supply manufacturer.

Pharmaceutical waste is currently being collected for free from residents of Ulster County at the Household Hazardous Waste Collection Events held a few times throughout the year at multiple locations. Residents can bring any prescription or over-the-counter pills, ointments, lotions and liquids for disposal. The collection procedures are as follows: 1. Residents sign a declaration

form stating that they are an Ulster County resident. 2. The entire container along with its medicine will be placed into a sealed waste receptacle. 3. Law enforcement will be on site to control the collection of these medications as well as to witness the best means of permanent disposal of medications at the Dutchess County Energy-From-Waste Facility in Poughkeepsie. There is no charge for this collection program.

Another option for safe disposal of unused medications is to visit a participating pharmacy. Walgreens, along with several other major national and local pharmacies (CVS and Rite Aid), have signed on to the Safe Medication Disposal Program, designed by Sharps Compliance Inc., to create an outlet for the unwanted medication. Since the program was launched, it has collected and incinerated more than 123,000 pounds of medication, most of which has been collected in the last 10 months. Residents purchase the pre-paid envelope for $3.99, take it home, and in the privacy of their own home, place their unused medications into the envelope. Some of the pharmacies, including many independent ones, have larger boxes where they collect medicine onsite, for free, and it is sent to Sharps Compliance when its bin is full. In total, more than 22,000 pharmacies across the country have access to the program. The drugs are sent to Sharps Compliance's Carthage, Texas, facility where they are processed by a police officer and put in a Drug Enforcement Agency cage before being incinerated. The packages are never opened. If for some reason residents are unable to participate in one of the Agency collection events held during the year, they also have the opportunity to safely dispose of the medications at their convenience by using the mail back program.

2.5 ELECTRONICS

Currently there are no Federal laws regarding recycling of e-waste. However, used CRTs exported for recycling must comply with requirements that are specified in 40 CFR 261.39(a)(5).[1] Many states have instituted mandatory electronics recovery, recycling or producer take-back programs. The NYS Electronic Equipment Recycling and Reuse Act was signed into law on May 28, 2010. The law will ensure that every New Yorker will have the opportunity to recycle their electronic waste in an environmentally responsible manner. The law requires manufacturers to establish a convenient system for the collection, handling, and recycling or reuse of electronic waste. Manufacturers of covered electronic equipment (CEE) will be responsible for implementing and maintaining an acceptance program for the discarded electronic waste, with oversight by the NYS Department of Environmental Conservation.[2]

Used electronic equipment can encompass a variety of equipment including, but not limited to computers, CRTs, wireless telephones, electronic keyboards, mice, televisions, printers, monitors, portable digital music players, video cassette recorders, DVD players, Blu-ray disc players, digital video recorders, digital converter boxes, cable or satellite receivers, electronic game consoles, PDAs, facsimile machines, and photocopiers, etc.

Much of this used electronic equipment contains hazardous elements and compounds, including lead, mercury, and cadmium, which can be toxic if released into the environment. Therefore, it is important that used electronic equipment is managed properly. The Agency collects electronics for recycling at the HHW collection events. The Agency also collects used electronic equipment during business hours (7:30am – 3:30 pm) Monday through Friday at the Agency facility located at 999 Flatbush Road in Kingston**.** Businesses (less than 50 employees), non-profits (less than 75 employees) can also recycle their used electronic equipment for free per the New York State Law at the Agency. Electronics are also being collected for recycling at the Municipal Recycling Drop-Off Centers (MRDCs).

1 Source: EPA website. http://www.epa.gov/epawaste/hazard/recycling/electron/index.htm
2 Source: NYSDEC website. http://www.dec.ny.gov/chemical/8788.html

2.6 SCRAP METALS/FREON/WHITE GOODS

This refers to the miscellaneous scrap metal (including freon appliances and white goods) delivered by residents, waste haulers, and some small businesses. The scrap metal received is not sorted by type by the Agency, but rather is sold as mixed scrap metal.

2.7 TIRES

Tires include car and truck tires. Tires are not routinely received by the Agency at its transfer stations or through the Municipal Drop-off Centers. Occasionally, tires come into the facilities by error. They are then processed for recycling through a tire recycling vendor.

2.8 WOOD

This refers to scrap wood, principally dimensional lumber used in construction, the movement of goods and products, demolition of structures, and discards from trucking, warehousing and retail operations. (From time to time, it may also include small volumes of unwanted tree limbs and trunks.) Most of the wood has been painted or preserved, or is otherwise contaminated, thereby eliminating the potential for recycling and it is currently disposed of at a landfill.

2.9 ORGANICS

Enhanced Yard Waste Composting

In its simplest form, composting is the biological breakdown and stabilization of organic materials. In nature, this occurs over time through the presence (aerobic) or absence (anaerobic) of air, and the addition of moisture that supports microbial activity and decomposition of organics over a range of temperatures. Formal composting procedures are intended to create a controlled biological process that accelerates the decomposition and stabilization of organics,

which can then be reused as a soil amendment. Enhanced yard waste composting is an organics management strategy that would allow the County to compost other source-separated organics with their current green waste composting operations in a systematic and potentially "phased" approach. A variety of composting methods and engineered systems could be utilized to expand the current green waste composting operations. The following discussion presents an overview of the options that may be available to the County.

1. Feedstock Availability

For an enhanced green waste composting program, ideal circumstances for quality feedstock are those materials that can be collected at the source of generation and provide consistent "non-contaminated" (no inorganic materials or paper) feedstock. Although a consistent supply of feedstock can be difficult to achieve, there are also methods and procedures that can be utilized to manage inconsistent feedstock but would require additional capital investment in equipment. The following are typical organic feedstocks that are most suitable for co-composting with leaf and yard waste:

 Biosolids from wastewater treatment facilities.

 Source-separated food waste from residential, commercial, and institutional facilities.

Food waste is often categorized as "pre-consumer" food waste (prior to consumption by consumers, e.g., grocery store organics, food preparation businesses, food processing industries, etc.) or "post-consumer" food waste which is discarded organics that are not consumed after serving (vegetable and meat scraps, spoiled foods, etc.). Pre-consumer food waste will generally have less paper and plastics than post-consumer food waste, but it is rare for food waste to be completely free of paper and plastics. The benefit of each of these types of organic feedstock is that they offer a higher percentage of nitrogen to carbon-rich green waste. Early blending of feedstock to achieve appropriate carbon: nitrogen ratios can accelerate the active composting phase of the material to achieve stable compost in less time. The advantages and challenges of these feedstocks are summarized as follows:

TYPE OF FEEDSTOCK	ADVANTAGES	CHALLENGES
Wastewater sludge	□ Readily available □ High nitrogen content	□ Regular testing at source □ Strong odors □ Inconsistent moisture content □ Requires more processing controls
Pre-consumer food waste	□ Relatively low odor □ Excellent source of nitrogen □ Many potential sources locally available	□ Requires some preprocessing for size reduction □ Variable quantity and quality □ Requires outreach program
Post-consumer food waste	□ Source of nitrogen □ Locally available	□ Potentially higher odors □ Requires pre-processing □ Collection challenges

2. System Components and Alternative Composting Methods

There are a variety of composting methods that may be utilized to co-compost multiple organic waste streams. However, given the sensitivity for odor generation, outdoor windrow composting is not the most suitable for nitrogen-rich materials since oxygen is rapidly consumed by microorganisms and compost must be mixed regularly to reintroduce oxygen into the compost. This can often result in the release of fugitive odors that are generated if oxygen is depleted, and ammonia and other gases are generated through anaerobic activity. However, if the compost site is isolated from downwind odor receptors, windrow composting is the least expensive option to the County. Where odors are a concern, the recommended composting methods are as follows:

2a. Aerated Static Piles

This is a process where source-separated organics are received and mixed with green waste and placed on an aeration pad for processing. The pad includes a system of perforated pipes and aeration blowers that regularly feeds air from the bottom of the piles through the organic materials to control the rate of decomposition and compost production. This method does not require the material to be turned, and generally completes the active phase of composting within 30 days, when the material can then be removed from the pad and cured in windrow piles for final processing. The Onondaga Resource Recovery Agency recently completed a pilot test program utilizing static aerated piles to compost green waste and pre-consumer food waste with excellent results, and therefore plans to pursue full-scale development at their site.

2b. Covered Aerated Static Piles

Similar to aerated static pile systems, this process utilizes similar forced aeration systems but adds a fabric cover (the Gore Cover System or equivalent) over the piles to control moisture content and to further prevent the escape of fugitive emissions. These cover systems allow air to circulate and escape through the (breathable) fabric while retaining moisture and off-gases that are bound by moisture. These types of systems are popular in Europe and have recently been developed in the western portion of the United States for green waste and biosolids co-composting.

2c. In-Vessel Systems

In-vessel composting systems are those that process organics in a vessel, container, or building by controlling moisture addition and oxygen as required, and mixing the material as decomposition of the material proceeds. The primary advantage of these systems is that they allow the greatest processing controls to accelerate the overall composting process. In-vessel systems generally control odors by retaining or collecting them and treating them prior to release to the atmosphere. In-vessel systems range from relatively small containers for farms (to compost manure) and universities (food waste) to building systems like the IPS Agitated BinSystem for composting biosolids (similar to the Rockland County Solid Waste Authority Co-compost Facility). The larger systems are generally suited to higher volumes of organic processing due to economy of scale.

3. Applicability to the Waste Stream

There has been a variety of experiences in both the United States (recently) and Europe (historically) related to organics composting and the trend to divert greater volumes of organic material from landfills. The Western Region of the United States has shown greater activity with source-separated food waste programs than other portions of the U.S. Biocycle Magazine (December 2008) reports that there are nearly 70 food waste composting facilities in Alaska, Arizona, California, Nevada, Oregon, and Washington. The most challenging and expensive portions of the program relate to collection, public outreach, and management of consistent feedstock. For Ulster County, the most readily available source-separated organics are from the wastewater treatment facilities located within the County and at institutional facilities (food waste).

4. Volume Reduction and Diversion Potential

Source-separated compost facilities can achieve a very high volume reduction of the organic waste received since it primarily consists of compostable materials. For food waste, however, there will always be a fraction of inorganic waste that will need to be screened from the final product. For pre-consumer food waste, the volume reduction can be over 90 percent. For post-consumer waste, the volume reduction will be somewhat less but should still achieve over 80 percent reduction. The challenge is to manage residuals that are removed from the compost on site without cross contamination of the final compost product. The overall program challenge for food waste composting is to achieve reasonable participation through the implementation of effective collection methods at a reasonable cost. It has also been noted by those communities that have implemented these programs that success often occurs at the “grass roots” level where individuals, businesses, and institutions have a strong desire and commitment to implement organics recycling programs since it generally takes more efforts to succeed.

5. Environmental Considerations

For composting operations, the most significant challenges for controlling environmental impacts relate to control of odors, fugitive dust emissions, stormwater management, and prevention of leachate generation. New York State requirements pertaining to composting operations are presented in the 6 NYCRR Part 360-5 Solid Waste Rules and Regulations. For those composting operations greater than 3,000 cubic yards per year, the NYSDEC requires the facility to be registered. For operations greater than 10,000 cubic yards per year, the facility will require a solid waste permit. In addition, if biosolids are processed in any volume, it will require a solid waste permit.

6. Residuals

For source-separated organics, there will be some inorganic materials that will need to be removed from the final compost product. Depending on the materials, this could range from 25 percent by volume to less than 10 percent by volume. Residuals would require disposal in the landfill if it consists of paper, plastics, or large organic material. Wood waste could be reused as a bulking agent for feedstock as part of the composting process.

2.10 TEXTILES

This refers to used and discarded clothing from residents. All such textile material is delivered to one of the Municipal Recycling Drop-off Centers which are equipped with specialized 4-6 cubic yard containers. There are also non-profit agency sponsored clothing drop boxes at multiple locations throughout the County for public use.

2.11 PRIVATE RECYCLABLES

This refers to all the recyclable material generated by private entities and sent by those companies to a materials recovery facility (or final end user) other than a facility in the UCRRA System.

2.12 WASTE WATER TREATMENT PLANT SLUDGE

Sludge is the solid residue left after the treatment of sewage and other wastewater usually at a publicly-owned treatment works (POTW). This represents the solids residue from all such water treatment facility (POTW) in Ulster County, plus the same type of residue from the septage pumped from individual septic tanks throughout the County which is delivered to a water treatment facility. Currently, the Agency is collecting and transporting sludge to a BFI landfill in Niagara Falls, New York.

The Agency is currently assessing other options for composting the material. The Agency contacted the City of Kingston for a possible partnership, but since the Agency is the contingency plan for the City of Kingston, a joint venture is very unlikely. The City of Kingston uses an innovative system to make lawn fertilizer and fuel from its waste water sludge. The City of Kingston partnered with the Aslan Group to develop the first system for managing wastewater treatment plant residuals in an economical and environmentally sound manner. Waste "biogas" is captured from the plant's digesters and used as the only required fuel to turn 10 wet tons per day of municipal wastewater sludge into one ton per day of an EPA-recognized, pelletized "biosolid." The biosolid is distributed free of charge for use as a lawn fertilizer or furnace fuel, which costs less than the previous practice of landfill disposal. The Agency is also in discussions with Rockland County about handling the County’s waste water treatment plants sludge. The Rockland County Co-composting Facility recycles biosolids from the five wastewater treatment plants in Rockland County. The biosolids are mixed with clean wood waste and then composted. The finished product is similar to peat moss and is an excellent soil amendment for use on golf courses, flower gardens and landscaping projects. The Co-composting Facility is a state-of-the-art in-vessel agitated bin composting plant which processes clean brush, wood waste, biosolids and other organic residues in the production of an exceptional quality (EQ) compost. The

Facility was designed and constructed by Waste Management of New York, and is operated by WeCare Organics under contract to the Authority. It is located about 70 miles from Kingston in Hillburn, New York, adjacent to the Authority's Materials Recovery Facility and Transfer Station.

2.13 LEACHATE

Leachate is the liquid remained of the solid waste decomposition process. The Agency collects leachate at its closed landfills (Ulster, New Paltz, and Lloyd) and the Rochester transfer station. Leachate is also collected from the Town of Hurley and Jockey Hill (City of Kingston) closed landfills. Leachate is trucked to the City of Kingston POTW for treatment.

The amount of leachate collected from the closed landfills remains extremely high, even though the landfills were capped about 14 years ago. It should be noted that the closed landfills are not lined. When the Agency took over the landfills from the respective municipalities, the landfills were under NYSDEC consent order to close. The Agency negotiated an agreement with the landfill municipalities to take over operation and management of the landfills, and with NYSDEC to extend the useful life of the landfills. This satisfied the goal of the Agency to provide county-wide MSW disposal on an interim basis while it was studying permanent county-wide MSW disposal alternatives. However, NYSDEC required new consent orders for the landfills which were subject to updated 6 NYCRR Part 360 requirements, including the requirement for leachate collection systems at New Paltz and Ulster. The result has been continuous generation of large amounts of leachate at the two closed landfills, even though effective landfill caps have been in place for many years.

In 2008, the Agency determined to study the leachate problems at New Paltz and Ulster closed landfills, beginning with the New Paltz closed landfill. The intent of the study was to find why, after all the years since capping and closure so much leachate was still being captured, and once the cause was discovered, to take appropriate action to mitigate the problem. The first phase of the study determined that the New Paltz system was capturing large amounts of ground water, resulting in vast amounts of diluted leachate. The results of the first phase of the study were provided to NYSDEC. In 2011, the Agency commenced the second phase of the study at New Paltz, which involves additional testing and a recommendation for a mitigating solution. NYSDEC has been consulted on and supports the scope of professional work to be undertaken in this phase. The third phase will consist of the construction and implementation of the mitigation system. Similar studies will be undertaken at the Ulster closed landfill after the New Paltz solution has been determined.

In summary, the proposed study consists of several milestones. Firstly, it must be determined what sections of the leachate collection system, if any, collect only groundwater. This will be done through the installation of a monitoring well through the center of the landfill and by

sampling the leachate at various points throughout the collection system. Secondly, the sections of the system that have been identified as collecting groundwater only will be removed from the collection system thereby reducing the overall volume of liquid collected.

2.14 CONSTRUCTION AND DEMOLITION DEBRIS

The Agency does not have a specific Construction and Demolition ("C&D") Debris program, however C&D debris is defined part of Solid Waste (means uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles and other roof coverings, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets ten gallons or less in size and having no more than one inch of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, and pipe and metals that are incidental to any of the above)[1], and the Agency routinely receives C&D waste at its transfer stations. C&D waste is primarily generated by residential construction, demolition or renovation, and consists of building materials (wood, brick, shingles and concrete), household items (couches, beds, chairs, mattresses) and like items. C&D waste is processed at one private facility in southern Ulster County (LaMela's in Marlborough), and two others in the region (Taylor's in Orange County and Recycling Depot in Dutchess County).

1 Source: NYSDEC website. http://www.dec.ny.gov/chemical/23700.html

2.15 MUNICIPAL SOLID WASTE

Municipal Solid Waste (MSW) is a refinement of the definition of Solid Waste set forth in 2050-b.15 of the Act. It is defined as combined household, commercial and institutional waste materials generated in a given area. MSW is collected by the Agency at the MRDCs and received by the Agency at the transfer stations. Totals of MSW collected and received in 2010 are set forth in Table 1-2.

CURRENT SOLID WASTE MANAGEMENT SYSTEM

3.1 MATERIALS RECOVERY FACILITY

1. Dual Stream Recycling

The Ulster County Resource Recovery Agency presently utilizes a dual stream collection system at the Materials Recovery Facility. Residents are asked to separate paper (newspapers,

magazines, junk mail, office/school papers, inserts, phone books) from commingled containers (glass bottles and jars, plastic bottles, aluminum and tin cans.) Private recycling and waste hauling companies provide curbside recycling trucks for pick-up that are designed to keep containers separate from paper products, and compartmentalized. Roll-off recyclables containers at transfer stations are placed to keep commingled containers separate from the mixed paper. Three designated areas in the Materials Recovery Facility were designed for drop off of three different groups of material: containers in one bay, corrugated cardboard in another area and mixed paper in the third area. Processing is split into two sections, with elevated sort lines for containers and another for paper products. Corrugated is dumped directly onto the floor for direct deposit on the conveyor system leading to the baler. Staff sorts the commingled containers on the separate sort lines. The presently configured system is geared totally to a dual stream collection and processing, so changing to single stream would entail costs to change the processing system within the Materials Recovery Facility. Refer back to Section 2.1, for preparation guidelines, as well as the Appendix for a copy of the Ulster County Recycling Instructions Brochure.

2. Single Stream Recycling

The Agency is currently accepting single stream material from private haulers operating in Ulster County. The Agency is not able to process the single-stream material due to operating a dual-stream MRF. The Agency collects a tipping fee from haulers for the material and then loads it into long-haul trailers which are then brought for processing to a single-stream MRF.

3.2 HOUSEHOLD HAZARDOUS WASTE (HHW), PHARMACEUTICAL WASTE AND ELECTRONICS COLLECTION

1. Household Hazardous Waste

Household hazardous waste (HHW) typically makes up a small portion of the municipal solid waste (MSW) stream by volume (less than 1%), however HHW contains potentially hazardous ingredients that warrant their diversion from landfills, transfer stations, waste-to-energy facilities, water supplies, etc.[1] Collection programs for these materials play an important role in the integrated solid waste management systems of communities throughout the country. HHW includes household products that contain corrosive, toxic, flammable, or reactive ingredients such as, but not limited to: cleaners, pool chemicals, herbicides, pesticides, automotive supplies, paints, stains, glue, batteries, fluorescent bulbs, mercury thermometers, etc.

The Household Hazardous Waste Collection Event, which is partially funded by the New York State Department of Environmental Conservation, was created to bring hazardous waste disposal services into the community and to provide a drop off location for Ulster County residents. By offering alternatives for the safe disposal of household hazardous waste, Ulster County is taking a proactive role in protecting the environment by preventing these items from ending up in landfills or contaminating water sources and wastewater treatment plants. Currently, the Ulster County Resource Recovery Agency hosts bi-annual HHW collection events for residents. The

Agency contracts with a hazardous waste management and disposal/recycling company for the packaging, transport and disposal of the HHW. Materials not accepted in the County's program include radioactive materials, smoke detectors, medical or infectious waste, explosives, and compressed gas cylinders.

1 Source: Waste Age/Recycling Times' Recycling Handbook by John Aquino, 1995

See Appendix for Table 3-2 for Quantities of HHW Collected per Event through Ulster County's HHW Collection Program

2. Electronic Waste

Used electronics or "e-waste" includes discarded computers, cell phones, televisions and other electronic products. Those with cathode ray tubes (CRTs), such as color computer monitors and televisions, are considered hazardous when discarded because of the presence of lead in the CRT. Televisions and computer monitors contain, on average, four pounds of lead (the exact amount depends on size and make).[2] Lead is not considered an environmental problem while the monitor or television is intact; however the lead can leach when compacted or broken and create an environmental hazard.

In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present environmental threats. Based on studies conducted by the United States Environmental Protection Agency (EPA), the CRTs and LCDs are likely to fail the Toxicity Characteristic Leaching Procedure (TCLP) test for heavy metals.

The EPA estimates that consumer electronics make up only 2% of the MSW stream, however the quantities of these materials being disposed has been steadily increasing for the past decade.[3] The Agency accepts certain electronics from residents at its HHW Collection Events including computers, monitors, printers, laptops, keyboards, radios, stereos, modems, televisions, VCRs, fax machines, mobile phones and pagers. Currently, the events are free of charge to residents to recycle electronics and small household appliances (e.g., microwaves, vacuum cleaners, etc.). There is a limit of five televisions and/or computers per visit. Per the NYS Electronic Equipment Recycling and Reuse Act, electronics are also being collected from businesses (less than 50 employees), non-profits (less than 75 employees) for recycling for free at the Agency facility during business hours as well as at the collection events.

2 Source: "Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling," EPA, 2001. http://www.epa.gov/osw/conserve/downloads/elec_fs.pdf

3 Source: EPA website. http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm

3. Pharmaceutical Waste

As part of the HHW Program, with approval from both the NYSDEC and the New York State Department of Health, in order to address the emerging environmental and public health concerns associated with improper disposal of medications, the Ulster County Resource Recovery Agency, in cooperation with the Ulster County Sheriff's Office and the Dutchess

County Waste-to-Energy Facility collects household pharmaceutical waste such as; controlled substances, prescription medications, unwanted medications, over-the-counter medications, or any pharmaceutical waste that is no longer needed, wanted or expired for proper disposal.

TABLE 3-1 LIST OF ACCEPTABLE ITEMS FOR ULSTER COUNTY'S HHW COLLECTION PROGRAM

Household Hazardous Waste, Pharmaceutical Waste and Electronics Collection is **FREE** to all Ulster County Residents. You must sign a Declaration of Residency and Non-Commercial Waste form when you arrive.

CANCELLATION or RESCHEDULE: Please call the Agency to cancel or reschedule your appointment. Please call our 24 hour hotline at (845) 336-3336 and leave a message; or call (845) 336-0600 during business hours, Mon – Fri. Informing the Agency of a cancellation enables other residents to utilize the Collection Event. Thank you!

DIRECTIONS: Ulster County Resource Recovery Agency Collection Event located at 999 Flatbush Road, Kingston (Town of Ulster):
From the Thruway Circle: Take Route 28W to the first exit after the light by Johnson Ford car dealership. Enter on Route 209 North/Rhinecliff Bridge (approx 4.5 miles). The last exit before the bridge toll is Route 32. At end of ramp make a left on Route 32S (also Flatbush Road). Sign on left: Ulster County Solid Waste Transfer Station. Follow road to collection site.
From Route 9W: Take Route 9W North into Kingston. Make right at light at intersection of 9W and Route 32 (also Flatbush Road). Take Route 32N approximately 2 miles to UCRRA sign for Ulster County Solid Waste Transfer Station just before Rhinecliff Bridge exit and 209 overpass. Follow road to collection site.

	HOUSEHOLD HAZARDOUS WASTE & PHARMACEUTICAL WASTE – ACCEPTABLE ITEMS		**ELECTRONICS – ACCEPTABLE ITEMS**
__	Oil based paints, stains, varnishes- **NO LATEX PAINT**	__	Monitors
__	Paint thinner, solvents, and strippers	__	CRTs
__	Lighter fluid	__	TVs
__	Waste fuels: Kerosene, Gasoline	__	Telephones
__	Pesticides and insecticides	__	Copy machines
__	Poisons, weed killers, mothballs	__	Keyboards
__	Mercury, thermostats, thermometers	__	Terminals
__	Hobby supplies, artist supplies	__	Printers and scanners
__	Photo chemicals, chemistry sets	__	Modems
__	Oven, toilet and drain cleaners	__	CPUs
__	Rug and upholstery cleaners	__	VCRs
__	Automotive products	__	Fax Machines

	- used oil filters	__	Typewriters
	- antifreeze, engine degreaser	__	Cables
	- carburetor cleaner, brake fluid	__	Cell Phones
	- transmission fluid	__	Batteries
	- automotive batteries	__	Video game players
__	Swimming pool chemicals	__	Answering machines
__	Rubber cement, airplane glue	__	Tape recorders
__	Furniture, floor, and metal polishes	__	Stereos and radios
__	Dry cleaning solvents and spot removers	__	DVD players
__	Fluorescent bulbs (CFLs, UV, tubes, spirals, etc.)	__	Microwaves
__	Pharmaceutical Waste includes: Expired/unused medications, pet medications, liquid medications, ointments, lotions, prescription medications, over-the-counter medications		**NOTE: Electronics Collection does NOT include appliances such as: AIR CONDITIONERS, REFRIGERATORS, VACUUM CLEANERS** **Electronics Recycling Collection ONLY: Ulster County Households, Businesses w/ less than 50 employees and Nonprofit Organizations w/ less than 75 employees can participate per New York State law**

DO NOT BRING THE FOLLOWING:

	1. Any empty containers, including empty paint cans which should be disposed of in the trash; 2. Waste in containers larger than 10 gallons 3. Non-Hazardous products like laundry detergent; 4. Smoke detectors and radioactive materials;		5. Explosives, ammunition, or fireworks; 6. Etiological, pathological, or medical wastes (SHARPS); 7. Controlled Substances; Propane tanks or fire extinguishers (call your propane or fuel provider)

HHW, PHARMACEUTICAL WASTE AND ELECTRONICS WILL BE ACCEPTED FROM ULSTER COUNTY RESIDENTS/HOUSEHOLDS ONLY.

MATERIALS FROM BUSINESSES, SCHOOLS, FARMS OR ORGANIZATIONS ARE NOT ACCEPTED. CALL NYSDEC FOR MORE INFORMATION AT 1-877-SWEEPNY or VISIT www.cleansweepny.org/ or CALL THE RECYCLING HOTLINE AT (845) 336-3336 or VISIT OUR WEBSITE AT www.ucrra.org

The Household Hazardous Waste Collection Program is partially funded by the NYS Department of Environmental Conservation

3.3 MARKETS FOR RECOVERED RECYCLABLES

1. Market Overview

There has been an overall increase in value for recovered recyclables from the mid-1990s through 2007, including steel, aluminum, glass, old corrugated cardboard (OCC), old newspaper pulp (ONP), and mixed paper. However, in response to the downturn of the global economy (at the end of 2008), the market for all of these and other recovered recyclables suddenly and drastically dropped in price. Because of the overall value drop of materials, a site-specific evaluation of potential markets with cost analysis will not be completed at this time. However, the Agency currently holds no long-term contracts with any vendor or broker. The Agency markets recyclables on a month-to-month system using commodity market indicators such as the Official Board Market (OBM) for fiber.

The addition of any other potential items to the Agency's existing program is researched to determine the economic impact, the impact on the space available for processing and storing recyclables, as well as the manpower needed and any infrastructure and operating and maintenance (O&M) costs for equipment and buildings. Potential markets must be researched, along with the potential revenue to be gained by another product. Public education is also a factor, and some programs are done as pilots to determine their viability before announcing them to the public. This is done because the Agency does not want to offer a program to the public, and then discontinue it if markets fail, so that recycling guidelines remain consistent.

Currently, recyclables processing and the current program has not been impacted to date. The major impact to loss of revenue for the Materials Recovery Facility has been due to the introduction of single stream recycling within the County by private haulers which will be further discussed in Section 4.2.

2. Restrictions to Market Development

There are both physical and institutional restrictions to increasing recycling participation in the County. The first is reliance on the private sector, where they would have to expand their facilities and collection services. With recyclables taken out of the County or collected by outside organizations, the benefits to the County are compromised and market development is restricted. Institutional restrictions include the control, flow, and processing of solid waste within the County in order to fund expanded programs. Flow control is not currently legislated by the County.

The materials collected from residents, commercial, industrial, and institutional establishments and separated for sale in secondary markets include:

- Paper - old corrugated cardboard (OCC), newspaper, mixed paper, old boxboard (OBB), old magazines/catalogs (OMG), household office paper and mail (HOMP), phone books, and beverage boxes.
- Plastic - (1-7 including polyethylene terephthalate (PET) and high density polyethylene

(HDPE).

- Metals - (aluminum, steel).
- Glass - (flint and colored).

TABLE 3-3 TABLE OF RECYCLABLES DESTINATIONS OUTSIDE PLANNING UNIT

DESTINATION	RECYCLABLE MATERIALS
Haycore Canada Inc. 3144 Gregoire Road, Russell ON K4R 1E5	HDPE natural, HDPE colored, PET, tin
B. Millens & Son 209 E. Strand Street, Kingston, NY 12401	Scrap metal, aluminum
American Independent 15 South Depot Plaza, Tarrytown, NY 10591	OCC
KC International 1608 Route 88 West Suite 301, Brick, NJ 08724	HDPE natural, HDPE colored, PET, Tubs and lids (#3-7 plastics)
Sierra Recycling PO Box 1528, Clifton Park, NY 12065	Mixed news, books (no hard covers)
FCR Trilogy Glass Stanley, NY 14561	Glass
Metro Waste Paper Recovery 71 Fuller Road, Albany, NY 12205	Mixed news
North Shore Recycling 53 Jefferson Ave, Salem, MA 01970	Mixed news
R Kelly Freeman PO Box 1531, Green Island, NY 12183	Scrap metal, aluminum
RD Mountain Trucking/Mountain View Recycling PO Box 924, Little Falls, NY 13365	Beverage containers (deposit bottles)
Mike's Bottles and Cans 9A Vatrano Road, Albany, NY 12205	Beverage containers (deposit bottles)

TABLE 3-4 TABLE OF AVAILABLE AND POTENTIAL RECYCLABLES MARKETS FOR ADDITIONAL MATERIALS

RECYCLABLE MATERIAL	MARKET
Tires	Casings, Unity Tire Creations
Vehicle batteries	B Millens & Sons,

Electronics	WeRecycle!
Fluorescent bulbs	American Lamp Recycling, WeRecycle!, Home Depot
Freon	Interstate Refrigerant
Textiles	Salvation Army, Goodwill Industries, Planet Aid
Rechargeable batteries & cell phones	RBRC, UCRRA, retail locations (i.e. Staples, Best Buy, Verizon)

TABLE 3-5 MATERIAL DEFINITIONS AND CATEGORY LIST

PAPER PRODUCTS	
Newspaper (ONP)	Printed "ground wood" newsprint, including glossy and semi glossy advertisements and inserts typically found in newspapers.
Household Office Paper and Mail (HOPM)-recyclable	Also referred to as "mixed paper" or "junk mail", paper that would be included in residential "mixed mail" or commercial "office" recycling programs, not including the grades identified above. Examples include "junk" mail, printer paper, envelopes of all types, file folders and notebooks, card stock, key punch cards and computer printouts, financial statements, annual reports, other report-like documents, books, brightly colored paper, calendars, tablets with colored glue bindings, shredded paper, fax paper, onion skin paper, and Post-It Notes.
Magazines/Catalogs (OMG)	Magazines, catalogs including any "seasonal circular" catalog clearly recognized as such from direct mail (e.g., LL Bean, Nordstrom's, etc.).
Phone Books	Clean telephone directories printed for or by telephone directory publishers.
Uncoated Old Corrugated Cardboard(OCC) and Brown Paper Grocery Bags	Uncoated cardboard with a wavy core and not contaminated with other materials such as wax, plastic coating, Styrofoam, or food, and all paper bags. Examples include large packing boxes, clean pizza delivery boxes, and paper bags-including brown Kraft bags.
Old Boxboard (OBB)	Chipboard boxes not coated with wax, plastic or metal. Examples include cereal boxes, other clean chipboard food containers, shirt boxes, and shoeboxes, egg cartons, and tissue roll cores.
Beer, Pop (Soda) & Water Boxes	Also, referred to as "carrier stock". Used as "wet-strength", coated boxboard. Includes 12-pack and 24-pack cartons used for cans of beer, pop (soda), water, etc.
Other Paper Items	Includes those items not currently collected by Ulster County, such as milk and juice cartons, frozen pizza boxes and frozen food packaging.

PLASTIC	
#1 Polyethylene Terephthalate (PET)Containers	Plastic containers and bottles coded #1 without a New York deposit label.
#1 PET Deposit Bottles	Plastic bottles coded #1 with a New York deposit label.
#2 High Density Polyethylene (HDPE)	Plastic containers and bottles such as milk jugs, shampoo

Containers	bottles, and laundry detergent bottles coded #2.
#3-7 Plastic Containers	Plastic containers coded #3, #4, #5, #6, #7.

METALS	
Aluminum Beverage Containers	All beverage containers made from aluminum without a New York deposit label.
Aluminum Deposit Beverage Containers	All beverage containers made from aluminum with a New York deposit label.
Ferrous Food and Beverage Containers	Food and beverage containers composed primarily of iron/steel.
Other Aluminum	Other aluminum items such as aluminum pans and clean foil.

GLASS	
Glass bottles and jars	All glass food, beverage, wine, liquor and beer containers without a New York deposit label.
Glass deposit containers	All glass food, beverage, wine, liquor and beer containers with a New York deposit label.

NON-TARGETED MATERIALS (i.e., "trash" or "rejects" as collected)	
Other paper trash	All other non-recyclable paper; contaminated paper (i.e., paper used to dispose of chewing gum, soaked with food spills, sprayed with paint, covered in tape, OCC with Styrofoam attached); paper or boxboard coated with wax; tissue papers, napkins, cups, coffee filters, tea bags, wax paper, and cellophane, carbon paper, wallpaper, bathroom waste paper, photos, slides, and transparencies.
Plastic bags and other film plastic	Includes trash bags, grocery bags, storage bags, plastic wrap, film, etc.
Other trash	All other non-recyclable items including other scrap metal (ferrous and non-ferrous), rope, string, twine, cotton balls, tape, cups, silverware, trays, and foam packaging. Includes "Non-Recyclable Glass/Ceramics" such as windowpanes, mirrors, bulbs of any type, dishes, glasses, pottery, and ceramics. Also, includes "Non-Recyclables Plastics" such as plastic toys, clothes hangers, extruded pipes, etc., including anything not coded with a #1-#7. Also includes "Non-Recyclable Cans" such as aerosol cans, paint cans, motor oil containers, and gasoline containers. Also includes "Medical Waste" such as sharps (e.g., needles/syringes, razors), medicine containers, etc.
Fines	Residuals on the sort table after the sample has been sorted. Includes dirt, broken glass, etc.

3.4 PUBLIC EDUCATION, PROGRAM OUTREACH AND ENFORCEMENT OF RECYCLING LAWS

Continued enforcement of the local laws mandating source separation for recycling through a system of public education and outreach is essential to having a successful recycling program.

1. The Recycling Coordinator

A professional Recycling Coordinator is currently employed at the Agency to spread the recycling message and to bring technical assistance to the residents, schools, and businesses in Ulster County. The Recycling Coordinator explores inquiries and complaints about business, apartment, and institutional recycling. The Recycling Coordinator visits local businesses, apartment complexes, and schools to offer assistance in designing recycling programs as well as free recycling containers and decals. In addition, the Recycling Coordinator is a certified educator, who speaks to thousands of students in hundreds of classrooms each year. The Agency also conducted educational programs with schools including school tours of the Materials Recovery Facility. The Ulster County waste reduction and recycling public education programs are promoted through distribution of information on recycling practices and general information on reuse, waste reduction and recycling to County residents. These programs include publication of recycling information in the Ulster County phonebooks, availability of the Recycling Coordinator from 8:00am to 4:00pm, a 24-hour Recycling Hotline for information, questions or concerns regarding recycling, distribution of recycling posters and recycling bin labels, a website (www.ucrra.org) dedicated to the Solid Waste Management and Recycling Program of Ulster County, availability of backyard compost bins, assistance with implementing a composting program, billboard public outreach campaign, Ulster County Green Schools Program and Ulster County Partner in Recycling Program for commercial, institutional, and industrial waste generators.

The Recycling Coordinator currently plays two roles and also acts as the Agency Recycling Compliance Officer. When needed, the Recycling Compliance Officer, is also available to call on businesses and apartment buildings when it is determined that other approaches have not resulted in cooperation. The Ulster County Environmental Committee encouraged the Agency to increase its recycling education budget and in the County Legislature appointed a Hearing Officer to provide assistance for recycling compliance issues. The Recycling Coordinator will visit any waste generator that may be in violation of the Ulster County Mandatory Source Separation and Recycling Law to determine the source of the problem and to assist in designing or amending a recycling program which will capture the mandated recyclables.

2. Communications

In order to maintain a high recycling rate, frequent communications from the Agency is necessary to advise those who recently moved to the area as to the local recycling rules, to remind current residents of what's recyclable, and to inform the public of special events. To keep the public informed of the recycling program, an ongoing and extensive public communication

program has been established. All advertising/educational campaigns emphasize the Agency's website, www.ucrra.org as a community resource. This communication program consists of an advertising campaign focusing on humor, 'real-life' images and basic recycling rules. It has been shown that it is important to provide a public message that promotes the "why" of recycling and the difference one person can make in preserving natural resources for future generations. To answer this question, the Agency developed a waste reduction and recycling campaign to promote good recycling practices through use of an informational video. This video, "The Importance of Recycling in Ulster County," contains footage of the Ulster Transfer Station, the Ulster Materials Recovery Facility and discusses the environmental impact of landfilling. The main purpose of the video is to remind the public about the importance of recycling. This video was made into a DVD for distribution to all Ulster County Schools, Ulster County Libraries and Local Public Access TV Stations. It is also available for viewing on the main page of our website at www.ucrra.org and a copy of the video is available in the Appendix. Continuing to grow the Agency waste reduction and public outreach campaign, the Agency created a roadside billboard program for public display using 'real-life' images to promote recycling. The designs currently being used for the billboard campaign are shown below.

3. The Importance of Commercial Recycling

In Ulster County, most of the public discussion about recycling seems to involve residential recycling. While residential recycling is important, that segment of the solid waste stream does not have the greatest potential for recovering significant volumes of discarded material. The largest volume of recyclable material is probably on the commercial recycling area (including multiple-unit dwellings), based upon the experience of other recycling programs.

The Onondaga County (OCRRA) recycling program is a case in point:

For the calendar year 2009, OCRRA calculated a recycling rate of 64 percent. That is, 64 percent of the solid waste stream was recycled, while 36 percent was sent for disposal.

In addition, OCRRA provides the following breakdown of recycling for residential vs. commercial sources of material:

Curbside recycling (primarily residential recycling) 42, 014 tons
Commercial recycling (primarily business recycling) 539,467 tons

_____
Total 581,481 tons
42,014 tons/581,481 tons = 7 percent
539,467 tons/581,467 tons = 93 percent

So, for the OCRRA recycling program, which is a decidedly ambitious recycling program, only seven percent of the recycled materials are the result of residential recycling, while 93 percent of the recycled materials are the result of commercial recycling.

To look at this situation in terms of the overall solid waste stream, 581,481 tons is 64 percent.

Therefore, OCRRA's total solid waste stream for 2009 was 908,564 tons, of which 42,014 tons was residential recycled material while 539,467 tons was commercial recycled material.

Residential recycled material accounted for 42,014 tons/908,564 tons = 4.6 percent, while commercial recycled material accounted for 539,467 tons/908,564 tons = 59.4 percent of the total solid waste stream. Meanwhile, 327,083 tons was disposed of in some other way.

While there may be some variation from community to community in terms of the percentage of the solid waste stream which is recyclable, the proportions are probably very similar to OCRRA's.

There are conclusions which may be drawn from the above information:

1) As much as the County may try to improve the rate of residential recycling, it is unlikely to significantly improve the overall recycling rate of the total non-organic portion of the solid waste stream by more than a few percent. This does not mean that the improvement of residential recycling should not be pursued, but the County should recognize its limits in improving the overall recycling rate.

2) There is great potential for recovering recyclable materials from the commercial sector of the solid waste stream. The commercial sector deserves as much of the educational and enforcement resources as the residential sector, and more. Mandatory source separation of recyclables from commercial, industrial and institutional sources was established in Section 10: Commercial and Institutional Sector Recycling of the Ulster County Mandatory Source Separation and Recycling Law. Multiple-unit dwellings of more than five units are considered commercial buildings and are subject to this section of the recycling law. Multiple-unit dwellings of five or fewer units are subject to the same provisions of the recycling law which applies to individual residences. The Ulster County Business and Commercial Property Compliance Program focuses primarily on the commercial and institutional sectors. More efforts to increase recycling in these areas will be pursued and details of this program are explained in Section 5.2.2

TABLE 3-6 EDUCATION SCHEDULE

MONTH	PROGRAM	OUTREACH
January-February	HHW and electronics recycling	Advertisement in newspaper. Outlines accepted materials & collection days for the year, press release, posting on County & Agency website, printed schedules & submitted to free news outlet (community calendar). Billboard recycling campaign to begin
March-April	Recycling, waste reduction	Advertisement in newspaper to promote recycling/provide tips, posted on County & Agency websites, press releases, & printed guides.
March-April	Backyard composting	Sell bins at discounted rate, press releases, posted on County & Agency websites, distribute posters & brochures on composting, promote at farmers markets & special events.

April	Earth Fest & outdoor Public events	Community event-display table & disbursement of informational guides. Provide ClearStream or Clear Canables recycling public event containers to events for public use
April-May	Farmer markets	Participate in a few events & promote composting, recycling, HHW & electronics recycling.
May-July	Grass recycling	Radio advertisements (one week in May, one week in July), press release, posted on the Agency website (composting page), printed brochure.
May-October	Electronics collections offsite	Advertisements in newspaper, press release, letter to area clerk offices, posted on County and Agency websites, posters, libraries, posted at Town Transfer Stations, submitted to free news outlet (community calendar).
November-December	Waste reduction/holiday tips, buy recycled, recycling	Advertisement in newspaper, press release, posted on Agency website.
Year-round	Recycling programs, MRF tours	Conduct year round specific school & community group programs regarding recycling, HHW, electronics, composting. Promoted through direct contact with teachers, the Agency website and email correspondence. Plan to utilize free social marketing tools including FaceBook, Twitter and YouTube

3.5 MUNICIPAL RECYLCING DROP-OFF CENTERS (MRDCs), A PAY-AS-YOU-THROW (PAYT) SYSTEM

Introduction

Traditionally, municipal solid waste collection and disposal services have been financed through property taxes or by fixed annual fees charged to households. At the same time, households are charged according to their rate of use for other utilities such as water and sewer service or electricity. As a result, residents often mistakenly perceive that solid waste services are free because of the separation between cost of services and how they pay for them. Citizens have little direct financial incentive to reduce the amount of waste they produce. Also, because each household is generally charged the same amount, small generators subsidize garbage services for those who throw away more.

