SPEA

Lead for the Greater Good

Bloomington Recycling

Evaluation of the City of Bloomington's Recycling Program and Expansion Program Recommendations

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Executive Summary

This report analyzes the current recycling program in the City of Bloomington, Indiana. The SPEA 2015 Fall Capstone Group was tasked by the Bloomington Environmental Commission (EC) to examine the feasibility to expand the city's recycling program to include curbside pickup for downtown commercial businesses and apartments. The following report examines the current public recycling structure, regulatory restrictions, explores alternative private sector options, analyzes several different cost scenarios, and provides several recommendations to provide the EC with a complete and detailed analysis to the best of the team's ability.

One main finding of the report is that the perception of the Bloomington recycling program as a $1.5 million cost is excessive relative to the actual financial impact. Further, under certain assumptions the program provides revenue in excess of its expenditures. To assess alternative options for expansion given that Republic Services is not currently accepting new customers in the Bloomington market, the team examined alternative haulers' costs in Bloomington for businesses. These alternative haulers include the county-operated Green Business Network, Ray's Waste Services, and Rumpke Waste Management. The report finds Ray's to be the most expensive private hauler option for both apartments and businesses. Although Rumpke was slightly more expensive than the Green Business Network, Rumpke would provide both trash and recycling pickup services, whereas the Green Business Network would only provide recycling pickup. These costs were further solidified through a Monte Carlo simulation that tested the costs using a probability function of the given variables.

Furthermore, the report provides recommendations for Bloomington to provide a more efficient recycling program that could lead to an expansion of the service to the Downtown Network. The recommendations are largely based on evidence from comparative cities across the United States and communication with various stakeholders in Bloomington. The recommendations are as follows:

- Improve E-governance Platform and Financial Management
- Incrementally Mandate Recycling
- Provide Support for a More Competitive Market
- Expansion of the Green Business Network
- Public-Private Partnership for Education
- Franchising

These recommendations should be taken holistically in view of the entire report that provides detailed analysis of Bloomington's entire recycling operations.

1. Project Overview

The Bloomington Environmental Commission (EC) mission "is to advise the City of Bloomington on how its actions and policies may preserve and enhance the quality of Bloomington's environment, including the life-supporting processes that natural ecological systems provide to humans and other organisms" (City of Bloomington's Environmental Commission, n.d.). To further its mission to improve Bloomington's environment, the Commission tasked Professor Justin Ross's SPEA Fall 2015 Capstone class to explore the feasibility of expansion to the city's current recycling program to include downtown commercial properties and apartment complexes.

The purpose of this report is to equip Bloomington policy makers and citizens with an understanding of (1) the current recycling program, (2) challenges facing recycling expansion, and (3) recommendations for overcoming these challenges. This report assesses the feasibility of a City of Bloomington recycling expansion program to businesses and apartment complexes in the downtown area using information gathered from the Commission, the Bloomington Sanitation Department, the Monroe County Solid Waste District (the District), Rumpke Waste Management (Rumpke), Ray's Trash Services (Ray's), and other pertinent stakeholders. The report begins with an overview of current recycling operations in Bloomington. Next, case studies of comparable cities to Bloomington address the regulatory and operational challenges of the city's Sanitaiton Department. Lessons Learned from these cities provide a robust analysis for Bloomington. Fiscal impact analyses of potential recycling expansion options discuss alternative haulers. Another potential option for expansion is municipal code reform. The team's recommendations offer guidance to overcome challenges of a downtown Bloomington recycling expansion.

2. Current Recycling Operations in Bloomington

The following section provides contextual information regarding municipal regulatory laws affecting city-provided recycling pick-up options, an analysis of Bloomington's current recycling operations, and an overview of past recycling expansion efforts.

2.1 Municipal Regulations: Title 6

Bloomington Municipal Code Title 6.04.050 mandates that the Bloomington Sanitation Department provide curbside recycling services free of charge to any and all residences who receive city trash collection services. The city provides residential trash collection within city limits with the following exceptions:

- Buildings containing more than four units;
- Residences located above commercial buildings;

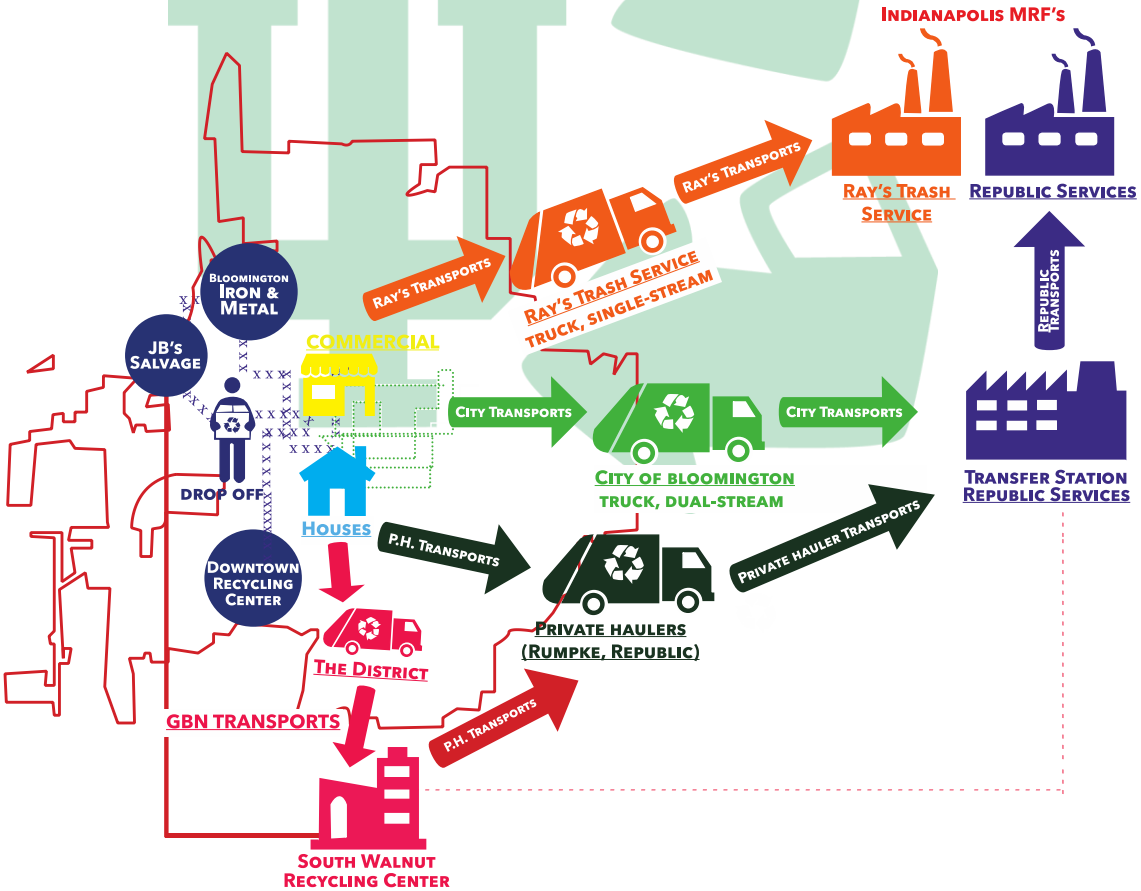
- Residential units located on private streets.

Therefore, under Title 6, the Bloomington Sanitation Department is currently statutorily unable to provide recycling services for commercial properties or multi-unit residences (S. Walker, personal communication, September 2015).

2.2 Recycling Logistics

Title 6 restrictions have opened the opportunity for the District and private haulers to provide recycling services for commercial properties in the Bloomington area. Figure 1 provides a graphical representation of the process and organizations that provide recycling services in Bloomington. The Green Business Network highlights a publicly run recycling option. The City of Bloomington's public recycling option, as well as the Green Business Network, contract with Republic Services, while Rumpke and Ray's Trash Service provide private recycling options with different contributing factors. Appendix A provides background information for each organization.

Figure 1. Current Recycling Operations in the City of Bloomington



Source: Designed by the authors of the report with information gathered from the City of Bloomington and the District.

Figure 1 presents the current recycling operations in the City of Bloomington and identifies the recycling process used by different vendors. This includes single and dual stream recycling. Dual stream recycling requires fibers to be separate from all other recyclables whereas single stream recycling is commingled of fibers and all other recyclable materials. The City of Bloomington provides dual-stream curbside recycling service for noncommercial properties, which requires residents to separate fiber products from other recyclables. After residential pick-up, the city delivers recyclables to Republic's transfer station for further processing before being taken to Republic's materials recovery facility (MRF) in Indianapolis, IN. Although the city does not provide curbside services to commercial properties, business owners have the option to contract recycling pickup from a private hauler or drop off their recyclables free of charge at the Bloomington Downtown Recycling Center or one of the District's recycling centers. With the exception of businesses that choose to contract with Ray's or Rumpke, all recyclables in Bloomington are separated at Republic's transfer station and transferred to Republic's MRF in Indianapolis where Republic processes and packages materials for sale to manufacturers. Ray's MRF is located in Clayton, Indiana and Rumpke's MRF is located in Louisville, Kentucky (Ray's Trash Services, n.d.; Rumpke, n.d.).

2.3 Materials Recovery Facility (MRF)

As previously mentioned, both the District and the City of Bloomington contract with Republic Services. Because Republic Services owns and operates the only local transfer station, under current circumstances it is not logistically possible for the city to negotiate more competitive rates than it receives under contract with Republic. Republic currently operates through oral agreements with both the City of Bloomington and Indiana University. The contract is subject to change on a monthly basis (City of Bloomington's Contract with Republic, 2014). The District currently operates on an expired contract from 2011 with Republic Services (M. Rouker, Personal Communication, October 2015). Republic sets different rates and rebates for each entity active in Bloomington, as illustrated below in Table 1.

Table 1. Republic Rebates and Rates for Major Solid Waste Management Entities in Bloomington, IN

	City of Bloomington	District	Indiana University – Bloomington
Rebates	$5 per ton for fiber materials	• 50% of Midwest Commodities Exchange weekly rate for fiber materials, metal, aluminum • 65% of Midwest Commodities Exchange weekly rate for aluminum	Unknown
Rates	$10 per ton of commingled recyclables	• $395 per ton of glass • $100 per ton for each haul from District sites to transfer station	$19.22 per totter for commingled recycling pickup twice a week

Source: Rebates and rates for the City of Bloomington were obtained from a personal communication with the City of Bloomington's attorney, Mike Rouker. The District's rebates and rates are derived from the Recyclables Contract made in 2011. Rates for Indiana University comes from personal communications with a Residential Programs and Services employee.

