ECONOMIC IMPACT AND MARKET STUDY REPORT:
ELEMENTS OF THE CASE FOR ADVANCING FOOD SCRAP
COMPOSTING INDUSTRY AND THE LINK TO BUILDING ILLINOIS’
LOCAL FOOD ECONOMY

Final Report
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# Organization of the Report

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1. Executive Summary

Building on the 2015 Food Scrap Composting Challenges and Solutions in Illinois Report produced by recent collaboration with the Illinois Food Scrap Coalition (IFSC), Seven Generations Ahead (SGA) contracted Skumatz Economic Research Associates (SERA) to identify the problems associated with landfilling organics, food scraps in particular, and recommend solutions emphasizing the development of the Illinois sustainable food industry.

The goals of the project are to examine the influence of expanded food scraps recovery and composting programs on improving the viability of commercial composting ventures in Illinois, driving Illinois-based food production, and enhancing the local food economy in Illinois, including jobs and revenues.

Objectives and Approach

The objective is to examine the potential for increasing the efficiency of the Illinois food system from waste reduction strategies to improved food production and job creation. In order to achieve these goals, SERA:

- Reviewed and analyzed data on food scraps and compostable materials in the Illinois residential and commercial disposal streams.
- Conducted an extensive literature review on current practices, recommendations, and results of state-wide programs and successful community programs. This included multiple reports provided by SGA as well as independent web, interview, and literature research and previous SERA studies.
- Developed programmatic alternatives to recover food scraps and compostable materials from the waste stream, and developed a status quo (or less aggressive) scenario and a higher achieving, more aggressive approach.
- Examined tonnages and market flows affected by the proposed scenarios.
- Conducted interviews with Illinois market actors / stakeholders about market and business effects in food production, composting, and their associated costs from the modeled scenarios.
- Used a well-vetted state and national input/output model to estimate the job and economic output effects of the scenarios (direct, indirect, and induced) based on the data gathered from research, surveys, interviews, and analysis of suitable program and policy scenarios for Illinois.

Recommendations

The analyses in this report indicate that the three targeted organic materials – food scraps, compostable yard waste (not including woody materials), and compostable paper-- represent significant recoverable resources. Diverting the three target materials would reduce 22% of tons disposed, and 16% of the MTCO2e available from all the non-recovered recyclables and organics disposed annually in Illinois. Using estimates of future prices of carbon dioxide, the value of the carbon dioxide represented by the target food scraps is $54 million - $89 million annually (2020 prices).

Recommended Programs for Increased Organics Diversion, with an emphasis on Food Scraps:

- “Piggy back” on existing yard waste landfill ban: This involves adding food scraps as an additional item to the existing yard waste landfill ban to capitalize, or “Piggy-Back” on existing infrastructure.
• **Tip Fee Incentives:** Additional fees (such as a State Solid Waste Fee) could be added (or raised) on landfilled materials to increase the cost of using this waste stream and making the non-taxed streams, such as composting, more financially attractive.

• **Pay-As-You-Throw (PAYT) Residential:** This is a volume-based program for trash fees with recycling or organics embedded (included in the trash bill at no additional cost). The more material diverted from trash, the smaller sized trash container can be used, lowering the trash bill.

• **Grant programs:** These grants can be used to help businesses start up or expand composting facilities to include food scraps or help communities establish programs.

• **Urban gardens / backyard composting and education:** Urban gardens allow for diversion of food and yard waste at a local or neighborhood level by encouraging composting for direct usage. They provide opportunities to educate on the benefits of diverting organic materials.

• **Donations Regulations:** This requires clarifying donation regulations and potentially providing incentives to encourage reuse of food items.

• **Diversion goal:** Set a statewide diversion goal for compostable material.

• **Commercial PAYT for organics:** As with the residential program, this program embeds the cost of the organics into the cost of trash service, reducing the size of trash container and cost.