Many local governments are adopting Pay-As-You-Throw (PAYT) programs for both curbside and drop-off collection systems. With PAYT, customers are charged by weight, by volume, or by a combination of the two per unit of garbage disposed. Market-based approaches such as these are proving to be important tools for dealing with environmental issues. Thousands of communities across the country are using PAYT to manage trash in a way that is fair, economically sound, and environmentally sustainable.1

Benefits of PAYT

Pay-as-you-throw programs offer a myriad of benefits for local governments. Furthermore, PAYT programs can be structured to maximize particular benefits. Some benefits of PAYT are:

Equity – Households and businesses are charged based on the amount of waste generated for disposal. This approach minimizes the need for small generators to subsidize the waste disposal of larger generators resulting in an equitable approach to paying for solid waste management.
Economic Incentives to Reduce – PAYT creates a direct link between waste disposal and cost resulting in a true economic incentive to reduce the amount of waste generated and recycle as much as possible.
Reduced Solid Waste Tonnage – In most communities, the realization of costs associated with waste management results in a decreased tonnage of waste to be disposed. This decrease is attributable to both source reduction and increased recycling. A reduction in the tonnage of waste disposed generally results in savings from reduced tipping fees.
Increased Recycling – The easiest way system users can save money is through increasing recycling. Increases will vary in size based on public education programs and the level of services available. Communities that receive revenues from recycling will see an increase in recycling revenues, however, these revenue increases may be quickly off-set by increased recycling hauling costs.
Revenue Stability – Programs that receive inconsistent funding or revenues can develop revenue stability through directly charging system users. This is particularly true for two-tiered systems that charge a set fee to all users to cover fixed costs and a variable fee to cover costs associated with disposal.
Environment – Natural resources and energy are conserved through source reduction and recycling. In addition, these resource and energy savings lead directly to reductions in greenhouse gas emissions.

1 Source: U.S. EPA website. http://www.epa.gov/epawaste/conserve/tools/payt/index.htm

Program Types

The type of PAYT program developed will ultimately be based on the needs and goals of a community. Although there are many ways to design and operate a program, most programs are usually described based on the collection method (curbside/drop-off), the collection unit (volume/weight) and the pricing system (fully variable/two-tiered). A short discussion of these aspects follows.

Collection Method – The collection method is simply the manner in which solid waste is collected. There are two basic types, curbside and drop-off, however, there are multiple variations of each type of collection that will dictate other aspects of the program. Other collection types include backdoor collection, shared alley collection, commercial dumpster, etc.

Collection Unit – Since PAYT charges system users based on the amount of waste disposed, a unit base needs to be used to accurately charge system users. Once again, there are two methods for charging by the unit; volume and weight.

Volume-Based – Volume-based systems are easily the most common in the United States. Volume-based systems can be curbside or drop-off and generally use either bags, cans, or stickers/tags to charge for solid waste disposal.

Bags – Bag systems generally require system users to purchase special bags to dispose of garbage. Bags are purchased from local retail outlets (grocery stores, hardware stores, etc.) or directly through the public works or solid waste department. Bags are marked up to pay for the appropriate costs (e.g., a box of 15 bags may cost $15) and often have special graphics such as the community's symbol on them so that they are easily distinguished.

Tags / Stickers – Tags and stickers work similarly to bags in that they are purchased from local stores or government departments and are marked up to cover the cost of the program. A tag or sticker is then required to be attached to each bag disposed and can be designated for specific size bags (e.g., 13 gallon, 30 gallon, etc.). Furthermore, tags or stickers also can be attached to bulky items allowing for cost recovery of bulky item programs as well.

Containers – In container systems, users pay based on the size and/or number of containers that are placed out for collection. The most common container system is the variable can system in which users subscribe to a specific size container (32, 64, 96 gallon) and must reduce their can size to see any savings. Backdoor or manual collection systems generally use smaller cans (20 or 32 gallon) but allow users to subscribe to multiple cans.

Other Options – There are many other methods or hybrid PAYT systems that utilize combinations of the above options. Perhaps the most common are container based systems that allow residents to set out overflow materials, but require special bags, stickers or tags be used.

Weight-Based – Weight-based systems, although less common, provide the most equitable approach to charging for solid waste disposal. Weight systems require the collector to weigh garbage at the curb or drop-off center and then charge the generator by the pound collected. Unlike volume-based systems that may require substantial reductions to decrease the can size or number of bags set out, savings from waste reduction are realized immediately in weight systems. The main drawback with weight systems is cost. Weight systems require scales to be placed either at the drop-off center or on the collection trucks, raising the capital costs required to implement the system. There are currently two drop-off centers in Ulster County that use some type of weight system. There are no weight-based curbside collection systems in Ulster County.

Pricing Systems– Unlike collection type and collection units which are generally determined by the existing factors and preferences, developing a pricing system requires a little more thought. Explanations of the four most common pricing systems follows.

Fully Variable – In fully variable systems, all or most of the programs costs are recovered through the unit fees paid by system users. For example, in a bag system, the fees collected through the sale of bags would need to cover all of the costs of running the solid waste

management system. This would include all direct and indirect, fixed and variable (disposal) costs. As can be expected, a fully variable pricing system provides the maximum incentive to reduce, however, given the uncertainties surrounding potential waste reduction, it is more difficult to set the unit costs (bag, sticker, etc.) and requires an in-depth knowledge of all program costs.

Two-Tiered – Two-tiered systems are probably the most common pricing systems in the United States. These systems charge multiple fees for solid waste management services. The first fee is set to cover the fixed costs of the system such as staffing, capital purchases and general operation. The fixed fee can be recovered through the tax base, utility bills, etc. The second fee is set to cover the variable costs of the system such as disposal and possibly hauling or collection. Hauling and collection costs are generally considered fixed costs, but in some cases are included with variable costs. In many ways two-tiered systems resemble phone bills in that the customer is charged a specific amount (fixed fee) to have the phone service available regardless of use, and variable costs (long distance/disposal) are determined based on use. Rate setting in a two-tiered system still requires a good understanding of full-costs, but tends to be easier than in fully variable systems and provides some security in that fixed costs are covered regardless of the level of waste reduction that occurs. Because the variable or unit fee charged in two-tiered systems is usually lower than in fully-variable systems, the incentive to reduce is not as strong. Some two-tiered systems use an alternative method for setting fees in that the fixed fee is set to cover the costs of a particular program such as recycling. This design option can provide a good incentive for reduction, but requires careful rate setting to ensure other program costs are adequately recovered.

Limited Base Service – Limited base service is the third system and probably the most common system in Ulster County. In this system, customers pay a set amount per month or year for a basic level of service, such as one 32-gallon container picked up weekly. Any additional service, such as overflow materials, requires additional payment. In Ulster County, the customer contracts the private hauler of their choice and pays the monthly fee directly to the company. Recycling is included for free with the monthly garbage service.

Hybrid Systems – Hybrid systems can provide a great boost to local governments recycling efforts. However, they tend to lack incentives to actually reduce the amount of waste generated. The typical hybrid system is either incentive-based or penalty-based and may or may not require altering existing financing mechanisms. In a penalty-based system, system users are charged to dispose waste only if recyclables are found in the waste. This, of course, limits their usefulness to staffed convenience centers. However, penalty based systems are relatively easy to implement and can greatly improve program participation. Incentive based systems more truly reflect typical PAYT systems. Users are required to pay for materials disposed. However, if the generator of the waste recycles, free or discounted disposal may be received for a set amount of material (e.g., 30-gallon bag). Once again, these systems tend to be limited to staffed drop-off centers.

Advantages/Disadvantages

Each program type and the specific options for each program discussed thus far all have advantages and disadvantages. What may work well in one community may not work well in another. A critical aspect of designing a PAYT program is to identify the goals of the system as well as the advantages and disadvantages of each design element. This process should help identify which program will work best in a community as well as which areas may create problems. These problems will need to be addressed early to ensure a successful program. Table 3-7 identifies some advantages and disadvantages associated with various design elements.

Implementation Issues

The ease or difficulty experienced while implementing a PAYT program will vary greatly from community to community. The following items are issues important to program implementation. Thoroughly addressing these issues early in the process will greatly increase the chance of a smooth conversion.

Elected Officials/Public Buy-in – Educating and gaining the support of both elected officials and the public is perhaps the most critical component of implementing a PAYT program. Without support for the program, the chances of successful implementation will be minimal. A good public/elected official education program will start very early and continue throughout program development. Expect resistance to PAYT initially. Over time, however, a good education program can decrease public resistance.

Program Goals – To design a program that properly fits a community, the goals of the program need to be identified early in the planning process. Program goals will vary from community to community and can range from revenue stability to meeting waste reduction goals to providing more equitable service.

Staffing Resources – Depending on the type of program implemented, additional staff resources may be necessary. It is important to identify the level of additional resources necessary and the area(s) in which they are needed (e.g., administrative, illegal disposal enforcement, etc.)

TABLE 3-7 ADVANTAGES AND DISADVANTAGES OF PAYT PROGRAM ELEMENTS

Collection Unit	Advantages	Disadvantages
Bag Programs	- Easy for residents to understand. - Lower distribution, storage, and inventory costs. - Inexpensive to implement.	- Uncertain revenues as citizens purchase on an as-needed basis. - Potential for bag to rip or may be incompatible with automated collection systems. - Bags are not reused and, unless recycled, contribute to the waste stream. - Bags can be torn by animals.
Sticker/Tag Programs	- The cost of producing stickers/tags for sale to residents is cheaper than bags. - Easy for residents to understand.	- Potential for poor sticker adhesion in bad weather and possible counterfeiting. - Uncertain revenues.

	- Inexpensive to implement.	
Variable Can System	- Constant revenue stream.	- Little flexibility between can sizes. Citizen must lower needs to next can size or reduce collection frequency. - Need method to deal with waste beyond subscription level like bulky items or extra waste such as on holidays. - Higher start-up costs for can purchase. - May require specialized equipment. - Higher administrative costs for storage of cans, distribution, and billing.
Weight-Based Program	- Citizen realizes immediate savings from reduction.	- High equipment demands for trucks outfitted with certified weighing devices and equipment to record weights and addresses. - At staffed drop-off centers, requires more staff time to weigh garbage. - Specialized curbside or drop-off equipment. - Higher start-up costs.
Pricing Systems	**Advantages**	**Disadvantages**
Fully-Variable Pricing	- Greatest waste reduction incentive.	- More difficult to set rates. - Some risk associated with not recovering all program costs.
Two-Tiered Pricing	- Guaranteed recover of fixed costs. - Rates setting is not as complicated as fully-variable.	- Lower unit charge decreases the waste reduction incentive.
Limited Base Service Pricing	- Relatively easy to implement.	- No incentive to reduce below the base level of service.
Hybrid Systems	- Requires little or no financing changes to implement.	- Limited incentive to reduce and reuse.

Public Education – As with any program change, educating the public is crucial. Public education campaigns should cover: what PAYT is, new requirements that they will have to meet, and additional means such as backyard composting that will allow them reduce their disposal costs.

Existing Waste Reduction Programs – The comprehensiveness of existing waste reduction programs should be reviewed. A community with a limited recycling program and no source reduction or reuse options available to the public may need to add programs to help residents reduce, reuse and recycle as much as possible.

Rate Setting – Rate setting is a critical step in implementing a PAYT program. It is extremely important to understand your full costs prior to trying to set rates. Two key concerns are: 1) setting rates too low, not recovering necessary costs, and 2) setting rates too high, creating public resistance to the program.

Subsidies – Some communities will choose to offer subsidies to low income residents and senior citizens while other communities will feel that subsidies are inappropriate. Although this decision will likely be left up to elected officials, it is wise to design the program with enough flexibility to handle either option.

Illegal Disposal – Illegal disposal is likely to be one of the larger concerns surrounding PAYT

programs. Case studies and research from around the country indicate that, in reality, illegal disposal does not create the problems that one would expect. Nonetheless, it is important to have an enforcement program in place to deal with the issue if it does arise.

Multi-Family/Commercial – Although not an issue for every community, multi-family housing and, to a lesser extent, commercial establishments may create problems during program design. There is no one answer as to how to plan to PAYT program that includes multi-family housing and may require considerable attention prior to implementation.

Neighboring Communities – In rural areas, neighboring communities or drop-off centers in other counties may notice an impact from a community implementing a PAYT system. It is a good idea to discuss plans to switch to PAYT with other communities in the area.

Other Issues – Depending on program design, community demographics, and other aspects, other issues can and will arise.

How PAYT May Affect a Community

Pay-as-you-throw will affect communities differently based on program design, community receptiveness, and existing waste reduction programs. A community with high recycling participation and a comprehensive waste reduction program may not see huge changes in tonnages, while a community with low participation and a more standard waste reduction program may see substantial changes in disposal and reduction. In general, however, most communities can expect the following:

- increased recycling tonnage
- increased source reduction and reuse
- an overall reduction in the amount of waste destined for disposal

Another area in which a community may potentially be affected is cost. It is hard to determine how overall programs costs will be affected by PAYT. Most research indicates that costs are likely to stay about the same. However, it is likely that programmatic shifts in cost will occur. A community that is implementing PAYT is likely to see the following:

- increased education costs
- decreased solid waste hauling costs
- decreased disposal costs (i.e., tip fees)
- increased recycling hauling costs

Once again, these changes will vary greatly from community to community and will be dependent on current tip fees and hauling distances. With a careful review of existing operations, it may be possible to estimate how costs will change with program implementation.[2]

2 Source: NC Division of Pollution Prevention and Environmental Assistance Fact Sheet. http://www.p2pays.org/ref/01/00365.pdf

PAYT in Ulster County

As part of its initial solid waste plan, the Agency funded the design and construction of Municipal Residential Drop-off Centers (MRDCs). These were constructed in various municipalities at the site of former landfills, for the purpose of providing residents the opportunity to self-haul their municipal solid waste (MSW) and recyclables. The Agency removes the MSW and recyclables from the MRDCs to its transfer stations and Materials Recovery Facility, respectively, for transfer and disposal or processing and marketing. The Ulster County MRDC system is an exceptional example of the Pay-As-You-Throw Program. To understand how pay as you throw works, let's look at how we buy other products. We pay for apples by the pound, gasoline by the gallon, electricity by the kilowatt hour, etc... PAYT operates the same way. You pay for the amount of garbage you throw away. Although the concept may seem relatively new, there are now more than 4,000 communities in the United States using PAYT programs, including 18 in Ulster County. The MRDCs require the resident using the facility to purchase an annual permit and the rate is used to help cover the cost of operations of the transfer station. The PAYT program allows residents to better control their trash disposal expenses and provides the opportunity to recycle more. As with other utilities, residents will only be responsible for paying for the trash they produce. It is expected that residents will recycle a greater portion of their waste which will have at least these benefits: reduced cost to individual residents and families for waste disposal; reduced waste going to landfills. Residents pay a per bag fee for MSW disposal at the MRDC, and can recycle the regulated recyclables for free in all municipalities. The trash bags accepted for disposal are typically 30 gallons in capacity for household trash to ensure that residents who generate less waste pay less. Some MRDCs accept bags up to 55 gallons in capacity and fees are adjusted according to bag capacity. The price per bag (varying from $1.75 to $4.00) helps to offset fees charged to the MRDC related to the pull charges and tipping costs involved in the disposal of that garbage as collected by the Agency. Taking a closer look at some of the MRDCs, we can see more clearly see the effectiveness of this program. For example, the Town of New Paltz has about 1,500 residents that use the MRDC annually. In 2010, the residents of New Paltz generated 531.48 tons of trash while recycling 299.31 tons of materials (only accounting for regulated materials collected by the Agency; paper, cardboard and commingled containers-glass, metal and plastic). The town currently has a recycling rate of 56.3% which is almost 20 percent higher than the NYS recycling rate. The Town of Hurley MRDC also has about 1,500 permitted users and in 2010, generated 617.59 tons of trash. Residents recycled 323.50 tons of materials and the current recycling rate is 52.4%. The Town of Saugerties MRDC accepts residents from both the towns of Saugerties and Woodstock and has about 5,000 permitted residents using the facility each year. In 2010, the MRDC collected 2,213.88 tons of trash and 671.70 tons of recycling, which yields a 30.3% recycling rate. About 25% of Ulster County residents currently utilize the MRDC system while the other 75% subscribe to a private hauler curbside pick-up system. To increase the number of Ulster County residents using the MRDCs, the Agency plans to assist each town with promoting both the economic and environmental values of the MRDCs to the public

through various publications (Agency and Town brochures, town welcome packet, Agency website, etc.) and outlets (Town Halls, Libraries, Agency and Town websites).

3.6 TRANSFER STATIONS

The Agency owns and operates two solid waste transfer stations. The Ulster transfer station is located on Agency-owned property at 999 Flatbush Road in the Town of Ulster, New York. It services primarily the municipalities in the Central and Northern regions of the County. The Ulster transfer station is permitted by the New York State Department of Environmental Conservation under permit #3-5154-00125/00001. The permit expires on August 17, 2019. It has a rated capacity of 650 tons/day and 3,000 tons /week of MSW and C&D waste and the permitted capacity is 440 tons/day and 2640 tons/week. The Agency has advised NYSDEC that the tons per day limit is inadequate. During discussions in the permitting process various alternatives were explored with NYSDEC, but the NYSDEC has not yet agreed to increase the permitted capacity limit which was established by modification of the previous permit in 2000. In the summer of 2009 a privately-owned transfer station in the vicinity of the Ulster transfer station ceased operations and approximately 40,000 tons of MSW was diverted to the Ulster transfer station. This caused the Agency to exceed the daily tonnage limit on multiple occasions and to exceed the weekly limit on limited occasions. The Agency advised NYSDEC of these situations and filed an application for an increase in the permitted limits. The matter is still pending. The Agency, a public benefit corporation acting in a governmental capacity, has continued to receive and process MSW at the Ulster transfer station pending resolution of this matter. As there are no other facilities in this region of the County that can receive municipal solid waste, the Agency, in the public service, is impelled to receive it. The Agency has demonstrated that it has the capacity to receive and manage the waste at the Ulster transfer station in a manner that complies with the conditions of its permit and the laws of the State.

The MSW received at the Ulster transfer station comes from the Agency's roll-off vehicles which service the MRDCs, private sector solid waste collectors and residents who self-haul their solid waste. Residents are encouraged to utilize the MRDCs whenever possible. C&D waste is segregated from putrecsible waste and is held for the minimum regulatory period inside the transfer station. Recyclable materials are removed from the C&D and processed in the Materials Recovery Facility. All waste coming into the transfer station is visually inspected, weighed, processed in the transfer station and loaded into transfer trailers owned and provided by private sector companies for shipping to the Agency's contracted landfills. See Section 3.7 below. At the present time, no trailers loaded with MSW are parked outside. All loads are "live-loaded".

The second transfer station is located on Clearwater Road in the Town of New Paltz, on property leased from the Town. The leasehold term extends until all of the Agency's bonded indebtedness is retired. The New Paltz transfer station is permitted by NYSDEC under permit #3-5138-00089/00001. The permit expires on July 29, 2019. It has a rated capacity of 1,560 tons/week of

MSW and C&D waste and 100 tons/week of sewage sludge and is permitted for 390 tons per day and 1560 tons per week. In 2010, the Agency processed 35,337.80 tons at the New Paltz transfer station. The design and operation of the New Paltz transfer station is similar to the Ulster transfer station except that the New Paltz transfer station is permitted to process up to 100 tons of sewage sludge per week. The sewage sludge deposited in a designated area of the transfer station and is hauled by a long distance trucking company to a permitted facility in Buffalo, New York.

3.7 LONG-DISTANCE WASTE HAULING

Long distance solid waste haulers have been selected through a public bid. The companies truck the solid waste to the Agency's contracted landfills (Seneca Meadows in Waterloo, New York and High Acres Landfill in Fairport, New York). The Agency has contracts with the haulers and High Acres landfill that expire on December 31, 2012. The contracts can be extended. The haulers are paid on a per ton basis. They are required to use specific routes between the transfer stations and the landfills. The Agency has contracts with the Seneca Meadows landfill through December 2014.

A different hauler transfers sewage sludge from the New Paltz transfer station to the Browning Ferris Industries landfill in Buffalo, New York. The Agency pays a per ton hauling fee and a disposal fee.

3.8 LANDFILL DISPOSAL

The Agency has contracts with Seneca Meadows in Waterloo, New York and High Acres Landfill in Fairport, New York for the disposal of MSW and C&D received at the transfer stations. The contracts expire on December 31, 2014 and December 31, 2012, respectively. Both landfills are permitted in New York State and are convenient to the New York State Thruway. The Agency is charged on a per ton basis for disposal.

3.9 PRIVATE C&D DISPOSAL

C&D debris that is not received by the Agency at its transfer stations is disposed of at private facilities – one of which is in southern Ulster County (LaMela in Marlborough, NY), one in northern Orange County (Taylor Industries) and one in central Dutchess County (Recycle Depot).

3.10 CLOSED LANDFILLS

The Agency utilized three former municipal landfills in Ulster County for disposal before developing the current long-haul disposal system. The landfills are the former Town of Lloyd

landfill off Chodikee Lake Road in Lloyd, NY, the former Town of New Paltz Landfill on Clearwater Road in the Town of New Paltz, NY and the former Town of Ulster landfill on Frank Sottile Boulevard, Town of Ulster, NY. The Agency remains responsible for post-closure care and monitoring of the landfills. Financial assurance is currently provided under the Agency's Solid Waste Service Agreement with the County of Ulster.

3.11 ULSTER COUNTY MANDATORY SOURCE SEPARATION AND RECYCLING AND SOLID WASTE MANAGEMENT LAWS

The Ulster County Legislature adopted the Ulster County Mandatory Source Separation and Recycling Law (Local Law No. 8 of 1991) in 1991 and amended it in 2007. The local law requires that regulated recyclable materials (as defined in the law) be separated at the source from solid waste by citizens, businesses, institutions, and governmental entities such as schools, towns and villages. The Agency is responsible to implement and enforce the local law by education, and, when necessary, administrative procedures. Educational programs directed at schools and local businesses have been successful, and recycling plans have been implemented by public and private entities. Required reporting of recycled materials is an important part of the law as accurate reporting in essential to a successful recycling program. An advisory committee created by the local law reviews and recommends changes to regulated recyclable materials, and an independent hearing officer has been appointed by the County to preside over and determine the outcome of administrative enforcement procedures commended by the Agency against violators of the law.

The Ulster County Legislature also adopted the Solid Waste Management Law (Local Law No. 9 of 1991). This law provides the Agency with the authority to direct solid waste generated in or originated in Ulster County to facilities owned and operated by the Agency. The Agency has promulgated rules and regulations for implementing the Solid Waste Management Law. This solid waste "flow control" power was essential to ensuring that sufficient waste would be brought into the Agency's facilities so that public health and revenue goals would be achieved. The cost to the public of operating the Solid Waste Management system in the County is greater than that incurred by private sector companies because the public sector must provide for recycling and other essential waste related services, no matter what their cost and the Agency was required to be the market of last resort for many materials which the private sector found too expensive to handle. The Agency must provide solid waste and recycling services to all of its citizens no matter where they are situated – not to selected customers, as is the case with the private sector. Finally, the Agency is required by State law to have a solid waste management plan, and must bear the regulatory expense of implementing and maintaining that plan – a financial obligation not shared by the private sector. While this law was found to be constitutional by the New York State Supreme Court in 1993, its effectiveness became suspect in 1994 when the United States Supreme Court found a flow control law unconstitutional in the

case of *Carbone v. Village of Clarkstown*. The Agency determined not to enforce the flow control law, but to rely on negotiated "put or pay" contracts with its major customers, the private sector solid waste collection companies operating in Ulster County, in order to ensure that the solid waste originated and generated in the was delivered to Agency facilities. Since the Agency could not charge the full cost of the services it provides under the solid waste management plans in the agreements (the tipping fees covering the full costs of the system were unacceptable to these private companies), and the Agency had determined not to enforce the flow control authority provided by Local Law No. 9 of 1991, the revenues received by the Agency were insufficient to pay for the costs of the system. This resulted in the payment of "Net Service Fees" to the Agency by the County, a requirement of the Solid Waste Service Agreement between the Agency and the County which, in its essence, requires the Agency to make the solid waste management system available to the County, and requires the County to pay the Agency Net Service Fees if the Agency cannot raise sufficient revenues from its customers, and the Agency provided the system as required. Thus the costs of the system, originally envisioned to be paid by the users of the system, are now paid by the users of the system and the taxpayers of the County. While there has been some consternation as to the dual source of revenues, the bottom line is that the total cost of the service provided by the Agency to the residents of the County is modest when compared to the costs of such services in other counties in the state, and the Agency's recycling program is one of the most successful.

In 2006, the United States Supreme Court, in the case of *United Haulers v. Oneida Herkimer*, found that a "flow control" law, which was fair and served a system of publically owned facilities, was constitutional. This caused a new look at the Ulster County Local Law by the Agency and the County Legislature. An amendment to Local Law No.9 enhancing the flow control authority contained therein is currently under consideration by the County Legislature. If Local Law No. 9 of 1991 is enforced, it is quite possible that the payment of net service fees would no longer be required, and net service fees previously paid could be reimbursed to the County.

3.12 ORGANICS DIVERSION

The Agency currently provides several options for residents and businesses in the County to divert organics (yard waste, food scraps, wood waste) from the waste stream including:

☐ LargeScale Composting – Yard waste (including leaves, brush, grass clippings and tree limbs) must also be separated and kept out of landfills. Yard waste may either be managed on-site or brought to a Municipal Recycling Drop-off Center (MRDC). At each of the MRDCs, finished compost is usually offered to residents for free or for a nominal fee, while supplies last. The Agency also accepts brush, tree limbs and clean wood from the commercial sector at the Agency facility. However, the Agency is not currently permitted to process leaves and grass clippings at the facility. The City of Kingston offers curbside collection of yard waste as part of

their regular collection service. Some commercial haulers in the area provide organics collection services to customers including Wal-Mart, Sam's Club and SUNY New Paltz. This material is brought to McEnroe Farms located in Dutchess County for processing at their facility using the covered aerated static pile method of composting. Currently, several Ulster County schools, including Phoenicia Elementary, Marbletown Elementary and Woodstock Elementary compost food waste on-site and use the finished compost in their school gardens.

☐ Backyard Composting– The Agency encourages backyard composting and offers a fact sheet and basic information on the Agency's web site, www.ucrra.org. The Agency also works with Cornell Cooperative Extension (CCE) for direct educational outreach and CCE has a composting education program that includes home composting. Together the County and CCE promote backyard composting through workshops, classroom programs, bin sales and ad campaigns. Backyard composters are made available for purchase at public events throughout the County and at the Agency facility. The Forsyth Nature Center located in Kingston also provides composting workshops for area residents. Since 2008, over 1, 000 backyard compost bins have been sold to the public.

☐ Grasscycling– The Agency encourages residents to leave grass clippings on the lawn instead of bagging them, as a waste reduction measure. The Agency has a Grasscycling brochure posted on the web site and encourages residents to call CCE for more information. Due to the rural nature of the County, many residents dispose of grass clippings, branches and leaves on their own property through grasscycling and backyard composting.

☐Food Donation – The Agency encourages donation of non-perishable food items to local food pantries and lists several locations that accept food donations on the Agency web site.

4. TECHNOLOGY EVALUATION

4.1 CURRENT STATUS OF THE MATERIALS RECOVERY FACILITY

The Material Recovery Facility (MRF) accepts both dual-stream recycling as-well-as single-stream recycling. The dual-stream recycling is sorted and baled by UCRRA equipment and employees and then shipped to market. Because the MRF cannot process single-stream recycling the material is delivered by various private collection vehicles and then loaded into various long haul private trailers for transport to several private single-stream MRF processing facilities. During the past year, the Agency has seen a trend by the private collection companies to move toward single-stream recycling while with the exception of the City of Kingston, the MRDCs have not indicted their desire to do so. While the MRF continues to generate revenue it is expected that soon, if the trend continues to move toward single-stream recycling, this revenue may transform to a loss.

Dvirka and Bartilucci Consulting Engineers, South Plainfield, NJ, were commissioned by the UCRRA Board of Directors (Board) to conduct a study of the MRF. The purpose of the study was to analyze the current as-well-as the future financial stability of the MRF given the trend toward single-stream recycling. To summarize, the study titled and dated, "Material Recovery Facility Strategic Options Analysis", February 2011, concluded the MRF should be shut down and all recyclables, with the exception of OCC and mixed news, should be transferred to alternate facilities. OCC should continue to be baled while the mixed news should continue to be loose loaded and sent to market. A decision by the Agency Board has not been made.

4.2 SINGLE-STREAM RECYCLING

The MRF does not currently have the ability to process single-stream recycling. According to Dvirka and Bartilucci Consulting Engineers' February 2011 MRF study the capital cost to convert the MRF to accept single-stream recycling would be approximately $2.4 million. It is not known at this point as to whether-or-not the Board will decide to proceed with this option.

4.3 MRDC IMPROVEMENTS

During August 2010 the UCRRA installed a compactor unit at the Town of Saugerties transfer station for the sole purpose of MSW. The UCRRA provided the compactor, two receiving boxes, and the installation of such. The Town was responsible for the electrical connection to the compactor unit.

The Town of Wawarsing transfer station is scheduled to have compactor installed for the sole purpose of accepting MSW. The UCRRA will provide the compactor, two receiving boxes, and installation of such. The Town will be responsible for connection of the electrical service to the compactor unit. Installation is expected in May 2011.

4.4 TRANSFER STATION IMPROVEMENTS

Ulster Transfer Station
Recent improvements to the transfer station include:

☐Repairs to the knee wall – the steel wrap had been worn and was separating from the concrete underpinnings. The steel over the concrete knee wall was replaced and was installed down below the floor elevation. Concrete was replaced at the point where the steel meets the floor.

☐A section of the tipping floor in the eastern section of the building was replaced after cracks were noted.

New Paltz Transfer Station
Recent improvements to the transfer station include:

☐The replacement of the scale is currently in the design/approval stage. Once approved by NYSDEC and the Town of New Paltz, a Request for Proposal will be issued and once awarded, the scale will be replaced.

☐The knee wall will need to be replaced soon. Most of the wall has deteriorated to the point where large portions of it no longer exist. As a temporary measure, a telephone pole was horizontally bolted to the floor in the area where the most deterioration is located.

4.5 CONSTRUCTION AND DEMOLITION DEBRIS PROCESSING

Any C&D brought to either of the two UCRRA transfer stations is loaded into long haul trailers and taken to either the Seneca Meadows or High Acres Landfill.

4.6 LANDFILL EXPORT

The Agency exports MSW and C&D to two landfills; Seneca Meadows landfill in Seneca Falls, NY and High Acres landfill in Fairport, NY. Approximately 2/3 of the MSW is sent to the Seneca Meadows landfill while approximately 1/3 is sent to the High Acres landfill. The contracts expire 12/31/14 and 12/31/12, respectively.

4.7 EVALUATION OF ALTERNATIVE TECHNOLOGIES

The objective of the alternative technologies evaluation is to analyze preferred downstream conversion technologies to determine their applicability to Ulster County and its solid waste stream. The evaluation process included the following:

 Develop a list of technologies for initial screening.

 Conduct initial screening as part of a continuous improvement workshop with Agency staff.

 Identify a shortlist of alternative technologies as candidates for further review.

 Identify a set of screening criteria to apply to shortlist of technologies.

 Select two technologies for more detailed analysis.

 Develop recommendations concerning the implementation of these technologies.

INITIAL TECHNOLOGY SCREENING

At the September 2010 workshop with Agency staff, the project team discussed an overview of these technologies, including a general description, industry status, and landfill diversion potential. Based on the discussions, the following technologies were identified for review:

- Anaerobic digestion and waste-to-ethanol
- Pyrolysis/gasification/plasma technology
- Enhanced composting, including MSW composting
- WTE (summary only)

DESCRIPTION OF SHORTLIST OF ALTERNATIVE TECHNOLOGIES

Overview of Anaerobic Digestion

Anaerobic digestion (AD) is one of the downstream technologies being considered by the Agency as an option for managing waste that is not targeted upstream to be reduced, reused, recycled or composted. AD is a technology that can potentially reduce methane emitted from agricultural waste and landfills through a biological process in which organic matter is broken down by bacteria. AD has the potential to reduce the volume of waste while producing methane and digestate (i.e., fibrous by-product and water). The co-products of the AD process are a medium-Btu content biogas and slurry referred to as digestate. The biogas contains approximately 60 to 70 percent methane and is water saturated. The balance of the biogas mixture is carbon dioxide, and parts/million (ppm) of hydrogen sulfide. The digestate consists of undigested solids, cell-mass, soluble nutrients, other inert materials, and water.

A wide variety of engineered systems have been specifically developed for the rapid "in-vessel" digestion of the organic fractions of MSW (OFMSW) and other types of organic wastes. Most of these systems are located in Europe. Although the U.S. has been treating agricultural and municipal wastewater with anaerobic digesters for years, no commercial-scale solid waste digesters are operating today.[1] There are two AD facilities that currently process MSW located near Toronto, Canada. Most AD systems are classified as either wet or dry, and each has its own benefits and constraints. Although hybrids exist, six basic types of AD systems reduce volume and recover energy from solid wastes: (1) wet single-step; (2) wet multi-step; (3) dry continuous; (4) dry sequencing batch; (5) dry multi-step; and (6) percolation (dry two step). One-step wet systems are primarily designed to co-digest source-separated OFMSW with a liquid substrate, such as manure or sewage sludge. They are not typically used for the AD of the full OFMSW stream. Approximately 50 of the 90 wet systems in Europe co-digest the OFMSW with manure. Most of them are located in Germany, Sweden, Spain, and Denmark.[2] Generally, wet digestion is economically feasible when the residual liquids can be reused. If the MSW contains relatively high concentrations of heavy metals, this substrate may not be appropriate for beneficial use on agricultural fields.

1 Source: "Current Anaerobic Digestion Technologies Used for Treatment of Municipal Organic Solid Waste," Contractor's Report to the California Integrated Waste Management Board, 2008.

2 Source: "Anaerobic Digestion Feasibility Study for the Bluestem Solid Waste Agency and the Iowa Department of Natural Resources," by R. W. Beck, Inc., 2004.

The dry systems have been effective for managing the OFMSW outside the U.S. without the need for a liquid substrate, such as manure. High solids digesters (dry) process a thick slurry requiring more energy input than low solids digesters (wet) to move and process the feedstock, but will typically have a lower land requirement due to the lower volumes of moisture in the process. Several dry continuous and batch technologies, including Linde, Dranco, and Valorga, are being successfully applied to manage the organic fractions within MSW in several locations in Europe.

A. Feedstocks. An ideal circumstance for quality feedstock is when the organic fraction can be collected at the source of generation, (e.g., food processing industries, pulp and paper mills, etc.). In addition to the low degree of contamination, there is a more consistent composition of the waste over time that makes it easier to achieve a steady level of biogas production. This is optimal for conversion into a useful energy byproduct. The following are possible organic components for feedstock to the AD facility:

- Green waste.
- Residential and commercial food waste.
- Non-recyclable, but compostable paper.
- Biosolids (wastewater sludge).
- MSW.
- Other organic sludges.

B. Anaerobic Digestion Facility Components. An AD facility will consist of an enclosed building, including an enclosed waste receiving and storage area, digester area, and ancillary equipment room; operations control center; utilities service area; biogas engine-generator area; and residue storage area. Windrow composting of the AD process residue will occur on a large concrete pad outdoors with storm water control. The composted residue will require an on-site storage area. Initially, the facility should include digesters with available space to expand the waste receiving and storage enclosure, and potentially add another identical processing unit and biogas engine generator. The selected site should exist near a major road for ease of access, water supply source, wastewater discharge point to treat wastewater, and electrical interconnection.

C. Applicability to the Waste Stream. Program experience in Europe and the U.S. has shown that comprehensive source separation of organics provides the best quality feedstock for AD, with a minimum of heavy metal and plastic contamination. Where source separation has been mandated in Europe, the results have been encouraging. The experience of some European communities indicates that 30 to 50 percent of the total OFMSW can be successfully collected and managed separately. Moreover, industrial organics collected at the source of generation (e.g., food processing industries, pulp and paper mills, etc.) may provide an economically viable opportunity to apply AD for optimal conversion into a useful energy by-product. For Ulster County to consider this alternative technology, a program would need to be implemented that

minimizes contamination and ensures the collection of a significant proportion of the organic fraction of the disposed MSW to take advantage of needed economies of scale. In addition, a reliable market for the purchase of the biogas would need to be tapped.

D. Volume Reduction and Diversion Potential. Anaerobic digestion facilities can result in a 65 to 75 percent volume reduction of the organic solid waste received. Potentially, mixed MSW could be received at an AD facility, and a "dirty" materials recovery facility (MRF) could be integrated into the facility to process the non-organics. However, this approach creates greater risks related to the quality of the feedstock, directly impacts biogas production, increases the capital investment, and increases the quantities of residue.

E. Environmental Considerations. As with other solid waste processes, the AD facility may emit fugitive dust (particulate matter) and odors associated with the materials handling components of the process. Depending on the extent of potential fugitive dust, proper industrial ventilation design and control with a baghouse may be required. Organic emissions and odors in materials handling areas may also require local ventilation and control with activated carbon systems. Assuming that the process vents are completely leak-free, no air emissions or odor nuisances are likely to occur from the AD process since it is fully enclosed. A scrubber will remove hydrogen sulfide and moisture, directing the cleaned biogas (composed primarily of methane) to a low nitrogen oxides (NOx) reciprocating engine to cogenerate electricity and/or thermal energy to heat the digesters. Combustion of the biogas will result in emissions of NOx, carbon monoxide (CO), volatile organic compounds (VOC), particulate matter, and sulfur dioxide (SO2). The AD process will produce some wastewater which would need treatment and disposal. Proper process design and moisture management can minimize this by-product to a negligible level or eliminate this stream. In some instances, the moisture resulting from the process has been treated and used for irrigation or reintroduced into the composting process for the residue. The AD facility will likely require, at a minimum, both air quality and solid waste permits to construct and operate.

F. Residuals. An anaerobic digestion facility can process approximately 95 percent by weight of the diverted organic wastes received. The preprocessing system mechanically separates unacceptable material, which is disposed of at the landfill. The system will employ bag breaking and screening. Depending on the volatile content and quality of the feedstock, the AD facility will produce combined residue that is 25 to 35 percent by weight of the material processed. After the digestion process, post-processing of the resulting residue will occur. The post-processing system includes mechanical dewatering followed by biological treatment by windrow composting outdoors for 10 to 15 days. The final product could be sold as soil conditioner.

Overview of Waste-to-Ethanol

Waste-to-ethanol is considered an emerging chemical/biological technology that uses hydrolysis and other processes to break down the organic fraction of the waste (paper, food waste, yard waste) into sugars, which are then distilled into ethanol. For implementation in Ulster County, a waste-to-ethanol facility would most likely need a preprocessing step such as using the existing MRF to remove contaminants from the organic portion of the waste stream. There are several recently proposed U.S. waste-to-ethanol processing facilities including, but not limited to, the following:

- Fulcrum BioEnergy – Reno, NV
- Enerken – Pontotoc, MS
- Bluefire – LA. County, CA

One waste-to-ethanol facility that has been in the planning stages by Masada Oxynol LLC for more than six years is in Middletown, NY. Masada also has several projects in development in Latin America. Masada employs a process that uses strong acid hydrolysis to convert the cellulosic fraction of waste to sugars. The sugars are then fermented to ethanol using conventional yeasts. The non-cellulosic fraction of the waste is either recycled from a front-end materials recovery plant (plastics, metals, glass, etc.) or is burned to provide energy to the process. It is our understanding the project has secured most of the needed environmental permits, but construction has yet to be initiated.

Thermal-Based Conversion Technologies

Thermal-based conversion technologies utilize higher temperatures and have higher conversion rates when compared to other conversion pathways. In addition to the traditional combustion technology of WTE, thermal conversion pathways also include emerging processes such as pyrolysis, gasification, plasma arc, and advanced thermal recycling. Each process operates within a specific temperature range and operating pressure. Pyrolysis and gasification are not new technologies, having been used in the coal industry since the early 20th Century. Attempts were made in the 1970s to apply pyrolysis to the processing of MSW waste at several facilities in the U.S., but the projects failed primarily due to difficulties with the front-end waste processing of the solid waste. While the application of these technologies to solid waste, feedstocks is once again emerging in the United States, these technologies have been applied in other parts of the world, such as Japan and Europe. In most instances, the Agency would need to consider the import of applicable waste streams from outside the County to take advantage of the needed economies of scale for these options to be considered competitive. For the purpose of this section of the Plan, the review of thermal technologies includes proven and emerging thermal technologies. The emerging thermal conversion technologies included pyrolysis, gasification; plasma arc; and advanced thermal recycling. The proven technologies include mass burn combustion in waterwall furnaces and refuse-derived firing in dedicated boilers (WTE). For WTE, we have provided a high level summary.

A. Pyrolysis. Pyrolysis is a process that produces pyrolytic oils and fuel gases that can be used directly as boiler fuel or refined for higher quality uses, such as engine fuels, chemicals, adhesives, and other products. Solid residues from pyrolysis contain most of the inorganic portion of the feedstock, as well as large amounts of solid carbon or char. Pyrolysis typically occurs at temperatures in the range of 750°F to 1,500°F and thermochemically degrades the feedstock without the addition of air or oxygen. Because neither air nor oxygen are intentionally introduced or used in the reaction, pyrolysis requires thermal energy that is typically applied indirectly by thermal conduction through the walls of the containment reactor. The reactor is usually filled with an inert gas to aid in heat transfer from the reactor walls and to provide a transport medium for removal of the gaseous products. The composition of the pyrolytic product is changed by the temperature, speed of process, and rate of heat transfer. Lower pyrolysis temperatures usually produce more liquid products, and higher temperatures produce more gases. Slow pyrolysis is used to maximize the yield of solid char and is commonly used to make charcoal from wood feedstock. Fast or "flash" pyrolysis is a process that uses a shorter exposure time to temperatures of approximately 930°F. Typical exposure times for fast pyrolysis are less than 1 second. Rapid quenching of pyrolytic decomposition products is used to "freeze" the decomposition products and condense the liquids before they become low molecular weight gaseous products. This process results in a product that is up to 80 percent liquid by weight.

Combustion of the gases produced during the pyrolytic reaction in a separate reaction chamber releases significant thermal energy. This thermal energy can serve multiple purposes, including producing steam for electricity generation, heating the pyrolytic reaction chamber, or drying the feedstock that enters the reaction chamber. If pyrolytic gases are combusted to produce electricity, air emission control equipment will be needed to meet regulatory standards. The MSW feedstock typically requires shredding to a 12-inch maximum size prior to charging the pyrolysis reactors.

The net energy generation rate for the pyrolysis conversion technology can reportedly approach 700 kWh per ton of waste processed. Two facilities using MSW feedstock with WasteGen technology are operating in Germany, where the oldest facility has operated continuously for 22 years. The largest operating unit with over three years of experience processing MSW and similar waste is rated at 175 tons per day (TPD) in Hamm-Uentrop, Germany. A facility built by Brightstar Environmental in Wollongong, New South Wales, Australia, has had problems with the char gasification component of the process and corresponding financial problems with the plant. A proposed facility in the United States with the same conversion technology in Collier County, FL was canceled a few years ago. There are no full-scale facilities in commercial operation in the U.S. However, there are a few proposed U.S. projects that should be monitored in the near future.

B. Gasification. Two types of gasification technologies exist: (1) fluid bed gasification; and (2) two-stage (pyrolysis-gasification) fixed bed. The thermal conversion of organic carbon-based materials occurs in the presence of internally produced heat (typically at temperatures of 1,400°F

to 2,500°F) and with a limited supply of air/oxygen (less than stoichiometric, or less than is needed for complete combustion) to produce a synthetic gas (syngas) composed primarily of hydrogen (H2) and carbon monoxide (CO). Inorganic materials are converted either to bottom ash (low temperature gasification) or to a solid, vitreous slag (high temperature gasification that operates above the melting temperature of inorganic components). Some of the oxygen injected into the system is used in reactions that produce heat, so that pyrolysis (endothermic) gasification reactions can initiate; after which, the exothermic reactions control and cause the gasification process to be self-sustaining. Like pyrolysis, most gasification systems are closed systems and do not generate waste gases or air emission sources during the gasification phase.

An important aspect of gasification is that the chemical reactions can be controlled for the production of different products. The gases produced by gasification can be cleaned to remove any unwanted particulates and compounds prior to use as fuel. After cooling and cleaning in an emission control system, the syngas can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity or to make chemicals. Synthetic gases can produce methanol, ethanol, and other fuel liquids and chemicals. The MSW feedstock requires shredding from a 2- to 12-inch maximum size prior to charging the fluid bed gasification reactors. Several suppliers' two-stage (pyrolysis-gasification) fixed bed technologies require minimal preprocessing of the MSW before compaction. One fixed bed technology reportedly needs size reduction of the MSW feedstock to a 3-inch maximum size prior to feeding the fixed bed gasification reactors. In low temperature gasification, below the melting point of most inorganic constituents, a powdery to clinker-type bottom ash is formed. In high temperature gasification, the inorganic ash materials exit the bottom of the gasifier in a molten state, where the slag falls into a water bath and is cooled and crystallized into a glassy, non-hazardous slag. The slag is crushed to form grit that can be easily handled. Slag can be used in the manufacture of roofing tiles, sandblasting grit, and as asphalt filler. Bottom ash may require landfilling, although some suppliers have been able to manufacture ceramic-like bricks or paving stones.