The asymmetrical nature of the contracts with Republic and the expected increase in residential waste have fueled the District's interest to build a clean MRF for Monroe County (Monroe County SWD, 2015). The possible addition of a MRF is politically controversial in Bloomington and in Monroe County. Opponents state regulatory limitations and costs as the primary concerns. Title 13, Article 20 of Indiana Code prevents solid waste management districts from competing with private haulers. Therefore, it is unclear if a county MRF is statutorily feasible. Furthermore, opponents are concerned that costs will exceed benefits, as 90.2% of the District's recycling program is already subsidized. Additionally, the proposed MRF site will increase fleet travel from 6 miles to 18 miles, impacting costs and road maintenance, and environmental externalities (P. Stoffers, Personal Communication, October 2015). Another concern is the volatility of market prices for recyclable materials which make it difficult to predict future revenues (I. Kiesling, Personal Communication, October 2015). However, proponents argue that the MRF will generate revenue, provide jobs, and be a fiscally responsible solution for the county. The Economic Feasibility Report for a Monroe County MRF suggests that the current revenue

potential for owning a county MRF exceeds $150,000 annually (Greulich and Akers, 2009). This revenue could be used to fund operational costs and provide funding for future District projects. The MRF is projected to provide an additional 36 jobs, including manufacturing labor (L. Barker MRF Presentation, October, 2015). Lastly, capital costs could be repaid within 2-5 years if construction follows the current plan to build on the decommissioned county landfill (Greulich and Akers, 2009). As of August 2015, the MRF has yet to be approved. The county MRF discussion is included in the report because construction could affect the rates and capacity of the Green Business Network. Therefore, the decision could have significant impacts on the findings of this report.

2.4 Department of Sanitation Budget Analysis

The purpose of this section is to assess the financial feasibility of the expansion of recycling to downtown Bloomington businesses. The Department of Sanitation's Budget Analysis provides baseline cost estimates for the current residential recycling program. This baseline is included to equip policymakers with an understanding of the real cost of the city's recycling program.

In governments, budgets are used for control and managerial purposes. Costs are difficult to measure due to the fact that the budget structure does not contain separate line items for recycling and waste removal, and because budgets do not depict how these costs would differ if the programs were altered. For example, avoided landfill waste costs is a positive fiscal impact from recycling. Avoided waste costs are not represented in budgets because they do not represent an actual flow of revenue, but they have the same impact as revenues in terms of their fiscal impact. Therefore, the following net fiscal analysis provides estimates of the cost of the current recycling program regarding the Sanitation Department's current residential recycling services. The fiscal impact analysis presents the estimates of the operations and maintenance costs, weighed against avoided waste costs and revenues from recycled fiber rebates and user charges.

2.4.1 Assumptions

Two assumptions were made for annual values because of limitations in the data. First, the 2014 values for the costs of the fleet, fuel, and drivers were used for FY 2009 through 2013. If these costs increased (or decreased) then the costs of the recycling program will be overestimated (or underestimated). The second assumption is that all user charge revenue is derived from waste stickers. As the city's financial reports do not specify the sources of user charges, the analysis includes charges for yard waste (City of Bloomington Sanitation Budget, 2015). According to an interview with a SPEA corps intern for the city's Public Works Department, revenues from yard waste stickers occupy a very small proportion of the total revenue collected. To the extent this is true; the analysis may slightly overestimate the benefits of the recycling program. Additionally, the missing data on administrative costs from 2009 to 2013

may affect the accuracy of this analysis. The scope of this analysis is from 2009 to 2014, thus it does not cover all the years since the Bloomington recycling program began. See Appendix C for more detail.

2.4.2 Construction of Scenarios.

Four versions of the fiscal impact analysis have been conducted to reflect different assumptions for two key parameters. First, the contract with Republic indicates that the city pays a processing fee for commingled recyclables of $10 per ton; however, the Sanitation Department stated that the first 1,200 tons of commingled are free (S. Walker, Personal Communication, September 2015). Thus one set of scenarios assumes that the city does not pay for commingled materials. Secondly, it is widely understood that the waste stickers were implemented to encourage recycling and defray its cost. As a revenue source implemented as part of the recycling program, the conventional approach to a fiscal analysis would treat revenues from trash stickers as a positive inflow from having a recycling program. A contrary perspective to this convention, however, is that these would not be considered inflows if the city were unwilling to cancel the waste sticker program in the event the recycling program was discontinued. To reflect these competing perspectives on waste stickers, scenarios also differed in considering the waste stickers as receipts. Combined, these two sets of two parameter assumptions results in four alternative evaluations of the city's fiscal impact from the recycling program.

Table 2. Construction of Scenarios and Estimates of Annual Net Value of Current Bloomington Recycling Program in 2014 under Each Scenario

		Processing Fee for Commingled	
		$10 (per ton)	$0 (free)
Revenues from Stickers	Considered as Benefit of Recycling Program	Scenario 1 Annual Net Value **$385,513**	Scenario 3 Annual Net Value **$398,103**
	Not Considered as Benefit of Recycling Program	Scenario 2 Annual Net Value **-$514,479**	Scenario 4 Annual Net Value **-$501,889**

Source: The authors calculated these scenarios using the City of Bloomington's Sanitation Budget for FY 2014.

2.4.3 Summary of Findings.

Under Scenarios 1 and 3, which treated the revenues from stickers as true benefits of the recycling program, the net financial impact of the Bloomington Recycling Program to the city from 2009 to 2014 is estimated at $400,000 per year. These results indicate that the recycling program produced a net **benefit** of $400,000 per year for the City of Bloomington from 2009 to 2014. Under Scenarios 2 and 4, revenues from stickers are not included as a benefit of the recycling program. The annual net value of the Bloomington Recycling Program from 2009 to 2014 was estimated around -$500,000. These results indicate that it **costs** the City of Bloomington around $500,000 per year to operate the recycling program. This result is smaller than the often quoted cost of $1.5 million per year. Although the program results in a net cost to the city under these scenarios, this cost is much lower than what is perceived when solely examining budget figures. The perspective on revenues from stickers determine whether or not one consideres the overall fiscal impact of the recycling program to have been net positive or net negative.

2.4.4 Implications

This analysis is useful for future policy implementation. Several times in the course of interviews with stakeholders, the existing Bloomington recycling program was suggested to cost the city approximately $1 million. This figure is likely to affect general public and policymaker's perception of the program and a potential expansion. However, estimates from the analysis indicate a net fiscal benefit of $400,000 produced by the recycling program when considering the revenue generated by the trash sticker requirement (which was implemented to cover the cost of residential recycling in Bloomington). Therefore, while the Sanitation Department would need to change its daily operations, purchase new trucks capable of handling large receptacles, hire additional workers, and implement new regulatory measures to ensure the appropriate trash stickers are being utilized correctly by businesses, modifying the trash sticker program to include a cost structure for housing complexes may offset recycling expansion costs.

2.5 Challenges to Expansion of the Bloomington Recycling Program

In addition to statutory changes, the Sanitation Department would require capital improvements to support an expansion. New vehicles equipped with electronic arms would be required to accommodate business toter sizes. Currently, trucks are manually loaded by two union employees. Updating the fleet would reduce labor needs to a single driver, thereby conflicting with the current union contracts (S. Walker, Personal Communication, October 2015).

Furthermore, political interest in expanding the Sanitation Department's services to downtown Bloomington is limited to service for apartment complexes. The City Council views the cost for commercial trash and recycling as the responsibility of each business. In addition to the political

factors, stakeholders expressed concern regarding accurate predictions of recycling revenue due to market price volatility.

3. Recycling in Comparable Cities

Five cities (Ann Arbor, Mi; Fort Collins, CO; State College, PA, New Haven, CT; and Ithaca, NY) were selected for comparative case study analysis of their logistical, financial and education programs. The cities were selected based on their population size and density, demographics, "town and gown" relations, and availability of information on reliable information of the recycling programs. A detailed analysis of each city can be found in Appendix B.

The majority of the cities analyzed utilize private haulers or county solid waste authorities to collect most or all recycling and refuse. New Haven, CT is the only city whose Sanitation Department collects trash and recyclables for residents (City of New Haven, n.d). State College's Public Works Department collects refuse for residents and businesses (State College Borough, n.d.a). Additionally, almost all of the comparable cities have a MRF or a similar facility in their county. The only exception is New Haven, which relies on a MRF located 60 miles away, and uses a city-run transfer station (City of New Haven, 2010). Furthermore, all cities except State College use single-stream recycling to ease compliance, which increases participation rates for recycling. State College's contract with Centre County Refuse and Recycling Authority (CCRRA) requires that recyclables be curb sorted by the collection crews so that they can be marketed at the CCRRA's MRF without extra processing (State College Borough, n.d.b).

3.1 Lessons Learned from Comparable Cities

The selected cities have developed unique programs to implement expansion of recycling to businesses; elements of their programs can be adapted to Bloomington's proposed expansion. Fort Collins uses the Waste Reduction and Recycling Assistance Program (WRAP) incentive program, which provides rebates and referral money to both apartments and businesses downtown that participate in recycling programs (City of Fort Collins, 2015b). This program provides rebates up to 75% to businesses and apartment complexes who voluntarily begin a recycling service. Ann Arbor's municipal government has enacted recycling mandates for its residents and businesses, but its efforts to increase commercial recycling have been only partially successful, due to limited outreach efforts and an implementation schedule that local observers consider to be too ambitious (Dunn, 2014). From an institutional perspective, State College's Planning Department Health and Neighborhood Services Division, rather than the Public Works Department, manages recycling compliance for commercial properties (State College Borough, n.d.b). This unique operations management encourages businesses and apartments to comply with the recycling process.