• **Organics requirement by business type:** To maximize the tonnage of food scraps and compostable materials and minimize outreach and program costs, those businesses or industry sectors that generate the most material are targeted.

• **Generator database:** This sets up a statewide or regional database to assist contact between those with additional material and those in need of material.

• **Tracking and Measuring:** Strong tracking and reporting is needed to clarify position and progress and determine if enforcement or further steps are needed.

• **Percent Recoverables Remaining (PRR):** This is a new approach measuring the amount of material remaining in the waste stream. This metric helps focus goals and can be obtained using a waste characterization study.

Each of the recommended programs will help move Illinois towards increased organics diversion. In particular, the “Phased In” approach recommendation can incorporate the other programs and allow for adjustment periods for various stages on a statewide scale. This approach involves a multiyear implementation plan for statewide diversion programs, using the State of Vermont’s approach as an example.
Job and Economic Impacts - Results

The economic analysis was designed to estimate the various state-wide economic impacts of policies aimed at bolstering organics collection and processing. SERA used an input-output model with state and national modeling capabilities, and purchased data that portrayed the State of Illinois’ economy, including business sectors, employment, and production ratios. These data were combined with data collected from an extensive literature review, as well as structured interviews with local professionals and experts knowledgeable about food scrap generation, uses, and potential uses in Illinois.

The input-output modeling allowed us to tweak various inputs (i.e. amount of food scrap collected/processed, and eventual intended end-use of compost) and examine the difference in impact among several statewide policy scenarios. The inputs for each scenario were chosen based on SERA analysis of the effects of alternative food scraps policies and programs, including diversion, or supply-side elements (food waste bans and other strategies) and demand-side, or “use” options (the various potential end-uses of composted material).

SERA ran three levels of scenarios (low, moderate, and aggressive) which assumed that collection and processing of food scrap increased to 35%, 65%, and 85% of current statewide organics stock. These were modeled to represent thresholds for program / policy portfolios including thresholds for a material ban with and without enforcement. For each of these percentage increases we ran two individual scenarios based on different end-use applications of compost:
- agricultural uses, and
- non-agicultural (i.e. highway remediation) uses.

SERA also modeled an additional scenario, at the 85% of stock processed level, but with a 50/50 split for the end-use application between agriculture and highway remediation. This last scenario essentially shows the optimal situation for the organics diversion industry in Illinois with 85% of the material being processed annually, half of it being used for highway remediation (during winter months), and the other half being used for agricultural application (during planting and growing seasons). The key economic results of these scenario runs are presented in Figure 1.1.

Figure 1.1: Total Effect by Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Employment (millions)</th>
<th>Labor Income (millions)</th>
<th>Total Value Added (millions)</th>
<th>Output (millions)</th>
<th>State and Local Tax (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35%Ag</td>
<td>1,599.1</td>
<td>$85</td>
<td>$114</td>
<td>$152</td>
<td>$3.0</td>
</tr>
<tr>
<td>35%Hwy</td>
<td>1,714.8</td>
<td>$82</td>
<td>$119</td>
<td>$156</td>
<td>$6.0</td>
</tr>
<tr>
<td>65%Ag</td>
<td>2,969.8</td>
<td>$158</td>
<td>$212</td>
<td>$282</td>
<td>$6.6</td>
</tr>
<tr>
<td>65%Hwy</td>
<td>3,184.6</td>
<td>$151</td>
<td>$222</td>
<td>$290</td>
<td>$10</td>
</tr>
<tr>
<td>85%Ag</td>
<td>3,883.6</td>
<td>$207</td>
<td>$278</td>
<td>$370</td>
<td>$7.0</td>
</tr>
<tr>
<td>85%Hwy</td>
<td>4,164.5</td>
<td>$198</td>
<td>$290</td>
<td>$380</td>
<td>$14</td>
</tr>
<tr>
<td>85%Ag/Hwy</td>
<td>4,024.0</td>
<td>$202</td>
<td>$284</td>
<td>$375</td>
<td>$10</td>
</tr>
</tbody>
</table>