One system that utilizes oxygen injection creates extremely high temperatures in the bottom of the gasifier, reaching the melting temperature of some metals. In that process, metals can be recovered in "ingot" form. Fly ash from the air emission control system is the primary process residue. Reuse of the slag after metal recovery would result in the high reduction rate. A facility with the gasification conversion technology reportedly can reduce the feedstock by more than 90 percent by weight. If this rate of reduction is correct, it would represent an improvement over traditional thermal conversion technologies that can reduce the volume of MSW by 90 percent, but the weight by only 75 percent.

No MSW processing facilities employing the gasification conversion technology are commercially operating in the United States. However, there is a commercial operation in Sanford, FL that processes sewage sludge through a gasifier, and there are several suppliers of the technology that claim to have commercially operating facilities outside of the U.S. and that have proposed projects in the U.S. For fluid bed technologies, the net energy generation rate

ranges from almost 400 to 450 kWh per ton of waste processed, which is somewhat lower than the conversion rate of traditional thermal conversion technologies. For two-stage (pyrolysis-gasification) fixed bed technologies, the net energy generation rate reportedly ranges from almost 700 to over 900 kWh per ton of waste processed, which is significantly higher than traditional thermal conversion technologies. Global Energy Solutions has the largest operating unit rated at 180 TPD in Tokyo, Japan, with over three years of experience while processing MSW.

Locally, Taylor Biomass Energy LLC, a biomass gasification plant under construction in Montgomery (Orange County), N.Y., will receive its $100 million loan guarantee to begin construction. It has been estimated that it will be capable of generating 20MW of renewable energy in the form of biomass electricity. This will mean that it will be able to power around 27,000 homes per year based on the assumption of 500 kwh/month per residence. Titled 'The Montgomery Project', it will use the proprietary "Taylor Energy Solution" as the foundational technology for a three-part, integrated system design that converts the organic biomass portion of mixed solid waste (MSW) to electric power, through gasification.

The Montgomery Project will:

□ Expand the Taylor Sorting and Separating Process to accept mixed solid waste ("MSW"), in addition to wood waste, and waste from construction and demolition debris ("C&D") as inputs.
□ Produce a stable, cost-effective, biomass-processed fuel supply from suitable feedstock, reducing landfill waste in the process.
□ Use the biomass-processed fuel to feed its proprietary gasification process, producing a medium calorific value synthesis gas (syngas), capable of serving as a direct substitute for natural gas.
□ Connect to the power grid as a first-generation MSW product, providing clean, renewable energy.
□ Maximize financial investment by conducting the Montgomery Project with a view to cost efficiency, widespread commercial replication; flexible facility design that can meet local needs, and diverse potential for future development of product slate.

The project will generate a net 20 MW clean, renewable energy and produce enough electricity to power approximately 27,000 homes based 500 kwh/month usage per residence, with an estimated cost over 20 years of around 5 cents per KW.

The Montgomery Project will be located on 95 acres of interchange development property, at 350 Neelytown Road, Montgomery, in Orange County, New York. The site is the current location of Taylor Recycling Facility (TRF) and is "shovel ready" due to local site control and the extensive permitting work completed to date.

The Montgomery Project will expand from its current capacity of 307 TPD of C&D waste and 100 TPD of wood waste, to accommodate a new inflow of 450 TPD of C&D waste, 100 TPD of wood waste, and 500 TPD of municipal solid waste. Proposed site modifications include improvements to the existing C&D Processing Structure, and construction of a new Post Collection Separation Facility Structure, two Biomass Storage Silos, the Gasification Unit and a Power Generation Pad. The Taylor Post Collection Separation Structure will prepare a portion of the biomass feedstock for the gasifier. Additional wood and biomass for the project may be supplied as needed from the existing Construction and Demolition ("C&D") Processing Structure. Biomass will be stored in two storage silos with a combined storage capacity of five days. The storage silos will be supplied by Ladig and Weaver, vendors with extensive experience in storage and handling of materials. The current silo design is based on performance specifications; the actual design of the equipment will be by the supplier. The current PBF feed design is subject to review and modification by Tom Miles of TR Miles Technical Consultants, a leader in the design of handling and feeding of biomass, including RDF materials.

The design of the Taylor Gasification Process uses three, fluidized-bed reactors: a gasification reactor, a gas conditioning reactor, and a combustion reactor. The gasification and combustion reactors are circulating fluidized beds, while the gas conditioning reactor is of the bubbling fluidized bed type. TBE expects to use a Solar Titan gas turbine as the prime power generation component. A steam turbine based bottoming cycle will complete the power generation system. Grading, concrete work and installation of utilities necessary for the gasification and power generation islands will be completed as part of the project scope. In the final step, all piping associated with the gasification and power generation structure will be completed. Interconnection to the power grid will be completed by Central Hudson Gas and Electric Corporation. The Taylor site has a Central Hudson 13.2/69kv electric transmission line through the center of the 95 acres and a 69kv substation referred to as the Central Hudson Gas and Electric Maybrook substation on its property border. This will simplify the interconnection activities and allow for rapid completion of this task. All unit operations, including all heat recovery and gas compression steps, will be included as a part of the facility.[1]

1 Source: Taylor Biomass Energy website. http://www.taylorbiomassenergy.com/taylorbiomass04_mont_mn.html

C. Plasma Arc. Plasma arc technology is a heating method that can be used in both pyrolysis and gasification systems. This technology was developed for the metals industry in the late 19th Century. Plasma arc technology uses very high temperatures to break down the feedstock into elemental by-products. Plasma is a collection of free-moving electrons and ions that is typically formed by applying a large voltage across a gas volume at reduced or atmospheric pressure.

When the voltage is high enough and the gas pressure low enough, electrons in the gas molecules break away and flow toward the positive side of the applied voltage. The gas molecules, losing one or more electrons, become positively charged ions that are capable of transporting an electric current and generating heat when the electrons drop to a stable state and release energy. This same phenomenon creates lightning. Plasma arc devices or "plasma torches" can be one of two

types: (1) the transferred torch; and (2) the non-transferred torch. The transferred torch creates an electric field between an electrode, at the tip of the torch, and the reactor wall or conducting slag bath. When the field strength is sufficiently high, an electric arc is created between the electrode and reactor, much like an automotive spark plug. The non-transferred torch creates the electric arc internal to the torch and sends a process gas, such as air or nitrogen, through the arc where it is heated and then leaves the torch as a hot gas. Very high temperatures are created in the ionized plasma. The plasma can reach temperatures of 7,000ºF and above; the non-ionized gases in the reactor chamber can reach 1,700ºF to 2,200ºF; and the molten slag is typically around 3,000ºF. For applications in processing MSW, the intense heat actually breaks up the molecular structure of the organic material to produce simpler gaseous molecules such as CO, H2, and carbon dioxide (CO2). The inorganic material is vitrified to form a glassy residue. A main disadvantage of the plasma arc systems used in power generation is that a large fraction of the generated electricity is required to operate the plasma torches, which reduces net electrical output of the facility.

The MSW feedstock typically requires shredding to a 6-inch maximum size prior to charging the plasma arc reactors. By-products of plasma gasification are similar to those produced in high temperature gasification, as noted previously. Due to the very high temperatures produced in plasma gasification, carbon conversion nears 100 percent. The net energy generation rate can reportedly vary significantly depending on the facility throughput. The parasitic load of the torches at plasma arc facilities is significant. Hitachi Metals, Inc., has developed two commercial plasma arc facilities with the Westinghouse Plasma system in Japan. The facility in Utashinai has the largest operating unit rated at 83 TPD with over three years of experience while processing MSW and auto shredder residue. Existing systems use two operating and one spare torch per reactor. The scale of technology has also been used in a General Motors plant in Defiance, OH since 1989. The plasma arc-based facility melts scrap metal for engine block castings. The plasma heating elements there have logged more than 500,000 hours of operation. A leading supplier of the plasma arc technology, Westinghouse Plasma system, is Alter NRG. Alter NRG (formerly Geoplasma) was selected to build a 3,000 TPD facility in St. Lucie County, FL nearly five years ago. The project has been revisited and resized to less than 500 TPD and is still in the development stages. Koochiching County, MN is developing a plasma arc facility using MSW, along with other special wastes as feedstock. A independent review is presently being conducted, and funding is being secured from the state and federal governments to support project development. Plasco Energy Group, a plasma arc technology developer, has signed agreements with two provincial governments in Canada to design, build, and operate plasma arc facilities that will use MSW as feedstock. However, no facilities employing the plasma arc conversion technology to manage MSW are presently commercially operating in the United States.

D. Advanced Thermal Recycling. Advanced thermal recycling represents a second generation advancement of technology that utilizes complete combustion of organic carbon-based materials in an oxygen-rich environment, typically at temperatures of 1,300°F to 2,500°F, producing an

exhaust gas composed primarily of CO2 and water (H2O) with inorganic materials converted to bottom ash and fly ash. The hot exhaust gases flow through a boiler, where steam is produced for driving a steam turbine-generator, thereby generating electricity. The cooled waste gases flow through an advanced emission control system designed to capture and recover components in the flue gas, converting them to marketable by-products, such as gypsum (e.g., for wallboard manufacture) and hydrochloric acid (used for water treatment). Typical recovery rates of gypsum and hydrochloric acid from MSW on a weight basis are 0.3 and 1.3 percent, respectively. The bottom ash and fly ash are segregated, allowing for recovery/recycling of metals from the bottom ash and use of the bottom ash as a road base and construction material. The advanced recycling and emission control systems with recovery/recycling reportedly go beyond the technology utilized at conventional resource recovery plants. The feedstock for advanced thermal recycling systems can be unprocessed MSW or refuse-derived fuel (RDF). Using lower moisture content, RDF improves the heating value of the feedstock, resulting in higher efficiency and lower throughput per kWh of electricity generated. To improve economics and efficiency, facilities can incorporate preprocessing to remove marketable recyclables, such as paper, plastics, metals, and glass. Materials handling involves extensive recycling and reuse of solid and liquid residues which can include various by-products, such as hydrochloric acid, gypsum, metal scrap, and road base. In addition, some facilities will extract recyclables out of the feedstock before processing. These innovations reportedly result in disposal of less than 5 percent of process residues, which will be inert. The weight reduction rate of the advanced thermal recycling technology can reportedly range from almost 80 percent to over 95 percent. No facilities employing the advanced thermal recycling conversion technology are commercially operating in the United States. However, Waste Recovery Seattle International LLC (WRSI) is a licensee of the Muellverwertung Rugenberger Damm (MVR) advanced thermal recycling conversion technology. The MVR technology is proven in two full-scale commercial facilities in Hamburg, Germany. Müllverwertung Borsigstrasse Damm (MVB), the oldest facility, has been operational since 1994. The MVR facility has reportedly operated at over 90 percent annual availability. The net energy generation rate is 580 kWh per ton of waste processed.

Overview of Enhanced MSW Composting

In accordance with New York State Regulations, leaf and yard waste (green waste) is not allowed to be disposed of in Ulster County. As a service to County residents and businesses, the Agency currently operates a yard waste and clean wood composting area at the facility to process and recycle green wastes through use of the grinder and static pile method of composting. All of the Municipal Recycling Drop-off Centers (MRDCs) collect leaf and yard waste from town residents. These services are provided for a nominal annual permit fee to residents of that town. Other private enterprises within the County also offer facilities for the processing and recycling of green wastes. Backyard composting of yard waste is also popular with residents of Ulster County, especially in the more rural towns. In consideration of expanding the County's current composting operations to increase downstream diversion of organic waste, and in light of recent

New York State initiatives to promote greater diversion of organics from landfills, there are two potential management strategies that could enhance and expand composting operations. The first is the addition of other types of organic feedstock to the green waste currently being processed; the second is through a large-scale commercial MSW co-composting facility similar to that built for Delaware County, NY.

MSW Co-Composting. MSW co-composting is a waste diversion and organics recycling technology that processes a single mixed stream of solid waste and captures and composts the organic fraction of the waste. The advantage of this technology is that it does not require special separation or collection programs for the organic fraction of the waste stream (utilizes existing waste collection programs) and integrates well with existing recycling programs. MSW co-composting technologies are aerobic processes that do not produce synthetic gases for conversion to energy; however, the Nantucket Facility in Massachusetts recently received an approved protocol from the Chicago Climate Exchange for receipt of carbon credits.

A. Feedstock Availability. The following types of feedstock can be processed through an MSW co-composting facility:
- Mixed MSW
- Green waste
- Wastewater treatment plant sludges
- Non-contaminated waste liquids
- Other organic sludges
- Food waste
- Liquid sludges

As previously discussed, all of these organic materials are readily available within the County. The advantage of this process for feedstock is that inorganics are removed as part of the process and it does not rely on separation of organics at the point of generation. In addition, the process anticipates various levels of moisture content for different feedstocks and can be adjusted throughout the process.

B. MSW Co-composting Facility Components. MSW co-composting facilities are fully enclosed facilities that generally consist of a waste receiving area (solid waste, biosolids, liquid waste); an aerobic digester (rotating drum or other mixer); primary refining area where large inorganic material is separated from organic material; an active composting area; a secondary refining area where small inorganics are removed from the compost; operations control center; pre- or post-sorting areas for dry recyclables; automated instrumentation systems; and site utility systems. In some instances, there are enclosed storage areas for compost. The facilities can be developed as modular systems and can be sized for almost any throughput, although economy of scale is a key consideration.

C. Applicability to the Waste Stream. *Biocycle Magazine* (November 2008) reports that there are 13 MSW composting facilities operating in the United States ranging in size from 33 to 350 TPD. The largest MSW composting facility in North America is located in Alberta, Canada, and

processes over 350 TPD of MSW. The newest facilities to come on line were Delaware County, NY (2006) and Rapid City, SD (2005). Both of these facilities process both MSW and biosolids and are very well run facilities that sell their final compost product. A significant advantage of MSW co-composting is that it does not require changes to the County's current solid waste collection methods nor does it require residents to modify habits with respect to separation of recyclables and solid waste. It also potentially allows for greater processing of solid waste, which will lower the volume of material into the landfill to extend the overall life of the facility. However, like all alternative technologies, this process can be more expensive than disposal of waste in a landfill. The economic benefits occur with respect to the longevity of the landfill, the ability to process greater volumes of waste, the ability to utilize alternative energy resources to reduce operating costs, and the receipt of economic incentives such as carbon credits – all of which are potentially available to the County.

D. Volume Reduction and Diversion Potential. MSW co-composting facilities can achieve volume reductions of between 50 and 75 percent, depending on the equipment and systems utilized. Where the focus is on maximizing landfill diversion, additional capital expenditures are utilized for greater separation and reuse of materials (similar to the Conporec Facility in Canada). Where facilities are integrated with an active recycling program, the focus is on capturing the organic fraction of the waste stream and not spending additional money on recovering recyclables within the facility (similar to the Delaware County model). Delaware County reports that their total solid waste management program is achieving nearly 85 percent recycling with the implementation of the MSW co-composting facility (includes their MRF). From a volume perspective, Delaware County is achieving a 70 percent diversion rate for their landfill air space.

E. Environmental Considerations. For MSW co-composting operations, the most significant challenges for controlling environmental impacts relate to control of odors, fugitive dust emissions, and compost quality. New York State requirements pertaining to composting operations are presented in the 6 NYCRR Part 360-5 Solid Waste Rules and Regulations. All MSW co-composting facilities require a New York State solid waste permit to construct and operate the facility. Registration of odor control facilities is also required under the air regulations. Extensive odor control systems are utilized that maintain negative pressures throughout the processing areas and treat air through scrubbers or bio-filters prior to releasing to the atmosphere. Dust collection and removal systems are also used to remove particulates from the air during internal screening and processing of the final compost product.

Worker health and safety is also a significant consideration, and local ventilation systems are utilized extensively in the facilities, as well as sanitary facilities and clean-up areas.

F. Residuals. An MSW co-composting facility can process a variety of organic materials in a single stream. Biosolids and liquid waste have very little residuals left after processing, while MSW has a significant component of inorganic materials. Depending on the type of feedstock,

the MSW co-composting facility may produce combined residuals of 25 to 40 percent by weight of the material processed. This number may be a bit misleading since moisture is added throughout the process so weight comparisons may not be completely representative of the diversion potential compared to volume reduction. The inorganic material must be disposed of in a landfill or approved solid waste disposal facility. The final compost product is tested and sold as a soil amendment.

Overview of Waste-to-Energy

The WTE industry emerged in the United States in the 1970s due to several factors. The Arab Oil Embargo resulted in oil and energy prices increasing substantially. Second, there was growing recognition of the potential risks of groundwater contamination at existing unlined landfills. This led to new regulations requiring the construction of lined sanitary landfills, which increased solid waste landfilling cost. Third, WTE facilities were considered viable alternatives for waste disposal and energy production. In 1980, less than 60 WTE facilities were operating. By 1993, the number of operating facilities reached a peak of approximately 150. From 1993 to present, the number of operating WTE facilities has declined to approximately 89. The decline was caused in part by an abundance of landfill space with lower tipping fees than WTE facilities, loss of ordinance-based flow control, and implementation of more stringent federal air quality standards. Currently, WTE facilities process approximately 12 percent of all MSW generated in the United States, according to the USEPA.

It is important to note that the last "greenfield" WTE facility utilizing mass burn technology was constructed in the United States in the early 1990s. Since that date, several WTE vendors have exited the business (Westinghouse, Foster Wheeler, and General Electric), and multiple acquisitions have taken place. Covanta Energy, Montenay Power/Veolia, and Wheelabrator Technologies represent the three primary remaining WTE vendors. Several existing facilities are proceeding with expansion, including but not limited to, Lee County, FL; Rochester, MN; Honolulu, HI; and Lancaster County Solid Waste Authority. Higher energy prices over the last two to three years have resulted in a renewed interest in WTE technologies.

A. WTE Facility Components. Generally, a mass burn WTE facility will consist of a large building, including an enclosed waste receiving and storage area, furnace-boiler room, central operations control center, water treatment area, turbine-generator hall, and residue storage area. An air-cooled condenser, air emissions control systems, a continuous emissions monitoring system enclosure, and stack with multiple flues will be located outdoors. The WTE facility should be situated on a minimum of an 8- to 10-acre site surrounded by additional buffer area. The selected site should exist near a major road for ease of access, water supply source, wastewater discharge point to treat wastewater, and electrical interconnection. The design of a new WTE facility can incorporate on-site wastewater reuse. The anticipated energy content (higher heating value) of the solid waste will range from 4,500 to 5,000 Btu per pound. Typically, food waste is the highest moisture laden component with the lowest energy value of the potential waste stream for the WTE facility.

B. Commercially Proven Technologies.

1. Mass Burn WTE Systems. Mass burn WTE systems can be basically divided into three separate technologies: (a) modular starved air systems; (b) modular excess air systems; and (3) field-erected excess air systems. The modular starved air systems were historically used for small applications (under 400 TPD). These facilities would typically combine several refractory lined combustors, each rated for around 90 TPD, in the number necessary to dispose of the quantities of waste available in the area. These refractory lined combustors generally had two chambers in which the MSW was introduced and pushed through several steps during which the fuel was first dried, then combusted, and then completely burned with the ash removed into a submerged conveyor. The combustion was conducted without adequate amounts of oxygen; additional air was introduced in the secondary chamber where the combustion was fully completed. Many of these modular starved air systems were used in small applications for incineration only. If energy recovery was desired, a separate waste heat boiler was included to convert the hot gases from incineration into steam to drive a steam turbine connected to an electric generator. The modular excess air WTE system can be described as the rotary combustor systems currently in use in several facilities in the United States. These facilities use a rotating cylindrical combustor in combination with a waste heat boiler to create steam for electrical production. The combustors are constructed with tube material that circulates water to absorb the heat of combustion and to heat the water being used in the waste heat boiler to create the steam for use in the steam turbine generator. The MSW tumbles through the inclined combustor and falls out of the combustor onto an after burning grate system, which allows for the complete burn-out of the MSW fuel.

The type of WTE facility most prevalent in the United States uses the field-erected excess air technology. With this technology, the incinerator and boiler are one system; the walls of the incinerator are constructed of tubing in which water circulates as part of the steam generation process. The mass burn technology typically utilizes an overhead crane to feed municipal solid waste from a pit into a chute that deposits the municipal solid waste onto an inclined surface upon which the municipal solid waste burns in the presence of more than enough air (oxygen) to achieve complete combustion. The heat generated during combustion is transferred through the water walls to create steam. In addition, the water wall boilers are typically provided with additional tubing in other sections of the boiler to create superheated steam that improves the generation of electricity and other tubes to preheat the water, which improves the efficiency of the boiler process. The super-heated steam is sent to a steam turbine connected to an electrical generator to create electric power. Some facilities use steam turbines that allow for extraction of steam at some specific pressure level to be sold to an adjacent industry that may require process steam.

2. RDF Systems. RDF systems have been employed as a means to increase the quality of the MSW as a fuel and to provide a means to recover materials prior to combustion. RDF systems in use today are being used in combination with field-erected water wall boilers. RDF systems can be used to prepare fuel to be used with different types of combustors, including fluid bed

combustors and other industry boilers (cement kilns, pulverized coal units, etc.). On average, RDF systems have a larger design capacity than mass burn facilities. Most RDF facilities in the U.S. process 1,000 TPD or more. RDF systems can be arranged in several different forms. There are several systems typically used in an RDF plant, including shredders, magnets, eddy current separators, trommels, and picking stations. The combination of and order in which the systems are arranged are what differentiates one from the other. Two or three types of shredders can be employed, including slow speed shear-type shredders, bag-breaking "flail mill"-type shredders, and size-reducing hammermill-type shredders. Magnets can be used to remove ferrous metals such as steel cans and other iron. Eddy current separators can be used to remove non-ferrous metals such as aluminum, brass, tin, etc. Trommel systems can be used to separate materials by size using a rotating cylindrical drum with sides made of screens with holes of certain size. Picking stations provide a means to pick targeted items for recovery. In the United States, three types of RDF systems are normally employed, including the shred-and-burn system, the trammel-first systems, and the shred-first systems. All three designs use ferrous removal magnets. The shred-and-burn system in use at the SEMASS facility in Rochester, MA basically removes the non-processible waste, shreds everything else, removes ferrous metals, and burns the remainder. The trommel first system at SPSA in Portsmouth, VA and one of the Miami, Dade County, FL systems use trommels to open bags and remove glass and grit; then sends the material into another trommel to separate those items already sized appropriately for the combustor, which also concentrates the aluminum cans; then shreds the oversized material for use in the boiler.

Typically magnets are used to remove ferrous metal from each stream, and eddy current separators remove aluminum prior to the size reducing shredder. The shred-first systems typically use a flail mill to open bags of MSW, then magnets and trommels remove small residues and size materials, and hammermills size the remaining materials. H-POWER in Honolulu, HI uses the shred-first system. All of the RDF systems operating in the United States use grate-type combustion units. Typically, the boilers used in the RDF systems are very similar to those used in mass burn systems: field-erected water wall units with super heaters and economizers. The differences between mass burn and RDF combustion units are associated with the grate systems. The RDF units use a horizontal grate system; the mass burn facilities use inclined grate systems.

C. Residuals. Unprocessible (i.e., large, bulky) solid waste is separated in the waste receiving area for recycling or landfill disposal. Unprocessible solid waste components include demolition/renovation/construction debris, durables, household hazardous wastes, and special wastes. The remaining solid waste components are compatible with mass burn technology.

GENERAL COST COMPARISON

Based on the initial evaluation of alternative technologies for downstream diversion, the Agency conducted a preliminary overall comparison of costs for each technology which would allow a comparison with current waste management approaches. As each alternative technology requires

a minimum waste volume for the technology to be viable, a 500 TPD facility was selected to compare costs. As bioreactor landfills do not present an opportunity for diverting waste from landfill disposal, it was excluded from further consideration. Waste-to-energy facilities typically require a minimum of 1,000 TPD to be economically viable. Since Ulster County does not generate that volume of waste and is not interested in importing waste, this technology was also excluded from further consideration.

The cost for each remaining alternative technology will be compared with a $60/ton landfill cost (tipping fee and transport) which represents the expected average cost of the current landfill disposal approach over the proposed planning period. As a majority of the alternative technologies have limited full-size facilities in operation in the United States, the opinion of probable costs (both capital and operations) is based on information available in literature. The following sections present our general opinion of probable costs for each of the three remaining alternative technologies.

4.7.1 Anaerobic Digestion

A. Technology Options. Most anaerobic digestion technologies are classified as either wet or dry. This processing technology reduces the volume of solid waste and recovers energy through the process. AD systems may be classified as follows:

- wet single-step
- wet multi-step
- dry continuous
- dry sequencing batch
- dry multi-step
- percolation (dry two-step)

Presently, there are several wet and dry AD systems commercially operating in Europe that use the organic fractions of MSW as feedstock. In addition, digesters have been used in the U.S. to manage biosolids and manures for several decades. However, there are no commercially operating facilities in the U.S. using the organic fraction of the MSW as feedstock.

Wet and dry systems are not typically used for the AD of the full MSW stream, but target the OFMSW. Wet systems are primarily designed to co-digest OFMSW with a liquid substrate, such as manure or sewage sludge. Because the Ulster County disposed solid waste stream includes large quantities of both organics and biosolids, we have selected the wet AD system for further review. For purposes of this evaluation, we have identified a facility sized to process 220 TPD based on our characterization of the solid waste stream.

B. Selected Technology for Cost Comparison. For the purposes of a cost comparison, the wet AD system technology was selected based on the following considerations:

1. **Status of Technology.** Wet AD has been used in the U.S. for decades to manage manures and

sewage sludge. It is presently used in Europe and Canada to manage OFMSW. For example, since 2002, the City of Toronto has been operating an anaerobic digestion facility at its Dufferin solid waste transfer station using the BTA technology, a wet two-step process. There are several other commercially operating AD facilities in Europe that are co-digesting OFSWM (e.g., yard waste, kitchen waste, and compostable paper) with sewage sludge.

2. **Regulatory Acceptance**. Wet AD has been permitted as a management approach for biosolids in the U.S., including New York. Therefore, the technology is understood by the regulators, but its application to the organic fraction of the MSW would require additional information and analysis. The technology also fits within the State's Solid Waste Management Hierarchy to Reduce, Reuse, and Recycle.

3. **Operating Flexibility**. Wet AD co-digesting systems accept a range of OFMSW and sludges for processing. The proposed technology includes some up-front processing to remove the contaminants and optimize the process. Feedstock may include source separated organics (food waste), biosolids, non-hazardous liquid waste, paper sludge, yard waste, and non-recycled organic material such as soiled paper or cardboard. Thus, some flexibility exists in both the type of materials and the proportional mix of organics that can be processed.

4. **Landfill Preservation/Diversion Goals**. Wet AD systems accepting targeted OFSWM and sludges typically divert up to 80 percent of the materials processed from landfill disposal through volume reduction, composting of the solids, and reuse and/or land application of the process water. Keys to maximizing landfill diversion include finding markets for the compost byproduct and process water. The compost by-product can be used as soil conditioner. The process water and its constituents need to be evaluated prior to identifying reuse opportunities.

C. Cost Considerations. When evaluating the economic viability of alternative waste processing technologies, the basic business model holds true as for many industrial facilities. There is the need for a raw product (feedstock), preparation of the raw product (feedstock mixing and preparation), management of residual products (nonprocessibles), consistent and reliable processing methods and controls (the AD process), the marketing and distribution of the final end products (compost/biogas/process water), and applicable regulatory compliance and reporting (environmental controls).

In addition, it must also be recognized that AD facilities utilize a biological process that must be applied consistently within the system. Unlike landfills, these facilities cannot accept more waste than what they are designed to process. Landfill operators have the ability to accept a wide range of daily volumes of waste. However, an anaerobic facility designed to accept 220 TPD of materials cannot accept 500 TPD of materials since the throughput volume is limited and the organics would not be adequately processed.

D. Preliminary Cost Evaluation for Screening Purposes. To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar AD facilities, published articles, and technical presentations at waste conferences. However, it should be noted there are no commercially operating facilities in the

U.S. The purpose of this screening is to determine if the range of cost for an AD facility compares favorably with Ulster County's existing landfill export disposal cost, which is estimated at $60/ton over the planning period. This analysis is not intended to determine if an AD facility is a viable option for Ulster County. The intent is to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis. The following is a summary of the preliminary cost evaluation completed as part of this task based on processing 220 TPD of solid waste composed of OFMSW and wastewater sewage sludges.

1. **Facility Processing Input (Feedstock)**
a. OFMSW – 120 TPD (42,000 tons per year [TPY]).[3]
b. The OFMSW projected quantity includes the following segments of Ulster County's MSW stream:
- Compostable paper
- Food waste
- Yard waste
- Other organics

c. WWTP Sludges – 100 TPD (35,000 TPY).
d. Total – 220 TPD (77,000 TPY).
2. **Facility Processing Outputs**
a. Fiber (solids from digestate for composting) – 60 TPD (21,000 TPY) .
b. Filtrate (liquids in digestate) – 140 TPD (49,000 TPY).
c. Preprocessing residuals for landfill disposal -10 TPD (3,500 TPY).
d. Biogas – 3,000 cubic feet per ton of waste (70,000,000 cubic feet per year).
3. **Site Requirements**
a. Buildings – 2 to 4 acres.
b. Land Requirements – 7 to 10 acres.
c. Electricity – Varies.
4. **Summary of Facility Components.** The following is a summary of the key components required:

3 Quantities of organics composing the OFMSW were estimated using the waste characterization developed as part of the solid waste plan.

a. Waste pre-processing area**,** to remove materials that cannot be anaerobically digested (such as metals, glass, and concrete) to preprocess the remaining materials into a uniform feedstock and adding the sludges providing moisture to form a slurry in the digester.
b. Anaerobic digester, where large organic compounds are broken down into smaller compounds in an airtight vessel called a reactor or digester. The biogas produced by AD can be used with minimal treatment in boilers to generate heat and in reciprocating engines or turbines to generate electricity. If the gas is purified, it can be used in place of natural gas or compressed natural gas as a vehicle fuel.
c. Gas flaring, steam, and/or power generation using the digester as a fuel.
d. Emissions control on units combusting the gas produced.
e. Residue composting and beneficial use.
5. **Capital Cost Consideration**
a. Costs adjusted to reflect 2009 Cost Index.
b. Economies of scale are applicable depending on size and optimization of equipment throughput.

c. The estimated capital costs for an AD facility of 77,000 TPY are $250 to $275 per ton of annual capacity.[4]
d. Estimate for a 220 TPD MSW AD facility including (42,000 TPY MSW + 35,000 TPY sludge = 77,000 TPY) is $25,000,000 to $35,000,000.
6. **Operation and Maintenance Cost Considerations**
a. Personnel costs for 5 to 10 staff.
b. Facility operates seven days per week.
4 This is a planning level estimate based on R.W. Beck studies conducted for King County, Washington; Hawaii County, Hawaii; and Linn County, Iowa. There is very limited publicly available data.
c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, equipment maintenance.
d. Include a capital replacement fund of $500,000 per year.
e. Electrical costs at $0.12/kw-hour.
f. Residual disposal cost of $60/ton
g. No host community fee considerations.
7. **Gross Cost on Equivalent Per Ton Basis**
a. Operating costs - $55 to $65/ton.
b. Capital cost amortized over 20 years at 4 percent interest (public finance) equals $24 to $34/ton.
c. Gross operating cost, including debt retirement: $79 to $99/ton.
8. **Potential Annual Revenue Streams**
a. Sale of biogas for direct end use or power purchase agreement using relevant electric utility renewable energy pricing – potential of $500,000 to $1,000,000 net revenue depending on selected market (energy credits and other tax credits not considered).
b. Sale of compost assumed to be offset by cost of building material and mixing/handling.
c. Total Gross Revenue Potential: $6.50 to $13.00/ton
9. **Net Cost on Equivalent Per Ton Basis.** $72 to $86/ton.

E. Results of Preliminary Screening. The preliminary results of the screening process for AD reflect that the gross operating costs are higher than the Agency's current $60/ton tip fee and transport cost. Based on the cost analysis, AD is not competitive as an option for increasing diversion and recycling opportunities unless the potential revenue streams can be increased to address the net cost differential.

4.7.2 Gasification

A. Technology Options. In addition to the traditional thermal conversion technology of WTE, thermal conversion alternatives include several emerging technologies as outlined in the previous discussion. The emerging thermal conversion technologies discussed in the previous section included pyrolysis, conventional gasification, plasma arc, and advanced thermal recycling. Pyrolysis and gasification are not new technologies, having been used in the coal industry since the early 20th Century. Plasma arc has been applied in an industrial setting to manage hazardous waste for decades. Advanced thermal recycling represents second generation combustion-to-energy technology that has recently been considered for MSW. All of these technologies have been applied in other parts of the world, such as Japan and Europe, but there are no commercially operating facilities in the U.S. However, there are operating demonstration plants and commercial facilities in the planning stage in the U.S.

Because of the lack of commercially operating facilities in the U.S., cost data is very limited. The Agency has gathered some preliminary planning level capital and O&M cost information based on previous discussions with suppliers of various gasification technologies. It is worth noting the County would likely need to consider the import of applicable waste streams from outside the County to take advantage of the needed economies of scale for conventional gasification to be considered competitive. For purposes of this evaluation, we have selected conventional gasification for further review because there are commercially operating facilities in Europe and demonstration facilities in North America.

B. Selected Technology for Cost Comparison. For the purposes of a cost comparison, conventional gasification technology was selected based on the following considerations:

1. **Proven Technology.** This emerging technology has a commercially operating status in Europe and Japan. In addition, there are demonstration facilities in the U.S. that reflect that this emerging technology offers potential. Several facilities are planned for development in the U.S. in the future and should offer a frame of reference for additional consideration.
2. **Regulatory Acceptance**. As the technology evolves, the permitting issues will be clarified. Gasification technology has been applied in other energy production settings providing relevant information for the regulators. The key issues are the air emissions and management of the slag/ash.
3. **Operating Flexibility**. Conventional gasification offers operating flexibility because it can process most all of the MSW stream with limited materials considered non-processible. Moreover, some of the other emerging technologies such as plasma arc typically require more materials preprocessing and greater energy input for application of the technology.
4. **Landfill Diversion Goals**. For conventional gasification, up to 90 percent of the incoming waste stream may be diverted from landfill disposal. Fly ash from the emissions control system is the primary process residue that may need disposal. The slag resulting from the gasification process has beneficial reuse potential in building and road materials.

C. Cost Considerations

1. **Preliminary Cost Evaluation for Screening Purposes.** To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar types of conventional gasification facilities, published articles, and technical presentations at waste conferences. The purpose of this screening is to determine if the range of costs for conventional gasification compares favorably with Ulster County's existing landfill disposal cost, which is estimated at $60/ton over the planning period. This analysis is not intended to determine if gasification is a viable option for Ulster County. It is intended to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis. The following is a summary of the preliminary cost evaluation completed as part of this task based on processing 500 TPD of MSW.

2. **Facility Processing Input (Feedstock).** MSW – 500 TPD (175,000 TPY).
3. **Facility Processing Outputs.** Conventional gasification has the potential to reduce the volume of materials received by up to 90 percent. Various process outputs are provided below. Specific quantity estimates are not provided because of the lack of reliable materials flow data.
a. Syngas.
b. Ash/char.
c. Non-processibles.
d. Recyclable metals .
However, it is anticipated that non-processibles needing landfilling will compose approximately 5 to 10 percent of the throughputs by weight.
4. **Site Requirements**
a. Buildings – 3 to 5 acres.
b. Land Requirements – 10 to 15 acres.
c. Electricity – Varies.
5. **Summary of Facility Components.** The following is a summary of the key components required:
a. Waste pre-processing area, to remove materials that cannot be thermally degraded (such as metals, glass, and concrete) and some pre-processing of the remaining materials into a uniform feedstock.
b. Reactor/gas refining, where gasification reactions occur and the resulting product (gases, oils) is refined, as needed, to produce gas of suitable quality. The gas produced is often referred to as "synthesis gas" or "syngas," because it is predominantly a combination of methane and hydrogen.
c. Power generation or chemical production using the syngas and/or oils as a fuel or feedstock. Unrefined or minimally refined gas can be burned directly in boilers with heat recovery to produce steam for electricity generation. More refined gas can be used in reciprocating engines, gas turbines, or for chemical production.
d. Emissions control on units combusting the gas produced.
e. Ash, char, or slag handling and disposal.
6. **Capital Cost Consideration**
a. Costs adjusted to reflect 2009 Cost Index.
b. Economies of scale are applicable depending on size and optimization of equipment throughput.
c. For conventional gasification facilities, planning level capital cost ranges from $150,000 to $180,000 per ton of daily capacity.
d. Estimate for a 500 TPD MSW gasification facility is $75,000,000 to $92,500,000.
7. **Operation and Maintenance Cost Considerations**
a. Personnel costs for 15 to 20 staff.
b. Facility operates seven days per week.
c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, equipment maintenance.
d. Include a capital replacement fund of $ 500,000 per year.
e. Electrical costs at $0.12/kw-hour.
f. Residual disposal cost of $60/ton
g. No host community fee considerations.
8. **Gross Cost on Equivalent Per Ton Basis**

a. Operating and Maintenance Costs - $60 to $70/ton (based on data from demonstration facilities without facility scale-up).
b. Capital cost amortized over 20 years at 4 percent interest (public finance) equals $32 to $38/ton.
c. Gross operating cost, including debt retirement: $92 to $108/ton.
9. **Potential Annual Revenue Streams**
a. Power purchase agreement with renewable energy pricing – Potential for $2,000,000 to $5,000,000 in net revenues depending on end-use markets (energy credits and other tax credits no considered).
b. Gross Total Revenue Potential: $12 to $30/ton.
10. Net Cost on Equivalent Per Ton Basis: $70 to $85/ton.

D. Results of Preliminary Screening. The preliminary results of the screening process for conventional gasification reflect that the gross operating costs are higher than the Agency's current $60/ton disposal cost. Based on the cost analysis, conventional gasification is not competitive as an option for increasing diversion and recycling opportunities unless the potential revenue streams can be increased to address the net costs differential.

The Agency will however, take into consideration, transporting MSW to the Taylor Biomass Facility currently under construction and located in Montgomery, NY which is approximately 50 miles from the Agency's Kingston Facility and approximately 30 miles from the Agency's New Paltz Facility. For more information about this facility, refer to the section describing Thermal-Based Conversion Technologies in part B. Gasification. The Agency is currently in discussion with Taylor regarding potential fees.

4.7.3 Enhanced MSW Composting

As part of the evaluation of alternative technologies, enhanced MSW composting included two potential management strategies that could expand the County's current yard waste composting operations and increase diversion opportunities. The first was the expansion of yard waste composting with the addition of other organics on a small-scale basis, and the second was through a large-scale commercial MSW composting facility. The Agency recognized that an enhanced yard waste composting strategy was a potentially viable option, with relatively modest capital investment and risk, and thus should be further considered under the Local Solid Waste Management Plan. It was also agreed that while the economic advantages of MSW composting were not immediately apparent, it does offer a comparative basis to other alternative waste diversion technologies. As a next step in the evaluation process of alternative diversion technologies, a screening of cost considerations was completed to compare the County's current solid waste management operating costs with other alternative technologies, including MSW Composting.

A. Technology Options. There are a variety of composting processes for Municipal Solid Waste (MSW) that has been used throughout the world with varying degrees of success. These include:
 In-vessel aerated systems (containerized processes).
 Aerated static systems on pads (outdoor facilities),

 Aerated static systems with fabric covers (outdoor windrows covered with fabric).
 Rotary drum aerobic systems (fully enclosed within buildings).

All of these options apply the basic principles of composting: feedstock preparation, active maturation of the compost (mixing with the addition of air and water), curing, storage, residuals disposal, and compost marketing and sales. However, large-scale MSW composting results in material handling challenges and associated environmental mitigation challenges that are not as easily managed as some of the less automated compost technologies. Therefore, for the purposes of this evaluation, the rotary drum composting technology (large-scale composting) will be evaluated since there is a similar recently developed project in New York State that is currently operating in Delaware County, NY.

B. Selected Technology for Cost Comparison. For the purposes of a cost comparison, the rotary drum composting technology was selected based upon the following considerations:

1. **Proven Technology**. Although rotary drum composting has been utilized dating back to the early 1960s, its success was often dependent on the cost for alternative local disposal options, such as landfilling. Where facilities needed to compete on a "tip fee basis" against relatively low landfill cost, the success rate was poor since capital investments and operating controls relating to compost quality and odor management were less than adequate. Over the past 20 years, owners and operators of MSW composting facilities have made proper capital investments, and a number of successful projects are currently in operation. The compost process works and is technically and economically manageable. Today there are approximately a dozen MSW Composting projects operating in the United States, with a number of additional facilities in Europe and Australia.

2. **Regulatory Acceptance**. The rotary drum composting process has been successfully permitted in New York State through the NYSDEC. While the details of each project are unique in terms of site access, environmental sensitivities, public considerations, access, etc., the 6 NYCRR Part 360 Solid Waste Regulations are clear with respect to permitting requirements. Thus, the time needed to receive a permit is reasonable. The technology also fits within the State's Solid Waste Management Hierarchy to Reduce, Reuse, and Recycle.

3. **Operating Flexibility**. MSW composting facilities can accept a wide range of feedstock without disrupting the composting process. Feedstock could include MSW, source separated organics (food waste), biosolids, non hazardous liquid waste, paper sludge, yard waste, and non-recycled organic material such as soiled paper or cardboard. The technology does not require pre-sorting and can integrate effectively with existing recycling programs and strategies. It also allows operators to maximize their recycling revenue by focusing on high-value recyclables while capturing a significant volume of organic materials for reuse.

4. **Landfill Preservation/Diversion Goals**. For MSW co-composting facilities (MSW and biosolids), less than 30 percent of the incoming waste stream is sent to the landfill after processing (the inorganic fraction). The material is also inert, resulting from the removal of organics, and thus reduces the amount of contaminants within the landfill leachate.

C. Cost Considerations. When evaluating the economic viability of alternative waste processing technologies, the basic business model holds true as for many industrial facilities. There is the need for a raw product (feedstock), preparation of the raw product (feedstock mixing and preparation), management of residual products (inorganics), consistent and reliable processing methods and controls (the compost process), the marketing and distribution of the final end product (soil amendment/ compost), and applicable regulatory compliance and reporting (environmental controls). The primary difference with MSW composting facilities is that most of the revenue generation occurs through the acceptance of the raw product (feedstock) with limited revenue resulting from the final product. The paradigm shift in this business model leads to an important consideration for these facilities – revenue generation from multiple types of feedstock versus a consistent raw product. This offers both opportunities and challenges for MSW composting facilities. However, operating costs and the establishment of "tip fees" are usually based on a variety of feedstock and estimates of volume processed on an annual basis. Therefore, the greater variety of feedstock that can be processed provides for greater opportunities for revenue.

In addition, it must also be recognized that MSW composting facilities utilize a biological process that must be applied consistently from day to day. Unlike landfills, these facilities cannot accept more waste than what they are designed to process. Landfill operators have the ability to accept a wide range of daily volumes of waste. However, an MSW composting facility designed to accept 500 TPD of MSW cannot accept 750 TPD of MSW since the throughput volume is limited and the organics would not be adequately processed.

D. Preliminary Cost Evaluation for Screening Purposes. To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar MSW compost facilities, published articles, and technical presentations at waste conferences. The purpose of this screening is to determine if the range of cost for an MSW composting facility compares favorably with the Agency's existing landfill export disposal cost, which is estimated at $60/ton over the planning period. This analysis is not intended to determine if MSW composting is a viable option for Ulster County; it is simply intended to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis. The following is a summary of the preliminary cost evaluation completed as part of this task based on a "prototype facility" processing 500 TPD of MSW.