Further, Fort Collins and State College both have easily navigable city websites that make information readily available to citizens, easing compliance and understand of the recycling process. Additionally, Fort Collins, State College and Ann Arbor provide printer-friendly recycling information and brochures that explain accepted recycling materials and processes to city residents and commercial businesses. The ease of access to this material serves as a cost-efficient and replicable educational initiative to inform constituents. The more information and education citizens have on the recycling program, the lower the risk of recyclable contamination. This level of openness is also beneficial to citizens, who will be able to better understand the service that the government is providing.

4. Fiscal Impact Analysis of Expansion Options

Finacial impacts of alternative options utilizing private haulers are estimated in this section. In our cost equations below, the recycling output is measured on a per person output level; therefore, our analysis must find the number of residents and employees served in this expansion area. A geographic scale (measured by number of residents and employees) is defined to determine the number of clients that will be served by the expansion program. The collection and processing capacity needed to support an expansion can then be estimated.

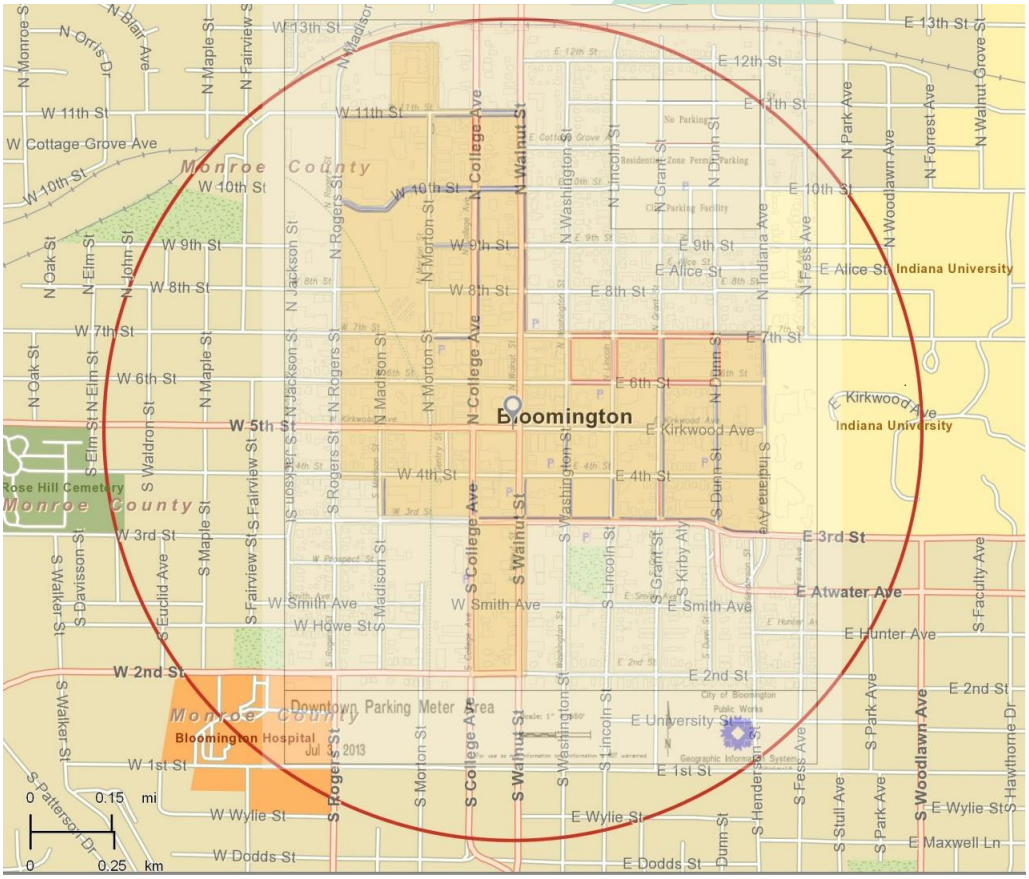
4.1 Shared estimates and assumptions: Residents

The portion of the city where parking meters were installed in 2013 initially served as an approximation of the "downtown area" for estimation of apartments units affected by a recycling expansion (City of Bloomington, 2013b). This zone contains many residential buildings with four or fewer housing units that are already served by the city's current recycling program (City of Bloomington, 2013a). Properties containing more than four housing units were identified, and their capacity was determined based on property websites and interviews with property owners. Using this process, a total of 980 apartments were counted. Since the average household size in downtown Bloomington is 2.20, the units are estimated to have a total of 2,156 residents (U.S. Census Bureau, 2015). Comparatively, a count conducted by the city government gave a total of 969 residential units, suggesting a population of approximately 2,132 (L. Abbott, Personal Communication, November 12, 2015). Because of the likelihood of further developments downtown, any expansion of the current recycling program should provide a greater collection capacity than the estimates above suggest. In addition, the population estimates arrived herein are based on *confirmed* multi-unit housing downtown, and should be treated as a minimum figure. To provide an even more conservative estimate, the cost analysis uses an estimate of 1,200 apartments within the parking-meter zone, with an estimated 2,640 residents.

4.2 Shared estimates and assumptions: Businesses

Information for Bloomington's downtown employment came from the Ivy Tech Cook Center for Entrepreneurship, which defined "downtown" as the area within a 0.6-mile radius from the intersection of Kirkwood Avenue and Walnut Street (Downtown Bloomington, 2013) as seen below in Figure 2. This radius encompasses all of the parking-meter zone. In 2013, the Cook Center identified 904 employers within this area, employing 13,117 people in a variety of fields and industries. Indiana University and the IU Health-Bloomington hospital, both of whose campuses lie partly outside the specified radius, were included in this employer count. It is unclear how many of their employees, if any, were included in the workforce figures.

Figure 2. Downtown Network Map



4.3 Shared estimates and assumptions: Waste Diversion

Estimates for residential trash and recycling output in the U.S. are readily available. However, estimate usage is complicated by local variations in waste-management policies and consumer behavior, and by differences in how estimates are calculated. Information available from the Bloomington Sanitation Department indicates that since 2009, residents served under the current city program produced an average of 231 pounds of recycling per person per year

(49.5% of which was paper and cardboard). According to the U.S. EPA (2015), recyclable output in America is about equally divided between fibers and other recyclables, suggesting that Bloomington's current program is equally successful at diverting both categories from the waste stream. However, recycling collection in other cities is often skewed towards fibers: paper or cardboard represented over 75% of the materials processed in 2013 by ReCommunity's Michigan facilities and over 80% of both residential and commercial recycling collected in Portland, Oregon in 2009-2010 (ReCommunity, 2014; Oregon DEQ, 2011, p. 5). The proportion of fibers collected in a recycling program will affect its net value and fiscal viability, given that different materials have differing collection and processing costs. Finally, increased efficiency among local businesses may lead to a decline in the production of trash, recyclables, or both. However, this cannot be assumed, and seems unlikely based on national trends in output over the last several decades (U.S. EPA, 2015).

Limited data are available on the volume and composition of commercial recycling, but some predictions can be made based on comparable cities. When the City of Ann Arbor prepared to enact its commercial-recycling mandate, it calculated that 28.1 tons of combined trash and recycling were produced annually per business, or 0.97 tons per employee (City of Ann Arbor, 2007, p. 66). Fibers were estimated to represent 42% of this output, while other typical recyclables represented 7.9% (City of Ann Arbor, 2007, p. 67). By combining the per-employer average from Ann Arbor with the number of employers reported by the Cook Center, it follows that commercial sources in downtown Bloomington would produce a total of 10,641 tons of fibers and 2,019 tons of other recyclables per year (Cook Center for Entrepreneurship, 2015). However, firms in downtown Bloomington employ fewer people on average than firms in Ann Arbor. Due to this difference, when Ann Arbor's per-employee averages are used, the total downtown recycling output is a lower estimate of 5,345 tons of fibers and 1,014 tons of other recyclables per year.

Both residential and commercial output estimates are subject to potential change over time in response to changes in Bloomington's economy and population. Estimates are based on the best currently available information for downtown firms and residents; will need to be adjusted if downtown Bloomington's population or economy changes significantly, or if further detailed data is collected.

4.4 Cost Models for Alternative Haulers

The following analysis calculates the costs of two private haulers (Rumpke and Ray's) and the county-run Green Business Network (GBN) as alternative haulers for expansion. All haulers currently provide services to downtown businesses. The models assess whether adding recycling services is cost-effective for the average business or apartment complex. Republic Services is currently not accepting new customers and therefore was not included in the following fiscal analysis.

Equation 1:

Cost of trash only = total waste output/unit *density * cost/volume

Equation 2:

Reduced trash + Cost of recycling = (total waste output*percent of non-recyclables * (density * cost/volume) + (total waste output*percent of recyclables* density* cost/volume)

The results of the models are presented in table 3. A breakdown of both our equations and assumptions are available in the Appendix D.

Table 3. Capstone Team's Estimated Pricing Scenarios by Provider

Business Rates for Monthly Collections		
	Trash Services Only (Equation 1)	Trash & Recycling Services (Equation 2)
Rumpke Services	$38.54	$16.57 + $51.34 = $67.91
Ray's Trash Service	$103.92	$44.68 + $80.72 = $125.40
Green Business Network	N/A	$66 (recycling service only)

Source: Green Business Network rates derived from the Monroe County Solid Waste annual contract of $800. Rumpke rate is based on the estimated cost for a fraternity house in Bloomington. Ray's rate is based on an interview with a sales representative.
Above estimates are from available information and do not represent committed quotes. These amounts are estimated flat rates paid once per month adjusted by service provider's differences in terms for the purpose of making them comparable.

Given the assumptions made in the cost structures, when applying the analysis to the average business, there are a wide range of cost outcomes. For the average business or apartment complex in downtown Bloomington, adding recycling services does not reduce the cost of trash pickup enough to make recycling cost-effective. Rumpke has a cost advantage over Ray's as it is less expensive for both businesses and apartments under all analyzed scenarios. Cost savings through use of the Green Business Network are not certain given that services are limited to recyclables. The Green Business Network might be cost-effective depending on each firm's current trash rate, provider, and contract.

Without complete rate information from each trash hauler, this analysis can only produce rough cost estimates. The Bloomington city contract with Republic contains a reimbursement for fiber materials. Through the research no discussion took place about any reimbursement language in rate conversations with private businesses but it is possible that larger firms that have high volumes of recyclable material may receive a reimbursement of some sort.