1 IMPLAN model, purchased from MIG Group. SERA has used this flexible model to estimate incremental job / economic impacts for multiple previous projects analyzing recycling and energy programs / policies.
Findings and Conclusions

There are two major barriers and recommendations for industry development. Based on extensive literature review, structured interviews, data analysis and input-output modeling, the composting industry in Illinois faces two main industry barriers: a lengthy and expensive permitting process, and low end-use demand particularly in agricultural sectors. The most critical areas of focus for the state of Illinois in further developing the composting industry are: simplifying the permitting process for food scrap composters, and driving the local economic engine by increasing small-scale farmer demand for compost as an agricultural product.

Composting Barriers & Policy Solutions

**Barriers:**
- **Complex Permitting Process:** The permitting process for compost facilities is unnecessarily time-consuming and expensive.
- **Low Demand for Compost:** There is low consumer demand (especially for agricultural uses) for compost, which is stalling industry development.

**Policy Solutions:**
- **Permitting Process:**
  - Standardize a food scrap processing technique for expedited permitting
  - Minimize regulatory constraints for on-farm composted materials and urban food scrap collection and processing facilities
  - Encourage local zoning to allow compost facilities as a normal agricultural or commercial operation
- **Low Demand for Compost:**
  - Pursue grant programs for cost-sharing, cooperative purchasing, and targeted demonstrations for new techniques or processes
  - Use non-agricultural applications of compost, during periods of low farm demand, like DOT projects
  - Create financial incentives for agricultural use of compost in preference to other fertilizers
  - Develop an in-depth data tracking and reporting initiative for this industry at the state level
2. Introduction and Background

Illinois is a “workhorse” for agricultural production in the United States, but only a small percentage of that material goes to feed its residents. Most of the corn and soybean crops are exported, resulting in most consumable food being provided by imports, often from California and other areas where continuous drought has cut production and increased price. Years of large scale agriculture and use of imported fertilizers are depleting the soil, with potential to cause significant pollution to Illinois waterways. In addition, Illinois residents and businesses are generating increasing amount of food waste and this compostable material rotting in landfills is a major contributor of methane and greenhouse gases. Across the country there is increasing public and political will to address this issue by decreasing waste that accompanies the disposal of food scraps and by encouraging purchase of local foods. One of the best ways to divert that material and produce healthy growing soils is through composting.

Building on the momentum of the recent collaboration with the Illinois Food Scrap Coalition (IFSC) on the Food Scrap Composting Challenges and Solutions in Illinois Report, Seven Generations Ahead (SGA) contracted Skumatz Economic Research Associates (SERA) to examine the viability of expanding food scrap programs and the sustainable food economy in Illinois. The goals of the project were to examine the influence of expanded food scraps recovery and composting programs on:

- Improving the viability of commercial composting ventures in Illinois,
- Driving Illinois-based food production, and
- Enhancing the local food economy in Illinois, including jobs and revenues.

The project’s objective was to examine the potential to increase the efficiency of the Illinois food system from waste reduction strategies, improved food production, job creation, and other strategies. In order to achieve these goals SERA conducted the following activities.

- **Food Scraps in Disposal Stream:** The team reviewed and analyzed data on food scraps and compostable materials in the residential and commercial disposal streams using waste composition data from the state.
- **Literature Review and Interviews:** The team conducted an extensive literature review on current practices, recommendations, and results of state-wide programs and successful community programs. The review covered reports provided by SGA, web research, interviews with experts, literature review, and research from previous SERA studies. This literature review uncovered strategies and policies considered and implemented in other jurisdictions, addressing strategies for capturing / diverting food scraps, as well as a variety of uses for food and organic materials.
- **Program / Policy Development:** The team used information on the available material in Illinois to develop suitable programmatic alternatives to recover and use food scraps and compostable materials from the waste stream, and develop low / status quo, moderate, and more aggressive portfolios.
- **Tonnages and Flows:** The team examined tonnage changes and market flows affected by the proposed scenarios.
- **Examined Costs and Business Effects:** The team conducted phone and email interviews with multiple levels and types of Illinois market actors / stakeholders about the range of market and business effects related to food production, composting, and their associated costs that could result from the proposed strategies.
- **Economic Modeling:** Using the data gathered from the research, surveys, interviews and other work, the team analyzed the industries affected by each of the proposed scenarios and developed model inputs for the variety of business sectors affected. Using an input-output model, the team estimated the baseline and “scenario” results to identify net job and economic output effects of the scenarios, including direct, indirect, and induced output effects.