1. **Facility Processing Input (Feedstock)**
a. MSW – 500 TPD (175,000 TPY).
b. WWTP Sludges – 100 TPD (35,000 TPY).
c. Liquid Waste – 100 TPD (35,000 TPY).
2. **Facility Processing Outputs**
a. Compost – 125 to 150 TPD (50,000 TPY).

b. Residuals for Landfill Disposal – 150 TPD (50,000 TPY).
c. Recyclable Metals – 10 TPD (3500 TPY).
d. Waste Liquids – 0.

3. **Site Requirements**

a. Buildings – 6 to 8 acres.
b. Land Requirements 13 to 15 acres.
c. Electricity – 1.0 to 1.3 MW.

4. **Summary of Facility Components**

a. Fully enclosed waste receiving area with three days storage for MSW.
b. Sludge receiving area.
c. Operator controls and automated instrumentation systems.
d. Waste feeding systems.
e. Rotary drum for waste processing.
f. Conveyance and transfer systems.
g. Active compost aeration system (windrows, concrete wall, aeration systems, mixing equipment, and support systems),
h. Compost refining systems and equipment.
i. Curing and storage area
j. Air handling and odor control systems, including dust collection and odor treatment.
k. Post-sorting area for capture of recyclable metals.
l. Building and support systems.
m. Site access and site storm water management features.

5. **Capital Cost Consideration**

a. Cost adjusted to reflect 2009 Cost Index.
b. Economy of scale is noted incrementally depending on size and optimization of equipment throughput.
c. For larger MSW composting facilities, capital cost ranges from $280 to $300/ton of annual capacity (for small facilities it increases to $450 to $550/ton).
d. Estimate for a 500 TPD MSW compost facility including sludge processing (175,000 TPY MSW + 35,000 TPY sludge = 210,000 TPY) is $58,000,000 to $63,000,000.

6. **Operation and Maintenance Cost Considerations**

a. Personnel costs for 25 to 30 people.
b. Facility operates seven days per week.
c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, and equipment maintenance.
d. Include a capital replacement fund of $200,000 per year.
e. Electrical costs at $0.12/kw-hour.
f. Residual disposal cost of $60/ton.
g. No host community fee considerations.

7. **Gross Cost on Equivalent per Ton Basis**

a. Capital cost amortized over 20 years at 4 percent interest (public finance).
b. Residual value for facility at the end of the 20-year finance period of 35 percent.
c. Estimated gross cost on an annual basis: $10,500,000 to $11,500,000.
d. Estimated annual processing fees for privatized operator: $3,000,000 to $3,500,000 (before taxes).
e. Gross operating cost, including debt retirement: $64 to $72/ton.

8. **Potential Annual Revenue Streams**
a. Compost Sale: Assumes 30 percent of incoming waste stream at $3 to $10/ton = $262,500.
b. Total Gross Revenue Potential: $1 to $3/ton.
9. Net Cost on Equivalent Per Ton Basis: **$63 to $69/ton**

E. Results of Preliminary Screening Process. The preliminary results of the screening process for MSW composting show that gross operating costs are competitive with tipping fees in other portions of the Northeast United States that range between $65 and $80 per ton. As an option for increasing diversion and recycling opportunities, MSW composting appears to offer some potential, but not without significant capital investment. As a future consideration, MSW composting may be a reasonable alternative and worthy of additional evaluation in terms of specific site considerations and site suitability, costs, integration of existing County programs, comparative long-term economic value, landfill life considerations, and risk assessment.

However, given the Agency's past and present capital investments, personnel experience, and operations success related to exporting solid waste for landfill disposal, a phased organics diversion and recycling strategy would integrate more effectively with the Agency's existing programs.

CONCLUSION AND RECOMMENDATIONS

Considering a variety of outputs from the alternative technology evaluation process, including:
 required tonnage
 required feedstocks
 applicability to the waste stream
 diversion potential
 environmental considerations
 residuals management
 commercial viability
 anticipated costs

it appears that organics processing through enhanced composting presents the best technological, economical, and environmental option for increasing downstream waste diversion for Ulster County. Anaerobic and thermal conversion technologies do not appear as viable or cost effective. However, this evaluation of alternative technologies, including the general cost comparison, was originally developed as a potentially significant downstream diversion approach. As the actual evaluation progressed and further discussions/work sessions were held, it became evident that a major program change from the current export landfill approach, which is currently more cost effective, was not likely. As a result, a more modest, sequenced, and scalable approach was considered for Ulster County. An approach that focuses on organics would satisfy both the County's interest in increasing recycling and diversion and NYSDEC's interest in organics diversion.

In keeping with enhanced composting as the preferred technology, this approach would most likely begin with expansion of the existing yard waste composting program. The first step in expanding the existing program would be the addition of food waste (preconsumer) or biosolids.

The addition of pre-consumer food waste from institutions (universities, prisons) and commercial enterprises (grocery stores, processors) typically represents the least contaminated (and therefore most cost effective) source of food waste for composting. Collection of pre-consumer food waste would also require the least change to current collection practices.

In addition, the Agency has had some initial discussions related to the economic viability of a County-wide biosolids management facility. The volume of food waste or biosolids that could be diverted will be a function of the volume of bulking agent (brush/yard/wood waste) that is available. Based on approximately 450 tons of yard waste processing per year, approximately 300 tons of food waste or biosolids could be processed annually without importing bulking material. This tonnage would be appropriate for an initial demonstration project. In order to expand processing capacity, the Agency could integrate biosolids disposal with wood waste disposal for interested municipalities.

Typically, a biosolids composting facility would be enclosed to minimize management of odor and other environmental impacts (such as leachate). Low volume food waste composting would not typically require a completely enclosed facility. However, the Federal Aviation Administration has expressed their concern with composting facilities and the potential to attract vectors compared to current open landfilling. Considering the processing capacity available with current wood waste tonnage, vector concerns, and other food waste/biosolids composting facilities in the region, an initial, outdoor, demonstration composting facility may be an appropriate first step in pursuing additional downstream organics diversion. A project of this nature would be pursued to demonstrate required mix ratios, processing options, processing times, finished product quality, the potential for vector attraction, and required environmental impact management.

For a demonstration project, a “low tech” approach to material processing could be used that would utilize the County’s existing equipment. The Agency currently owns a Peterson Pacific Grinder (model 4700B). The Agency would need to invest in a windrow turner and screen. This equipment, along with a front-end loader, could be adequate to operate a static, turned windrow demonstration facility depending on the nature of the food waste. As part of the demonstration, the Agency could also employ a forced aeration static pile processing approach by adding blowers and piping, in lieu of turning windrows, to compare the two processes. Biosolids and food waste could be composted separately and together to evaluate individual and combined processing details.

If this first step of enhanced composting shows promise, the next step in expanding organics diversion could be to construct a larger, enclosed composting facility that utilizes more process controls and automation. The nature of that facility (size, feedstock, processing capacity, processing approach, type of enclosure, etc.) would be determined as part of the demonstration project. Further expansion of enhanced composting as an alternative technology would require the diversion of more organic waste from the MSW stream. Inclusion of source separated

organic waste is one option for capturing organic material. The Agency has identified a "Phased Organics Diversion Strategy" that begins with the County's existing yard waste composting program (the baseline) and builds upon the program as follows:

 A demonstration project that utilizes a forced aeration composting method for processing yard waste and food waste or biosolids.
 A full-scale (outdoor) forced aeration composting operation to process 100 percent of the County's existing yard waste and food waste or biosolids.
 A fully enclosed composting facility to process 100 percent of the County's existing biosolids that is expandable for processing additional organic feedstock.

Table 4-2 presents a summary of the incremental costs associated with the proposed Phased Organics Diversion Strategy.

TABLE 4-1 ALTERNATIVE SOLID WASTE REDUCTION TECHNOLOGIES

TECHNOLOGY	APPLICABILITY TO ULSTER COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL,FINANCIAL)	WASTE DIVERSION POTENTIAL
Anaerobic Digestion (AD)	The overall waste stream is composed of nearly 70 percent of organics including, but not limited to, food waste, yard waste, paper, and wood. This estimate excludes the yard waste that is separated from the mixed refuse by homeowners and businesses. AD can be applied to this fraction of the waste stream to convert organics into biogas and digestate (i.e., solid residues).	A few pilot facilities using MSW as feedstock have operated in the U.S. in the past. The wastewater treatment industry has used AD to manage biosolids and generate biogas for decades. There are more than 100 commercially operating facilities using the organic fraction of the MSW stream and/or organic industrial wastes located in Europe, with a few in other locations, including Canada	Technology risks may include inadequate materials processing because of an underperforming digestion process caused by contaminated feedstock, inadequate moisture content. Environmental risks may include odor from pre-processing and/or digestion activities; exceeding air emissions limits when using the biogas as a fuel; and the inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include lack of markets for biogas and/or residues and failure to receive adequate quantities of materials to ensure needed economies of scale.	Volume reduction is projected up to 75 percent assuming the pre-processing of the feedstock to remove non-organics and the beneficial reuse of digestate. Without beneficial use of the digestate, the potential volume reduction is projected to be approximately 50 to 60 percent.

TABLE 4-1 (continued)

TECHNOLOGY	APPLICABILITY TO ULSTER COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Pyrolysis/ Gasification	This technology process converts the carbon-based portion of the waste stream into a syngas that can be used to generate electricity or fuels. The organic content, which is carbon- based, composes approximately 70 percent of the waste stream. The carbon content of the overall waste stream would exceed this value.	There are a handful of commercially operating gasification plants operating worldwide using MSW as feedstock. A small number of pilot facilities reportedly are operating or have operated in the U.S. using pre-processed MSW as feedstock to produce syngas. Operating data is very limited for the application of this technology to MSW; therefore, this technology is not considered fully commercialized. The technology has been used for other types of feedstock, such as coal and uniform types of biomass. Plasma arc thermal gasification, a variation of conventional gasification, has reportedly been used in Japan to manage pre-processed MSW and other types of homogeneous solid wastes, such as auto shredder fluff in commercially proven settings.	Technology risks may include inadequate materials processing because of underperforming gasification process due to lack of uniform feedstock and/or issues associated with scaling up demonstration projects. Environmental risks may include odor at the preprocessing stage; air emissions when using the syngas as a fuel in a boiler; disposal of residues (i.e., char, silica, slag, and ash); and inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include lack of markets for sales of syngas and uncertain capital and operating costs due to lack of full-scale projects with MSW as the feedstock.	Volume reduction for pyrolysis/ gasification can reach up to 90 percent with limited pre-processing. However, limited operating data using MSW as feedstock exists to confirm this projection.

TABLE 4-1 (continued)

TECHNOLOGY	APPLICABILITY TO ULSTER COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Waste-to-Energy (WTE)	The overall waste stream is composed of approximately 85 percent combustible materials by weight.	MSW combustion is a fully commercialized processing technology with nearly 90 WTE projects (mass burn and RDF) operating in the U.S. alone. Many others are operating throughout the world. Most of the facilities in the U.S. are sized to process, on average, approximately 1,000 tons per day. Some smaller WTE facilities of less than 250 TPD (i.e., limited economies of scale) are operating in the U.S, but in many instances struggle to remain economically competitive with landfill disposal options. In the last decade, many of these smaller WTE facilities have had to be retrofitted for additional air pollution control equipment, which has dramatically increased overall costs.	Technology risks may include inefficient energy production due to waste variability, as well as excessive unscheduled maintenance. Environmental risks may include odor at tipping floor/pre-processing stage; exceeding of air emissions limits (including dioxins and furans); metals in ash; and inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include large capital costs, variable operating costs, and variability in energy sales.	Volume reduction for WTE facilities is 75 to 80 percent, depending on the type of technology and system used.

TABLE 4-1 (continued)

TECHNOLOGY	APPLICABILITY TO ULSTER COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL

Enhanced Composting	**A. Expanded Organic Composting with the Existing Yard Waste Composting Operations**			
	□ Readily available wastewater sludges □ Institutional food waste is available □ Potential partnering opportunities with SUNY New Paltz or other schools and institutions □ Potential partnering opportunity with the Town of Ulster MRDC	The Northeast U.S. is primarily focused on yard waste, but communities are recently adding other source-separated organics, such as food waste (e.g., OCRRA). The western region of the U.S. is very active, with nearly 70 food waste composting facilities spread throughout 6 states.	□ Outdoor odor management □ Reliability of consistent feed stock □ Public perception of dangers of biosolids □ Risk of compost sales	□ Over 90 percent of the material processed, but at lower volumes
	B. MSW Composting			
	□ Single stream process to convert organic content of MSW to compost □ Integrates easily with existing recycling and collection programs □ Eligible for Carbon Credits *Other:* New York State is considering incentives for removing organics from landfills (Europe has already implemented organics waste bans to landfills).	13 operating facilities in the U.S. □ One operating facility in New York State (fully permitted through NYSDEC regulations)	□ Odor control management □ Worker health and safety □ Siting challenges at the landfill site with the FAA □ Perceptions of compost quality and available markets □ Capital reinvested over the long term	□ 60 to 75 percent of the incoming MSW; high volume processing

TABLE 4-2 INCREMENTAL COST SUMMARY FOR PHASED ORGANICS DIVERSION STRATEGY

PROGRAM ELEMENT DESCRIPTION	ORGANIC FEEDSTOCK TYPE AND VOLUME	INCREMENTAL CAPITAL COST INVESTMENT (Δ$)	INCREMENTAL OPERATION & MAINTENANCE COST (Δ$)	EQUIVALENT ANNUAL INCREMENTAL COST (Δ$/YEAR)	EQUIVALENT ANNUAL INCREMENTAL PROCESSING COST (Δ$/TON)
1. Existing Program: Outdoor composting of yard waste	Yard waste 450 tons/year	$0	Included within existing operations cost.	NA	NA
2. Demonstration Project: Yard waste plus food waste or biosolids	Yard waste 300 CY (135 tons) Food waste or biosolids 100 CY (60-80 tons)	Temporary pad with blowers and air distribution system - approximately $30,000	$5,000/year	$35,000(1)	$167
3. Forced Aeration Outdoor Composting: 100 percent of existing yard waste plus food waste or biosolids	Yard waste 1,000 CY (450 tons) Food waste or Biosolids 330 CY (300 tons)	Site development, pad, equipment, utilities, blowers, and air distribution system - approximately $250,000	$20,000/year	$45,000(2)	$70
4. Enclosed Composting Facility for 100 percent of County biosolids (with expandability to other feedstock)	Biosolids 20,000 tons Wood chips or sawdust 10,500 tons	Buildings, roadways, utilities, processing equipment, bulking agent, odor controls, etc. – approximately $8,000,000	$600,000/year	$1,200,000(3)	$60 (biosolids portion only)

(1) Assumes no financing and only a one-year demonstration period.
(2) Assumes 10-year financing at 5 percent interest.
(3) Assumes 20-year financing at 4 percent interest.

5. COMPREHENSIVE SOLID WASTE MANAGEMENT SYSTEM – THE NEXT 10 YEARS

5.1 SYSTEM GOALS

Over the next ten years, the Agency will strive to improve on its essential mission of the last twenty years – to provide a comprehensive solid waste management system for the citizens of Ulster County that is efficient, economical and environmentally sound. The Agency will accomplish this not only by maintaining and upgrading its current system components, but testing and applying new technology and changing its fundamental system of controlling solid waste originated in or generated in the County. Specifics are discussed below.

5.2 SYSTEM COMPONENTS

5.2.1 REDUCTION AND REUSE : EVALUATION OF UPSTREAM AND DOWNSTREAM DIVERSION OPPORTUNITIES

Given Ulster County's existing programs, past and current investments, and future opportunities, the Agency completed a series of team work sessions that evaluated past, present, and future solid waste management program elements and potential areas for improvement. In addition, New York State is currently developing draft guidelines for Local Solid Waste Management Plans based on a proposed policy framework that could also include increased requirements for organics diversion. As a baseline, the Agency selected 2009 as a representative year to examine current operations, waste generation volumes, and recycling rates (2008 was considered to be impacted by economic slowdown and reduced waste volumes). Based on County reporting, approximately 64,735 tons of materials were recycled through the combined efforts of local municipalities, private companies and commercial sector.

TABLE 5-1 ULSTER COUNTY REPORTED WASTE COMPOSTION IN 2009

WASTE STREAM	TONNAGES	DIVERTED
Landfill Disposal		
MSW including C&D Debris	159,043.40	
Subtotal Landfill Disposal	159,043.40	
Recycling		
Paper		8,808.74
Corrugated Cardboard		10,087.89
Plastic		29.51
Metals		8,149.09
Glass		711.90
Commingled Containers		5,946.04
Tires		2,079.55
Organics		305.00
Yard Waste		6,906.99

C & D Debris		16,696.43
HHW		636.74
Electronics		248.06
Sewage Sludge		2,004.80
Other		1,216.55
Subtotal Recycling		64,734.48
Total Waste Generated	223,777.88	64,734.48

Table 5-1 presents a summary of the estimated waste composition for the MSW that is exported to out-of-county landfills and the reported recycling efforts that resulted in a County-wide recycling rate of 41 percent for 2009. To increase recycling efforts, the Agency was interested in further examination of "upstream diversion opportunities" (capture, control, and processing of recycling streams prior to disposal) and "downstream diversion opportunities" (alternative disposal and diversion through waste conversion technologies). The following topics were selected for further consideration under upstream diversion opportunities:
1. Environmentally Preferable Purchasing (EPP) Practices & Recycled Content - Policy that encourages communities to purchase materials and services that offer specific environmental benefits.
2. Increase CII&M Recycling Participation – A target strategy directed at the largest generators or under-served portion of the County with respect to recycling efforts.
3. C&D Recycling – Source separation of demolition debris to remove reusable and recyclable products.
4. Expand the Existing Household Hazardous Waste (HHW) and Electronics Recycling to a permanent facility – In consideration of growing demands for electronics disposal.
5. Organics Diversion – Efforts to divert organics from the landfill through the participation of residents, businesses, and institutions.

For downstream diversion opportunities, the following technologies were considered during an evaluation of alternative technologies:
1. Anaerobic digestion.
2. Thermal technologies, including gasification, pyrolysis and plasma technologies.
3. Enhanced composting, including MSW composting.
4. Waste–to-energy.
An evaluation of alternative technologies was then developed for each of the four technologies listed above and is presented in Section 4.7.

1. Upstream Diversion Options

1a. Commercial, Institutional, Industrial & Multi-Family Recycling. This program expansion will focus on recycling collection programs at commercial and industrial sites; institutional facilities (i.e., schools, universities, hospitals, prisons, etc.); and multi-family buildings of five or more families. It is estimated that this program could encompass 2,000 to 4,000 building units. The potential to increase recycling participation is significant depending on the amount of staff time and funds that are dedicated to these efforts. Some of the challenges and program implementation needs are summarized in Table 5-2.

TABLE 5-2 SUMMARY OF INITIAL PROGRAM CHALLENGES FOR INCREASING CII&M RECYCLING RATES

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Lack of space in apartments, offices, and buildings for containers	Establish a CII&M building ordinance requiring recyclables storage in or near the building with individual containers available to transport materials to the central location	Dedicated staff time to work with Ulster County Building Code Officer
High resident, manager, and building owner turnover rate	Track recycling programs for participation, educational and collaborative opportunities for each building	Dedicated staff time to outreach
Small incentive for building occupants to recycle	Survey building occupants to determine appropriate methods to encourage recycling in that building	Dedicated staff time to outreach
Ineffective recycling and waste education	Improve and advertise the county's solid waste website and information; produce and handout simple and innovative educational materials; provide buildings with appropriate signage	Dedicated staff time to outreach and educational materials
Lack of recycling regulations enforcement	Periodically monitor and analyze recycling data for a statistically significant number of buildings	Dedicated staff time and tracking software

1b. Household Hazardous Waste and Electronics Recycling. This initiative involves expansion of the Agency's existing Household Hazardous Waste and E-waste Collection Program. Household Hazardous Wastes are household products that contain corrosive, toxic, flammable, or reactive ingredients, warranting their diversion from the landfill, transfer stations, and other waste disposal sites in order to protect ground and surface waters from accidental release. E-waste and HHW currently comprise about 1 percent of the MSW stream by volume and have high potential for harmful toxins to enter the surrounding groundwater. Regulations are already in place banning HHW from landfills, but this waste stream is not yet fully captured. Issues and methods to increase diversion are shown in Table 5-3.

TABLE 5-3 SUMMARY OF INITIAL PROGRAM CHALLENGES FOR INCREASING HHW AND E-WASTE PARTICIPATION

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Limited HHW collection events because of required staff involvement and budget constraints	Increase the Agency's HHW Collection Program though more one-day collection events and explore opening a permanent collection facility	Dedicated staff time to increase number of collection events and permitting approval process for permanent collection site
Low public participation rates	Increase educational activities and encourage product stewardship programs	Dedicated staff time for outreach and educational materials
Large amount of usable products going to the landfill	Explore opening a reuse center for certain items	Dedicated staff time to operate re-use center and storage area

1c. C&D Debris Recycling. This program would encourage separation of C&D debris for recycling or reuse at the job site of a construction, demolition, or remodeling project. As more buildings are built to achieve LEED[5] accreditation, deconstruction verses demolition will increase since one of the LEED accreditation points involves utilization of recycled or reused construction materials. Table 5-4 highlights the issues and potential activities associated with C&D debris recycling.

[5] LEED (Leadership in Energy and Environmental Design): According to the U.S. Green Building Council website**:** LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

TABLE 5-4 SUMMARY OF INITIAL PROGRAM CHALLENGES FOR IMPLEMENTATION OF C&D DEBRIS RECYCLING (UPSTREAM)

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Small incentive to spend extra to save material	Increase public and construction workers' education and awareness of LEED certification and the benefits of green building. Promote public recognition programs for those that participate.	Dedicated staff time for outreach
More time and effort needed for deconstruction verses demolition	Increase public and construction workers' education; offer guidance or incentives for C&D recycling such as preferred disposal rates for non-recycled C&D after separation has occurred or for site MSW	Dedicated staff time for outreach and program cost for incentives (lost revenue)

1d. Organics Diversion. This program would involve expansion of the current organics (yard waste, food scraps, wood waste) diversion program, including backyard composting, grasscycling, food donations, and small-scale vermicomposting (worm composting in containers). The primary issue associated with upstream diversion of organics is described in Table 5-5.

TABLE 5-5 SUMMARY OF INITIAL PROGRAM CHALLENGES FOR ENCOURAGING UPSTREAM DIVERSION OF ORGANICS

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Educating the public	Have an organics diversion team work with outreach groups to develop a comprehensive program to educate food waste generators and the general public	Dedicated staff time for outreach and educational materials

2. Downstream Diversion Options

2a. **C&D Debris Recycling.** This program expansion opportunity is targeted for implementation in 5 to 10 years and would involve diverting C&D debris from the landfill by processing material on site. Even with the clean wood diversion program on-site at the Agency facility, a minimum of 20,000 tons of C&D debris, of which 70 percent consisted of highly marketable materials was sent to the landfill. Table 5-6 identifies challenges that will need to be addressed prior to implementation of a C&D processing facility.

TABLE 5-6 SUMMARY OF INITIAL PROGRAM CHALLENGES FOR IMPLEMENTING DOWNSTREAM C&D RECYCLING

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Determination of waste composition of C&D debris	Identify space at the Ulster Transfer Station to complete a C&D composition demonstration study, including rental of appropriate processing equipment. Explore opportunities for beneficial reuse of non-recycled materials as bulking agents for compost operations.	Storage and processing equipment, staff time, and maintenance
Daily value variation of recyclable materials	Conduct a market assessment for materials as well as the site's potential recovery of recyclable materials	Dedicated staff time for research

2b. Organics Diversion. Choosing the best downstream diversion activity involved considering a variety of outputs from the alternative technology evaluation process, including:
 required tonnage
 required feedstocks
 applicability to the waste stream
 diversion potential
 environmental considerations
 residuals management
 commercial viability
 anticipated costs

It appears that organics processing through enhanced composting presents the best technological, economical, and environmental option for increasing downstream waste diversion for Ulster County. Anaerobic and thermal conversion technologies do not appear as viable or cost effective. However, the Evaluation of Alternative Technologies in Section 4.7, including the general cost comparison, was originally developed as a potentially significant downstream diversion approach. As the actual evaluation progressed and further discussions/work sessions were held, it became evident that a major program change from the current, more cost-effective landfill export approach was not likely. As a result, a more modest, sequenced, and scalable approach was considered for Ulster County. An approach that focuses on organics would satisfy both the Agency's interest in increasing recycling and diversion and NYSDEC's interest in organics diversion. In keeping with enhanced composting as the preferred technology, this approach would begin with expansion of the existing yard waste composting program. The first step in expanding the existing program would be the addition of food waste (pre-consumer) or biosolids. The addition of pre-consumer food waste from institutions (universities, prisons) and commercial enterprises (grocery stores, processors) typically represents the least contaminated (and therefore most cost-effective) source of food waste for composting. Collection of pre-consumer food waste would also require the least change to current collection practices.

In addition, the Agency has had some initial discussions related to the economic viability of a County-wide biosolids management facility. The volume of food waste or biosolids that could be diverted will be a function of the available volume of bulking agent (brush/yard/wood waste). Based on approximately 450 tons of yard waste disposed per year, approximately 300 tons of food waste or biosolids could be processed annually without importing bulking material. This tonnage would be appropriate for an initial demonstration project. To expand processing capacity, Ulster County could integrate biosolids disposal with wood waste disposal for interested municipalities.

Typically, a biosolids composting facility would be enclosed to minimize management of odor and other environmental impacts (such as leachate). Low volume food waste composting would not typically require completely enclosed facilities. However, the Federal Aviation Administration has expressed their concern with composting facilities and the potential to attract vectors. Considering the processing capacity available with current wood waste tonnage, vector

concerns, and other food waste/biosolids composting facilities in the region, an initial outdoor demonstration composting facility may be an appropriate first step in pursuing additional downstream organics diversion. A project of this nature would be pursued to demonstrate required mix ratios, processing options, processing times, finished product quality, the potential for vector attraction, and required environmental impact management.

For a demonstration project, a "low tech" approach to material processing could utilize the Agency's existing equipment. The Agency currently owns a Peterson Pacific Grinder (model 4700B). The Agency would need to invest in a windrow turner and screen. This equipment, in addition to a front-end loader, could be adequate to operate a static, turned windrow demonstration facility depending on the nature of the food waste. As part of the demonstration, the Agency could also employ a forced aeration static pile processing approach by adding blowers and piping, in lieu of turning windrows, to compare the two processes. Biosolids and food waste could be composted separately and together to evaluate individual and combined processing details. The next step in expanding organics diversion would then be to construct a larger, enclosed composting facility that utilizes more process controls and automation. The nature of that facility (size, feedstock, processing capacity, processing approach, type of enclosure, etc.) would be determined as part of the demonstration project.

Further expansion of enhanced composting as an alternative technology would require the diversion of more organic waste from the MSW stream. Inclusion of source-separated organic waste is one option for capturing organic material. However, processing the MSW stream may ultimately present a more cost-effective approach for significant capture and diversion of organics from the landfill than source separation methods.

Based on the above discussion, a phased organics diversion strategy was recommended that begins with the Agency's existing yard waste composting program (the baseline) and builds upon the program as follows:

 A demonstration project that utilizes a forced aeration composting method for processing yard waste and food waste or biosolids.
 A full-scale (outdoor) forced aeration composting operation to process 100 percent of the County's existing yard waste (as currently delivered to the site) and food waste or biosolids.
 A fully enclosed composting facility to process 100 percent of the County's existing biosolids that is expandable for processing additional organic feedstock.

3. Diversion Strategies

Diversion strategies to achieve the next incremental level of diversion for a municipality require targeting select sectors and materials. Strategies to enhance waste prevention and diversion can be classified into the following four categories:

3a. Regulatory – includes actions such as adopting extended producer responsibility mandates (i.e., producer-funded take-back programs), instituting bans on certain types of materials, charging user-fees on disposable items, or mandating recycling at construction sites.
3b. Policy – includes changing the rate structure for refuse collection, implementing environmentally preferable purchasing guidelines to emphasize recycled or reused materials in government projects, or adding materials that may be integrated into the traditional recycling and organics waste collection service.
3c. Programmatic – includes education, market development, or implementing changes in the actual collection of materials, including the frequency of collection and the size and type of containers used by residents and business.
3d. Contractual – includes structuring solid waste service contracts to compensate contractors, vendors, and suppliers based on performance objectives that are aligned with the community's waste reduction or product stewardship goals. In order to achieve higher waste diversion, it is important to focus efforts in areas with the greatest diversion potential and strong cost/benefit potential.

4. Application of Diversion Strategies

The diversion strategies listed above can be applied to a local government's various solid waste, recycling, and waste reduction programs. Some example applications are provided below for the Agency to consider.

4a. Single-Family Residential Programs

Enhancements to curbside recycling and refuse collection programs can be used to optimize diversion and manage costs. Variables that can be modified include rate structures, collection frequencies, container sizes, and items collected. All Ulster County communities have volume-based garbage collection also referred to as "pay-as-you-throw" (PAYT) available at every Municipal Recycling Drop-off Center (MRDC) while other communities set limits on the amount of garbage that can be set out for collection. Residents also have the option to contract private hauling companies for garbage and recycling curbside pick-up and the payment for services is on a monthly basis. However no County-wide, uniform PAYT approach is currently in place. Even though the Agency does not oversee the collection of garbage throughout the County, it is possible to implement a uniform PAYT program through hauler licenses.

For example, the City of Sioux Falls, South Dakota has a subscription-based hauling system in which residents choose their own garbage hauler. As a requirement of the annual hauler license, each hauler must submit their variable rate pricing schedule to the City. Per the City Ordinance, "All licensed garbage haulers shall file, as a part of their application for a business license, a general statement of their use rate structures and billing systems consistent with the City's comprehensive plan of solid waste reduction and recycling program which shall include the following elements:
1. A rate to reward people who reduce their level of solid waste collection service based either upon volume or weight.

2. A rate to provide customers with adequate options and incentives to reduce their weekly level of solid waste collection service and the amount of solid waste collected as a result of their participation in waste reduction and recycling programs.
3. A rate that includes the combined cost of solid waste, using the above elements, and recycling collection services."[10]

In an attempt to provide a larger financial incentive to recycle and reduce quantities of garbage set out for collection, some municipalities in the U.S. have implemented a more aggressive pricing schedule (i.e., with greater increments between service levels) to encourage more recycling. For example, in Seattle, Washington, residents may choose their own subscription levels for garbage collection service. (The fees include recycling service.) The City of Seattle offers a "micro-can" level of service. The micro-can is a 12-gallon container at a price of $14.05 per month compared to a 96- gallon cart for $66.90 per month. This represents a significant financial incentive to encourage diversion and waste prevention.

One measure of Seattle's success using a variable can rate to reduce waste generation is that in 2008, 62 percent of the City's residents were one-can (32-gallon) customers, 25 percent were mini-can (20-gallon) customers, and 5 percent subscribed to the micro-can (12-gallon) service. Only 8 percent subscribe to 2 or more cans of service. These percentages contrast with the situation prior to the introduction of variable rates, when 60 percent of single-family customers subscribed to one can and 39 percent subscribed to two or more cans.

The City of Austin, Texas has one of the most mature variable rate programs in the country. The program is designed as an economic incentive to increase diversion. Billing occurs monthly and residents have the choice of three cart sizes. The 2008 base rate of $8.75 per month includes unlimited curbside recycling and yard debris collection. Cart sizes and prices are $4.75 for 30 gallons, $10.00 for 60 gallons, and $16.50 for 90 gallons, and the cart exchange fee is waived for customers seeking smaller cart sizes.

The City of Minneapolis offers a unique program to attempt to reward those who recycle. Residents are billed a flat monthly fee of $24.00 for solid waste services that includes collection of refuse, recyclable materials, yard waste, and bulky materials. They offer a large cart for a $4.00 per month disposal fee and a small cart for $2.00 per month. If the resident participates in the recycling program, they receive a $7 per month credit on their bill. In other words, the resident receives a recycling rebate.

A relatively new approach to recycling incentives is the RecycleBank™ program which offers rewards to residents based on the quantities of materials set out for recycling. Each recycling container has an identification tag that is scanned and recorded by the collection truck each time the address is serviced. The amount of materials recycled is converted to RecycleBank Points, which can be redeemed for gift cards and/or coupons to local retailers. The incentives in the RecycleBank program are derived from two sources – donations of discounts and gift certificates

by local businesses (in exchange for advertisement) and the City's payment to RecycleBank to participate in the program. The City of Minneapolis' $7 per-month credit is budgeted as part of an expense that the City pays to operate the program. In essence, the user fees pay the rebate to those who choose to participate in the recycling program, which is appropriate, as the cost of recycling collection and processing (when markets are strong) is typically less costly than the collection and disposal of garbage. Recycling program user fees should be assessed periodically as participation changes. The success of enhancing residential diversion hinges on both convenience and adequate financial incentives. Collection services offered must be comprehensive and convenient. Residents need to be adequately rewarded in order for the residential programs to maximize diversion.

10 Source: Revised Ordinances of Sioux Falls, South Dakota, Chapter 18, Article IV. Commercial Haulers, Sec. 18-59. Solid Waste Collection Rates. http://www.siouxfalls.org/Council/Cityclerk/ordinances

4b. Multifamily Residential Programs

Most communities find the implementation of effective multifamily programs to be a challenge. Multifamily recycling and refuse collection tend to be regulated the same as the commercial sector, but the waste generated is more like the residential sector. Part of the challenge in the multifamily sector, is that there is little direct link between recycling goals or requirements and the behavior of individual tenants. Tenants have little to no control over the location, capacity or convenience of the recycling system at their residence. Property managers and owners have no control over the actual recycling and disposal behavior of the tenants. Overcoming multifamily recycling barriers requires tenant education as well as oversight of property managers and owners. Details of multifamily recycling issues and overcoming barriers are addressed in Section 5.2.2 Commercial and Multifamily Recycling.

An example of a successful multifamily recycling program can be found in Portland, Oregon. A City ordinance was passed in 2005 requiring standardized recycling systems at every multifamily property. Glass is collected in one container and all other recyclables (paper, metal, plastic) are commingled in a second container. A consistent and predictable collection system at the multifamily properties makes recycling education for tenants more effective. While all properties must be in compliance, City staff has assisted about one half of the complexes in converting to this standard. All properties are expected to be in compliance by 2010. Other requirements for Portland's multifamily properties include:

☐Multifamily property owners are required to provide a recycling system for tenant use at each property;
☐The collection system for recyclable materials must be as convenient as that provided for garbage; and
☐Property managers are required to provide tenants with recycling education materials within 30 days of move-in, and on an annual basis.

4c. Commercial Sector Programs

In most communities, the commercial sector generally has a moderate recycling or waste diversion rate, while generating the greatest portion of disposed waste. Disposed commercial waste includes significant volumes of recyclable materials, including glass, metal, paper and cardboard, wood, food, plastics, and yard debris. Details of commercial, industrial, and institutional recycling issues and overcoming barriers are addressed in Section 5.2.2 - Commercial and Multifamily Recycling.

The City of Seattle offers a commercial diversion incentive by offering businesses that generate low volumes of waste (i.e., less than 90 gallons per week) a less expensive, residential-type collection service, including recycling.

The City of Portland, Oregon provides for commercial collection of recyclable materials through permitted private contractors. The City has adopted a goal of diverting 75 percent of the commercial waste stream by 2015. A key to this program is that waste haulers providing service within the City must also collect specifically listed recyclables, report collection volumes to the City, and pay a tip fee surcharge for disposal (no fee is imposed on recyclables). In addition, Portland has a mandatory food waste recycling requirement for the City's largest food-producing businesses. Also, all building projects in Portland with a permit value of $50,000 or more are required to separate and recycle the following construction and demolition (C&D) materials from the job site:

☐Rubble (concrete/asphalt);
☐Land clearing debris;
☐Corrugated cardboard;
☐Metals; and
☐Clean Wood.

One additional commercial diversion strategy implemented by the City of Portland, is a ban of polystyrene foam containers. Since 1990, the City has prohibited restaurants, grocery stores and other retail vendors from using polystyrene foam containers for prepared food.[11]

Many corporate businesses have adopted a zero waste policy. One example is Subaru's Indiana automotive manufacturing plant in Lafayette, Indiana which attained "zero landfill" status in 2004 and has remained that way ever since.[12] In 2006, the plant recycled 97 percent of its materials including steel, plastic, wood, paper and glass. The remaining three percent was sent to a waste-to-energy incinerator where steam is produced to heat some of Indianapolis' downtown buildings.

11 Source: City of Portland website. http://www.portlandonline.com/osd/index.cfm?a=109474&c=41472
12 Source: Subaru website. http://subarudrive.com/Sum05_SubaruDifference.htm

4d. C&D Debris Programs

As discussed in detail in Section 5.2.7 - C&D Debris Recycling, common recyclable C&D materials include wood, drywall, metals, masonry (brick, concrete, etc.), carpet, roofing debris,

rocks, soil, paper, cardboard, and land clearing debris. There are typically two primary methods of improving C&D diversion. The first is facility-based, and involves improving customer access to drop-off facilities and support for the development of mixed C&D recycling facilities in a region. This could also include take-back programs for used building materials and the expansion of salvage and re-use stores and materials exchange programs. The second primary method for enhancing C&D diversion is based on directing generator behavior, which can be done with the use of rate incentives, building permit requirements, and market development. This could include such methods as:

☐Adopting rate incentives that make disposal of mixed C&D waste more expensive than recycling;
☐Mandating submittal of a recycling plan for all building projects over a certain dollar value;
☐Mandating that C&D waste be delivered only to a licensed recycler;
☐Setting a C&D diversion rate goal;
☐Developing and promoting pilot projects that show the benefit of de-constructing and recycling as compared to demolition; and/or
☐Developing markets for building products made with recyclable materials.

4e. Food Waste Programs

Several communities throughout the country are beginning to collect residential food waste in the same container as curbside yard waste. This is possible in places where processing facilities receiving the materials are permitted to accept both food and yard waste. In addition, a few pilot programs have been implemented around the U.S. collecting residential food waste and non-recyclable materials separately from yard waste. The cost effectiveness of such an approach is still being evaluated.

Currently, there are no facilities in Ulster County that actively compost food waste or co-compost food and yard waste. Nevertheless the following examples of food waste diversion programs are provided for the Agency to consider, as food waste diversion opportunities may arise in the future and is discussed as part of the Alternative Technology Evaluation in Section 4.7.

In Seattle, post-consumer commercial food, such as cafeteria waste contaminated with takeout containers, paper plates, cups, etc. is diverted and processed by co-composting it with yard waste. A key to success with post-consumer food waste is that the containers and cutlery must be compostable. Many products advertise that they are “biodegradable,” although whether a material that claims to be biodegradable can *actually* be composted is dependent on the receiving facility and its processes. Therefore a material testing and approval program, such as the one managed by Cedar Grove Composting[13], the private company that processes Seattle’s post-consumer cafeteria waste, is suggested before biodegradable items are accepted in the food waste program.

13 Source: Cedar Grove Composting website. http://www.cedar-grove.com/services/compost.asp

The St. Paul, Minnesota Independent School District recently implemented a large scale, post-consumer food waste composting program. This district has more than 42,000 students and 80 different schools. In the 2007/08 school year, 52 schools within the district implemented a food-for-livestock program. Each of these sites has trained its students and staff to source-separate their food waste in the cafeterias. The food waste is then cooked per Minnesota Animal Health Standards and fed to pigs. The program is estimated to reduce the volume of commercial waste requiring disposal by nearly 30 percent. This has resulted in cost savings to the district because of reduced MSW collection costs realized through a resource management program.

Pre-consumer commercial food waste, such as trimmings produced by restaurants and grocery stores, is compatible with a source-separated collection and processing program because it tends to be produced in higher volumes and is less likely to be contaminated with packaging. Grocery stores have a financial incentive to reduce their waste stream because not only is trash service expensive, but trash takes up valuable space. Some stores have contracts for organics collection service, while others backhaul compostable materials to a distribution center where it is directed to a composting facility. Examples include Safeway[14] and Whole Foods.[15] Whole Foods even markets its own bags of finished compost in some of its stores.

14 Source: Safeway website. http://www.safeway.com/IFL/Grocery/CSR-Recycling
15 Source: BioCycle, November 2004. http://www.jgpress.com/archives/_free/000309.html

Large-scale food waste diversion, whether collected with yard waste or as a separate commodity, is relatively new in the U.S. As such, compost facilities are becoming better at managing the material, and energy recovery technologies such as anaerobic digestion, are being considered by the public and private sectors alike. (Anaerobic digestion is discussed in more detail in the Evaluation of Alternative Technologies in Section 4.7.) As collection and processing capacity develop over time, it is expected that communities will begin to consider mandatory diversion and/or disposal bans for food waste.

4f. Mandatory Recycling Ordinances/Disposal Bans

Regulatory options that include mandatory recycling ordinances and disposal bans have the potential to increase diversion at little cost to the local government. (Most costs incurred are related to enforcement of the ordinances/bans.) However, reliable management options must be available upon implementing such an approach. Mandatory recycling ordinances typically require generators to separate a defined list of materials for recycling, or to recycle a certain percentage or number of the materials they generate. Enforcement of mandatory recycling ordinances is typically directed at the generator.

Disposal bans prohibit disposal of certain materials and/or limit solid waste loads to a maximum percentage of banned materials. Enforcement of disposal bans is usually directed at collectors, but can focus on generators and/or disposal facilities such as landfills and transfer stations. In 1991, the County banned recyclables from landfill disposal be enacting the Ulster County Mandatory Source Separation and Recycling Law. Based upon experiences in other

communities, it is observed that the most successful disposal bans have certain essential features in common including:

☐ Reasonably available alternatives to disposal exist and are relatively convenient for the generator;

☐ The disposal ban and alternatives to disposal are widely publicized;

☐ Support is built among stakeholders such as haulers, businesses, and residents; and

☐ A phase-in or grace period is used to introduce the program and allow a collection and processing infrastructure to develop or mature before strict enforcement is implemented.

In general, bans that are enacted without provision for enforcement, or with weak enforcement, are not effective. In 2003 Portland Metro (Oregon) commissioned a study to determine the impact that mandatory recycling ordinances and disposal bans aimed at the commercial sector have on markets for recycled paper. The study investigated the impact of mandatory recycling and disposal bans on the quantity, quality, and price of recycled paper in five North American communities. The study found that these policies increased the amount of commercial fiber recovered, and that they had limited impact on fiber quality or price. Since most programs were adopted concurrently with other enhancements to recycling programs and measurement methodology, the study did not attempt to isolate any specific impact on diversion rates.

The study also identified a number of factors that should be considered in terms of how they might impact government, collectors, processors and end-users when mandatory recycling or disposal bans are under consideration. A few are listed here as examples:

Government

☐ Outreach efforts need to include broad-based activities for the entire commercial sector, as well as sector-specific programs aimed at large volume sources (e.g., packing and shipping, office buildings, etc.) and "problem" sources (e.g., food service and multi-tenant).

☐ Recycling collection costs and logistical problems for small generators tend to be prohibitive. Moreover, it is difficult for small generators to achieve savings from reduced trash service to offset their recycling costs. The jurisdiction should work to identify viable strategies such as shared bins, commercial rates that include the cost of recycling services, distributing and sharing costs among larger and smaller generators, drop-off sites, etc. that help reduce the economic burden for small- and medium-sized enterprises.

☐ Enforcement is essential. It must be integrated with outreach activities and not simply punitive.

Collectors

☐ Mandatory recyclingordinances and disposal bans increase the "demand" for recycling services and thus tend to increase competition among collection service providers. Traditional waste collection companies have more incentive to offer recycling services and compete against established commercial fiber recycling companies.

Processors

☐ Processors have experienced some increase in contamination after implementation of mandatory recycling ordinances and disposal bans, but not beyond what they can handle. Processors continue to be able to readily meet market specifications for the paper grades they produce.

End Users

☐ End users are generally "insulated" from local program issues. They draw supply from many sources, and local processors must deal with problem loads. Those contacted could not identify specific quality problems due to the mandatory recycling ordinances and/or disposal bans. A list of example ordinances and disposal bans is provided in Section 9. - Resources.