4.5 Monte Carlo Analysis

Monte Carlo simulations are mathematical models designed to allow for better decision making under risk and uncertainty. An expanded recycling program involves assumptions of several unknown variables, including highly volatile prices in the market for recyclables. Monte Carlo simulations inform the decision by providing quantitative analyses of how sensitive the analysis is to variation in assumed values. The cost equations and assumptions of the simulation can be found in Appendix E.

This simulation generated a thousand trials under each of these eight different cost scenarios:

1. Rumpke Recycling for Businesses
2. Rumpke Trash for Businesses
3. Rumpke Recycling for Apartments
4. Rumpke Trash for Apartments
5. Ray's Recycling for Businesses
6. Ray's Trash for Businesses
7. Ray's Recycling for Apartments
8. Ray's Trash for Apartments

The simulation calculates the costs associated with the various scenarios given a probability function, randomizing total waste output, percentage of recyclables for both apartments and businesses, and the density of the total waste output. In any given trial of the Monte Carlo, some of these costs will be higher than average while others lower, but it will be relatively rate that a trial comes in universally high or low across all of the uncertainties. From the thousand trials, an average cost was calculated along with lower and upper bound cost range creating a 95% confidence interval. The results of the simulation in Table 4 demonstrate that the 95% confidence interval is within a few dollars of the main estimate, so the findings are not particularly sensitive to the uncertainties of the data.

Table 4. Monte Carlo Results for Estimated Monthly Rates

Scenario	Mean	Lower	Upper
Rumpke recycling businesses	51.66	50.57	52.75
Rumpke trash businesses	16.60	16.20	17.00
Rumpke recycling apartments	14.97	14.51	15.44
Rumpke trash apartments	40.73	39.88	41.59
Ray's recycling businesses	81.62	79.90	83.33
Ray's trash businesses	44.75	43.67	45.83
Ray's recycling apartments	23.66	22.92	24.39
Ray's trash apartments	40.73	39.87	41.59

5. Alternative Municipal Code Options

The following section outlines various city ordinance changes and recommendations that could allow the city of Bloomington to expand curbside recycling. A short limitation and feasibility section is included to describe the political likelihood of each change. Although all or most of these recommendations can act as stand-alone recommendations, they are expected to be most beneficial when made in conjunction with additional changes outlined in this report.

In order to make a change to city code: (1) the change must be submitted to the City Council with a legislative synopsis of the new legislation; (2) the submitted change must provide a fiscal impact statement describing the new legislation's potential financial impact on the city; and (3) the legislation must achieve a majority of the City Council vote for the new code to be enacted (Code 1.01.020).

As mentioned in the preceding section on current municipal regulations, two chapters in the Bloomington City code are applicable to the current recycling program. Title 6, "Health and Sanitation", strictly outlines the responsibility and capacity of the Bloomington Sanitation Department in terms of refuse and recycling collection. Title 20, "Unified Development

Ordinance", outlines the regulations for zoning new complexes, and could be modified to promote recycling for newly developed apartment complexes in Bloomington.

5.1 Title 6 Alternatives

As noted in section 2.1, Title 6 governs the Sanitation Department. It reads:

Bloomington Municipal Code 6.04.046: Recycling [in part]

"Recycling collection is provided free of charge to recipients of city trash and refuse collection".

This code stipulates the boundaries in which the Sanitation Department can operate and would require amendment to expand operations to downtown businesses and apartments.

Alternative options for amendment:

1. Rewrite the municipal code to state:
   (a) Recycling collection is provided free of charge within city limits.
2. Expand trash and recycling collection to include downtown businesses and apartments, and therefore allow recycling collection within the legal boundaries of the current code. It reads now as:

Bloomington Municipal Code 6.04.050: Collection Practices [in part]:

"(b) Collection shall be made from all places of residence within the city limits except for the following:

- Buildings containing more than four residential units;
- Residents located above or in the same structure as a business or businesses;
- Residential units located on private streets.

However, collection may be provided to the above listed residences if authorized in writing by the Director of Public Works. Before authorizing such collection, the Director of Public Works may require terms and conditions to protect the city and residents. The Director of Public Works may revoke such authorization in writing at his or her discretion.

(a - c, omitted)

(d) Collection shall be made from alleyways where road conditions permit and alley service is more convenient than street service."

Alternative options for amendment:

1. Remove the stipulation that prohibits city pickup from businesses and multi-family units.
2. Streamline the process of adding or removing recipients of city collection, such as by specifying the terms & conditions that may be required.
3. Add a following sentence to section (d) that allows businesses or properties with multiple residential units to share a central pickup location

5.2 Mandate Recycling Legislation

In addition to the above code modifications, the city could mandate recycling for businesses and apartments within part or all of Bloomington. This approach has seen limited success in other municipalities. The City of Fort Collins enforces a mandatory recycling program, and sells private haulers licenses which allows them to collect refuse from both businesses and apartment complexes (City of Fort Collins, 2015e). This type of service drastically cuts costs incurred by the city government.

An ongoing discussion to adopt a recycling mandate policy for apartment complexes has been discussed for many years by the Bloomington City Council. The discussion is found throughout the minutes of the Citizens' Advisory Committee, articles in the Herald Times, and minutes of the City Council. The following recycling mandate plan draws primarily on the discussion conducted with Isabel Piedmont-Smith, who was recently elected to the City Council. Piedmont-Smith argues that a city mandated recycling program for apartments could be implemented in an incremental manner, starting with smaller apartment complexes and gradually expanding to larger complexes. This process would allow the city to slowly expand its operations rather than providing recycling for all apartments at once.

This plan was successfully implemented in Austin, Texas, but apartment complex managers have concerns regarding the plan (I. Piedmont-Smith, Personal Communication, October, 2015). Apartment complexes will be held responsible for the correct sorting of the recycled materials by residents and will need to provide oversight to avoid contamination fines. Thus, apartment complexes will need to dedicate resources to provide education to its residents to ensure proper recycling practices. The additional costs to apartment complexes could result in opposition from owners.

5.3 Title 20 Reform

Title 20 of the Bloomington municipal code details the city zoning and development guidelines. Currently, there are a number of regulations and standards that new developers must meet to obtain the appropriate licenses and permits. The chapter does not detail regulations for recycling conditions for new apartments and businesses. However, adding a provision to Title 20 that requires new structures to provide space for recycling receptacles would serve as preparation for a mandate under Title 6 for new residential structures larger than four units. This option is currently being considered by the Council as part of the Growth Policies plan (City of Bloomington, 2002). Allowing a "grandfather clause" which will exclude current structures from complying with the new zoning ordinances would ease political opposition. Therefore, adding the provision for apartment complexes is likely to face limited opposition from the Council.

6. Policy Recommendations Moving Forward

The following recommendations represent general policy advice considerations, and should be taken holistically rather than as competing alternatives.

6.1 Recommendation 1: Improve E-governance Platform and Data Management

Comparable cities have employed an E-governance platform to enhance the accessibility of information on government services. In making this report, the team had difficulty accessing needed Bloomington data to evaluate the current program. In order to improve the current recycling program, data collection and management is key. The current web platform for the city government website should be updated to become more efficient and user friendly. To improve transparency and efficiency, the recycling program potentially could be included under the 'sustainability' tab of the website. Currently, the information for recycling is limited to the city pick-up schedule and information on the downtown recycling effort.

6.2 Recommendation 2: Incrementally Mandated Recycling

This recommendation further details the discussion in Section 5.2 Mandating Recycling Legislation. This potential mandate for apartment recycling would be gradual. A slow ramp up of adding apartments that must comply with the mandate would be a step-by-step process over time based on the complex size. Apartments with more units may have some economies of scale and would be able to implement recycling more cost effectively initially. For example, the mandate could be set up in phases. Phase 1 would include complexes with 71 or more units. Phase 2 would include complexes with 51 to 70 units. Phase 3 would include 21 to 50 units, and so on. A change to Title 6 is required to mandate apartment recycling in Bloomington.

6.3 Recommendation 3: Provide Support for Efficiency

Currently, Republic is the main recycling service provider, not only in Bloomington, but in the county as well. Indiana University, the District, and the city's trash and recycling are serviced by Republic, which allows the company to control the contracts and pricing. Republic's large economies of scale makes it the only competitive option for public entities in the area. However, if the City of Bloomington sells licenses to private haulers (similar to the policy of Fort Collins) they would be able to streamline processes and identify market actors that could create a more competitive market.

6.4 Recommendation 4: Expansion of the Green Business Network

The expansion of the competitive recycling program offered by the Green Business Network would provide an incentive for more commercial properties to recycle by saving on disposal costs. The GBN has experienced an increase in demand, but does not currently have the funding or resources to meet this demand. By expanding the South Walnut Recycling Center,

updating the trucks and equipment, along with a potential addition of the MRF, this program would be able to expand its service and improve sustainability in Bloomington and the County. Although the GBN provides one of the least expensive recycling options for businesses in Bloomington, the GBN does not service apartment complexes. The GBN maintains low costs through state subsides. Should funding be cut or reduced then the results of the above cost analysis would change. A list of current Green Business Network Members can be found in Appendix F.

6.5 Recommendation 5: Public-private Partnership for Education

To promote recycling and improve stakeholder engagement the city should partner with the Monroe County Solid Waste District, Indiana University, city and county commissions, property and business managers, and other pertinent stakeholders to provide effective recycling education programs and promote recycling awareness. Also, Indiana University's Office of Sustainability works with university students to improve recycling efforts on campus. Through a collaborative effort, the city could better educate the populace and promote proper recycling. The majority of students that live in apartment complexes and are currently not being serviced by the city's recycling program can benefit from a Downtown Network expansion. As improper recycling is often cited as a major barrier, the city could partner with the University to create a joint effort at educating the student population.

6.6 Recommendation 6: Franchising

Franchising is a practice in which the city negotiates rates and terms through a contract with a private hauler. Under these conditions, the franchise must charge the same fee for all customers for the same size container and collection frequency in the service area. The private hauler, in turn, has exclusive rights to provide services for businesses for the term of the contract (City of Chicago, 2008). In summary, the franchise reduces removal cost for the businesses, increases recycling, and reduces truck traffic on city streets. The franchise model also provides revenue to the city through administrative fees and permits.