5. Diversion Potential

Most U.S. communities claim to have a diversion rate in the 40 to 50 percent range. The City of San Francisco, California announced in May of 2009 that the City had achieved a 72 percent recycling rate for 2007, up from 70 percent the year before.[16] The City has a goal of 75 percent landfill diversion by 2010 and zero waste by 2020 and is making strides to achieving those goals. A mandatory C&D debris recovery ordinance was passed in 2006 and plays a large role in the City's high recycling rate. It is important to note, however, that comparing diversion and recycling rates among communities is challenging due to the manner in which different communities define and measure recycling and waste reduction, as well as the MSW stream.

16 Source: City & County of San Francisco website. http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org

A number of diversion programs could be considered by the Agency to enhance diversion beyond its current rate of just over 40 percent. These programs may include a mix of targeted programs focusing on specific materials (i.e., food waste) and/or specific sectors (i.e., commercial sector). Strategies for consideration include regulatory (i.e., disposal bans), policy changes (i.e., upgraded pay-as-you-throw), and programmatic (i.e., larger container sizes). Tables 2-1 through 2-7 provide strategies for the Agency to consider for each sector (single family, multi-family, commercial, etc.) as well as strategies for increasing food waste diversion and strategies related to disposal bans and producer responsibility.

The Agency can use these strategies as a guide to develop official waste diversion or zero waste goals. Each strategy could be ranked by diversion potential, as determined by the Agency.

One means of ranking diversion potential was developed by Skumatz Economic Research Associates, Inc. (SERA) for Metro Vancouver's (British Columbia) solid waste management system in 2007. SERA's diversion code ranking is provided in Table 5-7 below.

Table 5-7 Diversion Range Codes[1]

Diversion	Value Diversion Description	Diversion Code
Very High	Over 5.0%	**VH**
High	Up to 5.0%	**H**
Medium	Up to 2.0%	**M**
Low	Up to 1.0%	**L**
Very Low	Up to 0.3%	**VL**
Super Very Low	Up to 0.06%	**SVL**

[1] Source: Skumatz Economic Research Associates, Inc.

The ranking should be based upon a qualitative estimate of diversion potential, ease of implementation, and estimated cost to implement.

5a. Single-Family Residential Waste Diversion Strategies

Table 5-8 Single-Family Residential Diversion Strategies

- Implement a residential food waste disposal ban
- Add food waste to yard waste collection (pilot program at UCRRA Kingston Facility)
- Implement collection and separation of C&D waste (at MRDCs)
- Implement collection of electronic waste (at MRDCs)
- Enhance waste screening at the Transfer Station for exclusion of banned recyclables
- Adopt a compostable plastic bag or brown paper bag mandate for yard waste/organics collection (City of Kingston and pilot program at UCRRA Kingston Facility)
- Offer a thermometer exchange to replace mercury-containing fever thermometers with digital thermometers
- Develop a pesticide container recycling program
- Enforce Ulster County Mandatory Source Separation and Recycling Law of recyclable materials instituting a fine structure
- Add additional materials to curbside recycling program
- Require all haulers to leave education tags for customers who set out improperly prepared items and/or contamination as part of the recycling enforcement program

5b. Multifamily Residential Waste Diversion Strategies

Table 5-9 Multi-family Residential Diversion Strategies

- Establish mandatory recycling requirement for all multifamily buildings
- Monitor multifamily properties to verify that adequate recycling is provided and is as convenient as garbage disposal
- Expand residential food and yard waste collection to multifamily properties (City of Kingston)
- Inform multifamily properties about bulky item recycling (at MRDCs)
- Adopt minimum requirements for space for recycling containers at new multifamily developments
- Increase recycling education to multifamily residents
- Provide apartment-sized recycling totes, bags or bins to multifamily dwelling units

5c. Commercial Waste Diversion Strategies

Table 5-10 Commercial Diversion Strategies

- Establish an overall mandatory recycling requirement for businesses to achieve by a prescribed date/year
- Expand inspection & enforcement program (Ulster County Mandatory Business and Commercial Property Waste Reduction and Recycling Program)
- Conduct/expand commercial and institutional waste audits
- Require commercial haulers to offer recycling service of all regulated recyclable materials and to add additional recyclable items
- Work with commercial haulers to offer residential garbage rates to businesses who generate <90 gallons/week
- Work with commercial haulers to implement weight-based commercial garbage rates (incorporates disincentive to dispose organics)
- Work with commercial haulers to establish a commercial food waste collection and composting program (pilot composting program at UCRRA Kingston Facility)
- Establish mandatory food scrap diversion in commercial waste
- Promote reusable transport packaging
- Develop a pesticide container recycling program
- Work with local businesses to promote green purchasing and business practices

5d. Food Waste Diversion Strategies

Table 5-11 Food Waste Diversion Strategies

- Increase availability of commercial food waste collection and composting (pilot composting program at UCRRA Kingston Facility
- Implement a commercial food waste disposal ban
- Implement a residential food waste disposal ban
- Enhance residential curbside organics collection to include all food waste (City of Kingston)
- Implement multifamily collection of food waste
- Adopt a permit requirement that states restaurants must have food waste collection space
- Provide technical assistance to commercial kitchens
- Establish new mandatory food scrap diversion in commercial waste
- Establish a commercial composting program with low tip fee (pilot composting program at UCRRA Kingston Facility)
- Investigate/potentially implement an anaerobic digestion program for organics processing, possible biofuels production

5e. C&D Debris Diversion Strategies

Table 5-12 C&D Debris Diversion Strategies

- Incentivize development of mixed C&D debris recycling facility
- Require C&D waste pre-processing for commingled material
- Ban PVC plastic packaging
- Implement a disposal ban on all (or specific types of) C&D waste
- Work with New York State to increase illegal dumping fines
- Create a larger difference between disposal tip fee and fee to deliver source-separated C&D waste
- Promote salvage and reuse swap sites (New Paltz Reuse Center, Habitat for Humanities, Craigslist, FreeCycle, etc.)
- Encourage market development for C&D materials
- Research feasibility of a take-back program for carpet
- Building & demolition permit to include a C&D reuse and recycling fee deposit (County and Town)
- Take-back program for used building materials at home product centers
- Residential collection of C&D waste (at MRDCs)
- Divert C&D from Solid Waste Transfer Station to C&D local recycling facilities (no Landfill)
- Pilot deconstruction and salvage projects
- Mandatory waste diversion plan for projects over a specified size
- Mandatory C&D recycling of 75 percent (example) including development of notification education and

verification of compliance

- Recycle 75 percent of construction, remodeling and demolition (CR&D) waste at projects with a permit value over $50,000 (numbers are provided as an example)

5f. Producer Responsibility, Disposal Bans and Disposal Fee Strategies

Table 5-13 Extended Producer Responsibility, Disposal Bans, Retail, and Advance Disposal Fee Programs

- Ban PVC plastic packaging
- Implement a commercial food waste disposal ban
- Implement a residential food waste disposal ban
- Establish a take-back program for product packaging by retail sellers
- Charge a fee on incandescent bulbs to fund fluorescent bulb recycling
- Enforce disposal ban for recyclables in commercial waste
- Establish a take-back program for used building materials at home product centers
- Establish a take-back program for carpet
- Establish a take-back program for electronic waste
- Enhance waste screening at landfill for exclusion of banned recyclables
- Encourage/mandate the use of reusable transport packaging
- Implement a compostable plastic bag mandate for yard waste and organics collection
- Establish a product ban for polystyrene to-go containers and single-serve foodservice
- Implement a take-back program for foam packaging – negotiate with the Association of Foam Packaging Recyclers
- Implement a packaging tax
- Establish/encourage an eco-labeling program in retail stores
- Encourage/mandate retailers to charge an advance disposal fee (ADF) on disposable shopping bags (or alternatively, provide a per-bag discount for shoppers who bring their own reusable bags)
- Implement a phased ban on plastics in food takeout containers and utensils/shift to compostable disposables
- Enforce landfill ban of recyclable materials

To achieve significant increases in diversion, the Agency would need to embark on systematic incremental planning that includes commitments from stakeholders to implement specified waste diversion strategies, as well as commitment on the part of local government to provide adequate enforcement.

6. Steps in Developing Diversion Projections

To determine the current and future waste diversion projections for Ulster County should conduct the following steps:

☐ Identify the current MSW and C&D composition by quantity and material types;
☐ Gather data on current diversion quantities by material type;
☐ Calculate current waste generation by summing the material quantities disposed with quantities diverted;
☐ Identify additional waste diversion programs by material type that are planned for implementation or could be implemented in the future;
☐ Divide the future planning period into five-year increments for further analysis;

☐ Calculate waste diversion for MSW, C&D and combined sectors for each of the five-year increments to develop waste diversion projections by material type;
☐ Apply a waste generation growth rate to the existing generation rate based on existing per-capita waste generation rates and agreed-upon population growth rates; and
☐ Project waste generation, disposal, and diversion quantities for the planning period.

7. Education Tactics

Educating stakeholders (in this case, government officials; MSW, C&D, and recyclable materials haulers, processors, and end-users; businesses; multifamily building owners/managers; the general public; etc.) about a zero waste approach to waste management is critical in order to obtain key stakeholder feedback and support. Developing a zero waste policy and getting it adopted, would most likely take at least a year. Once adopted, multiple education tactics should be implemented in order to educate the stakeholders in Ulster County. Education and outreach tools should be developed to focus on particular types of waste (such as food waste and C&D debris) as well as particular sectors (single-family, multi-family, commercial). Disseminating education might be done through:
☐ Website/Intranet/Internet (which can be used to convey various types of information as well as provide access to some of the other tools listed below);
☐ List serve or social marketing strategies like FaceBook, YouTube and Twitter;
☐ Email bulletin;
☐ Conferences/seminars/workshops to inform various sector representatives or specific waste collectors and processors of the zero waste plan;
☐ Fact sheets (e.g., detailing requirements of the policy, alternatives to disposal, commodity-specific fact sheets, etc.); and
☐ Technical assistance to businesses (e.g., waste audits).

It is suggested that, to the extent possible, all education and outreach materials be offered electronically in order to minimize waste and expenses. Also, it will be critical for the Agency to educate all stakeholders about the zero waste plan and provide periodic updates regarding the progress made with regard to the policy, so that the County's dedication to reducing waste and minimizing health and environmental impacts is conveyed.

8. Capital and Operating Expenses

The capital and operating expenses to implement a zero waste plan would be dependent on the breadth of the program, but would most likely be sizable, because a policy change such as this would be far-reaching and affect most sectors within the County. A zero waste plan would require dedicated staff time for policy development, increased education efforts (including designing and distributing education pieces, website development, site visits and audits, additional data tracking, etc.), and policy enforcement. The extent of the capital expenditures would depend on the level of involvement from the Agency and other stakeholders. Zero waste programs not only require policy, regulatory, and contractual changes be made, but also programmatic changes. If the Agency took a hands-on approach to making changes to its waste diversion programs (e.g., expanded its C&D program, expanded its yard waste composting program to include food waste, or subsidized the purchase of containers for volume-based collection for the City of Kingston, etc.), the capital expenses could be great.

However, if most program changes were implemented by the private sector, the Agency would have less capital expenditures. Regardless of the approach, a large capital expenditure for a zero waste campaign would be the ongoing promotional and education pieces. A successful zero waste program would inevitably reduce the amount of waste requiring disposal, thus reducing the operating expenses for long-haul transportation and tipping fees to the landfill.

While developing and implementing policies are most likely activities that are part of existing staff time, a zero waste policy would most likely require additional time and labor because of its scope and ongoing need for monitoring and enforcement. Many municipalities will also have to provide dedicated staff to specifically implement and maintain a zero waste program.

9. Implementation Requirements

If the Agency were to move forward with researching the zero waste concept, it may consider forming a task force or a “team” of stakeholders to consider the practicability and implications of such a plan. The steps required to implement a zero waste plan might include, but not limited to:

☐Research other communities that have implemented a zero waste plan to ensure all stages of the process are included;
☐Determine Ulster County’s current diversion rate;
☐Develop a diversion plan including a list of sectors and materials to target for diversion;
☐Develop diversion projections for the near future and for the long-term (e.g., twenty years);
☐Set goals and target dates for future waste diversion;
☐Inform stakeholders of intent to develop a zero waste policy;
☐Solicit stakeholder input;
☐Identify goals of the policy;
☐Develop the policy;
☐Inform stakeholders of the policy;
☐Present/adopt the policy;

☐Develop policy tools;
☐Educate stakeholders about policy tools;
☐Evaluate the effectiveness of the policy and supporting programs (ongoing basis); and
☐Enforce the policy (ongoing basis).

Based upon the Agency's review of waste diversion rates in several communities with successful recycling programs, we note that reaching diversion targets greater than 50 percent requires a strong commitment by the local government, participating municipalities, waste haulers, processors, and end-users, manufacturers, producers and retailers, and by the residents and businesses which generate waste.

One barrier to increasing diversion can be the lack of uniformity in program services and requirements throughout the County. The variety of recycling services offered can make it more difficult to assess the impact of program enhancements or to provide consistent technical assistance to businesses and residents. The adoption of certain minimum standards for recycling services could serve to standardize expectations in both urban and rural areas. Standardizing service levels could reduce costs to the Agency because technical assistance, education, promotional materials and programs could be provided to all users of the system. It should be noted that recycling alone will not increase diversion significantly. Nationwide, waste generation per person continues to increase each year. As a result, the proportion of waste being diverted has remained stagnant in many communities, while the volume of waste requiring disposal continues to grow.

10. Addressing Stakeholder Concerns

The implementation of a zero waste plan would most likely impact every sector of Ulster County. Stakeholders would include, but not be limited to, government officials; MSW, C&D, and recyclable materials haulers, processors and end-users; residents; business owners and managers; multifamily building owners and managers; product manufacturers, producers and retailers.

As mentioned in Section 6 – Implementation Requirements, the Agency may want to consider establishing a task force to discuss the concept of zero waste, determine diversion strategies, and consider the policy language and implications. One role of the task force would be to address concerns which may include, but not be limited to:

☐Resistance from residential, commercial, C&D and food waste stakeholders to mandatory bans of specific materials;
☐Concerns from City of Kingston, towns and villages regarding potential increase in duties to monitor recycling ordinances and/or disposal bans;
☐Concerns from contractors, developers, and business owners regarding perceived cost increases to comply with disposal bans (i.e., the need to provide multiple containers or dumpsters to divert multiple materials);
☐Concerns from product manufacturers and retailers regarding take-back programs; and

☐Concerns from haulers required to collect and haul an increased number of source-separated materials.

11. Benefits and Drawbacks

Implementing a zero waste plan has benefits as well as drawbacks, as outlined below.

11a. Benefits

The benefits of a zero waste plan to the County may include, but not be limited to, the following:
☐A reduction in MSW quantities transported and landfilled resulting in GHG emissions reduction.
☐Disposal bans and recycling ordinances increase the quantities of materials recycled and diverted from disposal.
☐Packaging bans and incentives to buy in bulk can lead to increased waste diversion.
☐Products and services that use fewer resources (such as water and energy) save natural resources.
☐Expanded materials processing and markets create new business opportunities.
☐EPP programs increase the demand for recycled materials to be used as feedstock for recycled-content products.
☐When held accountable for the materials they produce, manufacturers have an incentive to create less waste. Promotes designs that consider the entire product life cycle.
☐An overall increase in awareness of recycling and environmental-related issues and a potential move towards increased sustainability.
☐A reduction in hazardous waste, toxic emissions, and energy waste.

11b. Drawbacks

The drawbacks to implementing a zero waste plan would most likely be financial. Increased staff time and resources would be needed to develop a zero waste plan and policies; track the County's diversion rate; increase outreach, education and technical assistance efforts; and enforce the policies, bans and ordinances. In addition, it may be difficult to obtain support from community leaders and stakeholders regarding the zero waste concept.

As stated in previous sections, when considering the "cost" of recycling and waste diversion programs there are both "economic" considerations and "non-economic" considerations. Under economic considerations, the County must take into account the reduction in revenue from tipping fees received at the Ulster and New Paltz Transfer Stations as a result of a successful zero waste program. Also, the cost of a zero waste program should be compared with the cost of landfill disposal, including transportation costs and long-term disposal obligations. For "non-economic" considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling and waste diversion, and New York State Rules and Regulations. These factors should all be considered as the Agency formulizes its integrated solid waste management planning efforts.

12. Resources

Provided below is a list of program information which will assist the Agency in its waste reduction program efforts.

☐City of Austin, Texas – Zero Waste Plan
http://www.ci.austin.tx.us/sws/0waste.htm
☐GrassRoots Recycling Network
http://www.grrn.org/zerowaste/
☐Metro Portland study "Impact of Mandatory Recycling Ordinances and Disposal Bans on Commercial Fiber Recycling," by Moore & Associates.
http://www.oregonmetro.gov/index.cfm/go/by.web/id=19318
☐City of Oakland, California – Zero Waste Resolution and Strategic Plan
http://www.zerowasteoakland.com/Page749.aspx
☐Product Stewardship Institute
http://www.productstewardship.us/index.cfm
☐RecycleBank
https://www.recyclebank.com/
☐San Francisco, California – Zero Waste Legislation and Initiatives
http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org
☐Zero Waste Alliance
http://www.zerowaste.org/
☐Zero Waste International Alliance
http://www.zwia.org/index.html

12a. Green Building Resources

☐BREEAM
http://www.breeam.org/
☐Green Globes
http://www.greenglobes.com/
☐U.S. Green Building Council
http://www.usgbc.org/Default.aspx
☐World Green Building Council
http://www.worldgbc.org/home

12b. Examples of Recycling Ordinances and Disposal Bans

☐City of Cambridge, Massachusetts
http://www.cambridgema.gov/TheWorks/departments/recycle/ordinance.html
☐Central Vermont Solid Waste Management District
http://www.cvswmd.org/wp/cvswmd-to-amend-surcharge-ordinance/
☐City of Durham, North Carolina
http://www.ci.durham.nc.us/departments/solid/pdf/ordinance.pdf
☐City of Gainesville, Florida
http://www.cityofgainesville.org/GOVERNMENT/CityDepartmentsNZ/Recycling/MandatoryCommercialRecycling/tabid/488/Default.aspx
☐Lee County, Florida
http://www3.leegov.com/solidwaste/uploads/Final_Scanned_Ordinance.pdf
☐Linn County, Iowa – Corrugated Cardboard Recycling Ordinance, Chapter 35

http://www.linncounty.org/content.asp?Page_Id=836&Dept_Id=6
☐Nova Scotia, Canada
http://www.gov.ns.ca/nse/waste/regulations.asp
☐City of Portland, Oregon
http://www.portlandonline.com/osd/index.cfm?c=47899&
☐San Francisco, California
http://www.sfenvironment.org/downloads/library/mandatory_pdf.pdf
☐Solid Waste Association of North America (SWANA) Technical Policy on Solid Waste Disposal Bans

5.2.2 PUBLIC EDUCATION AND PROGRAM ENHANCEMENT

5.2.2.1 Environmentally Preferable Purchasing and Recycled-Content Procurement Policies

1. Definition and Purpose of EPP

Environmentally preferable purchasing (EPP) is a practice that encourages communities to purchase materials and services that, in some way, are preferable to the environment and/or to human health, relative to "traditional" materials and services that serve the same purpose. EPP policies are implemented at the state, local, and federal level, as well as by individual businesses. Policies often focus on encouraging the purchase of recycled-content materials, but can also encourage the purchase of products that:

- Result in lower toxicity;
- Reduce greenhouse gas emissions;
- Are made with renewable energy;
- Contain the highest possible percentage of post-consumer recycled-content;
- Reduce air and water pollution;
- Reduce waste (e.g., by being reusable, lasting longer, or serving several functions);
- Are manufactured by suppliers who have adopted EPP and can document their supply chain and impacts of their efforts; and
- Are recyclable or compostable.

EPP policies can be implemented in part or in whole through state or local ordinances, executive orders, resolutions or policies (such as company or institutional policies). Ordinances have more "teeth" than resolutions. Policies are also often seen as less mandatory than ordinances. In some cases environmentally preferable purchasing is just one activity that supports a more broad sustainability policy. National, state and local governments as well as businesses and institutions can facilitate EPP through the use of various tools that assist local governments, residents, and businesses in identifying opportunities to "buy green."

Per Executive Order 13101[1], "environmentally preferable" means products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service. Many states and local governments have based their definition of EPP on the federal definition. The federal government sees the benefits of an EPP program to include:

- Improved ability to meet entity's environmental goals and/or ethics;
- Improved worker safety and health;
- Reduced liabilities;
- Reduced health and disposal costs; and
- Increased availability of environmentally preferable products in the marketplace.

Other potential benefits of an EPP program are:

- Reduced energy use;
- Strengthened markets for recycled materials;
- Reduced costs due to decreased use of water, energy, or due to the use of more durable items and reduced disposal costs;
- The potential to increase local reuse/recycling markets and the use of locally manufactured or remanufactured products, thus improving the local economy; and
- The opportunity to enhance an entity's image through the implementation of environmentally beneficial activities and programs.

1 Source: Office of the Federal Environmental Executive, Executive Order 13101, September 1998. http://www.ofee.gov/eo/13101.asp

2. Implementation Requirements

Implementation of EPP would require the adoption of an EPP policy – either through resolution, ordinance, executive order or a combination thereof. When considering stakeholders to include in the policy development and implementation process, it is important to remember that not all purchasing entities have knowledge about the environment, health, and the potential impacts certain materials can have on human health and the environment. Similarly, the stakeholders that have knowledge about potential environmental and health impacts of products may not know of the availability of products and performance requirements. Therefore, it would be beneficial to form a "team" of stakeholders to consider the policy language and implications. Many state and local governments form "green teams" when developing their EPP policies, to ensure that environmental, purchasing, and product expertise are all incorporated in the process. The steps typically required to implement an EPP program include:

- Inform stakeholders of intent to develop the policy;
- Solicit stakeholder input;
- Identify goals of the policy;
- Develop the policy;

- Inform stakeholders of the policy;
- Present/adopt the policy;
- Develop policy tools;
- Educate stakeholders about policy tools; and
- Evaluate the effectiveness of the policy and supporting programs (ongoing basis).

Stakeholders that the Agency might consider involving in the process include:

- Individuals responsible for making purchasing decisions;
- End users of products that would be considered for inclusion in the EPP program;
- Manufacturers of qualifying products;
- Individuals that are knowledgeable about the environmental and health benefits of environmentally preferable products and services;
- Local economic development specialists; and
- Individuals who are knowledgeable about the existence and suitability of environmentally preferable products and services.

3. Policy Considerations

There are several options the Agency should consider when deciding on the details of an EPP policy. They include:

3a. Include Source Reduction Strategies

Many EPP policies stipulate that agencies should include waste minimization efforts when possible. Generally these policies are geared toward avoiding the consumption of natural resources, as well as cost savings. Examples include:

- Using email instead of printed correspondence when possible;
- Printing on both sides of paper;
- Streamlining forms;
- Purchasing rechargeable batteries;
- Printing reports as requested instead of anticipating demand;
- Choosing durable, long-life products (in lieu of disposable – including dishes, utensils, glasses, etc.);
- Leasing or sharing equipment that is not used frequently;
- Buying in bulk, when storage is available;
- Reducing the weight of products (e.g., using lighter weight paper when appropriate or buying cleaning products as concentrates and diluting on-site, etc.); and
- Reusing items as much as possible (such as file folders, office furniture, etc.).

There are many opportunities for agencies, offices and departments to purchase refurbished items or have items they currently own refurbished instead of purchasing new items. It is often suggested that departments consider refurbished items as long as the practice is compatible with safety, quality, and cost goals. Examples include:

- Carpet tiles – replace the soiled or worn tiles only, instead of the entire area;

- Remanufactured toner cartridges – many communities not only decrease the amount of plastic disposed, but also save money by refurbishing toner cartridges;
- Re-treaded tires instead of new tires;
- Refurbished furniture;
- Re-refined antifreeze and oil; and
- Refurbished office equipment.

It is important that equipment purchased by departments and agencies is compatible with waste minimization efforts – for example, that copy machines and printers are capable of easily printing on both sides of paper.

3b. Consider Ownership Costs Instead of Initial Purchase Costs

In some cases, products and services that offer environmental benefits may appear to be more costly, however the initially higher purchase cost is offset by lower maintenance and upkeep costs and/or a longer product lifespan. One example is artificial turf, which is costly to install but can be more cost-effective when lower maintenance costs are considered. Similarly, hand dryers may be more costly to purchase than paper towel dispensers, however they eliminate the need to purchase and dispose of paper towels, as well as eliminate the labor required to re-stock the dispensers and clean-up and dispose of used paper towels. When considering ownership costs, one should consider all costs incurred during the useful life of the item, including:

- Initial acquisition costs;
- Warranty costs;
- Operation costs;
- Maintenance costs; and
- Disposal costs.

Costs for options should be compared for the same time period. The term "lifecycle costs" refers to a more complex calculation, including costs from resource extraction, production, material use, and disposal. It is not common practice to consider lifecycle costs in EPP programs.

3c. Recycled-Content Products

Most EPP policies include some type of recycled-content procurement policy. The U.S. EPA guidelines provide suggested recycled-content levels for various types of products. For example, the EPA suggests that many types of printing and writing papers (reprographic paper, offset paper, tablet paper, forms bond, envelope paper, cotton fiber paper, text and cover papers) contain 30 percent post-consumer fiber. Some types of paper (white and colored, machine finish, groundwood, and check safety paper) should contain 10 to 20 percent post-consumer fiber.

The guidelines can be found at the following website:
http://www.epa.gov/epawaste/conserve/tools/cpg/products/index.htm.

The U.S. EPA indicates that the following items are commonly purchased products that contain recycled-content:

- Carpet
- Concrete
- Engine coolants
- Office products
- Paper
- Parking stops
- Plastic lumber
- Re-refined motor oil
- Retread tires
- Toner cartridges
- Traffic cones
- Trash bags

3d. Consider Attributes Beyond Recycled-Content

Several state and local governments have EPP policy directives that specifically focus on material attributes other than recycled-content (although also include recycled-content directives). Examples (some of which may overlap with each other) include:

- Pollutant releases;
- Waste generation;
- Energy consumption/efficiency;
- Depletion of natural resources;
- Potential impact on human health and environment;
- Greenhouse gas emissions;
- Recyclability;
- Durability;
- Toxic material content (for example, low-VOC, dioxin-free, chlorine-free, etc.);
- Reduced packaging;
- Reduced transportation (e.g., sourced locally);
- Made of renewable resources (including energy);
- Bio-based;
- Biodegradable;
- Carcinogen-free;
- Persistent Bioaccumulative and Toxic (PBT)-free;
- Heavy metal-free (i.e., no lead, mercury, cadmium); and
- Reduced pollutant releases.

Many state and local governments direct purchasing entities to consider some of these product characteristics when making purchasing decisions and developing request for bids (RFBs) for products and services.

2 U.S. EPA, "State and Local Government Pioneers: How State and Local Governments are Implementing Environmentally Preferable Purchasing Practices," November 2000.

3e. Consider Other Departments' Specification Requirements

Specific departments often have very specific product needs. For example, in most counties and states the Department of Transportation (DOT) is required to specify products, such as aggregate, etc., to be used for a project. DOTs have expertise in the area of road and highway construction, and contractors must use what the DOT specifies in order to fulfill the requirements of the project. If a city or county wanted to incorporate the use of more recycled materials (such as recovered aggregate, asphalt containing recycled glass cullet, rubber-derived asphalt, recycled-content parking stops, etc.) they should work with the specifying agency in order to identify opportunities for rewriting specifications. Local DOTs sometimes adopt specifications from other local entities if projects have a positive history and assuming weather and soil conditions in the neighboring jurisdiction are similar. Similarly, some local jurisdictions may adopt specifications developed by the state DOT. Often state DOTs have more resources available for alternative material testing. When developing EPP specifications it is important that the needs of specific purchasing entities are incorporated into the specifications.

3f. Price Preference

Many communities include a price preference into their EPP polices – e.g., such that environmentally preferable products can still be considered to be cost-effective if their price is within a certain range (usually 5 to 15 percent) of the "traditional" goods or service. According to a U.S. EPA document2, some officials believe that price preferences can actually limit the market penetration of green products by encouraging prices for green products to remain higher than those of traditional products. The intent, however, is to provide leeway (or directive) for an agency or department to select a "green" product over a traditional product, even if the pricing is somewhat higher than a traditional product, due to the fact that some environmental and/or health benefit is derived from the product's use. Others cited in the EPA document indicated that they were not mandated to purchase the environmentally preferred product, so they simply made decisions based on price. In other words, only those making purchasing decisions that are committed to promoting EPP took advantage of the price preferential. Other communities indicate that they simply specify the type of product the department seeks to purchase (e.g., describing its environmentally preferable characteristics, such as low-toxicity cleaning products) and the price factor becomes irrelevant, as the lower-cost products that do not meet the other specifications can simply be disregarded.

3g. Provide Clarity Regarding Potential Concerns about EPP Policy

There are concerns and fears about EPP policies from the perspective of purchasing agencies, which are discussed in more detail below. The County should consider including limitations to the EPP policy, or verbiage to counteract such concerns, in the EPP Policy. For example, California's definition of EPP is very similar to the federal government's definition; however California's statute provides clarity on potential concerns about EPP. It states explicitly that EPP cannot supersede recycled-content laws, require purchase of poorly performing goods, exclude adequate competition, or require unreasonable prices or lead times. Similarly, in order to alleviate fears of "greenwashing" (the dissemination of false information pertaining to EPP

issues), some states use environmental specifications developed by a third-party certifier. Pennsylvania, for example, reportedly uses Green Seal's standards when purchasing paint, degreasers, and cleaning products.

3h. Incentive Programs

Some local and state governments participate in or establish their own incentive or award programs to encourage the environmentally preferable purchasing decisions. Such reward programs are critical to promoting the program, stressing the benefits of the EPP policy, recognizing the hard work and successes that have stemmed from the program, and generating enthusiasm and encouragement for others to consider and implement EPP options. One existing program that the County might consider participating in is the National Association of Counties (NACo) Environmental Achievement Awards Program. Examples of incentive programs that other communities have implemented include:

- Providing staff bonuses and an "employee of the month" program for EPP involvement (Lee County, Florida's vehicle fleet management);
- Including environmental performance as part of the annual review process for city department directors and management staff (Phoenix, AZ, pilot program);
- "On-the-Spot" award program, for employees that recommend ways to improve environmental performance (Phoenix, AZ);
- "Lead by Example" program that provides grant funding for agencies to try new, environmentally preferable products (MA DEP and Hennepin County, MN); and
- Requiring communities to establish EPP program in order to be eligible for recycling implementation grant funds (MA DEP).

4. Capital and Operating Expenses

Implementing an EPP policy is not expected to require capital expenditures, however will likely require some staff time. Simply developing and implementing a policy are activities that may be part of existing staff time, requiring no additional expenditures. However, it is possible that involving stakeholders, developing tools, and possibly evaluating the policy on an ongoing basis may require additional resources, such as additional staff time, possible use of consultants, and costs associated with holding stakeholder meetings, if desired.

5. Education Tactics

Educating stakeholders (primarily purchasing entities) about a County-wide EPP program before the policy is implemented is critical, in order to obtain key stakeholder feedback and support. Once the policy has been adopted, multiple education tactics should be implemented in order to educate County agencies, departments, and offices regarding:

- Requirements of the policy;
- Expected benefits of the policy;
- Resources available (including state purchasing contracts that local governments may be able to participate in);
- State and County purchasing contracts;

- Product specifications;
- Technical assistance; and
- Model EPP policies for companies to adopt.

Education and outreach tools can be developed to focus on particular types of products (such as cleaning products) or particular types of settings (such as an office, where multiple types of products might be discussed, such as copy and print paper, ink and toner cartridges, computers and janitorial paper, and cleaning products). Disseminating education might be done through:

- Website/Intranet/Internet (which can be used to convey various types of information as well as provide access to some of the other tools listed below);
- List serve;
- Email bulletin;
- Conferences/seminars/workshops (e.g., to inform purchasers of the policy, provide a forum for manufacturers and distributors of environmentally preferable products to interface with purchasers and perhaps demonstrate their products);
- Fact sheets (e.g., detailing requirements of the policy, alternatives to specific toxic or wasteful commodities, or industry-specific fact sheets);
- EPP product and services directory (to let purchasers of particular items know what vendors are available);
- Technical assistance (e.g., potential users/purchasers of a product may need assistance in identifying environmentally preferable options, and determining whether the product(s) will be suitable for their needs. Often state or county agencies assist in providing technical assistance to demonstrate the suitability of a product through demonstration sites, case studies or product testing, for example.); and
- Information about County or state contracts (so that individual agencies can "join in" on the state or County contracts to obtain favorable pricing).

It is suggested that, to the extent possible, all education and outreach materials be offered electronically in order to minimize waste and expenses. The primary audiences for the education and outreach would be those who make purchasing and specification decisions in County departments, offices and agencies. A secondary audience would be private businesses that wish to obtain EPP products and services. Some education tactics might be relevant to the general public – citizens who desire to minimize their environmental impact through their individual purchasing decisions. Also, it is beneficial for the County to educate businesses, institutions and individuals about the County's EPP policy and progress made with regard to the policy, so that the County's dedication to minimizing health and environmental impacts is conveyed.

6. Diversion Potential

There are many potential benefits to an EPP policy, as described above. While the potential to divert waste is not expected to be the primary benefit of an EPP policy, it can indeed be one of the benefits of such a policy. Waste can be diverted, for example, through the purchase of more durable or upgradeable products, purchasing goods with reduced packaging or in bulk, using locally generated materials (such as yard waste for mulch rather than disposing of it and

purchasing mulch elsewhere). It can also result in the disposal of less toxic waste, which can reduce disposal costs and reduce environmental and health risks at the landfill. Some EPP policies also include waste reduction measures. For example, one of the goals of Rutgers University's "Green Purchasing Policy and Guidelines" is to "reuse packing materials and plastic bags." Another goal is to "turn used paper into scratch pads for distribution to departments on campus." Their Green purchasing policy also includes several goals to recycle specific types of items (ink and toner cartridges, fluorescent bulbs, mercury- type bulbs, wood pallets, lead acid batteries) which increases the amount of waste the University diverts from disposal.

7. Case Studies

Provided below are two county EPP case studies (King County, WA and Alameda County, CA) and one state (New York) case study.

7.1 King County, Washington

7.1.1 Introduction

King County, Washington, first implemented its EPP policy in 1989, in hopes of strengthening markets for newly collected recycled materials. In 1995 the program was expanded, in order to target other environmentally preferable products. The county expanded the policy to consider multiple product attributes, including:

- Toxicity;
- Durability;
- Emissions;
- Energy efficiency;
- Recycled-content; and
- Conservation of natural resources.

In addition, the policy considers:

- Price;
- Performance; and
- Availability of the product.

King County's EPP Program is mandatory for all county agencies, offices and departments, as well as contractors. Through the program, county personnel are provided with information and technical assistance to help them identify, evaluate, and purchase economical and effective environmentally preferable products and services. In 2007, the county estimates that their agencies purchased $41 million worth of environmentally preferable products and services. The largest purchases of EPP products (in terms of total expenditures) included:

- Ultra-low sulfur diesel ($22.8 million);
- Biodiesel ($8.2 million);
- Recycled-content paper and paper products ($3.7 million); and
- Computers ($3.4 million).

It is estimated that EPP purchases resulted in cost savings of $875,000 over the purchase of conventional products. Estimated cost savings include:

- Aggregates (avoided purchase costs for reuse of asphalt and concrete that are stockpiled, then used as fill material in road projects) – $300,000;
- Toner cartridges – $275,000;
- Tire re-treading – $275,000;
- Antifreeze – $17,000; and
- Plastic lumber – $10,000.

7.1.2 Policy Highlights

The King County's EPP Policy highlights include requirements that all departments, offices, and agencies:

- Use, and require their contractors and consultants to use, products manufactured with the maximum practicable amount of recovered material, especially post-consumer material.
- Use, and require their contractors and consultants to use, environmentally preferable products whenever cost effective and to the extent practicable.
- Establish a price-preference of up to fifteen percent (15%) for recycled paper products and up to ten percent (10%) for re-refined lubricating oil.
- Ensure that they and their contractors use recycled paper in printed material, and that it bears an imprint identifying the recycled-content of the paper, whenever practicable.
- Ensure that they and their contractors use both sides of paper sheets whenever practicable.
- May specify recycled-content at levels higher than the minimum content standards.

Under the Policy, the Purchasing Agency and Solid Waste Division are responsible for providing departments with information to facilitate their evaluation and purchase of designated products, and to inform them of their responsibilities under the policy. They are also responsible for revising minimum standards as necessary, to ensure consistency with the other government entities, ensure that EPP are designated whenever practicable, transmit minimum content standards to departments, and provide an annual report to the county council. The county departments, offices and agencies must assign staff to:

- Ensure that contracting procedures do not discriminate against recycled products without justification;
- Evaluate each designated product to determine the extent to which it may practicably be used by the agency and its contractors;
- Revise contracting procedures to maximize the specification of designated products whenever practicable;
- Compile data on the purchase of designated products by the agency and its contractors; and
- Provide evaluation results and procurement data to the Purchasing Agency by July 30 each year for inclusion in the annual report to the county council on the status of policy implementation.

7.1.3 Tools Utilized

In order to inform county agencies, suburban cities, and the community-at-large about opportunities to purchase environmentally preferable products, the county focuses on the dissemination of information and technical assistance. Specific tools include:

- Educational Seminars – The Agency provides seminars on specific opportunities for EPP.
- Environmental Purchasing Bulletin – The Agency produces electronic "Environmental Purchasing Bulletins" to share information about EPP products, events, contracts, etc. There are over 1,000 direct email recipients of the Bulletin. Past Bulletin topics included:
    - Greenwashing;
    - Porous Concrete;
    - Green Procurement Case Studies;
    - Natural Vegetation Management (use of goats); and
    - Hybrid Bus Purchase.

An index of past bulletins is available at the following Website: http://your.kingcounty.gov/procure/green/bulindex.htm.

- Waste Prevention Forum – An online discussion group managed by the King County Solid Waste Division, and part of the National Waste Prevention Coalition.

- Website – Through the county's website, the Purchasing Agency shares information with county departments, offices and agencies. The Agency keeps in contact with many communities throughout the nation, and stays abreast of EPP issues through several Internet discussion groups. The website includes information about green building, EPP products, contact information for local vendors, some case study information regarding EPP products, and links to other resources for additional information. King County EPP staff also serve on the steering committee for the Responsible Purchasing Network, which has a mission to promote environmentally preferable purchasing policies.

- Annual Report – Agencies, Offices and Departments are required to report EPP activities, (environmentally preferable materials purchased, quantities purchased, dollar amount spent, and any cost savings realized over traditional materials) to the Purchasing Agency by July 30. The Purchasing Agency compiles a report for the county council on the status of policy implementation. The 2007 Report is available online at http://your.kingcounty.gov/procure/green/2007annrep.pdf.

- Technical Assistance – The EPP Program staff provides policy development and implementation strategies to other jurisdictions, businesses, and non-profit agencies. The program staff also assists buyers and user agencies in the development of specifications and contracts, and provide technical assistance to facilitate evaluation and adoption of environmentally preferable products and applications by county agencies. In addition, the staff researches and communicates information about price, performance, availability and potential benefits of environmentally preferable products.

- Supply Contracts – The county negotiates contracts for EPP products and services. Local governments within the county and non-profit entities are eligible to use the contracts.

7.1.4 Materials Targeted

Materials that are highlighted as EPP materials include:

- Recycled-content paper;
- Remanufactured toner cartridges;
- Refined antifreeze and motor oil;
- Ultra-low sulfur diesel;
- Biodiesel fuel;
- Hybrid Vehicles;
- Bio-based oils;
- Plastic lumber;
- Compost;
- Shredded wood waste; and
- Tire re-treading services.

7.2 Alameda County, California (Partnering with StopWaste.Org)

7.2.1 Introduction

The Alameda County Waste Management Authority and Recycling Board (also known as StopWaste.Org) is a joint powers authority that is controlled by two boards. The county itself has not passed an EPP policy specifically, but has passed several ordinances and policies which relate to and encourage EPP activities. StopWaste.Org has passed their own EPP policy which governs them as a public agency, and has developed a model policy which seven of their 14 member agencies have adopted.

StopWaste.Org had been focusing on buying recycled-content products, but in 2003 made a push to further their involvement in EPP. The Agency works with their members, including the county and municipalities within the county, to help implement EPP programs, as described below.

7.2.2 Policy Highlights

Alameda County has adopted a vision which has five areas (one being environment and sustainability) and goals and strategies pertinent to each area. For example, one goal for county operations and services is to "Ensure that the county's operations and services are consistent and comprehensive in prioritizing environmental protection." Another goal is to "Demonstrate a commitment to environmental stewardship in county policies." The county's General Services Agency (GSA)'s comprehensive sustainability efforts include actions to:

- Fight global climate change;
- Produce clean energy and conserve energy;
- Reduce waste, reuse, recycle and compost;
- Build and operate green buildings;
- Reduce toxics; and

- Purchase alternative-fuel vehicles and environmentally preferable products.

The County's GSA has undertaken several efforts regarding EPP which have resulted in the annual purchases of over $20 million in goods annually with environmental specifications. The county sees incorporating EPP criteria in purchasing decisions (at both the county and private-sector levels) as vital to helping the county achieve their goal of 75 percent waste diversion. (The current rate of waste diversion is 50 percent.) The county indicates that they have included environmental specifications when purchasing paper, furniture, computers, janitorial supplies, and vending machines.

The county has passed several policies/legislation regarding EPP including:

- Resolution No. 2008-213 – Resolution Establishing a Goal of 75 percent Reduction in Waste Going to Landfills by 2010 for Unincorporated Areas and Civic Operations of the County of Alameda. This is the mission of StopWaste.Org, which has been successful in getting all member agencies to pass resolutions establishing a goal of 75 percent waste reduction.

- Green Building Ordinance – Adopted in 2003, this ordinance states that all county projects must be built to a minimum U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Silver standard and divert construction debris from the landfill. StopWaste.Org has been successful in encouraging many member agencies to pass similar ordinances for civic projects. Some grant funding is dependent upon their passing this ordinance.

- Persistent Bioaccumulative Toxins Resolution – Adopted in 2002, this resolution requires elimination or reduction of PBTs, such as mercury, lead, and dioxins, through purchasing and disposal standards.

- Bay-Friendly Landscaping Resolution and Integrated Pest Management Resolution – Adopted in 2008 and 2001 respectively, these resolutions require a whole systems approach to pest management, where chemicals are a last resort for pest prevention, both indoors and out.

These policies are in compliance with and support the county's Climate Change Leadership Strategy and the county's Strategic Vision. Highlights of the Waste Reduction Resolution include:

- The Community Development Agency is to provide practicable assistance to local waste and recycling service providers to help them reach the 75 percent goal in unincorporated areas;

- The Board of Supervisors directs the General Services Agency to develop strategies to achieve the 75 percent goal for county operations in cooperation with all employees and agencies, which will be measured through internal inventories;

- All agencies will report annually on their efforts to minimize waste generation and promote recycling within their agencies and for services provided to them by outside contractors;

- County employees are expected to recycle and reuse all materials for which recycling programs are available, and consider the full lifecycle of products when using materials; and

- The county will partner with StopWast.Org, recycling companies, local businesses, and sustainability advocates to strengthen the county's economy by stimulating sustainable local enterprises that use discarded products and to develop strategies to advance "upstream" waste prevention strategies such as product redesign, process re-engineering, and low-impact lifestyles.

The ultimate goal of the resolution is for the county to review adopting a Zero Waste goal once the 75 percent goal is achieved.

7.2.3 Tools Implemented

StopWaste.Org's website, www.stopwaste.org, provides many resources that are well-suited for member agencies as well as private businesses. They may also benefit other local governments that are not agency members and provide additional assistance. The resources provided by StopWaste.Org include:

- Product Guides – The county has developed specific product guides and vendor contact information for specific types of EPP products, including:

- Compostable food service and kitchen products; and

- Recycled paper.

- Fact Sheets – The County has published fact sheets regarding different types of materials that can be considered in an EPP Program, and provides information regarding what to look for in the product (e.g., toxicity level, percent post-consumer content, etc.) and specifications. Several fact sheets appear to be county-specific (e.g., "How to Purchase Recycled Paper in Alameda County"), however even those fact sheets contain information of value to those located outside the county.

- Model Policy – The County has developed a model policy that is available online. The policy is intended to be used by local governments and businesses. This Model Policy is provided as Appendix B to this report.

- Guide to Green Maintenance and Operation – This publication describes how and why to implement green maintenance and operation practices. Specific topics discussed include

lighting, paint, flooring, furniture, appliances, water-efficient products, mechanicals (HVAC maintenance), janitorial cleaning and supply products, and landscaping.

- Technical Assistance – StopWaste.org provides technical assistance to businesses and agencies as well as municipal governments to help them identify and implement strategies to implement EPP policies and minimize waste.

- Information about State and Other Programs – StopWaste.Org provides information about upcoming state and regional conferences and events relating to EPP and often pays registration fees for member agencies. One example is a green building conference, West Coast Green. Another example is partnering with the Association of Bay Area Governments, a nine-county organization that will host an EPP workshop in the spring. StopWaste.Org will help sponsor the event and will pay the registration fee for member city purchasers.

- Workshops – From time to time, StopWaste.Org will host workshops for member agencies and private businesses where EPP vendors can discuss the benefits of their products to potential products. Past products highlighted have been rubber sidewalks and green building products.

In addition to the StopWaste.Org activities, the county develops county contracts that support EPP. In many cases member cities can be included in the contract.

7.3 The State of New York

7.3.1 Introduction

New York's governor signed Executive Order No. 4, "Establishing a State Green Procurement and Agency Sustainability Program," in April 2008. The Order directs state agencies, public authorities and public benefit corporations to "green" their procurements and to implement sustainability initiatives. The Order established an Interagency Committee on Sustainability and Green Procurement that is co-chaired by the Commissioner of General Services and the Commissioner of the Department of Environmental Conservation. The Interagency Committee is charged with identifying an annual list of product categories and specific products and services for which specifications will be developed and issued for greener procurements. The Committee is also charged with establishing goals for reductions in the amount of paper used and solid waste generated, and with the development of coordination, reporting and training programs to support agency sustainability efforts. The final list of product and service categories, issued in September 2008, includes:

Electronics/Appliances:

Desktop computers	Washers (domestic and commercial)
Laptop computers	Vacuum cleaners
Copiers	Dishwashers (domestic and commercial)

Room air conditioning	Printers (network and multifunction)
Refrigerators	

Transportation:

Traffic safety equipment	Asphalt mixes
Traffic Paint	Concrete
Glass Beads	Engine block heaters
Treated road salt	Re-refined motor oil
Passenger vehicles	Re-refined hydraulic oil
Aggregate for road construction	Traffic message boards

Office and Building Operations:

Toner cartridges	Drinking water fountains
Printing services	Pest management
Carpet	Cleaning products
Fluorescent lamps (compact and traditional)	Recyclables collection and disposal service
Interior paint	Turf management

In addition, there have been additional policies passed that relate to EPP. They include:

- Executive Order Number 142, "Establishing New Waste Reduction and Recycling Initiatives for State Agencies," which was passed in 1991; and

- Executive Order Number 134, "Directing State Agencies to Reduce the Impact of Cleaning of State Facilities," which was passed in 2005.

The New York State Department of Transportation (NYSDOT) also has a Solid and Hazardous Waste Reduction Policy in place, which was implemented in 1999. The policy expresses DOT's commitment to reducing waste and pollution by:

- Source reduction (eliminating or reducing the volume and toxicity of waste through good operating practices, product substitution, and procedure substitution);
- Reuse and Recycling (reusing material for its original purpose, or recycling when reuse is not possible);
- Using recycled-content products in all DOT projects "where reasonable and feasible;" and

- Implementing a preferred management hierarchy for waste management. The hierarchy is:
- Source reduction;
- Recycling;
- Energy recovery;
- Treatment; and
- Disposal.

The types of programs implemented by NYSDOT that support the DOT's EPP Policy include the use of:

- Environmentally friendly solvents for cleaning pavement-marking painting equipment;
- Eliminating the use of chlorinated solvents (e.g., for degreasing);
- Using reduced VOC traffic marking and bridge paints;
- Reducing the use of herbicides;
- Reducing the use of salt;
- Purchasing recycled products such as:
- Paper;
- Lead-acid batteries;
- Re-tread tires;
- Antifreeze;
- Lubricating oil; and
- Plastic cones.

7.3.2 Policy Highlights

Highlights of Executive Order Number 4 include:

- Establishes an interagency committee on sustainability and green procurement.

- Charges the Committee with selecting a minimum of three "priority categories" and products and services within those priority categories for which the Committee will develop "green procurement lists." The Committee is directed to focus on goods and services that will:

- Reduce or eliminate the health and environmental risks from the use or release of toxic substances;

- Minimize risks of discharge of pollutants into the environment;

- Minimize the volume and toxicity of packing;

- Maximize the use of recycled-content and sustainably-managed renewable resources; and

- Prove other environmental and health benefits.

- Charges the Committee with developing procurement specifications and new solicitations for priority commodities, services and technology. The Committee is to consider the

specific product attributes, including reduction of greenhouse gases, waste reduction, recyclability, durability, and others.

- Charges the Committee with establishing specific waste reduction goals and strategies.

- Stipulates that each state agency and authority shall develop and implement a sustainability and environmental stewardship plan.

- Stipulates that all copy paper, janitorial paper and other paper supplies purchased by each State agency or authority shall be composed of 100 percent post-consumer recycled-content to the maximum extent practicable, and shall be chlorine-free to the extent practicable.

- Stipulates that all public agencies and authorities shall use 100% post-consumer recycled paper for publications, to the extent practicable, or non-recycled-content should be from sustainably-grown trees.

- Directs state agencies and authorities to rely on and use the procurement lists and specifications issued by the Committee when developing new solicitations and contracts for the procurement of commodities, services and technology, unless there are cost or function issues or a compelling emergency.

- Directs state agencies and authorities to implement effective programs to source separate recyclable materials, to the extent practicable, as well as waste reduction programs, and to use locally available compost, mulch and soil amendments from recovered materials and recovered materials in construction.

- Stipulates that State agencies and authorities must assign an employee to serve as a sustainability and green procurement coordinator.

- Directs that the Committee shall design and implement training and outreach programs for coordinators.

- States that the Committee must develop a format for a progress report to be used by State agencies and authorities.

- States that each state agency and authority shall annually submit a progress report to the Committee describing the agency/authority's efforts and progress regarding green procurement, waste reduction, etc.

- Stipulates that the Committee must submit a report to the Governor each year compiling the information submitted by state agencies pursuant to Executive Order 4.

- Calls for the formation of a Sustainability and Green Procurement Advisory Council, consisting of 11 members appointed by the Governor who have experience in the fields of green procurement, public health, waste prevention and recycling, energy efficiency,

workplace safety, labor relations, environmental protection, environmental justice, or chemical manufacturing.

7.3.3 Tools Utilized

New York State has utilized the following tools in order to implement their Green Procurement Policy:

- Development of Product Specifications – The Committee has developed specifications for purchasing many priority materials. Three specifications have been finalized (computers, engine block heaters, and passenger vehicles). Several others are in draft form.

- DEC Green Schools Program – Provides resources (including grants) and information that allows schools to implement actions to be more "green." Assistance is available for pest management, toxics reduction, solid waste reduction and recycling, and stormwater management.

- Recognition and Awards Programs – NY DEC has a Green Schools Awards Program which rewards schools for implementing exceptional environmental programs. In addition, the DEC sponsors a NYS Environmental Excellence Awards Program which recognizes businesses, schools, organizations, individuals and others for "improving and protecting New York State's environment.

- Roundtable Discussions – NY DEC hosted a series of roundtable discussions in 2008 about chemicals. Key topics included but were not limited to: moving away from chemical-by-chemical approaches, prioritizing chemicals for evaluation, maximizing information sharing, promoting green chemistry and considering substitutions and restrictions for hazardous chemicals.

- NYSDOT GreenLITES Program – This NYSDOT program recognizes transportation project designs that incorporate a high level of environmental sustainability. GreenLITES (Leadership in Transportation and Environmental Sustainability) is a project rating system, similar to the USGBC's LEED system. Projects are rated based on the extent to which they incorporate sustainable design choices. This is primarily an internal management program for NYSDOT to measure performance, recognize good practices, and identify and improve where needed. The program also serves to provide the department with a way to demonstrate to the public how NYSDOT is advancing sustainable practices. The NYSDOT also has a carcass composting program located in New Paltz

There have been no annual reports submitted to the governor to date regarding Executive Order Number 4.

8. Addressing Stakeholder Concerns

Stakeholder concerns regarding EPP policies may include:

- Lack of familiarity with the use of many environmentally preferable products, and how to specify them effectively, or apply them as substitutes for more traditional materials;
- Fear that the costs associated with EPP purchases will be higher than the costs associated with traditional materials;
- Fear that quality of recycled-content products may be inferior or lack standards and specifications;
- Greenwashing – the dissemination of false information pertaining to EPP issues; and
- The fear of overly onerous data collection.

Means of addressing these issues are discussed below.

8a. Lack of Familiarity

The marketplace is continuously changing. There are new products and new versions of products constantly being developed. The Ulster County staff can facilitate the conveyance of knowledge about such products via the Internet, list serves, email lists, etc. There are many organizations and list serves in existence that share information on such topics, and could serve as a valuable resource to Ulster County. In addition, many government entities, as described in the case studies, have implemented programs that encourage and assist agencies with learning about and purchasing EPP products. They include:

- Workshops/vendor conferences;
- Roundtable discussions;
- Technical assistance to demonstrate or test the suitability of a product or product type;
- Development of case studies; and
- "Before You Buy" programs and other grant programs to pay for or partially pay for the product.

8b. Costs

Some environmentally preferred products and services may be more costly than "traditional" products and services, however some actually result in a cost savings. For example, King County, Washington, actually saved money over purchasing "traditional" materials through its use of:

- Reused aggregates;
- Refurbished toner cartridges;
- Tire re-treading (versus purchasing new tires);
- Antifreeze (re-refined versus new); and
- Plastic lumber.

In some cases, lifetime cost analyses are more accurate means of assessing costs than simply considering purchasing costs. For example, synthetic turf fields may cost more to install, initially, however they are less costly to maintain over time, so the lifecycle cost analysis may be

favorable. Similarly, plastic lumber may be more costly initially, but due to its durability and lack of maintenance, can be more cost-effective in the long run.

It is also important that EPP policies be implemented with cost-effectiveness in mind. While some communities' EPP policies provide a cost preferential for specific material types (for example, King County provides a cost preferential of 15 percent for recycled-content paper, and 10 percent for re-refined motor oil), other communities provide a cost preferential for all types of commodities. In some emerging markets product manufacturers are not always adept at identifying the needs of potential customers, marketing, and distributing products. The Purchasing Agency or Department, in some cases, can help facilitate these activities through conferences and workshops that bring product manufacturers and purchasers (as well as potential purchasers) together to share information and experiences.

In California, the California Integrated Waste Management Board (CIWMB) states that EPP = Environment + Price + Performance. As the "Price" component of this equation, the CIWMB acknowledges that "EPP is best value. When a product creates too much pollution this impact is a cost to those who have to clean it up or get sick from it. The lowest price isn't necessarily the lowest cost. That is what EPP tries to sort out." In other words, the economic externalities associated with "traditional materials" are not always considered in the purchase price.

8c. Product Quality

Ulster County once again can look to other communities for information regarding types of products and their quality. Some purchasers may be familiar with a prior "generation" of a product, and may be unaware of changes in manufacturing environmentally preferable products that have taken place. Further, Ulster County may be able to borrow language regarding product specifications from other communities to help ensure that the products meet their needs.

Some manufacturers of environmentally preferable products have begun to see the value of third-party standards and testing, and are engaging in developing standards and having independent laboratories conduct testing on their products. The County could also help educate departments about the successful use of certain products by researching what has been used with success in other counties and states, and by developing those into case studies. Similarly, as described above, the County might also develop a pilot test for a product or product type.

8d. Greenwashing

Greenwashing is a deceptive use of green public relations or green marketing. As the demand for "environmentally preferable" products has grown, so has the need to use caution when evaluating manufacturers' claims regarding the environmental benefits of their products or services. Some specific types of greenwashing to be aware of include:

- Fluffy yet meaningless language – language that sounds "green" but has no real meaning (for example, "eco-friendly," "green" and "environmentally sound");
- Overly scientific language, that is not understandable;

- Pictures that provide an "environmentally friendly" feeling with no real connection to the product or service;
- Statements that give the appearance of a third-party endorsement when one does not actually exist;
- Focusing on a small benefit when larger, more significant negative environmental impacts exist; and
- Making claims without providing evidence.

Products, companies and claims should be researched using resources and organizations that aim to safeguard against false claims regarding environmental benefits. Some resources include:

The Green Washing Index (EnviroMedia and the University of Oregon)
http://www.greenwashingindex.com/index.php

StopGreenwashing.org
http://www.stopgreenwashing.org/

Greenpeace
http://stopgreenwash.org/

The U.S. Green Building Council (USGBC)
http://www.usgbc.org/

Also, sharing information on list serves and through email and reading industry trade journals are other means of becoming aware of false "green" claims. Also, before entering into a contract with a manufacturer, it is important to conduct research. Read the company's annual report, interview other purchasers, and tour a manufacturing facility, if possible.

8e. Overly Onerous Reporting Requirements

While it can seem time consuming and costly to track data on EPP programs, it is important to track certain information to garner support and understand the progress that is being made. Also, analyzing information can point out specific strengths and weaknesses within the EPP program. To the extent possible, it is best to incorporate tracking within the existing system – for example, in some communities a certain two-digit number preceding the entry indicates that the item is an EPP purchase. In Minnesota, for example, the Department of Administration provides specific codes where EPP purchases can be tracked on an ongoing basis. This made it unnecessary for Authority of Local Purchase (ALP) buyers to submit quarterly reports. At the end of the year, it is relatively simple to track EPP purchases and tally corresponding cost savings and expenditures. Up-front planning with the entity's accounting system will help ensure that reporting is as automatic as possible.

9. Benefits and Drawbacks

The implementation of an EPP policy has benefits as well as drawbacks (real or perceived), as outlined below.

9a. Benefits

- Adopting a procurement policy that gives preference to recycled-content products, reducing toxicity, and reducing consumption represents an opportunity for the County to lead by example in their recycling effort, thus conveying to the community and agencies the County's dedication to recycling and reducing environmental and health impacts.
- Purchasing post-consumer recycled-content materials encourages markets for recycled products.
- Adopting a procurement policy that gives preference to products with other environmental attributes (such as lower toxicity) can:
- Reduce liabilities;
- Increase employee health; and
- Increase environmental health.
- Including provisions for more durable goods, reduced packaging (or buying in bulk) can lead to increased waste diversion, thus reducing disposal costs.
- Including provisions for recycling or reducing the use of certain goods can lead to increased waste diversion, thus reducing disposal costs.
- Including provisions for products and services that use fewer resources (such as water and energy) saves natural resources and expenditures on those resources.
- It is expected that no capital expenditures would be required to develop such a policy.

9b. Drawbacks

- In meeting the goals and requirements of an EPP, the County may be required to change vendors and products in some cases.
- The County will likely spend resources initially, in the form of staff time, developing an EPP policy.
- The County may spend resources on an ongoing basis, in the form of staff time, conferences, etc., in developing tools to facilitate the implementation of an EPP policy.
- The County may spend resources on an ongoing basis, in the form of staff time and potentially software upgrades, to develop tools to track progress in EPP programs.
- Some departments may see tracking and reporting the amount and type of EPP products purchased as burdensome.

10. Resources

There are many resources available on EPP and recycled-content products. Provided below are links to websites for accessing some of these resources.

Alameda County, California, Waste Diversion Resolution.
http://www.acgov.org/gsa/75_Waste_Diversion_Resolution_06-2008.pdf.

Alameda County, California, Strategic Vision.
http://www.acgov.org/pdf/strategicvision.pdf.

The California Integrated Waste Management Board, EPP Best Practices.
http://www.green.ca.gov/EPP/Introduction/default.htm.

The Center for a New American Dream (website/organization that "helps Americans consume responsibly to protect the environment, enhance quality of life, and promote social justice." – includes the "Responsible Purchasing Network" listed below, and other campaigns and programs).
http://www.newdream.org/

Electronic Product Environmental Assessment Tool (EPEAT) (a tool for evaluating the environmental performance of electronics throughout their life cycles).
http://epeat.net/.

The Green Meetings Industry Council (GMIC) (a non-profit organization that aims to transform the meeting industry through sustainability).
http://www.greenmeetings.info/.

Inform, (a non-profit agency that disseminates information about environmental issues, including EPP-related topics). http://www.informinc.org/.

King County, WA, Environmental Purchasing Program.
http://your.kingcounty.gov/procure/green/index.htm.

King County, WA, EPP Annual Report, 2007.
http://your.kingcounty.gov/procure/green/2007annrep.pdf.

King County, WA, EPP Bulletins. http://your.kingcounty.gov/procure/green/bulindex.htm.

Massachusetts DEP, Environmentally Preferable Purchasing Guide.
http://www.mass.gov/Aosd/docs/EPP/VOL_26_SEC_2_OCT_2007.doc.

Massachusetts DEP, EPP Product Fact Sheets (in development, please check back) and Buyer Update Newsletters.
http://www.mass.gov/?pageID=osdsubtopic&L=4&L0=Home&L1=Buy+from+a+Contract&L2=Environmentally+Preferable+Products+(EPP)+Procurement+Program&L3=Download+Publications%2c+Reports+and+Tools&sid=Aosd.

Minnesota Pollution Control Agency, 2006 Biennial Report to the Legislature.
http://www.pca.state.mn.us/publications/reports/lrp-gen-3sy-07.pdf.

Minnesota Pollution Control Agency, "Buying Green," (quarterly newsletter about EPP).
http://www.pca.state.mn.us/oea/epp/newsletter.cfm.

Minnesota Pollution Control Agency, EPP Guide.
http://www.rethinkrecycling.com/government/eppg/tools.

Minnesota Pollution Control Agency, Recycled Products Directory (provides information about products made from recycled materials). http://www.pca.state.mn.us/oea/rpdir/index.cfm.

National Association of Counties (NACo) (award programs, case studies and peer advice). http://www.naco.org/

National Institute of Government Procurement (has a "Green Knowledge Community" available to members, which can provide additional resources regarding EPP policies). http://www.nigp.org/communities/about.htm.

Natural Resources Defense Council, (information regarding company-wide EPP policies). http://www.nrdc.org/enterprise/greeningadvisor/gpp-purch_policy.asp

New York State Department of Transportation, GreenLITES Program. https://www.nysdot.gov/programs/greenlites.

New York State Department of Transportation, Solid and Hazardous Waste Reduction Policy. https://www.nysdot.gov/divisions/engineering/environmental-analysis/repository/wastered.pdf.

New York State Department of Transportation, Specifications. https://www.nysdot.gov/main/business-center/engineering/specifications/2008-standard-specs-us.

New York State Office of General Services, Green Procurement Information. http://www.ogs.state.ny.us/ExecutiveOrder4.html.

New York State, Executive Order Number 4, "Establishing a State Green Procurement and Agency Sustainability Program." http://www.ogs.state.ny.us/EO4/pdf/FinalGreenProcurementEO.pdf.

Responsible Purchasing Network (an international network of buyers dedicated to socially responsible and environmentally sustainable purchasing). http://www.responsiblepurchasing.org/.

Rutgers University, Green Purchasing Policy and Guidelines. http://purchasing.rutgers.edu/green/images/Rutgers%20Green%20Purchasing%20Policy.pdf.

Solid Waste Management Coordinating Board's (SWMCB) Environmentally Preferable Purchasing Guide (developed by the SWMCB which serves six metropolitan counties in the Minneapolis-St. Paul, Minnesota region). http://www.rethinkrecycling.com/government/eppg.

Solid Waste Management Coordinating Board's Sample EPP Resolution. http://www.rethinkrecycling.com/government/eppg/tools/sample-epp-resolution.

StopWaste.Org, Compostable Food Service Product List. http://www.stopwaste.org/docs/bioplastics_products-distrib.pdf.

StopWaste.Org, EPP fact sheets (topics include: Environmentally Preferable Cleaning Products, Recycled Paper, Toner Cartridges, Janitorial Paper Supplies, Park and Recreation Products,

Environmentally Preferable Traffic Control Products, Using Rechargeable Batteries, and Biodiesel Fuel Use in Heavy Duty Vehicles).
http://www.stopwaste.org/home/index.asp?page=372.

StopWaste.Org, Environmental Purchasing Links (provides links to information regarding specific products and product types geared for purchasers as well as consumers from the general public).
http://www.stopwaste.org/home/index.asp?page=532.

StopWaste.Org, EPP Implementation Guide.
http://www.stopwaste.org/home/index.asp?page=468.

StopWaste.Org, Guide to Green Maintenance and Operations.
http://www.stopwaste.org/docs/gbmg-dec-20-07ltr.pdf.

U.S. EPA, Comprehensive Procurement Guidelines.
http://www.epa.gov/epawaste/conserve/tools/cpg/index.htm

U.S. EPA, Environmentally Preferable Purchasing. http://www.epa.gov/epp/index.htm

U.S. EPA, "State and Local Government Pioneers: How State and Local Governments are Implementing Environmentally Preferable Purchasing Practices," November 2000.
http://www.epa.gov/epp/pubs/case/statenlocal.pdf

U.S. EPA, "Federal Pioneers: Environmentally Preferable Purchasing Success Stories From the Federal Government," September 2000. http://www.epa.gov/epp/pubs/case/FedPioneers.pdf

U.S. EPA, Green Meetings Information.
http://www.epa.gov/oppt/greenmeetings/.

5.2.2 PUBLIC EDUCATION AND PROGRAM ENHANCEMENT STRATEGIES

5.2.2.2 Commercial, Institutional, Industrial and Multi-family Building Recycling (CIIM)

Some recycling challenges are universal while others differ between the multifamily and CII sectors. [1] For that reason, some of the discussions are listed separately below.

1 In most municipalities, larger multifamily buildings (usually 5 units or more) are considered commercial accounts and their garbage and recyclable materials are collected separately from residential routes consisting of single-family homes. For this section, large multifamily dwelling units are the focus.

1. Site Issues

Oftentimes businesses and multifamily buildings have limited storage space for recycling containers. Any extra outdoor space is usually reserved for employee, customer, or tenant parking. Some cities and counties have passed ordinances that require adequate outside space be

designated for the placement of recycling collection containers when a new CII establishment or multifamily housing developer applies for a building permit. (This is often required in building plans for garbage dumpsters; however space for recycling containers is frequently overlooked.). The benefit to these types of ordinances isn't immediate, but in the long-run the local government would eliminate or at least reduce this barrier to recycling. Many municipalities adopt minimum requirements for space for recycling containers at all new developments.

1a. Commercial/Industrial/Institutional Locations

In addition to dumpsters, which are usually used for the collection of old corrugated cardboard (OCC) at CII sites, most haulers offer wheeled carts to be used for the collection of other recyclable materials such as paper, plastic, metal cans and glass. The carts take up less space and can be placed outside next to the garbage dumpsters. Depending on the size and layout of the business, it may be possible to store the recycling carts inside the facility and then wheel them outside on collection day. For large office buildings, recycling collection bins should be located on each floor or in a common area inside the building and then brought down to a centralized area for consolidation. In some situations it might make sense for businesses to share recycling containers/service.

1b. Multi-family Buildings

For multifamily buildings with several outdoor garbage collection points, recycling containers should be located next to every garbage dumpster so residents have the option to recycle when disposing of their trash. Some larger apartment buildings have recycling collection bins inside the building and then maintenance staff transport the materials outside for collection. Also, many residents lack adequate space inside their apartment to store recyclable materials. The Agency may want to consider facilitating proper recycling by providing small recycling containers to each dwelling unit to transport recyclable materials to a central collection location. Examples include small 5- to 10-gallon bins or reusable cloth tote bags. A list of companies that provide recycling bins and tote bags well-suited for apartment recycling is provided in Appendix B. Another option to address storage issues would be for apartment buildings to have recycling collection bins on each floor or in a common area inside the building.

However that would require the building staff (or a dedicated resident) be responsible for transferring the materials from the inside bins to the larger collection containers located outside. It is also important to ensure that, if possible, central recycling containers are located in high-traffic areas or areas that are frequented by residents – near the trash bin is ideal. The recycling/trash area should also be clean and well-lit.

2. High Turnover Rates

2a. Commercial Property Owner/Lease Company Turnover

Commercial property is bought and sold periodically resulting in changes to a building's owner or leasing company. As a result of these changes, the recycling program can sometimes suffer. Some owners and leasing companies may view recycling as a high priority, while others may

not. If a property owner or leasing company does not consider recycling a high priority, collection programs put in place by the previous owner may fall by the wayside, resulting in an increase in the quantity of garbage collected. This is especially true if recycling laws are not enforced and/or education is weak.

Considerations for improvement include creating recycling information packets specifically designed for commercial property owners and leasing companies. The information could include detailed waste reduction, reuse, and recycling tips to be forwarded to building tenants, as well as a copy of the County's recycling ordinances. The packets could even be tailored for specific business types such as offices, retail businesses, restaurants, etc. The Ulster County Chamber of Commerce could be enlisted to distribute the information packets to new businesses as they open in the County, as well as distribute information to current businesses.

Another approach is to ask building managers to provide the Agency with names and addresses of new commercial tenants on a monthly or quarterly basis so that the Agency can send out information packets as needed.

2b. Business Manager Turnover

Just as commercial property is bought and sold periodically, managers of commercial property, retail businesses, and multifamily properties turn over periodically. Knowledge and enthusiasm about recycling programs and responsibilities can wane when such turnover occurs.

If not already created, a database of businesses in Ulster County could be generated and letters sent annually asking for updated contact information. The Agency could inquire about any recycling issues, or the need for more information packets, signage, etc. The Agency might consider hosting an event periodically where a working session could be conducted in order to gain an understanding of specific barriers business managers face, and allow the sharing of information and suggestions among managers. Functions like these often motivate managers to reinvigorate their recycling program, and also show that the Agency is interested in helping, not just enforcing. Providing this information by email to businesses could save the Agency money on publishing and mailing information, as well as reduce the consumption of paper.

2c. Resident Turnover

Because the nature of apartment building living isn't always a long-term living arrangement for a majority of tenants, there tends to be a constant flow of incoming and outgoing residents.

To combat this, a "new resident" information packet could be created that is specifically designed for multifamily residents and provides recycling and waste reduction information. Packets could be provided to apartment managers and ask that they be delivered to each new resident. Agency staff should work with building owners, managers, and condo associations to ensure this is carried out in order to be successful. Apartment managers could also be asked to provide the Agency with names and addresses of new residents on a monthly or quarterly basis so that the Agency can send out information packets. For examples of multifamily recycling

information created by other municipalities, as well as a list of multifamily recycling resources, see Appendix C.

3. Minimal Incentive to Recycle at Multifamily Buildings

In most cases, residents in multifamily dwelling units do not receive a separate bill for garbage and recycling services, as fees for these services are usually prorated and each unit's portion is included in their monthly rent. Consequently, there is not a financial incentive for the tenants to recycle or reduce the amount of garbage they generate. Furthermore, there is little accountability for residents, as it is not known who is recycling and who is not. The Agency could consider conducting a survey of residents from multifamily buildings with low participation rates in an attempt to understand residents' particular needs and obstacles to recycling. A sample survey is provided in Appendix D. Another angle is to promote environmental stewardship by asking residents to recycle, conserve natural resources and to take responsibility for protecting the County's environment. The building manager, Agency staff, and/or volunteers (for example, environmental club high school students) could set up a recycling education "booth" on-site (perhaps as people are returning from work) to distribute information about the environmental benefits of recycling. This, in conjunction with the distribution of apartment-sized recycling bins or tote bags, would demonstrate to the residents the commitment to recycling by the Agency and the building manager/owner. It would also provide effective one-on-one recycling education and provide residents with the opportunity to have their recycling questions answered.

4. Recycling and Waste Reduction Education

Providing recycling information to commercial establishments and residences in large multifamily buildings can be difficult due to the potentially high turnover rate of multifamily residents and property owners and/or managers. Suggested improvements to increase recycling are outlined in the sections below.

4a. Recycling Education

General recycling reminders should be provided at least once per year to all residents and businesses. As mentioned earlier, information packets for commercial businesses, or at least new establishments, is one way to get the message out. Listed below are other recommendations for improving recycling public education to the CII sector and multifamily residents.

 Website – Many people look for recycling information on their municipalities' website. The Internet is a relatively low-cost means of providing information. In addition to the current recycling guide, it is recommended that the Agency add more detailed commercial and multifamily recycling information and tips/suggestions to its website, so businesses and residents have a source to turn to for easily accessible information. See Appendix C for examples of other municipalities' websites specifically designed to provide information regarding commercial and multifamily recycling.

 Clear Signage – Recycling areas should have clear signage, both on containers and above containers, if possible, explaining which recyclable items should be placed in each container. Text should be large and bold and signage with pictures is generally preferable.

 Promotional Items – Promotional items such as pens, magnets, calendars, etc. (specifically made with recycled-content materials) are an inexpensive way to convey the County's recycling message to businesses and multifamily residents in a way that has the potential to be seen over and over again.

 Brochure or Flyer Developed Exclusively for Multifamily Residents – A recycling brochure or a flyer should explain the basics of the County's recycling program, including what materials are accepted in the program and how to prepare the items for collection. Ideally, additional information addressing apartment building recycling issues would be most beneficial.

In addition, residents should be reminded that garbage and recycling collection services are not free, but are included in their rent and if the amount of garbage increases, it may result in the need for increased collection service (i.e., larger garbage containers or more frequent collections per week), which could result in an increase in rental fees. Public education pieces that are sent through the mail and addressed to the resident by name are more likely to be read than items addressed to "Resident." However, if the cost of postage is prohibitive, the Agency could hand-deliver brochures to each multifamily building or property manager and ask that they distribute the information to their tenants. In general, brochures are most effective when they are printed in more than one color and have pictures or drawings to emphasize the message. Also, in communities with large populations of non-English speaking residents, brochures printed in additional languages and/or brochures that feature pictures, not words, help to educate more of the population.

 Door Hangers for Multifamily Buildings – Because multifamily residents are often "on the go," delivering door hangers to their apartments may be a convenient and effective means of providing a friendly reminder about the recycling program.

 Letter to Multifamily Building Managers and Landlords – By sending a separate letter directed toward multifamily building managers and landlords (especially if addressed to the individual by name), the County may achieve better recycling participation from multifamily dwelling units. The letter should not only reference Ulster County's Mandatory Source Separation and Recycling Law, but also offer assistance in the form of a site visit or site audit, especially for buildings that are struggling with participation or contamination issues. If at all possible, Agency staff should periodically deliver printed materials to building managers and landlords, and while on-site, visit the recycling area(s). If warranted, suggestions for improving the site should be provided to the manager or landlord.

Provided below are broader recommendations for developing effective public education materials. Some of these options may not be financially feasible for the Agency, but they are included here for future consideration.

 When designing public education brochures and information pieces, consider using a consistent "look" in all pieces (i.e., use the same font, colors, logo, mascot, etc.). Residents will eventually recognize these as recycling information pieces and will hopefully save them and reference them when needed.

 Increase the public education budget to expand the visibility of the County's recycling program. It is recommended that at least $1.50 per household, per year, be budgeted for public education.

 Consider partnering with Ulster County's Environmental Management Council (EMC) for public education and outreach assistance. The EMC is the County's citizen advisory board for local environmental matters.

 Consider hiring a college intern or part-time staff person to help with CII and multifamily recycling-related tasks.

4b. Waste Reduction Education for Businesses

The advantages of waste reduction are numerous. Waste reduction impacts the economic health of all types of businesses, from corner stores to international corporations. For industrial entities (e.g., those manufacturing goods), there is a built-in economic incentive to minimize waste, as inputs are generally purchased, and no business wishes to waste a commodity. The Agency could consider providing businesses with waste reduction education and tools to assist with:

 Estimating Disposal Costs – Many businesses are unaware of the cost savings that can be attributed to waste reduction and recycling. Worksheet A in Appendix E provides the steps and equations to estimate disposal costs.

 Conducting a Waste Analysis – Businesses can gain valuable knowledge by conducting a waste analysis or composition study of their waste stream. Worksheet B in Appendix E provides options for estimating the types and quantities of materials in a company's waste stream. With this information, a business can increase its recycling efforts to capture recyclable materials that are currently being thrown in the garbage. A waste analysis also provides insight to where waste reduction efforts could be focused. For example, large quantities of paper towels from restrooms could be reduced by installing hand dryers or cloth towels; and large quantities of paper cups in the waste stream could be eliminated by using ceramic mugs or glassware. There is potential to realize cost savings due to decreased number of pulls for disposal or decreased size of disposal containers. Currently, the Agency Recycling Coordinator/Compliance Officer provides waste analysis assistance to businesses.

 Tracking Progress – As with the United Way Campaign and other similar charities, a "thermometer-like" poster that shows progress to date can help motivate employees to recycle.

 Marketing – Many cities and counties provide free marketing to businesses that implement and maintain successful recycling programs. Examples include mention in the municipal newsletter, on a web page, or a sticker placed on the front door of the business, which will appeal to environmentally-conscious customers. This method of "social marketing" is increasing in popularity as individuals are more frequently weighing how "green" a business is when deciding which businesses to support. Utilizing other "social marketing" outlets such as YouTube, FaceBook and Twitter could also be helpful in providing recycling information and praise to area businesses.

 Incentives and Award Programs – Businesses should recognize individual employees and departments that are particularly successful in reducing waste. To encourage businesses to institute waste reduction strategies, the following messages should be conveyed:

 Economic gain – Controlling raw material waste and reducing waste disposed are increasingly important business goals, which can often result in reduced costs. Worksheets C and D in Appendix E can assist with evaluating the costs of a waste reduction or recycling program as well as calculating avoided collection and disposal costs.

 Enhanced product and business image – The benefits of waste reduction extend beyond the short-term economic advantages. U.S. consumers are increasingly changing purchasing habits based on the environmental records of products and companies with sustainable goals.

 Improved employee morale – Waste reduction programs have also served as an effective tool for improving employee morale. Many programs provide ideal opportunities to involve employees in organizational decision making and team work. The County and its cities, towns, and villages have the opportunity to set an example for reducing waste by implementing source reduction policies and directives in-house. Similar to waste assessments for businesses, Agency staff should conduct site visits at all government offices and buildings to not only improve recycling efforts, but also look for opportunities to increase source reduction.

5. Enforcement of Recycling Regulations

Ulster County mandates that all businesses and residents separate their recyclable materials from the waste stream for collection under the Ulster County Mandatory Source Separation and Recycling Law. Materials that must be source-separated include paper, glass, metals, plastics, leaves, yard wastes, tires, batteries and household hazardous waste (HHW), per Local Law No. 8. While this law is difficult to enforce, the Agency should consider tracking CII and multifamily recycling program data by conducting an inventory of each business and multifamily building to determine what recycling services are currently being offered. This could be a daunting task if done manually, however the Agency could survey the sites via a form letter or provide the option

of submitting data electronically by implementing a web-based data collection program, so that businesses and multifamily buildings can conveniently report what type of recycling program they have in place. Eventually the program could be expanded to track tonnage data and become a tool for the Agency to monitor its waste diversion programs and concentrate its efforts on areas identified as needing improvement.

For example, a company called Emerge[3] offers a web-based program called Re- TRAC™. Their program is designed to assist communities in managing their data and reporting activities by allowing users to:

- Collect MSW and recycling data over the Internet;
- Keep data organized in a searchable, secure database;
- Conduct program performance analyses; and
- Automatically generate annual reports.

Some municipalities use Re-TRAC to efficiently obtain and track MSW and recycling tonnage data. Lancaster County (PA) Solid Waste Management Authority implemented Re-TRAC as a way to reduce its staff's time that had been spent collecting, organizing and reporting MSW and recycling data and is so far pleased with the results.[4]

Once the Agency has established an inventory of CII and multifamily recycling programs and service levels, it can work to achieve the following:

- Determine sites with low recycling participation rates;
- Target individual multifamily buildings or businesses;
- Determine why residents or employees within those buildings do not recycle; and
- Develop specific strategies for increasing recycling within these businesses or buildings.

3 Website: http://www.emergeknowledge.com/
4 Source: Re-TRAC Client Profile, "Re-TRAC Performance Exceeds Expectations in Lancaster County." http://www.emergeknowledge.com/pdfs/Lancaster_Profile.pdf

6. Implementation Requirements

Implementing an advanced CII and multifamily recycling program would likely require additional staff time (or assistance from the EMC or a college intern) because one of the main components to a successful program is increased education. In addition, coordination with the recycling haulers is key to making the program a success. In Ulster County, the majority of CII sites and multifamily buildings are serviced by private haulers. In the City of Kingston, municipal crews service businesses and apartment buildings. Depending on the hauler, the recyclable materials are collected either commingled in one container (single-stream) or the fiber is kept separate from the glass, metal and plastic containers (dual-stream). The collection method

is determined by the hauler and/or processor. This could require that some of the education materials be tailored to a particular collection method.

7. Capital and Operating Expenses

The capital and operating expenses to implement an advanced CII and multifamily recycling program would be dependent on what ideas or recommendations the Agency chooses to implement. As stated in Section 6, Implementation Requirements, an advanced recycling program would likely require additional staff time for increased education efforts (including designing and distributing education pieces, website development, etc.), additional site visits and audits, additional data tracking, etc. Capital expenditures could include, but not be limited to, the purchase of promotional and education pieces, the purchase of software for a data collection program, and the purchase of bins or tote bags for multifamily units.

8. Diversion Potential

By implementing an advanced CII and multifamily recycling program, the Agency could see significant increases in waste diversion. The extent of the diversion is difficult to measure, as it would be dependent on how much staff time and financial resources the Agency plans to dedicate to these programs. It is likely that with each additional recycling program improvement, expansion, policy, or service level, the County would most likely see an increase in diversion.

This section provides numerous suggestions for improving or enhancing CII and multifamily recycling programs, including:

 Passing an ordinance that requires adequate outside space be designated for the placement of recycling collection containers at new CII or multifamily sites;

 Providing small recycling containers or bags to each multifamily dwelling unit to transport recyclable materials to a central collection location;

 Creating recycling information packets specifically designed for commercial property owners and leasing companies;

 Hosting a working session with business managers to discuss barriers to recycling and offer information and suggestions for improving recycling in the workplace;

 Creating a “new resident” recycling and waste reduction information packet specifically designed for multifamily residents;

 Designing and distributing multifamily recycling educational tools such as flyers, brochures, door hangers, promotional items (calendars, pens, magnets), etc.;

 Conducting a survey of residents from multifamily buildings with low participation rates;

 Expanding the commercial and multifamily recycling information on the Agency’s website;

 Providing CII sites and multifamily buildings with standard, consistent signage for recycling areas including posters and labels for collection containers;

 Hiring a college intern or part-time staff person to help with CII and multifamily recycling-related tasks;

 Conducting more waste analyses or composition studies for businesses;

 Enforcing mandatory recycling regulations by instituting fines for lack of recycling; and

 Tracking CII and multifamily recycling program data either manually or via a web-based data collection system.

Obviously, the more time and effort the Agency can put towards CII and multifamily recycling issues, the greater the potential of increasing recycling participation and waste diversion.

9. Addressing Stakeholder Concerns

The stakeholders most impacted by changes to the County's CII and multifamily recycling programs include business and multifamily building owners/managers and recycling haulers.

To address stakeholder concerns, it is recommended the Agency work with the EMC, the Recycling Oversight Committee or form an advisory or ad-hoc committee to promote dialogue between the major players. The Recycling Oversight Committee already consists of County staff, Agency staff, recycling collection haulers, landlords/building owners/managers, business owners and managers, and condominium or homeowner association representatives. Discussions should include what is working, what obstacles to collecting recyclable materials are the haulers encountering, what do business owners perceive to be barriers to recycling, what are the obstacles to increasing participation, etc. The group should be encouraged to share ideas and examples of successful programs, and work together to solve CII and multifamily recycling issues. A pilot study could be coordinated among willing haulers and businesses or multifamily buildings as a way to test a new collection approach, or education tactic. The committee approach allows haulers and business and multifamily managers to see each others' perspectives, which can be invaluable.

10. Benefits and Drawbacks

Implementing an advanced CII and multifamily recycling program has benefits as well as drawbacks, as outlined below.

10a. Benefits

The benefits to the Agency may include, but not be limited to the following:

 A potential increase in recycling participation from businesses and multifamily buildings;

 A potential increase in the quantities of recyclable materials collected thereby creating and increase in recycling revenue at the Materials Recovery Facility;

 A potential decrease in the amount of waste disposed by long-haul trucking to distant landfills;

 A potential increase in cost-savings for business and multifamily building owners as a result of downsizing solid waste collection container sizes and/or service frequency levels; and

 An overall increase in awareness of recycling and environmental-related issues.

10b. Drawbacks

The drawbacks to implementing an advanced CII and multifamily recycling program are strictly financial. Most program additions or enhancements would require the Agency to increase funding for additional staff and expenses.

When considering the "cost" of recycling programs there are both "economic" considerations and "non-economic" considerations. Under economic considerations, the Agency must compare the cost of recycling programs with the cost of landfill disposal, including transportation costs and long term disposal obligations. For "non-economic" considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling, and New York State Rules and Regulations. These factors should all be considered as the Agency formulizes its integrated solid waste management planning efforts.

5.2.2 PUBLIC EDUCATION AND RECYCLING PROGRAM ENHANCEMENT STRATEGIES

5.2.2.3 Recycling Enforcement Efforts

Overview

The new Agency recycling enforcement program will be quite comprehensive. The Agency will send letters to large waste generators, residents, municipalities, school districts and private carters reminding them of the requirements of the Ulster County Mandatory Source Separation and Recycling Law and inform them that recycling enforcement will be increased countywide. The Agency will conduct seminars for municipal officials, school districts, sanitation workers and private haulers during which they will be reminded of their responsibilities under the Mandatory Source Separation and Recycling Law. The Agency will conduct follow-up seminars for private haulers to review proper recycling practices and to update the haulers on amendments to the Mandatory Source Separation and Recycling Law. A follow-up seminar will also be provided for municipal officials.

Throughout the year, the Agency Recycling Coordinator/Compliance Officer will conduct recycling presentations for various groups and organizations within Ulster County, including the County Legislature; town and municipal officials including Town Supervisors; municipal public

works officials and employees; real estate management companies, apartment building superintendents, co-op boards; health facilities; schools; and an environmental symposium available for the public.

Currently, all haulers operating in Ulster County have a Recycling Plan on file with the Agency detailing their collection methods and recycling promotion/educational efforts with their customers. The services vary from standard pick-up of mandated recyclables to tailored services. Generally, recyclables are separated utilizing a dual-stream system; commingled materials and fiber materials or a single-stream system; both commingled and fiber materials collected mixed together.

Additionally, the Agency will update and redesign its recycling website. The website will be updated to include recycling self-audit forms for businesses, schools and municipal facilities, and an educational video on conducting a waste audit.

1. Monitoring the Recycling Practices of Ulster County Agencies

In April and May of 2009, The Agency and the Ulster County Department of the Environment personnel conducted recycling audits at facilities owned and leased by the County to ensure that (i) the facilities were equipped with an adequate number of accessible and identifiable recycling containers; (ii) recyclables and garbage were being properly consolidated, collected and hauled away; and (iii) County employees were following proper recycling practices. The Ulster County Office Building has now become an Ulster County Partner in Recycling and is listed on the Agency website with such recognition. The Ulster County Office Building has also submitted an approved Ulster County Business and Commercial Property Waste Reduction and Recycling Plan to the Agency. The Agency plans to submit comprehensive audit reports to other appropriate facility personnel relating to their facilities by directing them to review the recommendations of the Agency and remedy any deficiencies.

2. Oops! Stickers

The Agency plans to issue two types of "OOPS" stickers to municipal (City of Kingston) and private haulers to be used when their sanitation employees find recyclables improperly commingled with garbage. During the beginning part of the year, yellow OOPS stickers will be used as warnings for waste generators; a hauler will collect the improperly mixed load of garbage and recyclables but will leave a yellow OOPS sticker behind, warning a waste generator that beginning on a designated date, such materials will no longer be collected.