7. Conclusion

As the City of Bloomington strives to lead its peers in creating a thriving, sustainable community through its Be Green Initiative, recycling plays an integral component to achieving this goal. In our interviews, various stakeholders expressed frustration with the current recycling program as well as a desire to improve it. Students often want to recycle but many live in rental apartments without access to recycling services. Through the analyses conducted, it is apparent that under the current operating environment, the city cannot sustainably expand its current recycling services without a number of important changes.

Appendices

Appendix A: Private and Public Monroe County Haulers

The Monroe County Solid Waste District

The District is an independent entity governed under a board of city and county officials from the seven different cities of Monroe County. The state of Indiana mandates that each county run a solid waste management district (P.L. 10-1990). Throughout this report we will refer to the Monroe County Solid Waste District as simply "the District." The District is currently led by interim Director Scott Morgan while the Board looks to find a replacement for the recently retired former Director, Larry Barker. The District currently operates five recycling centers: Ellettsville, Northeast, Westside, South Walnut, and Southside. South Walnut accepts most of the materials collected at the Rural Recycling Centers but also provides additional recycling options. The District also offers hazardous materials and Freon appliance recycling free of charge. While individual residents are encouraged to use the facilities, the District does not provide pick-up services for residents. The District does provide commercial pick-up services through the Green Business Network program. From the District recycling centers, the majority of glass is hauled by K&S Services to Shelbyville or Indianapolis. Metals and aluminum are sold to JB's Salvage or Bloomington Iron and Metal. The remainder of recyclables are taken to Republic Services' Transfer Station on IN-37 (Green Business Network, n.d).

Private Hauler: Republic Services

Republic Services is the second largest provider of domestic non-hazardous solid waste services in the United States. Republic is a Fortune 500 company, publicly traded on the New York Stock Exchange (NYSE: RSG), and functions as a holding company with most operations being conducted by its subsidiaries. Republic provides non-hazardous solid waste and recycling services for commercial, industrial, municipal and residential customers. The company currently has 338 collection operations, 200 transfer stations, 193 active solid waste landfills, 66 recycling centers, and 69 landfill gas and renewable energy projects across 39 states and Puerto Rico (Republic Services, n.d).

The company is the sole operator of the Sycamore Ridge Landfill in Terre Haute and owns the only transfer station in Monroe County. The transfer station, while owned by Republic Services, is called Hoosier Disposal. Currently, Republic is the main servicer of curbside recycling for commercial properties in Bloomington. Republic currently operates through oral agreements with the City of Bloomington, the Monroe County Solid Waste District, and Indiana University (S. Morgan, Personal Communication, October 2015), with different rates for each customer. It should be noted that as of October 2015, Republic Services is at service capacity and therefore is not accepting new customers to its current Bloomington routes (Republic Customer Service Representative, Personal Communication, October 2015).

Private Hauler: Rumpke

Rumpke, established in 1932, is a family owned company based in Colerain Township, Ohio that offers waste management and recycling solutions. Rumpke's Indiana hauling office is located in Columbus, IN and the company has a landfill in Medora. In 2004, Rumpke opened its own materials recovery facility (MRF) with a transfer station in Louisville, Kentucky where it processes more than 1,600 tons of recycling a month (Rumpke, n.d). The Louisville MRF processes recyclables collected through curbside, drop-off and commercial recycling programs throughout greater Louisville and southern Indiana. At its MRF, materials such as paper, cardboard, container glass, plastic bottles, and steel and aluminum cans are sorted and baled according to material type through a process known as dual stream technology (Rumpke, n.d). Currently, Rumpke does not include apartment services in its commercial offerings, but the company would consider expansion to apartments if recycling education programs are in place to ensure quality control (Rumpke Customer Service Representative, Personal Communication, October 2015).

Private Hauler: Ray's Trash Service, Inc.

Ray's Trash Service Inc.was established in 1965 and is a family-operated business that offers recycling and waste disposal services to the Indianapolis area and beyond. It is the largest independent recycling and waste disposal operation in the area and owns eight facilities throughout central Indiana, three of which are recycling facilities. The company offers rebates for the following recyclables: office paper, cardboard, and ferrous and non-ferrous metals. Ray's also accepts pallets, plastics, and other materials for recycling. The company offers residential and commercial recycling options (Rays Trash Service, n.d).

Appendix B: Detailed Analysis of Comparable Cities

Selection of Comparable Cities

Table B.7: Comparison of Bloomington to Other Cities

City	Ann Arbor	Fort Collins	State College	New Haven	Ithaca	Bloomington
Demographics*						
- Area	23.16	33.56	54.28	4.56	5.39	18.68
- Pop density	3472	2611.2	2652.8	9224.1	5570.5	6947.9
- Population	117,025	152,061	41,757	130,660	30,515	82,575
University	University of Michigan	Colorado State University	Pennsylvania State University	Yale University	Cornell University	University Indiana
Recycling Programs						
Who Picks Up Recyclables?	City and private	Private	County	City (residents and private business)	County	City
Where does recyclables go?	Ann Arbor MRF	a) 4 county transfer stations b) IPC	Centre County MRF	Willimantic Waste MRF	County MRF	Republic/ Indianapolis
City Mandated?	Y (not fully enacted)***	Y (for single family units)	State	State	State & County	No
Single-stream?	Yes	Yes	No***	Yes	Yes	No
MRF in County?	Yes	IPC in county	Yes	No	Yes	No

General Expansion occurred/ occurring?	Yes (recent commercial expansion ongoing)	Yes (expanding to multi-family and commercial business	Pursuing compliance of commercial properties	Big expansion in 2010 **	No	No

* Area in sq. miles (2010); Pop density is per sq. miles (2010); Population is 2013 estimate
** Converted from dual to single stream and resized trash & recycling bins
*** State College's contract with Centre County Refuse and Recycling Authority (CCRRA) requires that recyclables be curb sorted by the residence so that recyclables can be marketed at the CCRRA's MRF without extra processing.
**** City-mandated in downtown, Recycle Ann Arbor-mandated in other areas for both residence and businesses

Observations from Comparable Cities

The recycling programs of the comparable cities share a number of commonalities, and have major differences from the current Bloomington recycling program. This section highlights some of the main features of each city and its respective "best practices" that could have applications in Bloomington, either for making the current recycling system more efficient, or in considering an expansion to the system.

First, the majority of these cities utilize private haulers or county solid waste authorities to collect most or all recycling and refuse. New Haven was the only city whose Sanitation Department collected all trash and recyclables from residents. According to comparative analysis of dual and single-stream recycling systems conducted for Waukesha County, Taxes, "there is no evidence in the literature showing that fiber from single stream systems cannot be sold and successfully recycled", that is, "quality is recycling facility specific and there is evidence that state of the art systems produce much higher quality fiber than first generation systems" (RRT Design & Construction, 2007).

Second, some of these cities successfully covered the costs of their recycling program with user charge and external grants. The Solid Waste District of Tompkins County, whose jurisdiction includes the city of Ithaca, self-finances its operation through annual user fees. Fee amounts are revised and adjusted annually. New Haven kept clear records of budget, performance and personnel data for recycling in its annual budgets. The State of Pennsylvania offers grants to cities that meet a certain level of recycling services, which help State College fund its program. Saving money from operation and maintenance of recycling services, Fort Collins focuses on constructing community recycling centers and adding space for recycling dumpsters in its

downtown area. Solid Waste Fund of Ann Arbor experienced surplus in 2014 but it is not clear that how its recycling program is funded.

These cities have initiated unique programs to implement expansion of recycling to businesses; some elements of their programs could be used to inform Bloomington's proposed expansion (Ann Arbor, 2011; New Haven, 2010; Fort Collins, 2013). Fort Collins also published an ordinance banning the landfill of cardboards in 2013. Ann Arbor's municipal government has enacted recycling mandates for its residents and businesses in 2011, but its efforts to increase commercial recycling have been only partially successful, due to limited outreach efforts and an implementation schedule that local observers consider to have been too ambitious (Dunn, 2014). New Haven switched its recycling model from dual-stream to single-stream, in combination with resizing trash bins and recycling bins sizes to encourage more recycling. Centre County Refuse and Recycling Authority, where State College belongs, has a route for cardboard collection from businesses. For other recyclables, CCRRA provides pick-up services based on amount of generation. These unique measures help encourage businesses and apartments to get involved in the recycling process. It is noteworthy that all the states, where comparable cities locate, mandate recycling, single-family units in Fort Collins, both of residential and commercial properties in others.

Comparable City Case Study 1: Ann Arbor, Michigan

Recycling Logistics

Ann Arbor is similar to Bloomington in several notable ways. Although Ann Arbor has a larger population with a higher median age (U.S. Census Bureau, 2015), both cities are located in the Midwest with populations of approximately 100,000 (including over 40,000 public university students), and are located 40 to 50 miles outside a significantly larger city (specifically Indianapolis and Detroit).

The City of Ann Arbor relies on a non-profit, Recycle Ann Arbor (RAA), to collect recyclables from all city residents and most businesses (Recycle Ann Arbor, 2010). Trash pickup is also conducted by the city for downtown businesses and all residential buildings, while trash from other businesses is collected by Waste Management of Michigan (City of Ann Arbor, n.d.). Ann Arbor's recycling program uses a single-stream collection system, in which glass is accepted but plastic #3 (PVC) is not (Recycle Ann Arbor, 2010; Biolchini, 2013). Since 1995, the program has relied on a MRF located within the city, operated by ReCommunity Recycling, to process all local recycling (Biolchini, 2013). In 2012 the facility processed 12,268 tons of material, or 214 pounds per resident (Biolchini, 2013; U.S. Census Bureau, 2015). Based on aggregated statistics from all ReCommunity facilities in Michigan in 2013, fibers made up approximately 75% of this tonnage (ReCommunity, 2014).

Finances

Expenses were $14.8 million in 2013 and $13.1 million in 2014 (City of Ann Arbor, 2015, p. 330; U.S. Census Bureau, 2015). Reported figures from earlier years indicate that materials recovery represented approximately 25% of these costs (City of Ann Arbor, 2013). The majority of funding—over 70% for the years reported—is derived from property tax revenue, with less than 10% coming from recovery of recycled materials. The city also charges fees for commercial trash collection.