After the warning period, the Agency will expect municipal and private haulers to refuse to collect garbage improperly commingled with recyclables; in such cases, a hauler could leave a red OOPS sticker on the materials, explaining that the hauler did not collect the materials because they were not properly separated.

To start, the Agency plans to provide over 80,000 red OOPS stickers to municipalities and private haulers throughout Ulster County.

3. Ride Along Program

The Agency plans to institute an annual "Ride-Along" program in cooperation with selected private haulers servicing Ulster County residents. The Recycling Coordinator/Compliance Officer will join private haulers picking up solid waste and recycling in every town, city and village, to see firsthand the problems they encounter, including contamination of recyclables when picking up materials. The Recycling Coordinator/Compliance Officer will inform and remind private haulers of the recycling guidelines, and provides red OOPS stickers to place on garbage that contains recyclables. When improperly prepared recyclables are left at the curb by the private hauler, the Recycling Coordinator/Compliance Officer provide the resident with an informational sticker and adhere it to the container explaining why recyclables were not picked up. The Recycling Coordinator will also provide a copy of the updated Ulster County Recycling Instructions Brochure to the resident. This program opens up communication between the Agency and private collection companies, so that each understand the others' job, and how to work toward educating the public about correct recycling procedures.

4. Inspections

4a. Warning Phase

The Agency also plans to conduct inspections at both the Ulster and New Paltz transfer stations to look for recyclables improperly mixed with garbage. Throughout the beginning of the year, the inspector (Recycling Coordinator/Compliance Officer) will issue Warning Notices (in both English and Spanish) to municipal and private haulers who dumped such materials, notifying them that beginning on a designated date, the Agency would be issuing violations to municipalities and private haulers that collected recyclables improperly mixed with garbage, and that fines could be assessed for such violations.

4b. Inspections Conducted at Transfer Stations

Throughout the year, the Recycling Coordinator/Compliance Officer along with other Agency personnel ('inspectors'), will inspect loads dumped at both the Agency Ulster and New Paltz transfer stations located within Ulster County, looking for improperly mixed loads of garbage and recyclables in violation of the Ulster County Mandatory Source Separation and Recycling Law.

During the year, the Agency anticipates inspecting thousands of loads of garbage and recyclables dumped at transfer stations in Ulster County by both municipal haulers and licensed private haulers.

4c. Waste Generator Inspections

When an inspector discovers recyclables improperly mixed with garbage in a load dumped at a transfer station, the inspector will attempt to trace the load back to the location of origin through visible observation and from information provided by the employees who dumped the load. In cases where an inspector is able to trace such a load back to the waste generator, the inspector

will visit the waste generator and inspect its external garbage and recycling containers to determine whether the waste generator is complying with the requirements of the Ulster County Mandatory Source Separation and Recycling Law.

The Recycling Coordinator/Compliance Officer will also perform waste generator inspections targeted at commercial zones throughout Ulster County as part of the Ulster County Business and Commercial Property Recycling and Waste Reduction Program. The Ulster County Resource Recovery Agency is encouraging all businesses with existing recycling or waste reduction programs to submit a completed Business and Commercial Property Solid Waste Reduction and Recycling Plan to qualify as a candidate for the Ulster County *Partner in Recycling* Program. Businesses, institutions and commercial properties with 10 or more employees (including multiple locations) and Residential Premises (including apartments and condominiums with 5 or more units) are required by the Ulster County Mandatory Source Separation and Recycling Law per Section 10 to complete and submit the plan to the Agency. For convenience, the plan is designed as a fillable pdf format located electronically on the Agency website at www.ucrra.org/recycling/PDF/BusinessRecyclingPlan.pdf

Upon receipt and review of the Commercial Solid Waste and Recycling Plan, the commercial entity will receive the Ulster County *We Recycle* decal (including a permit #0000) for window display at the place of business advocating their recycling efforts to the public. The commercial entity will be recognized as a recycling leader in the community and will be listed on the Agency website, www.ucrra.org/recycling/ucbussinessandproperty.html as an Ulster County *Partner in Recycling*. The website also contains information for commercial entities including a Business and Commercial Property Recycling Guide (a comprehensive guide for creating successful recycling and waste reduction programs) and a means to review the Ulster County Mandatory Source Separation and Recycling Law as it pertains to the commercial sector. Currently, there are over 150 commercial entities that have approved Recycling and Waste Reduction Plans on file with the Agency and have also become Ulster County *Partners in Recycling*.

The Recycling Coordinator/Compliance Officer will check external garbage and recycling containers during these inspections to ascertain whether businesses are complying with the requirements of the Ulster County Mandatory Source Separation and Recycling Law. When circumstances allow, the Recycling Coordinator/Compliance Officer will enter a business and explain to a manager or supervisor that the Agency is conducting recycling inspections in the area; if a recycling program is not in place, the Recycling Coordinator will offer assistance in determining what is needed for the business to come into compliance with the requirements of the Ulster County Mandatory Source Separation and Recycling Law. During 2010, the Recycling Coordinator/Compliance Officer performed 79 waste generator inspections as part of the Ulster County Business and Commercial Property Recycling and Waste Reduction Program.

5. Complaints

The Recycling Coordinator/Compliance Officer investigates complaints concerning alleged

violations of the Ulster County Mandatory Source Separation and Recycling Law, including complaints submitted by municipal and private haulers, businesses, and residents. Many complaints are received via the Recycling Hotline (845) 336-3336 and through email UCRRA@ucrra.org on the Agency website. Another way for the public to report non-compliance with recycling is available on the Agency website at www.ucrra.org/recycling/non-compliance.htm. The fillable form is a convenient way for residents to report *Apartment Complexes*, *Office Buildings*, *Restaurants*, *Non-profit Agencies*, *Government & Town Agencies*, *Commercial Properties* and *Schools* that are not recycling the mandated materials.

6. Violations

Prospective recycling violations identified by the Agency 'inspectors' or Recycling Coordinator/Compliance Officer are reviewed by the Agency Executive Director. Once the Executive Director approves a violation, a hearing is scheduled before the Hearing Officer and a Notice of Hearing is issued to the appropriate respondent. The Notice of Hearing informs the respondent of the nature of the alleged violation and of the date, time and place of the scheduled hearing. Respondents are afforded the opportunity to plead guilty by written acknowledgement and pay the recommended fine or appear at the scheduled hearing to present mitigating evidence or a defense to the alleged violation. At the hearing, an Agency representative is present. After the hearing is concluded, the Hearing Officer issues a written report and recommendation.

7. Ongoing Agency Enforcement Initiatives

The Agency continues to conduct the following enforcement procedures:

 Monitor the recycling practices of the County's various agencies to ensure compliance with the provisions of the Ulster County Mandatory Source Separation and Recycling Law.

 Offer recycling presentations to interested businesses, schools, hospitals, multi-family dwellings, condominium associations, municipal officials, etc., to educate different sectors of the County on their responsibilities under the Ulster County Mandatory Source Separation and Recycling Law.

 Offer recycling audits to interested businesses, schools, hospitals, multi-family dwellings, condominium associations, municipal officials, etc., to assist these entities in developing comprehensive recycling plans.

 Investigate complaints concerning violations of the Ulster County Mandatory Source Separation and Recycling Law, including complaints submitted by municipal and private haulers, businesses, and residents.

 Continue performing waste generator inspections targeting commercial zones throughout Ulster County.

8. New Agency Enforcement Initiatives

The Agency plans to implement the following enforcement initiatives:

 Inspect loads of garbage and recyclables dumped at the Agency transfer stations located in Ulster and New Paltz in order to look for violations of the Ulster County Mandatory Source Separation and Recycling Law.

 Attempt to trace recycling violations uncovered at transfer stations back to the waste generator responsible for the violation.

 Issue and prosecute violations of the Ulster County Mandatory Source Separation and Recycling Law against both municipal and private haulers, and waste generators.

 Expand the scope of waste generator inspections. This will be accomplished by invoking a provision of the Mandatory Source Separation and Recycling Law, which allows either an 'inspector' or the Recycling Coordinator/Compliance Officer to accompany licensed private haulers on their collection routes. Riding along with, or following, haulers on their commercial collection routes will allow the Agency to review the recycling practices of a large number of non-residential waste generators in a relatively short period of time. This initiative will also ensure that waste generators are being inspected on their designated pick-up days, thereby making it easier for an inspector to determine whether the non-residential waste generator is properly recycling.

 Observe municipal haulers in the City of Kingston as they operate on residential routes to ensure that haulers are providing separate collection of residential waste and garbage, and that residential waste generators are complying with the requirements of the Ulster County Mandatory Source Separation and Recycling Law.

 Offer recycling seminars for residential and commercial property management companies to review their obligations under the Ulster County Mandatory Source Separation and Recycling Law. Recycling at multi-family dwellings and multi-tenant commercial building and shopping centers raises unique issues and concerns, and recycling performance at such locations has often been found to be sub-standard.

 Request the assistance of Weights and Measures officials from the Department of Consumer Protection in identifying gas stations within Ulster County that fail to properly recycle.

 Request the assistance of inspectors employed by the Department of Health in identifying food establishments within Ulster County that fail to properly recycle.

5.2.3 MATERIALS RECOVERY FACILITY

Dual-stream vs. Single-stream Recycling
There are two basic methods for collecting and processing recyclable materials at a Materials Recovery Center (MRF): Dual-stream and single-stream.

Under the dual-stream recycling scheme, the citizen separates paper and cardboard from the cans, plastics and glass, either by using two recycling bins, by placing the papers in a paper bag on the top of the other recyclables in the recycling bin, or by simply placing the papers loose on top of the other recyclables in the recycling bin. The two categories of recyclables are kept separate as they are placed in two separate compartments in the truck picking them up, and the two categories of recyclables are dumped separately at the MRF.

Under the single-stream recycling scheme, all of the recyclables (paper and cardboard, plastic, metal and glass) are mixed in one bin by the citizen, the bin is dumped into a truck with one compartment when they are picked up, then dumped into one pile at the MRF. The MRF then sorts these materials into paper, metals, plastics and glass.

While it is true that single-stream recycling decreases the cost of collection of recyclables and makes the collection more convenient for the hauler, advocates of single-stream recycling also claim that the convenience of this method increases the recycling rate, i.e. that citizens recycle more and throw less recyclable material in the trash. However, there is clear evidence that single-stream recycling results in contamination of paper and cardboard by residual liquids from bottles and cans, as well as by broken glass which becomes embedded in the cardboard and paper. The net result is that the paper and cardboard is less useful to paper and cardboard recyclers at the mills and therefore less valuable financially.

While single-stream recycling may increase the tonnage of materials going into a MRF, or the percentage of the solid waste stream going into a MRF, that is not the same as the tonnage of sorted material coming out of the other end of the MRF. Potentially recyclable material is lost because of contamination created when paper and cardboard is mixed with the other materials.

These claims of contamination of paper and cardboard have been substantiated by paper and cardboard recyclers, as well as by a study conducted by CM Consulting on behalf of the Container Recycling Institute (CRI). CRI selected Clarissa Morawski, principal of CM Consulting, to research this issue. Ms. Morawski is a leading expert on Extended Producer Responsibility (EPR), and has authored numerous reports on beverage container recovery systems. For this study, Ms. Morawski reviewed 60 previously-published studies, reports and articles in trade magazines. Ms. Morawski was interested to find that, as a result of the struggling economy and plunging market prices for recyclables, she is seeing increased market sensitivity to quality issues. “End markets are really starting to quantify their economic losses from poor quality of material, and from a qualitative perspective, they feel this problem is very serious

indeed and could have an impact on any future investments of capital to increase capacity of secondary feedstock."

The report finds that there are many negative downstream impacts of contaminated feedstock due to the mixing of materials through single-stream curbside collection. "Basically, the report confirms that you can't unscramble an egg," explains CRI Executive Director Susan Collins. "Once the materials are mixed together in a single-stream recycling system, there will be cross-contamination of materials and significant glass breakage. Those cross-contamination and breakage issues then result in increased costs for the secondary processors." The CRI report attempts to quantify those costs, but the study acknowledges that there is a need for more comprehensive data. "Nor are costs calculated on an apples-to-apples basis, because the tons that are handled through various recycling systems are not necessarily the same as the tons recycled" Collins observed. "If you take the contaminants out of the equation, the cost per ton recycled increases. With such high contaminant levels, some of these recycling systems are merely shifting costs to the paper mills, aluminum manufacturers, glass beneficiation facilities and glass manufacturers, and plastics recyclers."

"To date, the impacts on various collection methods—source-separated curbside, commingled curbside, deposit/return—on the quality of materials destined for recycling have not been formally researched and documented. In fact, rarely is "material quality" or the "end-destination" of the material considered by government decision-makers when choosing an appropriate recycling system." The report ("Understanding economic and environmental impacts of single-stream collection systems") is also available for viewing on the Container Recycling Institute's website: http://www.container-recycling.org/ [1] So, the question is, "Are the Citizens being best-served by dual-stream or single-steam recycling?" While more research needs to be done, it appears that single-stream recycling does not have all the advantages claimed by proponents.

1 Source: "Understanding economic and environmental impacts of single-stream collection systems", Container Recycling Institute's website: http://www.container-recycling.org/

Dual Stream Recyclables Collection and MRF

Most haulers in Ulster County that collect recyclables from the curbside allow residents to commingle all recyclable paper in one container, and all recyclable glass, metal, and plastic bottles and cans in another container. This is referred to as dual- stream recyclables collection. These collected recyclables are then delivered to one or more material recovery facilities (MRFs) where the dual stream recyclables are sorted into their constituent marketable commodities.

Currently, the Ulster County MRF is the only operating MRF in Ulster County that accepts dual stream recyclables from the County communities. These dual stream recycling systems evolved out of earlier efforts where materials were source separated into their constituent commodities such as newspaper, office paper, glass, etc. Dual stream systems proved to be more efficient from a collection standpoint and more convenient for program participants. Over time these

systems have become the norm for the collection and processing of residential recyclables, although as noted below, a new single stream approach is becoming increasingly more popular.

Single Stream Recyclables Collection and MRF

Single stream recycling refers to a system in which all paper fibers and containers are mixed together in a collection truck, instead of being sorted into separate categories or commodities by the resident and handled separately throughout the collection process. In single stream recycling, both the collection and processing systems must be designed to handle this fully commingled mixture of recyclables.

Proponents of single stream note several advantages:

• reduced sorting effort by residents may mean more recyclables are placed at the curb and more residents may participate in recycling;

• reduced collection costs because single-compartment trucks are cheaper to purchase and operate, collection can be automated, and collection routes can be serviced more efficiently;

• greater fleet flexibility which allows single compartment vehicles to be used for refuse or recycling, providing greater fleet flexibility and reducing the number of reserve vehicles needed. (To avoid confusing customers, a large sign/banner can be used to distinguish when a refuse truck is being used for recycling);

• participation and volume per household may increase and worker injuries may decrease because the switch to single stream is often accompanied by a switch from bins to cart-based

collection;

• changing to single stream may provide an opportunity to update the collection and processing system and to add new materials to the list of recyclables accepted; and

• more paper grades may be collected, including junk mail, telephone books and mixed residential paper.

Potential disadvantages of single stream recycling may include:

• Initial capital cost for

 new carts,

 different collection vehicles,

 upgrading of processing facility, and

 education of residents;

• processing costs may increase compared to multiple stream systems

• possible reduced commodity prices due to contamination of paper;

• increased “down-cycling” of paper, i.e., use of high quality fibers for low-end uses like boxboard due to presence of contaminants;

• possible increase in residual rates after processing (due chiefly to increased breakage of glass);

• potential for diminished public confidence if more recyclables are destined for landfill disposal due to contamination or inability to market materials.

Many of the nation’s largest waste companies are developing single stream collection and recycling capabilities. One of North America's top recycling companies, Waste Management nearly tripled the volume of material processed in its single-stream recycling facilities, from about 722,000 tons in 2002 to more than 2 million tons in 2006. (Waste Management, 2008) Allied Waste Industries is reported to be spending $ 2 million to upgrade its recycling facility in Buffalo New York to a single stream system. (Waste News, 2008) Casella Waste Systems, Inc. operates a single stream MRF facility in Ontario County, NY and in the Chittenden Solid Waste District in the Burlington Vermont area. Casella also submitted a response to the RFI which included a single-stream MRF with a capacity of 65,000 tons per year. Waste Management, Inc. recently invested $11 million to build a single stream recycling facility in the Syracuse suburb of in Liverpool NY. The 94,000 square feet facility is able to process up to 20 tons of recyclables per hour, and is among the largest single-stream recycling facilities in the country. This facility is contractually utilized by OCRRA. In addition to material delivered on OCRRA account, other single stream recyclables are also accepted. According to the facility representative, this single stream MRF can process 400 tons per day of single stream recyclables, and recover multiple grades of paper, glass, metal and plastic. As of June 2009, such a facility would be expected to cost approximately $12 million to construct and equip, including the building.

In January 2010 County Waste announced its intention to develop a single stream MRF at its existing dual stream MRF on South Pearl Street in Albany (Sierra Fibers) and that it is currently providing single stream recyclables collection to all of its residential customers in the Capital District and other areas, including Ulster County. The single stream facility is now in full operation.

5.2.4 HOUSEHOLD HAZARDOUS WASTE (HHW) AND ELECTRONICS RECYCLING PROGRAM

5.2.4.1 Household Hazardous Waste Program Expansion Considerations

Program parameters to consider when evaluating the County’s HHW program include:
☐Program Convenience;
☐Participation Rates;
☐Quantity and Types of Materials Collected/Managed; and

Each of these program parameters, and its application to Ulster County, is discussed below.

5.2.4.1(a) Program Convenience

Currently, the Agency provides Ulster County residents the opportunity to safely dispose of household hazardous waste materials at collection events held three times a year; spring, summer and fall. One way to improve the program would be to host more collection events for the public. Another way to improve the program would be to open a permanent HHW Facility at the Agency's Kingston location. Opening a permanent HHW Facility will provide a more convenient opportunity for residents to participate in this program. The facility would have more accessible hours and would be open several days per week. It is suggested that the Agency evaluate the existing storage lockers on site at the facility to determine if they can be used for storing the HHW materials. By having a permanent facility and by extending the hours/days of operation, the Agency would most likely collect increased quantities of HHW materials. Depending on the details of the agreement with the contracted vendor, it is possible the Agency could benefit from increased economies of scale by collecting more materials. Another collection option that the Agency may want to consider, in an effort to increase convenience to residents is by creating a satellite collection system.

Satellite Collection System

Satellite HHW collection facilities are designed to support a permanent processing site. These sites could be located at some of the MRDCs. Satellite facilities serve as permanent drop-off locations for program participants that typically would not travel the distance to deliver HHW materials to the central or main facility. To provide a full service program, the same HHW materials that are accepted at the permanent site should be collected at the satellite facilities. HHW materials are regularly collected from the satellites and transported to the "hub" permanent facility where materials are sorted, bulked and lab packed for recycling or disposal, or the site may be serviced directly by a hazardous materials vendor. Depending on the needs and the budget of the town, a satellite facility could be as basic as a seasonal, open-air collection site with a hazardous materials storage locker or it could include a fully enclosed building designed to be open year-round.

A year-round satellite facility design might include:

☐ A preengineered metal building to house a small office, a product exchange or reuse room, a mechanical room, and one unisex bathroom;

☐ A metal canopy attached to the building to cover two drivethrough lanes of traffic and provide shelter for staff while they unload HHW materials from the vehicles;

☐ Adequate parking for up to four vehicles at one time for staff persons working at the facility; and

☐ A preengineered hazardous materials storage locker, enclosed with a chain-link fence and gate. The entire satellite facility property should also be surrounded by a chain-link fence that can be locked.

The Agency may also consider using an existing County-owned facility as an HHW (and electronics) collection facility. The size of the facility would determine if it would strictly be used as a collection and storage site or if any preliminary processing could be done on-site (such as bulking oil-based paints into 55-gallon drums). At least one hazardous materials storage locker would be required to store the waste. The storage locker would require electricity and most likely require a concrete slab be poured for its placement. The storage locker should be enclosed with a chain-link fence for safety reasons, as should the entire facility if possible. This may deter, but probably not eliminate, illegal dumping of HHW and electronics at the site.

Limited hours of operation would be preferable when operating a satellite program, keeping staffing costs to a minimum. Staff operating the facility would need to be trained under the Occupational Safety and Health Administration's (OSHA) guidelines, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training, and/or other requirements as determined by the State of New York. The Agency could either transport the HHW materials to its permanent Facility (should one be constructed) or the Agency's contracted vendor could be scheduled for quarterly, semi-annual, or on-call collections to package, transport, and dispose and/or recycle the HHW.

The Agency would need to review local zoning ordinances to ensure this type of use would be allowable in a building/location chosen by the County, if a County building is utilized. Depending on the facility, the County may also be required to apply for a solid waste management facility permit. The Agency may consider working with one or more municipalities to provide satellite HHW collection sites. However, the Agency would need to provide guidance to the municipality(ies) wishing to establish a satellite collection site and assist in coordinating collection activities.

Other Alternative Options

Listed below are other alternative program management approaches for the Agency to consider that could result in a more cost-effective collection program, and may enable the Agency to implement another collection option within the current budget. The potential savings realized from these alternative options could be allocated for additional advertising and/or additional collection events.

☐*Establish collection events or facilities for recyclable HHW such as antifreeze, batteries, oil, and paint (also referred to as ABOPs).* These four materials typically compose about 25 percent of the Agency's total HHW disposal costs. ABOP collection sites have been used successfully in other portions of the United States. Many communities have ABOP collection sites located at municipal buildings such as maintenance facilities, public works buildings, fire stations, etc.

These collection sites are staffed and are usually opened a limited number of hours per month. ABOP collection events could also be scheduled annually in which just those four material types are collected.

☐*Continue to instruct residents to take certain items to various retailers.* Many retailers already accept certain HHW items at their place of business. For example, most automotive battery retailers take old batteries from customers in exchange for new auto battery purchases. Certain automotive repair businesses and retailers in New York are required to accept waste oil free of charge and all New York wireless telephone service providers that offer phones for sale must accept cell phones for reuse or recycling.[1] In addition, retailers including Lowe's Home Improvement Warehouse, Ace Hardware and Home Depot collect batteries and compact fluorescent bulbs for recycling. Best Buy, Staples and Office Depot collect electronics. Over thirty retailers in Ulster County are listed as accepting rechargeable batteries through the Rechargeable Battery Recycling Corporation's "Call 2 Recycle" program.[2] Other materials that may currently be accepted by retailers or in which drop-sites could be established include: latex paint, antifreeze, explosives, fire extinguishers, propane tanks, and electronics. Diverting these materials through other outlets may save the Agency money in disposal and recycling costs.

1 Source: NYSDEC website. http://www.dec.ny.gov/chemical/8786.html
2 Source: RBRC website. http://www.call2recycle.org/

5.2.4.1 (b) Participation Rates, Quantities and Types of HHW Materials Collected and Managed

The number of Ulster County residents that reportedly participated the County's HHW Collection Events from 2008 through 2010 is shown in Table 3-2. While the numbers seem to fluctuate from year to year, it appears the average number of participants is about 800 per year.

Most permanent HHW collection facility participation rates are in the 5 to 10 percent range. The When the number of Ulster County participants is divided by the number of occupied housing units in the County, the participation rate is calculated to be between 0.004 percent and 0.005 percent. The participation rate is very low due to the inadequate number of collection events a year (the Agency budget allows for only 3 events) and convenience factor for residents. If the Agency invested in a permanent HHW collection facility, the participation rates would greatly increase. See *Appendix* for Table 3-2.

5.2.4.2 Electronics Collection Program Expansion Considerations

Program parameters to consider when evaluating the electronics recycling program include:
☐Program Convenience;
☐Participation Rates;
☐Quantity of Materials Collected/Managed; and
☐Scope of Services Offered.
Each of these program parameters, and its application to Ulster County, is discussed below

5.2.4.2 (a) Convenience

The County currently provides two options for the collection of used electronics, free of charge to residents: the HHW collection events held several times throughout the year and at select MRDCs. The NYS Electronic Equipment Recycling and Reuse Act (Article 27, Title 26 of the Environmental Conservation Law) was signed into law by the Governor on May 28, 2010. The law will ensure that every New Yorker will have the opportunity to recycle their electronic waste in an environmentally responsible manner. The law requires manufacturers to establish a convenient system for the collection, handling, and recycling or reuse of electronic waste. Manufacturers of covered electronic equipment will be responsible for implementing and maintaining an acceptance program for the discarded electronic waste, with oversight by the NYS Department of Environmental Conservation. The Agency now provides a permanent and continuous opportunity for residents, small businesses and non-profit agencies to recycle electronics for free at the facility located in Kingston. In addition, Agency staff routinely recommends to residents a list of alternate recyclers or retail locations that service the area. As the quantities of discarded e-waste increases, the Agency may want to research other options for the disposal and recycling of used electronics, as described below.

5.2.4.2 (b) Provide Information to Residents and Businesses on E-Waste Take Back Programs

Nationally, as the quantity of used electronics in the waste stream continues to grow, there is more and more pressure being placed on the producers of electronic equipment to play some role in the proper disposal of the items they manufacture. Product stewardship has grown in recent years and some of the larger computer and electronics manufacturers as well as large retailers have implemented "take-back programs." (It should be noted that product stewardship not only considers the end of a product's life, but also takes into consideration the entire life-cycle impacts of a product and its packaging to reduce the amount of energy, toxins, air and water emissions, etc. that go into making a product and its packaging.)

The EPA has partnered with many electronics manufacturers and retailers to develop the "Plug-In To eCycling" program in an effort to make it easier to reuse and recycle used electronics. Some of the participating partners include Best Buy, Dell, Hewlett- Packard, Sony, Sprint, Staples, and Verizon, just to name a few. It is recommended that the Agency keep up-to-date on take-back programs and make this information available to residents and businesses via the Agency's website, periodic mailings and other correspondence. Residents and businesses should be encouraged to use manufacture take-back programs first, before bringing used electronics to the Agency's HHW Collection Events or Agency's Permanent E-Waste Collection Program.

5.2.4.2 (c) E-Waste Participation Rates

The number of residents that participated in the Agency's electronics collection program from 2008 through 2010 is shown in Table 3-2. There has been an increase in the number of participants and overall, the numbers show an upward trend. There should also be a steady

increase in material recovered due to the New York State Legislation that allows the public to recycle their used electronic equipment for free.

5.2.4.2 (d) Quantities of E-Waste Collected/Managed

The total quantities of used electronics collected in Ulster County by use of the local MRDCs, Agency sponsored collection events, retail locations and other vendors is steadily increasing each year. The overall amount of used electronics in the waste stream is difficult to estimate. EPA commissioned two reports that took different approaches to analyzing the amount of electronics in the waste stream – one relied on market research data on sales of electronics and one relied on government statistics on sales of electronics.[3] By looking at waste characterization studies conducted between 1998 and 2004, the EPA estimated that the average pounds of consumer electronic discards (e.g., computer-related electronics and CRTs) per person, per year was 9.4.[4] (That number is likely to be higher now due to more people purchasing electronic equipment and more equipment becoming obsolete faster than in past years. Also, the EPA estimate does not include cell phones.)

Applying the EPA estimate of 9.4 pounds per capita per year to the U.S. Census Bureau's estimated 2009 population of 181,440 the result is approximately 853 tons of e-waste discarded per year. In 2010, 178 tons of e-waste was collected in Ulster County or approximately 21 percent of the e-waste stream. When the tons of e-waste collected from the public were converted to pounds, the average number of pounds collected per participant ranged from 60 to 120 pounds. This appears to be in the range of other programs researched by the Agency including:

- Buck County, Pennsylvania – 108 pounds per participant (2008)
- Iowa – 81 pounds per participant (2006)
- Kansas – 92 pounds per participant (2007)
- Wisconsin – 65 pounds per participant (2008)

3 Source: EPA website, Statistics on the Management of Used and End-of-Life Electronics.
http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm
4 Source: "Electronics Waste Management in the United States - Approach 1," EPA, July 2008.
http://www.epa.gov/epawaste/conserve/materials/ecycling/docs/app-1.pdf

5.2.4.2 (e) Scope of Services Offered

Ulster County's collection program for used electronics is fairly comprehensive. However, as the quantities of e-waste continues to grow, it may become more critical that the Agency offer more collection events or increase days/hours for accepting e-waste at the Agency Facility. When the state of New York ban on disposing e-waste at landfills takes effect, the Agency will need to expand the collection program. It is likely that more producer take-back programs will emerge, so it is recommended the Agency monitor this issue in order to provide its residents with the most current information.

5.2.4.3 Capital and Operating Expenses

Expanding the County's current HHW and/or electronics recycling program may require additional staff or contracted labor to collect, manage, and process additional volumes of materials in preparation for their ultimate disposal or transportation to a processing or disposal site should the Agency construct a permanent HHW Collection Facility. (The Agency currently has no such facility and no employees designated as a Solid and Hazardous Waste Facility Technician.) Also, any type of expansion would require increased staff time to develop, coordinate and implement expanded public information, outreach, and marketing programs, as well as additional data tracking, program management, etc. (The Agency currently has one full-time Recycling Coordinator dedicated to the HHW Program.) Any additional staff or staff time would result in an increase in operating expenses.

5.2.4.4 Evaluation of Public/Private Ownership and Operation Options

Public-private partnerships provide an option for municipalities to consider when expanding their HHW and/or electronics recycling program. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector. The public/private approach might be considered for an electronics collection and recycling program or if the Agency ever chose to not be involved in the operations side of the HHW collection program.

An approach to a public/private partnership is to distribute a Request for Interest (RFI) to hazardous waste management companies with capabilities and interest in providing collection, processing, packaging and/or transportation services for HHW and/or used electronics. If the Agency considered this option, staff time would be needed to develop and distribute an RFI to companies with capabilities and interest in providing the services of an expanded HHW and/or electronics recycling program. The approach could include an incentive in which the Agency provides the land for use at a minimal cost and then contracts with a private firm to operate the collection/processing facility.

5.2.4.5 HHW and E-Waste Recycling Education

The Agency provides information on HHW and electronics disposal and recycling options on its website, www.ucrra.org, has developed a *How-To Guide for Proper Disposal of Hazardous Products* and a *Safe Alternatives to Common Household Products Guide* (available in print and also on the website) and publishes print ads announcing HHW and electronics collection events. In addition, the Agency Recycling Hotline provides information throughout the year regarding proper disposal options for HHW and used electronics. Recommendations to expand on education efforts include:

☐ Expansion of the collection program to include CESQGs

☐ Send an annual letter to small businesses in the County that explains the basics of the Agency's CESQG program, including what materials are accepted in the program, what the costs are for disposal, and how to prepare the items for delivery to the Agency Facility. Work with the local Chamber of Commerce to obtain contact information for small businesses. Because this could be a large mailing, the Agency could consider sending letters to one-fourth or one-third of the businesses one year and send the remaining letters in subsequent years and continue with the rotation.

☐ Expand/rearrange the HHW and e-waste information section of the Agency's website.

Update website to include the following pages:

☐ Transport of HHW;

☐ Alternative Products;

☐ FAQ for residents; and

☐ Provide a description of environmental and health hazards of improper use and disposal of HHW products.

☐ Continue to partner with the MRDCs and Ulster County Department of the Environment, public libraries and County's Environmental Management Council (EMC) for dissemination of public education and outreach information. The EMC is the County's citizen advisory board for local environmental matters.

☐ Continue to partner with Cornell Cooperative Extension (CCE) for direct educational outreach. Currently, CCE includes hazardous waste information in its recycling outreach for the County. Keep CCE informed of the new e-waste legislation or take-back programs that might develop in the future.

☐ Consider distributing promotional items such as pens, magnets, calendars, etc. to promote the Agency's HHW and electronics recycling programs. These inexpensive marketing tools have the potential for the Agency's message to be seen over and over again.

5.2.4.6 Revenue Options

HHW and residential e-waste recycling programs are typically not revenue-generating programs for cities and counties. More often, they are justified expenses to ensure these hazardous materials are managed properly and kept from harming the environment. CESQG programs however, should be structured to generate enough revenue to cover the capital and operating costs of managing the hazardous waste from the small business sector. It is recommended the Agency allow CESQGs to utilize this program and charge for the management of hazardous materials and charge small businesses for the collection. It is recommended the Agency make a

concerted effort to increase the awareness of the HHW collection program to CESQGs in an attempt to include CESQGs in using the collection program.

5.2.4.7 Addressing Stakeholder Concerns

If the Agency chose to expand its HHW collection program to include a satellite facility, the residents of certain cities, towns and villages within the County should benefit greatly from this service. If the satellite facility was a joint venture between a municipality and the Agency, any concerns related to financing, staffing and operations would need to be resolved before such a project could move forward.

5.2.4.8 Implementation Requirements

In order to expand the current HHW and/or electronics recycling program, Agency staff would need to evaluate each expansion option as it relates to:

☐ Federal and State rules and regulations;

☐ Local permitting;

☐ Storage issues;

☐ Handling of materials;

☐ Staffing requirements;

☐ Health and Safety issues;

☐ Capital expenditures and operating costs; and

☐ Other program-specific considerations.

5.2.4.9 Benefits and Drawbacks

Implementing an expanded HHW and/or electronics recycling program has benefits as well as drawbacks, as outlined below.

5.2.4.9 (a) Benefits

The benefits to Ulster County may include, but not be limited to, the following:

☐ A potential increase in HHW and e-waste collection participation from both residents and businesses;

☐ A potential increase in the quantities of materials collected;

☐ A potential decrease in the amount of HHW and e-waste disposed of as garbage;

☐ Avoided disposal costs of electronics by providing a convenient opportunity for residents and small businesses to recycle e-waste through the Agency's permanent on-site collection program;

☐ Environmental benefits from diverting materials from being improperly disposed, by offering more convenient disposal and recycling options for HHW and e-waste; and

☐ Overall increased health & safety of the communities located within Ulster County.

5.2.4.9 (b) Drawbacks

The drawbacks to implementing an expanded HHW and/or electronics recycling program would most likely be financial. Most program additions or enhancements would require the Agency to increase funding for additional staff and expenses. By increasing the quantities of HHW and electronics collected, the Agency would incur increased collection, processing, transportation, disposal and recycling fees.

However, any fees incurred are likely to be less expensive collectively when compared to the cost of landfill disposal on a per ton basis or per cubic yard of air space, or when compared to remediation costs due to a hazardous waste spill or incident.

When considering the "cost" of recycling or diversion programs there are both "economic" considerations and "non-economic" considerations. Under economic considerations, the Agency must compare the cost of recycling programs with the cost of landfill disposal, including transportation costs. For "non-economic" considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling, and New York State Rules and Regulations. These factors should all be considered as the Agency formulizes its integrated solid waste management planning efforts, regarding hazardous waste and e-waste.

5.2.5 COMPOSTING DIVERSION OPTIONS

1. Large-Scale Composting

Currently the Agency actively composts yard waste at the Ulster Transfer Station Facility. In an effort to increase diversion, the Agency could consider composting additional materials such as biosolids (the nutrient-rich organic materials resulting from the treatment of sewage sludge) and/or food waste.

2. Biosolids Composting

Currently the Agency transports biosolids that are delivered to a processing facility in Buffalo, New York. The disposal of biosolids is a County-wide issue and diversion options for biosolids will be discussed in more detail in the Evaluation of Alternative Technologies - Section 4.7.

3. Food Waste Composting

Commercial/industrial/institutional (CII) food waste (typically generated from grocery stores, hotels, restaurants, and institutions such as universities, hospitals and prisons) is an ideal feedstock for composting. The material usually consists of pre-consumer food waste such as raw fruit and vegetable peelings and meat waste,[1] as well as postconsumer waste such as leftovers. In addition, certain types of paper (including nonrecyclable waxed corrugated cardboard, paper towels, paper plates, etc.), can also be diverted from the garbage and composted. Residential food waste is also an ideal feedstock for composting, however, it is logistically more difficult to collect than CII food waste. The downstream diversion of food waste will be discussed as part of the municipal solid waste (MSW) composting options in the Alternative Technologies Evaluation – Section 4.7.

1 Source: Typically fats, meats, and bones are acceptable in large-scale, properly managed composting systems. Cornell Waste Management Institute http://cwmi.css.cornell.edu/smallscalecomposting.htm

4. Backyard Composting

Currently the County encourages backyard composting and contracts with Cornell Cooperative Extension (CCE) for direct educational outreach. CCE distributes a quarterly composting newsletter and has a Home Composting Demonstration Site for members of the community to visit that features commercial and homemade compost bins. Also, the Agency sells backyard compost bins (at cost) year round at the Ulster facility. In an effort to increase backyard composting, the County and CCE could consider offering more workshops throughout the year and increase the advertising for compost bin sales. In addition, the Agency could consider expanding the Backyard Composting information on the Agency website to include more information such as troubleshooting, health and safety, preventing animal nuisances, pH and temperature control, etc. Links to other organization's backyard composting websites are provided in Section 5.2.5.8 - Resources.

5. Small-Scale Vermicomposting

Vermicomposting (composting with worms) is an easy way to divert food waste from the garbage by turning food scraps into a rich soil amendment. It can be done indoors, requires little space, and is odorless, if maintained correctly. Vermicomposting typically utilizes redworms, also called "red wigglers," because the species thrive in small, confined spaces and they tolerate a wide range of conditions. CCE usually offers a worm composting workshop for Ulster County residents every year. Attendees receive a worm container, bedding and starter worms. In addition, CCE also holds an annual vermicomposting workshop specifically designed for school teachers. One option the County may consider to increase worm composting, is to add a vermicomposting webpage to the Agency's website. The information could include how to start a worm composting bin, troubleshooting, and where to purchase redworms. In addition, the County could consider having a "worm sale" once a year. Vermicomposting can be an educational project for school children and is incorporated into waste reduction and recycling outreach efforts. The Agency has a working worm composter for staff generated food waste.

This is used as a teaching demonstration project for school/public tours promoting composting of organic waste.

6. Food Waste Collection/Diversion

Nationwide, food waste accounts for an estimated 12.5 percent of MSW.[2] At a time when many recycling programs have hit a plateau, food waste is commonly the next segment of MSW to be tapped for diversion. Collecting food waste is often more challenging than collecting typical recyclable materials. Some of the hurdles to collecting food waste from both residential and CII generators include space considerations, the costs of collection containers and vehicles, and the distance to the composting/processing facility.

Currently, there are no large-scale facilities in Ulster County that actively compost postconsumer food waste or co-compost food and yard waste. The State University of New York (SUNY) New Paltz campus composts some yard waste in a static pile and transports food waste to McEnroe Farms where it is co-composted with yard waste and manure. Delaware County, east of Ulster County, owns and operates an MSW co-composting facility near Walton, New York. Large-scale food waste or organics composting facilities are typically more economically viable in locations that have high tipping fees for MSW disposal (>$50/ton), whose construction and/or operations are subsidized in some way, or where there are specific long-term economic considerations that lower the present worth cost over a 20-year planning period. Nevertheless the following information on food waste collection and diversion is provided for the Agency's reference, as food waste diversion opportunities may arise in the future.

2 Source: "MSW Generation, Recycling, and Disposal in the United States: Facts and Figures for 2007," U.S. EPA. http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-fs.pdf

6a. Residential Collection

Several communities in the United States have implemented curbside collection of residential food waste and food-soiled paper (e.g., paper towels, napkins, paper plates, tissues, etc.) in the same container as yard waste. Links to some of these programs (including Seattle, WA; San Francisco, CA; Alameda County, CA; Cedar Rapids, IA; and Hutchinson, MN) are provided in Section 5.2.6.8 - Resources. The co-collection of food waste with yard waste is possible in places where processing facilities receiving the materials are permitted to accept both food and yard waste. While some of the program examples are located in communities much larger than

Ulster County, it should be noted that two residential organics collection programs are operating on a smaller scale: Hutchinson, Minnesota, with a 2007 population estimate of 13,929 and Cedar Rapids, Iowa with a 2007 population estimate of 126,396. Most residential food waste collection programs utilize lidded, wheeled carts and automated collection vehicles for the curbside collection of food and yard waste. Because the Agency does not operate or manage the collection of MSW, recyclable materials or yard waste in the County, the issue of purchasing or using carts for organics collection would have to be researched and discussed with the municipalities and private haulers who operate collection programs within the County. The issues include, but are not limited to:

☐ Cost of carts;

☐ Compatibility with haulers' current collection vehicles;

☐ Cart maintenance; and

☐ Residents' lack of space to store carts.

In addition to the types of carts, many organics collection programs are using aerated carts such as SSI Schaefer's "Compostainer"[3] or IPL's "Bio Cart."[4] While the quantities of organic materials may increase with the use of wheeled carts, there is also the potential for an increase in contamination of "non-targeted" materials (items that are defined by the County as not acceptable) to be placed in the carts. Some residents may place garbage or recyclable materials in their organics cart if they are confused about the program, their trash container is full, or as a way to avoid purchasing specially-marked bags, such as those required for garbage collection at some of the Municipal Recycling Drop-off Centers (MRDCs).

3 Source: SSI Schaefer website. http://www.ssi-schaefer.ca/WR/WRproAP.html#wr2

4 Source: IPL website. http://www.ipl-plastics.com/Afficher.aspx?page=197&langue=en

6b. Commercial/Industrial/Institutional Collection

Implementing a food waste collection program with the CII sector can be easier than implementing a residential food waste collection program, because there are fewer generators so education tends to be more site-specific or one-on-one. Also, because of the larger quantities generated, a commercial business can often use a dumpster, a roll-off container, or a compactor for food waste which many haulers are capable of servicing using their current fleet of collection vehicles. Pre-consumer commercial food waste, such as trimmings produced by restaurants and grocery stores, is ideal for composting because it tends to be produced in higher volumes and is less likely to be contaminated with packaging. Grocery stores have a financial incentive to reduce their waste stream because not only is trash service expensive, but trash takes up valuable space. In some communities, stores have contracted for organics collection or they backhaul compostable materials to a distribution center where it is directed to a composting facility.

Some grocery store food discards may be packaged in plastic wrap, which does not decompose and can pose handling issues in a compost system and contamination issues if not screened out at the end of the process. To reduce the impact of plastic packaging, grocery stores should be educated to remove packaging prior to setting out material for collection, and the finished product should be screened to make sure no stray plastic bits remain. Fats, meats, and bones are acceptable in a large-scale composting system.

The Windham Solid Waste Management District (WSWMD) in southern Vermont accepts old corrugated cardboard (OCC) and non-recyclable paper in its commercial composting program for economic reasons. While they had preferred to recycle OCC back into paper products, it was not economical to dispatch a separate truck for OCC collection and a truck for organics collection in their rural service area.[5]

In Seattle, post-consumer commercial food, such as cafeteria waste contaminated with takeout containers, paper plates, cups, etc. is diverted and processed by co-composting it with yard waste. A key to success with post-consumer food waste is that the containers and cutlery must be compostable. Many products advertise that they are "biodegradable," although whether a material that claims to be biodegradable can *actually* be composted is dependent on the receiving facility and its processes. Therefore a material testing and approval program, such as the one managed by Cedar Grove Composting[6], the private company that processes Seattle's post-consumer cafeteria waste, is suggested before biodegradable items are accepted in the food waste program.

The St. Paul, Minnesota Independent School District recently implemented a largescale, post-consumer food waste composting program. This district has more than 42,000 students and 80 different schools. In the 2007/08 school year, 52 schools within the district implemented a food-for-livestock program. Each of these sites has trained its students and staff to source-separate their food waste in the cafeterias. The food waste is then cooked per Minnesota Animal Health Standards and fed to pigs. The program is estimated to reduce the volume of commercial waste requiring disposal by nearly 30 percent. This has resulted in cost savings to the district because of reduced MSW collection costs realized through a resource management program. As collection and processing capacities develop over time, it is expected that more communities will consider mandatory diversion and/or disposal bans for food waste.

5 Source: "Public/Private Partnering Facilitates Organics Diversion," by Robert Spencer, BioCycle June 2008. http://www.jgpress.com/archives/_free/001662.html

6 Source: Cedar Grove Composting website. http://www.cedar-grove.com/services/compost.asp

7. Rules and Regulations

The management of organics composting, including siting and permitting, is regulated at the state level with the exception of biosolids and animal manures. In New York, composting biosolids is regulated by both State and Federal regulations. New York state requirements for facilities involved in composting of sewage sludge, food, yard and other solid wastes are subject to regulation under the Comprehensive Revisions and Enhancements to Title (6 NYCRR) Subpart 360-5: Composting Facilities.[7] The regulations apply to the construction and operation of composting and other organic waste processing facilities for mixed solid waste, source separated organic waste, biosolids, septage, yard waste and other solid waste. These requirements include general requirements, pollutant limits, operational standards, monitoring, record keeping and reporting. Permitted facilities in New York must submit an annual report pertaining to the above requirements. Local regulations related to the collection of organics typically include hauler licenses/permit requirements and published ordinances.