According to the city's budgets, "Commercial Recycling" costs nearly doubled from 2009, when the commercial mandate was passed, to 2010 (City of Ann Arbor, 2011, p. 306. The total cost of commercial recycling appears to have peaked in 2010 at $993,000; more recent costs have remained high, but are decreasing and expected to decrease further, suggesting either increasing efficiency in collection or decreasing participation (City of Ann Arbor, 2011, p. 306; 2015, p. 353).

Recycling Education

Commercial recycling mandate in Ann Arbor illustrates the importance of aggressive, persistent outreach before implementation (Dunn, 2014). According to Recycle Ann Arbor, many local businesses were unaware that a mandate existed until recently.

On the University of Michigan campus and website, educational materials on recycling are widely available, but their effectiveness is unclear, and specific collection and cost figures for the university are unknown. However, the city government specifically allocates funds for increased collection during student move-in and move-out, and the university makes efforts to educate students and train staff repeatedly throughout the year (City of Ann Arbor, 2015; University of Michigan, 2014).

Comparable City Case Study 2: Fort Collins, Colorado

Recycling Logistics

The city of Fort Collins mandates recycling for single-family units within the city limits; however, the city does not provide the pickup of recyclables from households. Instead, citizens must sign up for recycling services from a private hauler, which is regulated by the city government. In order for a private hauler to have access to the market, the hauler must obtain a license from the city government. Currently there are four haulers that provide services to the market, and all four of these haulers are also available to commercial businesses (City of Fort Collins, 2015b). These haulers also provide trash pickup services, which the citizens must also contract with the private haulers to obtain.

Lastly, the city of Fort Collins has implemented a recycling incentive plan for multi-family units and commercial businesses to encourage them to begin recycling without a program being mandated. The Waste Reduction and Recycling Assistance Program (WRAP) provides a 50% discount to new recycling customers on their first six months of recycling services. In addition, the city provides a 75% rebate on any one-time costs associated with beginning a recycling service, such as buying recycling bins. The program also offers a $50 bonus to any apartment complex or business that refers someone else to the program (City of Fort Collins, 2015d).

Finances

Fort Collins has substantial funds reserved for its trash and recycling program despite not having a Sanitation Department that picks up and sorts the trash and recyclable materials. The city designated $3.843 million in the 2015-2016 fiscal year to support its trash and recycling program. Although this is not much larger than Bloomington's budget despite Fort Collins being nearly double the size, none of this budget is going towards pickup, truck maintenance, fuel, or salary which are some of the largest costs associated with the Bloomington budget. Instead, this funding comes from a special account called the "Keep Fort Collins Great Fund," designated for city enhancement projects (City of Fort Collins, 2015a). Overall, by using private haulers and a county MRF and landfill, the city saves substantial amounts of money compared to Bloomington's Sanitation Department costs.

Recycling Education Programs

Fort Collins has a number of educational programs and brochures that are easily accessible and easily disseminated amongst the public. In addition to its multiple brochures that are distributed for free to apartments, businesses, and single family units that explain and clearly identify items that are recyclable, the city also has a "Garbage Garage Education Center," that explains the benefits of recycling and the PAYT system used in Fort Collins. Additionally, it has a user friendly website that clearly showcases the different recycling options available in Fort Collins from normal recycling, food waste, yard waste, and hazardous waste, and highlights how and where these items should be recycled. There are numerous printer friendly brochures available online and available for free upon request (City of Fort Collins, 2015e).

Comparable City Case Study 3: State College, Pennsylvania

Recycling Logistics

Through a combination of public collection crews and contracted services, the borough provides all residential and commercial waste collection, recycling, and disposal services to roughly 4,300 customer accounts that represent almost 15,000 individual units, many of which are large multi-family buildings (MSW Consultants, 2015).

All recycling services are provided by the CCRRA. On a contractual basis, CCRRA collects and recycles glass, blow-molded plastics, newspaper, magazines, and metal cans throughout the borough. All residents receive collection of source separated recyclables using 22 gallon bins (once per week). CCRRA additionally collects several grades of paper and cardboard from the commercial accounts of the borough (including apartment complexes) on a daily basis. Other recycling services are provided based on customer generation.

Table B.1: Amount of Recyclables Collected by CCRRA in Borough of State College, by type of materials, in pounds, 2014

Materials	Curbside	Commercial	Drop-off
Newspaper	796,570	-	-
Mixed paper	-	412,580	218,265
Clear Glass	124,810	285,390	2,660
Green Glass	137,945	196,185	6,195
Brown Glass	128,780	325,300	5,315
Misc Glass	-	-	9,770
Plastic	99,480	164,790	5,880
Metal Cans	97,675	118,990	2,005
OCC	-	-	200
Residue	-	-	1,215
Total	1,385,260	1,503,235	250,290
Total (tons)	692.63	751.62	125.15

Note: "OCC" stands for "old corrugated containers"; “Misc” stands for Miscellaneous
Source: Centre County Refuse and Recycling Authority, Curbside Recycling Report (2014), Commercial Recycling Report (2014) and Drop-off Recycling Report (2014)

Recycling is mandated by Pennsylvania State Law thus all residents and businesses are required to recycle the following (Municipal Waste Planning, 1998):

- Mixed office paper (magazines, paperboard, envelopes, etc.);
- Newspaper & phone books;
- Plastic bottles, narrow-necked jugs & jars;
- Steel & aluminum cans;
- Glass bottles and;
- Corrugated cardboard.

The Borough of State College, Garbage and Refuse Regulations VIII 201-212 sets rules for recycling. It includes fines for non-participation or non-payment, and is stated as follows:

> “On neglect or refusal of the occupant of any dwelling serviced by curbside recycling collection, a multifamily housing program, or a commercial, municipal, or institutional program to separate recyclable materials from municipal solid waste and place them at

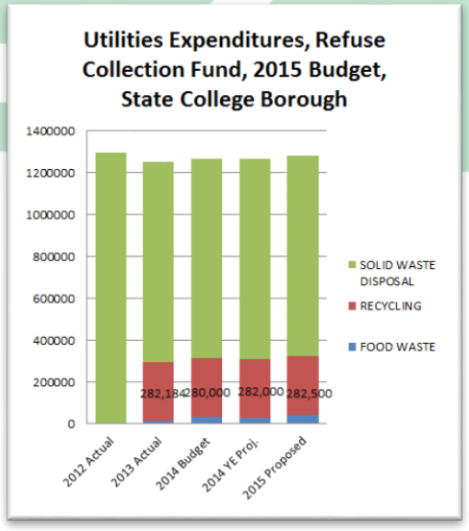
curbside or sites established by the Borough, or pay the penalty or penalties specified in Section 212.a of this Chapter, that person shall, upon conviction of such default, neglect or refusal, pay a fine of not less than $100.00 nor more than $600.00 together with the costs of prosecution, to be collected as now provided by law. Each violation shall constitute a separate offense."

Finances

The Borough of State College manages the finances of refuse and recycling programs through the Refuse Collection Fund-- an enterprise fund used to provide an equitable distribution of costs among users, and Compost Operations Funds. The total expenses from the Refuse Collection Fund in 2014 were projected to be $3,814,639, including operating cost of $2,827,998 and capital cost of $757,286 (State College Borough, 2015). The projected total revenue was $3,393,130, 90.2% of which are from user charge. The projection about expenses and revenues from Compost Fund were $381,065 and $264,042, with deficit of $117,023 (State College Borough, 2015).

For the recycling program, utilities expenditure was $282,500 in 2014 Budget (Figure B.1 below). This was used for the cost of monthly Centre County Recycling and Refuse Authority invoices for residential and commercial recycling collection. Under this category, the costs for the expected expansion of the commercial food waste collection program, and cost of disposal of landfill-bound waste at the CCRRA transfer station were $44,000 and $955,000.

Figure B.1: Historical Utilities Expenditures of Solid Waste Disposal, Recycling and Food Waste, Borough of State College, 2012-2015



Source: Borough of State College, 2015 Budget, J-57

The projected cost of contracted service was $293,351 in 2015 (State College Borough, Proposed 2016). Projected recycling rebate from CCRRA is at $43,888 (State College Borough, 2015). Therefore, the projected net annual cost of the recycling program for 2015 is $249,463.
The State Grant makes up a significant portion of the revenue. As the recycling program in State College matched the requirements of Pennsylvania State Recycling Grants, the borough will receive $277,888 in 2015, 2017, and 2019 (Borough of State College, 2014). In addition, in the first quarter of 2015, the borough received a Municipal Recycling grant from the Commonwealth of Pennsylvania for $250,000 (Borough of State College, 2015). Table B.2 can provide a reference about the cost breakdown for Borough recycling program.

Table B.2: Cost Structure of Current Contract-Based Service and Proposed City-Run Single-Stream Recycling Program for Residents

Costs	CCRRA Contract	Borough-provided Single Stream Collection	*Difference*
Capital Costs	$0	$459,450	*$459,450*
Operating Costs + Depreciation			
Contracted Services	$115,153	$0	*($115,153)*
Annual Depreciation	$0	$57,431	*$57,431*
Operating Costs	$0	$97,323	*$97,323*
Shuttle Service to Lycoming County MRF	$0	$59,060	*$59,060*
Avoided Disposal Costs	$0	($7,346)	*($7,346)*
Material Revenues	($12,963)	($16,563)	*($3,601)*
Net Annual Cost (O&M + Depreciation)	**$102,191**	**$138,191**	***$95,060***

Source: MSW Consultants, Borough of State College, Pennsylvania Refuse Services Evaluation and Rate Study (March 2015)

The borough prepares an annual report to allocate operational costs of residential collection and commercial/apartment routes (Borough of State College, 2014)). The borough uses this cost breakdown to develop a user fee rate structure that is equitable based upon the different types of collection. Table B.3 illustrates the results a recent analysis completed in March, 2015. Figure B.2 is the projected revenue distribution based on the proposed rates. The Bloomington recycling program can use these rates as reference for future project costs.

Table B.3.1: Proposal of Full Cost Standard Commercial Dumpster Rates, FY 2015

Container Size	Number of Weekly Scheduled Collections						
	1x	2x	3x	4x	5x	6x	7x
2 CY	$74.79	$149.58	$224.37	$299.16	$373.95	$448.74	$523.53
4 CY	$84.83	$169.67	$254.50	$339.34	$424.17	$509.01	$593.84
6 CY	$94.88	$189.76	$284.64	$379.52	$474.40	$569.28	$664.16
8 CY	$104.92	$209.85	$314.77	$419.70	$524.62	$629.55	$734.47
10 CY	$114.97	$229.94	$344.91	$459.88	$574.85	$689.82	$804.79

Table B.3.2: Proposal of Full Cost Standard Apartment Dumpster Rates, FY 2015

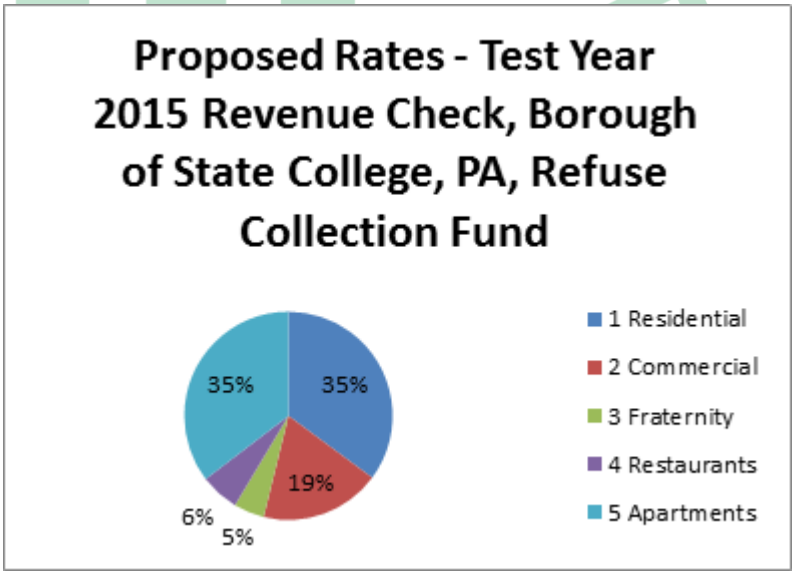
Container Size	Number of Weekly Scheduled Collections						
	1x	2x	3x	4x	5x	6x	7x
2 CY	$91.41	$182.82	$274.23	$365.64	$457.05	$548.46	$639.87
4 CY	$103.69	$207.37	$311.06	$414.75	$518.43	$622.12	$725.81
6 CY	$115.96	$231.93	$347.89	$463.86	$579.82	$695.78	$811.75
8 CY	$128.24	$256.48	$384.72	$512.96	$641.20	$769.45	$897.69
10 CY	$140.52	$281.04	$421.55	$562.07	$702.59	$843.11	$983.63

Table B.3.3: Proposal of Full Cost Standard Fraternity and Restaurant Dumpster Rates, FY 2015

Container Size	Number of Weekly Scheduled Collections						
	1x	2x	3x	4x	5x	6x	7x
2 CY	$99.72	$199.44	$299.16	$398.88	$498.60	$598.32	$698.04
4 CY	$113.11	$226.23	$339.34	$452.45	$565.56	$678.68	$791.79
6 CY	$126.51	$253.01	$379.52	$506.02	$632.53	$759.04	$885.54
8 CY	$139.90	$279.80	$419.70	$559.60	$699.50	$839.40	$979.29
10 CY	$153.29	$306.58	$459.88	$613.17	$766.46	$919.75	$1,073.05

Source: MSW Consultants, Borough of State College, Pennsylvania Refuse Services Evaluation and Rate Study (March 2015)

Figure B.2. Projected Revenue Distribution Based on the Proposed Rates



Source: Adapted from MSW Consultants, Borough of State College, Pennsylvania Refuse Services Evaluation and Rate Study (March 2015)

Recycling Education

The County hired consultants to provide technical assistance with its educational program for the restaurant recycling and composting program. One of the recommendations the Borough received is as follows:

> "…an important way to disseminate information should be at the time of the annual inspection. Staff will have a "captive audience" after the inspection, which will motivate the owner or manager to improve their recycling and composting program. Educational materials should be tailored for the individual establishment category, i.e. fast food, casual dining, fine dining, coffee or ice cream shop." (MSW Consultants, 2012)

Figure B.3: CCRRA Recycling Informational Handout for Commercial Dumpsters

Source: Centre County Recycling & Refuse Authority

Comparable City Case Study 4: New Haven, CT

Recycling Logistics

Unlike Indiana, recycling is mandated by the State of Connecticut (State of Connecticut, 2015). In New Haven, the city's Public Works Department collects trash and recyclables weekly, then sends the collected items to the city-owned transfer station, which is ran by Solid Waste Authority, who is responsible for the operations and management of the City's transfer station for solid waste before delivering to Willimantic Waste MRF (City of New Haven).

Before 2010, New Haven utilized a dual-stream recycling model, similar to Bloomington's current model. In 2010, the city kicked off an expansion program to encourage recycling and save the city tax dollars. The recycling program is a single-stream process (Bailey, 2015). Moreover, recyclables are picked up with an automated-arm truck, which is quicker, less labor-intensive, and less hazardous to workers than the manual pick-up method currently used in Bloomington. The city is currently contracting with Willimantic Waste MRF for processing of recyclables. Similar to Bloomington, recycling is provided free of charge to residential customers having six or less units. However, unlike Bloomington, the city of New Haven does provide commercial waste and recycling collection, but only for high volume commercials at a rate of $225/year per bin (which means $4.33/bin/week), this service began in 2010.

Finances

The city budget for recycling, not including costs of the transfer station, is about a quarter of million dollars, most of those are personal services. Data are not available for the period before 2010, so it is not possible to evaluate the effectiveness of the expansion program. However, a declining trend in municipal solid waste (MSW) and increasing trend of recycling and recycling rates can be observed from performance and financial information gathered from FY10-FY15 budgets. Costs for hauling and disposal (i.e. costs of the transfer station) decreased over time—which may be due to decrease in waste disposal and increase in recycling—indicates an increase in efficiency.

The city is currently subsidizing its transfer station at over $3 million/year. Operating expenses of a transfer station is about $5.6 million, according to city's 2014 CAFR. This number does not include personnel costs, which is paid by through the city's general fund. According to the Solid Waste Authority (New Haven Solid Waste and Recycling Authority, 2010), in FY2010-11, hauling and disposal costs to private actors were over $6.5 million. Half of this number is recovered from "Commercial Waste", another half is paid from the city's General Fund (Note that these costs include both waste disposal and recycling).

Recycling Education

As mentioned above, single-stream reduced a lot of New Haven's recycling educational efforts. The process is simple, easy to follow and is detailed in a two-page flyer (New Haven Curbside Recycling, n.d).

Comparable City Case Study 5: Ithaca, New York

Recycling Logistics

The state of New York requires each county to have its own law regarding recycling (State of New York). Accordingly, Tompkins County mandates recycling to all people living within the county (Tompkins County Code).

In Ithaca, recycling and trash pickup services are provided by the County, which has its own MRF, the Recycling and Solid Waste Center. Logistically, the County provides single stream recycling. In 2013, it served a customer base of 103,617 residents (living in 41,000 homes), along with about 3,000 businesses (Tompkins CSWMD, 2013. Trash and recyclables are picked up at the curbside on a bi-weekly basis. The County not only provides the service to households, but also services businesses and the University.

Finances

The operations of Tompkins SWD are divided into three main programs: Disposal, Recycling Processing, and Recycling Collection. Together, these three programs cost about $4.4 million, in that $2.7 million comes from Trash and Recycling collection. Compared to Bloomington, Tompkins County serves a customer base of more than 3.5 times that of Bloomington, and its costs for trash and recycling collection are just over 1.5 times that of Bloomington's.

Recycling Education

Public education is a part of the county recycling program. The program, called Waste Reduction program, encourages innovative waste reduction and reuse projects, many of which are accomplished through public-private partnerships with local organizations (including the University). In addition, the program also offers education to share these projects with the public (Tompkins County SWM, 2013). This public-private partnership model is worth considering in Bloomington, as the City may partner with IU in providing and publicizing recycling initiatives.

Appendix C: Baseline, Data Sources & Tables of Results of Preliminary Fiscal Impact Analysis of Current Recycling Program in Bloomington

Fiscal Analysis Baseline

To estimate the fiscal impact of the current recycling program, we compared its cost structure before and after its implementation and summarized it as follows:

Prior to the implementation of Bloomington's Recycling Program:

- The City of Bloomington paid for the disposal of all the waste through the city's General Fund.
- There was no user charge for disposed waste.

After the implementation of the Bloomington Recycling Program:

- Residents participated in dual stream recycling of fiber and commingled materials that the city would have otherwise had to pay to dispose (i.e. avoided waste costs).
- The city began to receive a rebate for fibers at $5 per ton, and paid a processing fee for commingled materials at $10 per ton.
- The city created trash and yard waste stickers with user charges of $2 and $1 per unit as an incentive for residents to engage in recycling.
- The city purchased three more trucks for the recycling program, thus costs of trucks, drivers, fleets and fuel became fixed costs of the recycling program.

From the perspective of the City government, the benefits include avoided waste treatment costs for recycled materials, rebates from recyclable fibers, and user charges collected from the trash and yard waste stickers, while the costs are the payments for trucks, fleets, fuels and drivers. Because we included avoided waste treatment costs as a benefit, our results are different from the figure cited by the city government. The approach of the city government is budget-focused, while our analysis includes impacts that are counted separately, but affect the program's true costs and benefits.