7 Source: NYSDEC website. http://www.dec.ny.gov/regs/4411.html

8. Implementation Requirements

Currently Ulster County actively composts yard waste (including leaves, brush, grass clippings and tree limbs) at the 18 Municipal Recycling Drop-off Centers (MRDCs). In an attempt to increase organics diversion from the landfill, the Agency would need to research and evaluate its

diversion options. Composting food waste (with MSW) and biosolids is discussed in the Alternative Technologies Evaluation Section 4.7. Expanding backyard composting and small-scale vermicomposting could be done with increased staff effort. However, to implement a large-scale food waste diversion program (separate from an MSW composting program) would require the development of the infrastructure needed to collect and process the material. As stated previously, there are no facilities in the County that actively compost food waste or co-compost food and yard waste at this time. Whether a public or private facility is developed, the Agency would need to consider:

☐ Facility permitting;

☐ Acquisition of feedstock;

☐ Management/monitoring of composting operation;

☐ Health and Safety;

☐ Cost; and

☐ Other site-specific considerations.

In addition, the collection of the organic material would need to be evaluated for both the residential and commercial sectors and would include, but not be limited to:

☐ Collection container options and compatibility with haulers' current collection vehicles;

☐ Public Education; and

☐ Cost.

The Agency wants to consider implementing a pilot study to gather more data on the logistics and effects of an organics collection program. Public/private ownership and operation of a food waste/organics composting facility may be an option for the Agency to consider. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector. If the Agency considered this option, staff time would be needed to develop and distribute a Request for Information (RFI) to firms with capabilities and interest in providing the services of composting organic materials. The approach could include an incentive in which the Agency provides the land for use at a minimal cost and then contracts with a private firm to operate the processing facility. Another option the Agency may consider researching is a food waste-to-livestock program. Such a program has not been implemented in New York State and would require approval from the state's Department of Agriculture and/or Department of Health. The Agency may consider establishing an organics diversion working group or committee. The group could be charged with researching the various diversion options, identifying barriers to each option, and be asked to make specific recommendations to the Agency's solid waste management staff.

9. Education Tactics

The education requirements of implementing an expanded organics diversion program will depend on the diversion options that are ultimately chosen: backyard composting, vermi-composting, residential and/or commercial food waste collection, etc. The Agency will continue to work with CCE to promote backyard composting, grasscycling, vermicomposting (for residents and schools), composting workshops, and compost bin sales. The option that would require an increased level of public education would be a food waste collection and composting program. In order to receive feedstock that is appropriate for composting and free of contaminants, Agency staff would need to educate the generators of the food waste (i.e., residents, restaurants, institutions, grocery stores, etc.) as well as the collectors (haulers) of the food waste. Educating residents would require a coordinated plan to disseminate public information before the program is to be implemented (direct mailings, coverage in community newspapers, local cable access programs, neighborhood advisory groups, etc.) as well as during implementation and throughout the life of the program (cart tags/notices). The City of San Francisco's contracted hauler uses photographs to educate customers what materials should be placed in what cart (garbage, recycling, compostables).[8]

The Agency currently provides technical recycling and composting assistance to businesses. This service may be in higher demand if the Agency implemented a food waste collection and composting program. Certain businesses may need a waste audit to determine if they generate enough food waste to participate in the program. As with any program change, the Agency's website will be kept up-to-date with diversion program information. Many people have come to rely on their municipalities' website for solid waste-related instructions and it is a relatively low cost means of providing information.

8 Source: "Food Waste Diversion Promoted on the Street," by Rhodes Yepsen, BioCycle March 2009. http://www.jgpress.com/archives/_free/001833.html

10. Capital and Operating Expenses

Implementing an expanded organics diversion program may incur considerable costs to the Agency. The extent of the capital and operating expenses depends on the option(s) considered by the Agency. Dedicated staff time would be required to analyze each diversion option. If the Agency was to be involved in the development and operation of a food waste composting facility, the capital expenses would be great. Costs could include, but not be limited to: land acquisition, costs associated with designing and constructing the composting facility, equipment required to handle and process the organic feedstocks, labor required to operate the program, etc. However, if a food waste composting facility were to be developed by a private entity, the Agency could have less capital expenditures. Regardless of the approach, a large capital expenditure for a food waste collection and diversion campaign would be the ongoing promotional and education pieces. Additional staff time would be required to monitor the program and work with the private haulers on collection issues. A successful organics diversion

program would inevitably reduce the amount of waste requiring disposal, thus reducing tipping fees and transportation expenses from exporting to an out-of-county landfill.

11. Diversion Potential

To determine the current and future organic waste quantities available to the County, the Agency will survey large private industrial and commercial solid waste generators in an attempt to gather data including the tonnages generated and the tonnages recycled, composted or diverted for each organic material. It is assumed that certain paper grades such as newspaper, corrugated cardboard, magazines, high grade office paper and mixed recyclable paper (box board, junk mail, etc.) would be recycled through typical residential and commercial recycling programs, rather than composted.

12. Addressing Stakeholder Concerns

Stakeholder concerns regarding an expanded organics diversion program will depend on the option(s) considered by the Agency. Concerns may include, but not be limited to:

☐ Resistance from residential and CII stakeholders to an organics collection program;

☐ Concerns from business owners regarding perceived increases in time and labor to divert multiple materials;

☐ Concerns from haulers and municipalities that currently operate their own collection programs being required to collect and haul an increased number of source-separated materials;

☐ Concern that the costs associated with implementing a residential curbside cart based collection program for organics may be high; and

☐ Concerns related to siting and permitting issues for a food waste composting facility.

13. Benefits and Drawbacks

Implementing an expanded organics diversion program has benefits as well as drawbacks, as outlined below.

13a. Benefits

Potential benefits of increased organics diversion include:

☐ A decrease in the amount of waste disposed via export to an out-of-county landfill;

☐ Benefits related to the increased use of finished compost, a by-product of organics diversion, (by residents, landscapers, the County, etc.) include a reduction in need for fertilizers, providing nutrients to deficient soils, prevention of soil erosion and nutrient run-off, and feedstock for land reclamation projects. The benefits to implementing a residential curbside cart-based collection program for organics may include, but not be limited to, the following:

☐ Increased convenience to residents by switching to lidded, wheeled carts;

☐ Increased quantities of organic materials collected due to adding food waste to the diversion program in addition to yard waste;

☐ Improved residential neighborhood aesthetics by reducing the amount of yard waste litter caused by windy conditions as well as having uniform containers for every household;

☐ Protection of organic materials from excess moisture on rainy days, which can make materials and containers heavier when manually collected;

☐ An increase in productivity by the haulers because the collection crews would be able to service more households in one day than they are able to service using the current, manual collection method; and

☐ The potential to lower haulers' workers compensation claims because workers would be doing less lifting compared to the current manual collection of yard waste.

13b. Drawbacks

Potential drawbacks of increased organics diversion include:

☐ An increase in capital and operating expenses;

☐ An increase in Agency staff time to research diversion options, determine available feedstocks, design a facility, proceed through a facility permitting process, work with haulers regarding collection issues, etc.; and

☐ Addressing concerns and potential resistance from haulers and residential and CII stakeholders to an organics collection program. The drawbacks related to implementing a residential curbside cart-based collection program for organics may include, but not be limited to, the following:

☐ A potential for increased quantities of contaminants or non-targeted materials to be collected, however education and enforcement efforts can mitigate this risk;

☐ Implementing a cart-based collection system for organics may impose a financial burden on some haulers to purchase new, fully-automated collection vehicles or retrofit current vehicles with semi-automated cart tippers. These costs are not likely to be included in the hauler's current equipment budget;

☐ Implementing a cart-based system may impose a financial burden on the Agency if the Agency subsidizes the program in any way (e.g., by purchasing the carts);

☐ Some businesses may not have space for an organics collection container; and

☐ Some residents may resist the use of carts, siting lack of space to store the cart.

14. Resources

Provided below is a list of resources which may be beneficial to the Agency when researching organics diversion options.

14a. Backyard Composting

☐ Cornell Waste Management Institute http://cwmi.css.cornell.edu/smallscalecomposting.htm
☐ Maryland Cooperative Extension Home and Garden Information Center
http://www.hgic.umd.edu/_media/documents/BackyardCompostinghg35pfv.pdf
☐ U.S. EPA – Backyard or Onsite Composting website.
http://www.epa.gov/waste/conserve/rrr/composting/backyard.htm
☐ University of Wisconsin Extension
http://www4.uwm.edu//shwec/publications/cabinet/composting/CommonBackyardCompostingQA.pdf

14b. Small-Scale Vermicomposting

☐Maryland Cooperative Extension Home and Garden Information Center
Indoor Redworm Composting
http://www.hgic.umd.edu/_media/documents/IndoorRedwormCompostingHG40pfv.pdf
☐ New York Worms http://www.nyworms.com/vermicomposting.htm

14c. Curbside Collection of Food Waste

☐ Alameda County, California http://www.stopwaste.org/home/index.asp?page=528
☐ BioCycle, "Diverting Food Residuals in Minnesota," by Roberta Wirth, September 2005. http://www.jgpress.com/archives/_free/000525.html#more
☐ BioCycle, "Organics Cart and Container Trends," by Nora Goldstein, October 2007. http://www.jgpress.com/archives/_free/001469.html
☐ City of Cedar Rapids, Iowa http://www.cedar-rapids.org/solidwaste/prepare.asp
☐ City of Hutchinson, Minnesota – Curbside Organics Collection
http://www.ci.hutchinson.mn.us/composting.html#curbside
http://www.ci.hutchinson.mn.us/pdf/organiccompostprog.pdf
☐ King County, Washington http://your.kingcounty.gov/solidwaste/garbage-recycling/food-collection.asp
☐ City of Olympia, Washington http://www.ci.olympia.wa.us/city-utilities/garbage-and-recycling/organics-andyard-waste/organics-and-yard-waste-the-basics.aspx
☐Resource Recycling, "Getting Organics to the Curb," by John Jaimez, May 2005.
☐ City of San Francisco, California http://www.sfrecycling.com/residential/composting.php?t=r
☐ City of Seattle, Washington – Food & Yard Waste Collection
http://www.seattle.gov/util/Services/Yard/Yard_Waste_Collection/index.asp
☐ SWANA, "Curbside Collection of Residential Food Waste," December 2008 (available free of charge to SWANA members). http://swanastore.stores.yahoo.net/cucoofrefowa.html

14d. Food Waste-to-Livestock

☐Hennepin County, Minnesota
http://www.co.hennepin.mn.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnextoid=f866b70a699fc010VgnVCM1000000f094689RCRD

☐ North Carolina Division of Pollution Prevention and Environmental Assistance
http://www.p2pays.org/ref/20/19926/P2_Opportunity_Handbook/7_II_A_5.html
☐University of Minnesota
http://www.mntap.umn.edu/food/67-FeedingFood.htm

5.2.6 CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING

The Agency will not develop a C&D processing program. The high capital investment, impact on the likely site (the Ulster property), minimal return and existence of three area private sector facilities serving this purpose mitigate against such development. However, the Agency will continue to receive C&D waste at its transfer stations, and to provide roll-off containers to customers who require this C&D service, and to separate components of C&D in its processing of mixed MSW at its transfer stations.

5.2.7 MUNICIPAL RECYCLING DROP-OFF CENTERS (MRDCs)

The Municipal Recycling Drop-Off Centers are a key to the success of the Agency's system. They provide the citizens of the participating jurisdictions the alternative to self – haul MSW and regulated recyclable materials to convenient and accessible drop off facilities. Citizens can drop off regulated recyclables for free and pay reasonable charges for disposing of MSW. The MRDCs are a cost-effective alternative to private sector collection contracts. The Agency will seek to extend the Solid Waste Management contracts with the municipalities, which provide, among other things for the MRDC operating obligations of the municipalities and the Agency, for the duration of the Plan extension period. In order to accomplish this, the Agency will review the current system with each municipality, and will work to reduce the costs of operating the MRDC through scheduling, combining MRDCs (if that does not impact customer convenience) or through changes to the MRDCs or the equipment serving them. Most pertinent here would be the conversion of roll-offs to compactor units at appropriate sites, thus reducing the number of trips and costs to the municipality and the Agency. Such conversion has already occurred at the town of Saugerties MRDC (which also services the towns of Woodstock and Shandaken) and the town of Wawarsing MRDC.

5.2.8 TRANSFER STATIONS

The Agency will continue to maintain its Transfer Stations at Ulster and New Paltz as regional facilities. Under the 10 year operating permits, improvements will be made to the facilities as authorized by the NYSDEC. Certain improvements are currently being implemented after public bid. At the New Paltz transfer station the Agency is installing a new scale and safety improvements. At the Ulster Transfer Station, construction of a spill prevention system is underway. Another improvement being discussed is a potential leachate collection system for transfer trailers. This will allow outside storage of trailers loaded with processed MSW. This will in turn permit the queuing of trailers which increases the operating efficiency and lowers operating costs at the Transfer Stations.

Most important, though, is the Agency's current pursuit of a modification of the Part 360 operating permit for the Ulster Transfer station. The current throughput limits at Ulster are inadequate to address an increase in MSW when the Agency began receiving approximately 40,000 tons of MSW per year from Waste Management. Furthermore, the current limits are inadequate to address daily fluctuations in MSW throughput caused by various factors, including increased amounts of MSW received after holidays, or after disruption of the system by weather or temporary unavailability of the landfills. Finally, the County Legislature is currently considering an amendment to Local Law No. 9 of 1991 (the "flow control law"). Enforcement of flow control could result in an increase in MSW because generators or haulers in Ulster County would be prevented from disposing of it in other counties. The Agency estimates an additional 10% to 20% of MSW may be received if flow control is implemented. The Agency applied for the permit modification in January of 2010, and expects a favorable response from NYSDEC in the near future.

5.2.9 SOLID WASTE HAULING

The Agency will continue to use contractors to haul processed MSW to its contracted landfills, Seneca Meadows and High Acres. The hauling contractors Santaro Development LLC, D&N and Michael Spada have contracts which currently expire on December 31, 2012. It is the Agency's intent to negotiate multi-year extensions of those agreements with the existing haulers, based on their continued acceptable service. If these negotiations are unavailing, then the Agency will publically bid those services as it did in 2010. The Agency expects that bidding for the MSW hauling contracts will continue to be competitive.

5.2.10 PRIVATE LANDFILL DISPOSAL

Disposal at out of county landfills is the most practical disposal alternative for the study period. The agency's transfer station and hauling system is mature and functions smoothly. The landfills used by the Agency have sufficient capacity for the Agency's solid waste stream over the next ten years. It is likely that the landfills will negotiate acceptable pricing with the Agency extending the existing contracts through the planning period. The costs of this system are reasonable and substantially less than the costs that would be incurred if the Agency sought to plan, design, site and construct a solid waste facility in Ulster County. Other alternatives to the current system are not financially competitive, nor do they have adequate capacity to handle the Agency's requirements. For instance, the Dutchess County Resource Recovery facility in Poughkeepsie, while only 20 miles from the New Paltz Transfer Station and 35 miles from the Ulster Transfer Station, charges approximately 3 times the fee charged by the landfills and does not have sufficient capacity to handle but a small portion of the County's solid waste. The Hudson Falls facility also charges much more than the landfills, is approximately 100 miles from the transfer stations and has limited available capacity. The Taylor biomass project would located within 50 miles of the New Paltz Transfer station and 35 miles within the Ulster station, but it is not yet constructed; has a projected user fee much higher than the landfill costs but this option will be evaluated as the facility becomes operational. Alternative technology can be used

with regard to sewage sludge. The Agency will work to negotiate a contract with a local municipality, company or Rockland County to receive sewage sludge, thus avoiding the inordinate cost and expense of hauling the sludge to Buffalo, New York. The Agency will take steps to reduce the cost of long-distance hauling/landfilling solid waste, as well. Increasing recycling will reduce the amount of solid waste to be hauled – resulting in lower costs. Furthermore, the composting of organic waste received at the transfer stations will dramatically reduce the weight of solid waste hauled and disposed of at the landfills.

5.3 SYSTEM OPERATING COSTS AND FINANCING

5.3.1 System Operating Costs

The costs of the Ulster County Solid Waste and Recycling System throughout the planning period should continue to be reasonable when compared with other regional systems. No major increases in operating costs (without a concomitant increase in revenues) are envisioned. If flow control is implemented, and a projected 10% to 20% increase in MSW is received by the Agency, the net cost of operating the system will not increase dramatically, but the allocation of the costs of the system will be changed. The main impact of successful enforcement of flow control is that a uniform fee for disposal of MSW will be charged to all users of the system. The discounted fees now charged to implement contractual flow control with the major MSW collection companies would no longer be charged. MSW would be brought into the system by force of law, not negotiated contracts containing necessary discounts. The Agency would establish a uniform rate applicable to all MSW being received by it. This will result in a reallocation of the costs of the system. If flow control is successfully enforced, the users of the system would pay 100% of the costs. There would be no Net Service Fee charged to the County under the Service Agreement between the Agency and the County, and, therefore, County taxpayers would no longer pay a percentage of the system cost. It should be noted that the system's costs were supposed to be paid 100% by the users under the original SWMP, and, in fact were paid 100% by the users until 1998, when the first Net Service Fee was collected by the Agency from the County government. In the ensuing years of the post-*Carbone* era, the County taxpayers shared in paying the costs of the system. During this period though, the users continued to pay by far the greatest percentage of the cost. It should be noted that if flow control is not implemented, the Agency will continue the current system, which is based upon economic flow control and cost-sharing by the users of the system and the Ulster County taxpayers. The Agency projects that the current system, which has been the operating paradigm since 1998, will continue to provide efficient and cost-effective MSW services as it has over the past 13 years.

The projected increase in receipt of MSW because of flow control will not overburden the Agency's operating system, as long as NYSDEC grants the modification to the NYCRR Part 360 permit at the Ulster Transfer Station permitting an increase in MSW throughput. Both transfer stations have the capacity to deal with the projected increase in MSW and the Agency's staffing

is adequate for such purposes. Operating costs will naturally increase because of the increased tonnage, but the cost increase will be offset by the Agency's charges for such increased amounts.

Finally, MSW amounts processed through the transfer station/long-haul/landfill disposal system will be reduced by the recycling initiatives described elsewhere in this document. Most notably, a successful organic composting program would dramatically reduce the amount of MSW currently processed, saving capacity and costs.

5.3.2 System Financing

The Agency has authority to issue public debt to finance the capital requirements of the system. The Agency's agreement with the Ulster County government provides that the Agency does not have to obtain any prior approval from the County before it issues debt, unless the total outstanding debt will exceed $40 million. The current debt level is $23 million. It is likely that equipment replacement over the planning period will necessitate the issuance of public debt. Equipment replacement borrowing would not in and of itself involve long-term debt as the term of bonds issued must relate to the useful life of the equipment purchased. However, should the Agency proceed with new major repairs or improvements, such as the construction of an organic composting facility, long term public financing would probably be needed. While the current volatility of the economic system will no doubt have an impact on the costs of borrowing, the favorable bond rating of the County of Ulster and the Agency's borrowing capacity are positive factors if long term borrowing must be considered.

5.4 COMPREHENSIVE RECYCLING ANALYSIS

The Agency prepared a Comprehensive Recycling Analysis pursuant to State law (the "CRA") at the same time it prepared the original Solid Waste Management Plan. The reduction, reuse and recycling information contained in this document updates and amends not only the original Solid Waste Plan, but the CRA as well.

5.5 COORDINATION WITH LOCAL GOVERNMENTS AND THE PRIVATE SECTOR

In order to have a successful System, the Agency must maintain a cooperative relationship with the County government, the governments of the municipalities of the County and private sector users of the System, providers of service and markets. While the Agency is an independent public benefit corporation, it cannot provide service in a vacuum or act by unilateral fiat. Its powers within the geographical area of the County and the subject matter area of solid waste are broad, but by no means controlling. Coordinating its provision of service and informing the County, local governments, private sector companies and the general public of the status of its work and pricing are major goals of the Agency.

The Agency's relationship to the County government is discussed in detail elsewhere in this plan update. See Section 6.1. The Solid Waste Service Agreement defines the cooperative relationship between the County and the Agency.

The Agency has Municipal Solid Waste Agreements (SWMAs) with the towns of Saugerties, Woodstock, Shandaken, Ulster, Esopus, Lloyd, Marlboro, Shawangunk, Wawarsing, Denning, Hardenbergh, New Paltz, Gardiner, Plattekill, Rochester, Hurley, Kingston, Olive, Rosendale and Marbletown, and the city of Kingston. These agreements, which provide the specifics of the relationship of the Agency to the municipalities of the County, are more fully described in Section 6.4 of this Plan Update. In addition to the contractual requirements, the Agency tries to foster a cooperative relationship with the municipalities by meeting with town supervisors and the mayor, providing information on current issues such as flow control, single stream recycling and budgetary matters. It tries to coordinate services wherever possible, especially in the area of recycling. HHW days have been scheduled in various municipalities. Educational programs are coordinated with municipalities and school districts. When extensive flooding occurred in the town of Ulster in 2005, the Agency stepped in as contractor under FEMA, and assisted the town with the clean up and disposal of debris. When Wawarsing was left with a huge waste tire problem, the Agency handled disposal arrangements for those tires. Many towns schedule clean up days. The Agency has assisted in those efforts by making its facilities available to the municipalities. The Agency is currently working with the City of Kingston with regard to its effort to implement single stream recycling. The Agency and the town of Ulster have shared snowplowing and mowing responsibilities. The Agency provides its grinder to municipalities for grinding wood, and it collects leachate from the town of Hurley.

The Agency has participated with other governments and agencies in regional efforts to coordinate and cooperate on solid waste and recycling problems and issues. The Agency intends to continue these efforts during the term of the Plan Update.

The Agency is a member of solid waste and recycling committee of the Hudson Valley Regional Council. This committee's mission is to provide a forum for discussion of regional issues and explore regional solutions to problems. Most recently, the implementation of single stream recycling and the impact of the New York State Solid Waste Management Plan update were topics of discussion.

The Agency has participated in regional solutions to operational problems. The Agency's Materials Recovery Facility is currently receiving commingled recyclables from Westchester County while that government reconstructs its Materials Recovery Facility. The Agency has received solid waste from Orange and Dutchess Counties when their facilities were not available to them. Pharmaceuticals received at the Agency's HHW collection events are sent to the Dutchess County Resource Recovery Facility in Poughkeepsie. Legislative leaders from Ulster and Dutchess counties have met recently to discuss the possibility of regional initiatives, and the Agency has a long history of discussions with representatives of the Dutchess County Resource

Recovery Agency about cooperating on recycling matters. The Rockland County Resource Recovery Authority, the Columbia County government and the Agency have cooperated on certain tax matters, and the Agency is currently discussing the possibility of hauling municipal sewage sludge to the Rockland County Resource Recovery Authority for processing at their Co-Composting Facility.

6. ADMINISTRATION OF THE SYSTEM

6.1 AGENCY AS PLANNING UNIT AND SYSTEM PROVIDER

The Ulster County Resource Recovery Agency is the solid waste management planning unit for Ulster County so designated by the County Legislature under New York State Law. The Agency is also the provider of the Ulster County Solid Waste Management System as defined in the Plan. The Agency's role as the System provider is defined in the Solid Waste Service Agreement with the County of Ulster, and further defined in the Solid Waste Management Agreements with 16 of the municipalities of the County. The Agency also has been given certain authority under Ulster County Local Law No. 8 of 1991, as amended (source separation and recycling) and Local Law No. 9 of 1991 (solid waste management). Among the main duties under the dual designations are the drafting, adoption, approval, and amendment of the Solid Waste Management Plan, and the implementation and enforcement of the Solid Waste Management System.

6.2 ADMINISTRATIVE STRUCTURE

The Ulster County Resource Recovery Agency is a public benefit corporation formed by the New York State Legislature at the request of the Ulster County Legislature. The State legislation establishing the Agency is codified in Article 13-G of the New York State Public Authorities Law. Article 13-G is the "enabling act" of the Agency, and, among other things, it sets forth the powers and duties of the Agency, describes the governing body (a five member board appointed by the County Legislature to 3 year terms), provides for staffing the Agency, delineates the Agency's relationship to the County and its municipalities (most pertinently the ability of the parties to contract among themselves to carry out the purposes of the enabling act), and authorizes the County Legislature to adopt local laws for flow control of the County's solid waste stream and for mandatory recycling.

For financial purposes, the Agency is considered as a subsidiary agency of the County, and the Agency is part of the County's financial reporting. However, the Agency is legally an independent entity. It is not a County department; it is not directly supervised by the County government, nor does the County guarantee the debt and obligations of the Agency.

The functional relationship between the Agency and the County is set forth in the Solid Waste Service Agreement by and between the parties (the "Service Agreement"). The Service

Agreement was entered into in 1993. It has been amended on four occasions, and expires on December 31, 2026. Under the Services Agreement, the Agency is obligated to plan, design, finance, construct and operate a solid waste management system for the County. The Agency has the authority to charge fees to pay for the costs of the system, and has the obligation prepare annual budgets setting forth the cost and revenues projected for the ensuing year. It must provide a preliminary budget to the County government for review and comment, and action as limited by the terms of the Service Agreement. The Agency is authorized to issue debt, but is limited by the Service Agreement which requires County approval if the outstanding debt will exceed $40 million dollars. The County government is obligated under the Service Agreement to pay to the Agency "Net Service Fees" if the Agency is unable to raise sufficient revenues to meet its expenses. The amount of the Net Service Fee is calculated every year and equals the Agency's shortfall as calculated pursuant to a formula set forth in the Service Agreement. The County's obligation to pay Net Service Fees is absolute, as long as the Agency's system is available for service. The legal remedies of the parties are limited to enforcement of their respective obligations.

The County performs roles other than those specifically delineated in the Service Agreement. The Environmental and Governmental Services Committee of the County Legislature oversees the ongoing operations of the Agency through monthly meetings, generally at the Agency's headquarters in the town of Ulster, and through ongoing communication between the Committee Chairman and Agency officials. The Recycling Oversight Committee, established under Local Law No. 8 of 1991, meets regularly with Agency representatives to consult on recycling matters, including the listing or delisting of regulated recyclable materials. The Agency's administrative enforcement procedure for the mandatory recycling requirements set forth in Local No. 8 of 1991 ends with the presentation of the enforcement case to an independent hearing officer appointed by the County. The County Legislature has also appointed a special committee of County Legislators and Agency Board Members to review the Agency, and to recommend possible changes to the current structure and scope of the Agency. Information is exchanged routinely by and between the County Executive's office and the Agency. The County Comptroller has undertaken studies of the Agency's fiscal status and the County Legislature's oversight of the Agency. The County's Department of the Environment also confers with the Agency from time to time. The County Department of Weights and Measures inspects the scales at the Agency's facilities, and the County Sheriff's Department assists in the destruction of recycled medical materials collected at the Agency's Household Hazardous Waste events. Finally, the Ulster County Health Department cooperates with the Agency by licensing solid waste collectors in the County and inspecting their vehicles. Perhaps the most significant oversight of the Agency exercised by the County is the method prescribed in the enabling act for appointing Agency Board members. The five Board members are appointed by the Chairman of the Legislature (one member is specifically recommended to the Chairman by the Legislature's minority party), subject to approval by the County Legislature. Agency Board members serve three year terms.

6.3 SOLID WASTE SERVICE AGREEMENT

The essential document of the System is the Solid Waste Service Agreement between the Agency and the County, described in detail in Section 6.2, above. This agreement defines the obligations and rights of the Agency and the County and provides for the administration of the system. The agreement terminates in 2026. The Agency and the County must live up to their respective obligations as defined under the agreement if the System is going to succeed over the next ten years. This involves open communications and cooperation between the County and the Agency, and effective oversight by appropriate County legislative committees. The County and the Agency each have responsibilities under Local Law No. 8 of 1991(as amended) and Local Law No. 9 of 1991. The System cannot function successfully without cooperation in implementing those local laws.

6.4 MUNICIPAL AGREEMENTS

The Solid Waste Management Agreements (SWMAs) between the towns of Ulster County and the City of Kingston (the "Municipalities) and the Agency are also essential to an effective System. The SWMAs provide for the MRDCs, which are an essential service to the citizens of Ulster County, and the Agency's services to the Municipalities. The SWMAs terminate at various times beginning in the fall of 2012. The Agency intends to negotiate an extension of the SWMAs with each of the Municipalities.

Under the SWMAs, the Agency provides the system of recycling and solid waste management to the Municipalities. In turn, the Municipalities agree to use the system for recycling and disposal of solid waste. The system consists of MRDCs, which the Agency designed, equipped, registered and financed to the extent of $40,000 per municipality. Residents of the municipality may use their municipality's MRDC to self-haul and dispose of MSW in designated roll-off containers (at a cost generally charged on a per bag basis – a pay-as-you-throw program) and to deposit regulated recyclables, as defined in Local Law No. 8 of 1991, as amended, into separated roll-off containers at no charge. The Agency services the MRDCs, collecting full roll-off containers and replacing them with empty ones. The regulated recyclables are then brought to and processed at the Agency's Materials Recovery Facility and are marketed for sale. The Agency keeps whatever revenues it earns from the regulated recyclables, and bears the risk that revenues will be sufficient to cover the cost of recycling operations. The Agency sets an annual fee for the collection and disposal of MSW collected at the MRDCs, which is based upon the Agency's budgetary requirements. The Municipalities are advised of the proposed annual fee and are given the opportunity to be heard with regard to the fee prior to the adoption of the Agency's annual budget. The Municipalities agree to operate and maintain the MRDCs, pay the fees duly established by the Agency, and provide free recycling to the residents. Commercial haulers and larger businesses cannot use the MRDCs, but must go to the Agency's Transfer Stations.

The Municipalities which had non-complying landfills in the early 1990's also received from the Agency under the SWMAs the payment of $500,000 to defray the cost of lawfully closing their landfill. The purpose of the payment was to expedite closure of the landfills, providing for a safer environment.

Prior to negotiating extensions of the SWMAs, the Agency intends to analyze the MRDC operations and to discuss current needs and criticisms the Municipalities. It will fashion its proposals for extended SMMAs accordingly. Potential changes to be offered include compactor roll-offs, which will lessen the frequency of trips to the MRDCs, suggestions on ways to improve the efficiency of operations and thus lower costs, and the possibility of combining MRDCs, something that has already been done in Saugerties, where the town's MRDC also serves the towns of Woodstock and Shandaken.

Finally, the Agency has agreements with the towns of New Paltz and Ulster for the Agency's regional Transfer Stations. The Transfer Stations were planned, designed, financed, and constructed by the Agency, and are owned and operated by the Agency. The New Paltz Transfer station is on land rented from the town. The Agreement provides for the times of operation of the Transfer Station, and other matters, including the payment of a graduated host community benefit fee to the town and the local fire district. The Ulster Transfer Station is on land owned by the Agency, which also pays the town and fire district a host community benefit fee.

6.5 PRIVATE SECTOR CONTRACTS

The Agency has enjoyed successful contractual relationships with private sector companies, as well. The most significant agreements are those providing for the delivery of solid waste and recyclables, the long-distance hauling and landfilling of solid waste, the marketing of recycled materials. The Agency will negotiate favorable contracts with private sector companies, with the goal of maintaining financially advantageous relationships and obtaining and providing consistent, efficient services.

However, the implementation of the flow control powers set forth in Local Law No. 9 of 1991 will no doubt cause issues with solid waste collectors operating in Ulster County. Fees for disposal of solid waste currently established under contract will no doubt be increased to bring the fee for service more in line with the cost for service. The Agency will coordinate this change from "contractual" flow control to "regulatory" flow control in a way that will maintain the successful relationships maintained with solid waste collectors over the years. It will strive to do this by ensuring that all solid waste collectors bring solid waste collected in Ulster County to the Agency's transfer stations and that all solid waste collectors will pay the same fee for service. This will ensure a "level playing field", which should provide for an increase in competition, including the licensing of small collectors who will be able to use the Agency's facilities at the same cost as larger companies.

6.6 LEGAL

The Agency undertakes its responsibilities subject to the legal framework described above. Apart from the legal authority provided to the Agency in the Enabling Act, perhaps the most important parts of the legal framework are Local Law No. 8 and Local Law No.9 of 1991. These local laws provide significant authority for the Agency to implement the solid waste management system. Under Local Law No. 8, source separation of regulated recyclables by the County's residents, commercial and not for profit entities, governments and solid waste collectors is mandatory. Plans for achieving source separation and recycling must be drawn up and submitted to the Agency. Failure to comply with the law's requirements could result in administrative enforcement of the law's provisions by the Agency. The Agency makes every effort to impel performance of the law though education, information and consultation. The extensive program is outlined earlier in the Plan Update. But, if these means and methods are not successful, the law will be enforced. The enforcement provisions are discussed in detail in Section 5.2.2.3 of the Plan Update.

Local Law No. 9 of 1991 is the Solid Waste Management Law. This law provides that all solid waste, as the term is defined in the Agency's Enabling Act originating or generated in Ulster County, must be disposed of at facilities designated by the Agency. It also provides for the licensing of solid waste collectors to use the facilities of the Agency. Those licenses are issued after an application form has been completed by the collector and received and reviewed by the Agency staff. Any financial, compliance, equipment or other related issues must be resolved before the license is granted. Guarantees from potential licensees may be required before licenses are granted. Some companies guarantee that they will dispose of a certain amount of MSW at the Agency's facilities through "put or pay" contracts. The Agency has adopted rules and regulations for the enforcement of Local Law No. 9 of 1991. An administrative enforcement process is provided for, with the final administrative decision being made by an independent hearing officer appointed by the County.

An amendment to clarify and strengthen Local Law No. 9 is being considered by the County Legislature. This amendment will enhance the Agency's ability to enforce the Local Law. See also Section 5.3.1of this Plan document.

6.7 PUBLIC

The approval process of this Plan Update includes review by the Ulster County Government, Ulster municipalities, adjoining Solid Waste Management Planning entities and members of the public. Final approval by the New York State Department of Environmental Conservation is required.

The Agency will commence a proceeding under the State Environmental Review Act (SEQRA) as the mechanism to accomplish this review. An announcement of the specifics of the Plan

Update review process will be made after initial action by the Board of Directors of the Agency. The announcement will detail the action being undertaken and the locations where persons can access the proposed Plan Update. Essentially, the proposed Plan Update will be placed on the Agency's website at the following address www.ucrra.org. Copies of the proposed Plan will be made available for review at the Ulster County Clerk's Office, the clerk's offices of Ulster County municipalities, the Agency's offices and the New York State Department of Environmental Conversation Region 3 offices, and, finally at each local library in Ulster County.

The Public Comment Period shall extend from _____ to_____, 2011. A public hearing is scheduled for _____at _____. Comments received at the public hearing will be recorded. Written comments may be provided to the Agency at its website or to its offices at the following address:

Ulster County Resource Recovery Agency Plan Update
P.O. Box 6219
Kingston, NY 12402

7. IMPLEMENTATION SCHEDULE

Many of the Agency's initiatives under the amended Plan are ongoing, and, thus, already being implemented. The essential services of operating the MRDC's, the MRF and the Transfer Stations will continue. Certain improvements to the system have already been scheduled.

SUMMARY OF SOLID WASTE PROGRAM ENHANCEMENTS KEY MEASURABLES AND MILESTONES

UPSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIME-FRAME
CII&M recycling	Quantify number of CII&M building	Establish a communication system with the County Building Code Officer	By Year 1
		Work with tax information to building a database of existing CII&M buildings in the County	By Year 2
	Establish a baseline participation rate	Develop & distribute survey to all building units	By Year 2
		Determine estimates of participation rates based on survey results	By Year 2
	Education & outreach to the public	Develop & distribute educational material to participants	By Year 3
		Revise Agency website & offer more information	By Year 3 &

		& outside links; utilize free social marketing tools like FaceBook, YouTube & Twitter	annually thereafter
	Track participation rates & trends	Conduct a survey of occupants in a statistically representative sample of buildings regarding recycling participation	By Year 3 & annually thereafter
	Track tonnages of recyclables collected in Ulster County with private haulers	Continue to conduct this research through annual reporting procedures	By Year 3 & annually thereafter
HHW & electronics (E-Waste) recycling	Quantify number of HHW & E-waste collectors	Work with tax information to building a database of existing electronic stores that accept E-waste	By Year 2
		Conduct research to find businesses that accept HHW or E-waste	By Year 3
	Calculate existing County participants who self deliver	Develop & distribute educational material to public forums, collection centers, & all County residents	By Year 3
	Measure increases in tonnage received & number of participants	Increase collection event hours & days for HHW & E-waste	By Year 1
		Increase storage at E-waste collection centers at Town transfer stations & the Agency facility to double current capacity	By Year 2
UPSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIME-FRAME
HHW & electronics (E-waste) recycling (continued)	Determine results of program expansion efforts	Track tonnages of HHW & E-waste collected in Ulster County using Agency collection events & private collectors	By Year 3 & annually thereafter
		Determine estimates of participation rates based on tracking results	By Year 3 & annually thereafter
C&D debris recycling	Quantify C&D composition through a waste characterization process	Establish a communication system with the County Building Code Officer, Economical Development, Planning Board & County	By Year 2
		Conduct research to create database of local businesses who reuse building material	By Year 3
		Update educational materials with reuse list, LEED & construction regulations	By Year 4 & annually thereafter

	Implement tip fee incentives & record participation	Develop & distribute educational material to public forums, collection centers, & all County residents	By Year 4 & annually thereafter
Organics diversion	Identify number of compost bins sold to date	Determine local organizations who promote & work with residents on composting	By Year 2
		Establish a communication system with the identified organizations	By Year 2
	Track purchase of Agency & Vendor compost bins	Update educational materials with available compost assistance & resources	By Year 3 & annually thereafter
	Track businesses and institutions who develop organic diversion programs	Develop & distribute educational material to public forums, collection centers, & all County residents	By Year 3 & annually thereafter
UPSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIME-FRAME
C&D debris recycling	Track tonnage of C&D debris passing scalehouse & entering transfer station	Designate an area at the Agency's Ulster Transfer Station for temporary storage & processing of C&D material	By Year 1
	Based on the database of C&D debris recyclers, track tonnage of C&D diverted from landfill	Work with haulers to separate C&D debris from MSW upon delivery	By Year 2
	Determine estimates of diversion rates based on tracking results	Conduct pilot C&D debris processing program	By Year 3
		Conduct market research to determine potential value of reusable materials	By Year 4
		Determine appropriate management strategy-publicly or privately owned	By Year 5
Organics diversion	Estimate feedstock & tonnages of organics available in County	Track tonnage of yard waste entering transfer station at scalehouse & at Town transfer stations	By Year 1 & daily thereafter

		Conduct survey of commercial, industrial, & institutional centers who process food for types & amounts	By Year 2
		Determine amount of biosolids produced in County by contacting WWTPs	By Year 2
	Determine amount of organics that could be composted at existing facilities	Conduct survey to Commercial entities in County to determine interest in composing at the Agency	By Year 2
		Calculate feasibility of composting organics identified in survey at Agency facility: land & bulking agents available	By Year 3
		Research permitting requirements for a biosolids and/or food composting facility at the Agency	By Year 3
	Measure volume of organics composting	Construct a demonstration food waste compositing facility	By Year 4
		Determine feasibility of full-scale operation	By Year 5
DIVERSION ACTIVITIES	MEASURABLES	MILESTONES	TIME-FRAME
Recycling Enforcement	Monitor the recycling practices of businesses, schools, hospitals, multi-family dwellings, condominium associations, municipal buildings and residences to ensure compliance with the provisions of the Ulster County Mandatory Source Separation and Recycling Law	Offer recycling audits to interested businesses, schools, hospitals, multi-family dwellings, condominium associations, municipal officials, etc., to assist these entities in developing comprehensive recycling plans	By Year 1 & thereafter
		Investigate complaints concerning violations of the Ulster County Mandatory Source Separation and Recycling Law, including complaints submitted by municipal and private haulers, businesses and residents	Ongoing
		Offer recycling presentations to interested businesses, schools, hospitals, multi-family dwellings, condominium associations, municipal officials, etc., to educate different sectors of the County on their responsibilities under the Ulster	By Year 2

		County Mandatory Source Separation and Recycling Law.	
		Perform waste generator inspections targeting commercial zones throughout Ulster County	By Year 3
		Expand the scope of waste generator inspections. This will be accomplished by invoking a provision of the Mandatory Source Separation and Recycling Law, which allows either an 'inspector' or the Recycling Coordinator/Compliance Officer to accompany licensed private haulers on their collection routes. Riding along with, or following, haulers on their commercial collection routes will allow the Agency to review the recycling practices of a large number of non-residential waste generators in a relatively short period of time.	By Year 3 & annually thereafter
		Inspect loads of garbage and recyclables dumped at the Agency transfer stations located in Ulster and New Paltz in order to look for violations of the Ulster County Mandatory Source Separation and Recycling Law.	By Year 2 & annually thereafter
		Request the assistance of Weights and Measures officials from the Department of Consumer Protection in identifying gas stations within Ulster County that fail to properly recycle.	By Year 3
		Request the assistance of inspectors employed by the Department of Health in identifying food establishments within Ulster County that fail to properly recycle.	By Year 3
Recycling Public Outreach & Education	Increase recycling education and outreach opportunities throughout the County by various activities outlined below		
	HHW and electronics recycling	Advertisement in newspaper to promote recycling/provide tips, posted on County & Agency websites, press releases, & printed guides. Distribute event flyers to schools, libraries, pharmacies, MRDCs, Town Halls and Community Buildings	By Year 1 & annually thereafter
	Recycling, waste reduction Backyard composting	Sell compost bins at discounted rate, press releases, posted on County & Agency websites, distribute posters & brochures on composting, promote at farmers markets & special events.	By Year 1 & annually thereafter
	Earth Fest, Outdoor Public Events,	Community event-display table & disbursement of	

	Farmer Markets	informational guides. Provide ClearStream or Clear Canables recycling public event containers to events for public use. Participate in a few events & promote composting, recycling, HHW & electronics recycling.	By Year 2 & annually thereafter
	Grass recycling	Radio advertisements (one week in May, one week in July), press release, post on the Agency website (composting page), printed brochure.	By Year 3
	Waste reduction/holiday tips, buy recycled, recycling	Place advertisements and information in newspaper, press release, posted on Agency website.	By Year 2
	Recycling programs, MRF tours	Conduct year round specific school & community group programs regarding recycling, HHW, electronics, composting. Promote through direct contact with teachers, the Agency website and email correspondence. Utilize free social marketing tools including FaceBook, Twitter & YouTube	By Year 1
ACTIVITIES	MEASURABLES	MILESTONES	TIME-FRAME
Closed Landfill Leachate Mitigation	Determine what volume of leachate is groundwater	Shut down sections of leachate collection system that collect strictly groundwater	By Year 2
Transfer Station Upgrades	Completion of construction	In compliance with NYSDEC regulations	By Year 1
Ulster Transfer Station Permit Modification	Application to NYSDEC	Increase maximum daily rate from 440 tons/day to 650 tons/day	By Year 1
Materials Recovery Facility Modifications	Determine what modifications if any will be proposed	Complete modifications	By Year 3
Ulster and New Paltz Transfer Station Permit Renewals	Apply to NYSDEC for permit renewal	Obtain permit renewal	By Year 7

Alternative - Flow Control Amendment and Implementation	Legislation passed by the Ulster County Legislature	Implementation of Flow Control program	By Year 2
Alternative – Renegotiation of Put or Pay Contracts	Advertise bidding	Secure highest bidder(s)	By Years 1 and 3
Bidding MSW Hauling Contracts	Advertise bidding	Secure highest bidder(s)	By Year 1
Bidding MSW Disposal Contracts	Advertise bidding	Secure highest bidder(s)	By Year 1 and 3
Extending and Amending Municipal Solid Waste Agreements	Negotiate contracts with towns	Secure contracts with towns	By Year 1 & 2