Data Sources

- Shelby Walker, City of Bloomington Sanitation Department
  - Amount of trash, commingled and fiber (2009-2014)
  - Annual costs of trucks, fleet, fuel, drivers (2014)
- Indiana Gateway, Detailed Receipts Form
  - User charge – Garbage/Trash Collection and Landfill Charges (2011-2014)
- Bloomington Financial Report
  - User charge – Charge for services (2009-2010)
- Contract between City of Bloomington and Republic Services (2014)
  - Rates of processing trash, commingled and rebate per ton of fiber

Tables of Results

Scenario 1 analyzes the processing fee of commingled recyclables as a $10/ton cost and the stickers as a benefit to the recycling program. Scenario 2 analyzes the processing fees of commingled recyclables as $10/ton and does not consider the stickers as a benefit to the recycling program. Scenario 3 analyzes the processing fee for commingled recyclables as a $0/ton cost and the stickers as a benefit to the recycling program. Scenario 4 analyzes the processing fee for commingled recyclables as a $0/ton cost and does not consider the stickers as a benefit to the recycling program

Table C.1: Cash flows when the processing fee per ton of the commingled was $10 per ton and revenues from stickers were considered as benefit of recycling program

	(+)Avoided	(+)Receipts		(-)Labor Costs	(-)Administrative Costs		Start-up Costs	Annual Net
	Waste Costs	Fiber	User Charge	Drivers	Fleet	Fuel	Trucks	Value
*							750,000.00	
2009	106,741	8,820	929,161	575,397	24,000	22,107	-	423,218
2010	117,805	10,260	907,181	575,397	24,000	22,107	-	413,742
2011	114,929	6,545	907,181	575,397	24,000	22,107	-	407,151
2012	150,129	8,060	881,610	575,397	24,000	22,107	-	418,295
2013	99,650	7,640	907,358	575,397	24,000	22,107	-	393,144
2014	99,255	7,770	899,992	575,397	24,000	22,107	-	385,513

Table C.2: Cash flows when the processing fee per ton of the commingled was $10 per ton and revenues from stickers were not considered as benefit of recycling program

	(+)Avoided	(+)Receipts		(-)Labor Costs	(-)Administrative Costs		Start-up Costs	Annual Net
	Waste Costs	Fiber	User Charge	Drivers	Fleet	Fuel	Trucks	Value
*							750,000.00	
2009	106,741	8,820	-	575,397	24,000	22,107	-	-505,943
2010	117,805	10,260	-	575,397	24,000	22,107	-	-493,439
2011	114,929	6,545	-	575,397	24,000	22,107	-	-500,030
2012	150,129	8,060	-	575,397	24,000	22,107	-	-463,315
2013	99,650	7,640	-	575,397	24,000	22,107	-	-514,214
2014	99,255	7,770	-	575,397	24,000	22,107	-	-514,479

Table C.3: Cash flows when the processing fee per ton of the commingled was free and revenues from stickers were considered as benefit of recycling program

	(+)Avoided	(+)Receipts		(-)Labor Costs	(-)Administrative Costs		Start-up Costs	Annual Net
	Waste Costs	Fiber	User Charge	Drivers	Fleet	Fuel	Trucks	Value
*							750,000.00	
2009	119,041	8,820	929,161	575,397	24,000	22,107	-	435,518
2010	129,975	10,260	907,181	575,397	24,000	22,107	-	425,912
2011	136,059	6,545	907,181	575,397	24,000	22,107	-	428,281
2012	179,039	8,060	881,610	575,397	24,000	22,107	-	447,205
2013	112,720	7,640	907,358	575,397	24,000	22,107	-	406,214
2014	111,845	7,770	899,992	575,397	24,000	22,107	-	398,103

Table C.4: Cash flows when the processing fee per ton of the commingled was free and revenues from stickers were not considered as benefit of recycling program

	(+)Avoided	(+)Receipts		(-)Labor Costs	(-)Administrative Costs		Start-up Costs	Annual Net
	Waste Costs	Fiber	User Charge	Drivers	Fleet	Fuel	Trucks	Value
*							750,000.00	
2009	119,041	8,820	-	575,397	24,000	22,107	-	-493,643
2010	129,975	10,260	-	575,397	24,000	22,107	-	-481,269
2011	136,059	6,545	-	575,397	24,000	22,107	-	-478,900
2012	179,039	8,060	-	575,397	24,000	22,107	-	-434,405
2013	112,720	7,640	-	575,397	24,000	22,107	-	-501,144
2014	111,845	7,770	-	575,397	24,000	22,107	-	-501,889

Note:

*: Used * instead of the year when the trucks were bought.

Avoided treatment costs

= treatment costs without recycling program- treatment costs with recycling program

Treatment costs without recycling program

= (amount of trash + amount of commingled + amount of fiber)*processing fee of trash per ton

Treatment costs with recycling program

= (amount of trash*processing fee of trash per ton) + (amount of commingled*processing fee of commingled per ton) + (amount of fiber*processing fee of fiber per ton)

Therefore, avoided treatment costs

= (amount of commingled + amount of fiber)*processing fee of trash per ton-(amount of commingled*processing fee of commingled per ton + amount of fiber*processing fee of fiber per ton)

Receipts from sold recyclable

= amount of fiber*rebate of fiber per ton

Appendix D: Equations and Assumptions for Recycling Model Solutions

Rumpke: the recycling rate is from the sorority house contract

Amount	Service Schedule	Monthly Charge (3 yr contract)	Monthly Charge (1 yr contract)
2-4 cubic yards	1 x per week	$35.00	$45.00
6 cubic yards	1 x per week	$45.00	$57.00
8 cubic yards	1 x per week	$55.00	$70.00

Trash service: $500/month for 54 cubic yards per week pick up.
Ray's Trash Service:

- Recyclables: $30.00, monthly for 2 cubic yards.
- Trash: $50.00 for 2 cubic yards.

Green Business Network

Service Schedule	Annual Price
2 x per week	$1,600.00
1 x per week	$800.00
2 x per month not to exceed 1 per week	$400.00
1 x per month	$200.00

Output:
Using the estimates outlined in the Shared Estimates and Assumptions of current Bloomington household output

Recycling:

- 508.6 pounds/household annually
- 231.18 pounds/resident annually

Trash: (using State College data estimates of 57% recyclables, 43% trash)

- 383.68 pounds/household annually
- 174.39 pounds/resident annually

Appendix E: Monte Carlo Cost Equations and Assumptions

Basic Research Question

Cost of trash with no recycling vs Cost of trash with average recycling + cost of recycling

Cost for Businesses: Rumpke Rates

Cost of trash with no recycling:

$$\frac{(49.12\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$2.14}{1yd^3} = \$38.54 \text{ per month}$$

Cost of trash with average recycling (recycling rate = 0.57):

$$\frac{(21.12\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$2.14}{1yd^3} = \$16.57 \text{ per month}$$

Cost of recycling:

$$\frac{(28.13\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{10yd^3}{1\ ton} \text{ x } \frac{\$2.19}{1yd^3} = \$51.34 \text{ per month}$$

Cost for Businesses: Ray's Trash Service

Cost of trash with no recycling:

$$\frac{(49.12\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$5.77}{1yd^3} = \$103.92 \text{ per month}$$

Cost of trash with average recycling (recycling rate = 0.57):

$$\frac{(21.12\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$5.77}{1yd^3} = \$44.68 \text{ per month}$$

Cost of recycling:

$$\frac{(28.13\ tons)}{1\ year} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{10yd^3}{1\ ton} \text{ x } \frac{\$3.46}{1yd^3} = \$81.10 \text{ per month}$$

Cost for Apartments: Rumpke

Cost of trash with no recycling:

$$\frac{(0.8\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$2.14}{1yd^3} = \$46.64 \text{ per month}$$

Cost of trash w/ average recycling (recycling rate 0.14):

$$\frac{(0.6841\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$2.14}{1yd^3} = \$39.88 \text{ per month}$$

Cost of recycling:

$$\frac{(0.1159\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{10\ yd^3}{1\ ton} \text{ x } \frac{\$\mathbf{2.19}}{\mathbf{1yd^3}} = \$15.44 \text{ per month}$$

Cost for Apartments: Ray's Trash Service

Cost of trash with no recycling:

$$\frac{(0.8\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$5.77}{1yd^3} = \$125.76 \text{ per month}$$

Cost of trash with average recycling (recycling rate = 0.14):

$$\frac{(0.6841\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{4.4\ yd^3}{1\ ton} \text{ x } \frac{\$5.77}{1yd^3} = \$107.54 \text{ per month}$$

Cost of recycling:

$$\frac{(0.1159\ tons)}{1\ person} \text{ x } \frac{74.3\ people}{complex} \text{ x } \frac{1\ year}{12\ months} \text{ x } \frac{10\ yd^3}{1\ ton} \text{ x } \frac{\$3.46}{1yd^3} = \$24.83 \text{ per month}$$

Appendix F: Current List of Green Business Network Participants

American Red Cross Monroe County Chapter
American Rental
Area 10 Agency on Aging
Association of College Unions, int'l
Author Solutions
Aver's Pizza
Baxter Pharmaceutical Solutions (daniels - g)
Baxter Pharmaceutical Solutions (s curry)
Baxter Pharmaceutical Solutions (t-2 / n curry)
Baxter Pharmaceutical Solutions (t-3 / north)
Bloomington Board of Realtors Publications, inc.
BBQ Train 1, llc (eastside short stop food mart)
Bellwether Manufacturing
Bloomington Bagel co
Bloomington Country Club
Bloomington Discount Printing
Bloomington Housing Authority
Bloomington Pedal Power
Centerstone
Comedy Attic
Cook Family Health Center
Cook, inc (main bldg)
Curare Group
Ferguson and Ferguson
Finch's Brasserie, inc.
Fine Print
Global Gifts
Guerbet llc
Hoosier Energy Rec
Hoosier Hills Food Bank
Indiana Metal Craft
IU Health Community Health
IU Health Southern Indiana Physicians - Orthopedics of Southern Indiana
Ivy Tech Community College
J.L. Waters and Co.
Jerico Metal Specialties
Landlocked Music
Mechanics's Helper, inc. dba hi-tec
Metropolitan Printing Service

Monroe County Commissioner (courthouse)
Monroe County Commissioner (health bldg)
Monroe County Commissioner (justice bldg)
Monroe County Commissioner (showers)
Monroe County Commissioner (youth srvc)
Monroe County Public Library
Morton Street Properties (solution tree n morton)
Morton Street Properties (solution tree warehouse)
Mr. Copy
Office Easel
Oliver Winery
Olympus Properties, llc
One World Enterprises (Lennie's)
Opportunity House/ Second Hand Stores
Roots & Associates (Nick's English Hut)
Scenic View Lodge, inc.
South Central Community Action Program
Stars End inc. dba Tracks Records
Tasus Corporation
The Green Nursery
Tis, inc
United Way of Monroe County
Upland Brewing Co. (11th st.)
Upland Brewing Co. (profile parkway)
Wonderlab Museum of Science Health & Technology
Worm's Way, inc

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