In the 1990s, Illinois banned yard waste material from the landfill, helping create a basic composting industry and infrastructure. The addition of food scraps to yard waste processing is a much more involved process. In 2009, permit requirements were relaxed to allow for commercial food scrap composting, and were adjusted again in 2013 to allow small urban farms and facilities to accept food waste for compost piles under a certain size. However, permitting is still an issue and there are currently not enough permitted facilities to handle the maximum potential diversion of food scraps. Capacity and facilities are discussed later in the section discussing Industry Barriers and Market Development.

Review of Current Programs and Initiatives

There is movement and interest towards increased diversion of organic material throughout Illinois in the form of coalitions, donations, urban gardens and farmers’ markets, and communities piloting food scrap diversion programs. This has been through local or private initiatives. Below is an overview of the status of state level programs and laws affecting the diversion of organic materials.

Yard Waste Ban

A material ban can be one of the more aggressive programs for material diversion. The existing state-wide ban on yard waste has helped establish a widespread composting infrastructure while diverting approximately 59% of the compostable yard waste generated from landfills. However, this leaves some 40% of all yard waste generated (a banned material) still finding its way to the landfills. Analysis of the Illinois Statewide Waste Characterization and Generation Study indicates that generation of food scraps is nearly double that of compostable yard waste. Although diverting 100% of a banned material is unrealistic, many states are achieving significant reductions in the amount of yard waste to landfills.

The analysis of yard waste generation and landfilled tonnages from the 2009 State Waste Characterization Report and the 2015 Study reveals that the number of tons being diverted since 2009 in Illinois is increasing, but the number of tons being generated are also increasing, resulting in fairly stagnant material diversion over the years (57% in 2009 and 59% in 2015).

Grants Program

The Illinois Department of Commerce and Economic Opportunity lists grants currently available. The Food Scrap Composting Revitalization & Advancement and the Illinois Recycling Grants Program (IRGP) are both closed and, due to the budget impasse, are not planned to resume in the near future.

Solid Waste Tracking and Reporting

Information on current generation and diversion amounts on a statewide level does not currently exist in a publicly available, reliable or usable format. In 2010, the IEPA stopped making recycling and composting data available and there is not another agency that tracks that information.

State Regulations

Public Act 96-0418 was passed by the Illinois legislature in 2009; this legislation makes it possible to add food scraps to existing yard waste composting operations provided that the food scraps constitute no more than 10% of the total volume handled at the facility. This speeds up the process and avoids additional
permitting costs. However, the addition of only 10% of food scraps to yard waste is only suitable for certain types of compost—higher percentages are usually needed to produce agricultural grade compost.

Public Act 98-0239, which took effect in 2013, opened up new opportunities for farmers in urban and suburban areas to bring in material from off-site for composting and also for community gardens to compost. This does allow for small amounts of additional material to be diverted; however, the material must be used on-site.

Public Act 99-0011 bypasses the strict permitting process for municipalities and local communities holding one-day events. This enables them to collect materials such as pumpkins after Halloween or other such material for composting. This law took effect in 2015.

Illinois Legislature also passed a law (Public Act 98-0146) that grants two sites in the state the right to pilot organics collection (both food and yard waste) programs in order to help develop best practices for other such programs throughout the state.

**Material Generation and Landfill Statistics**

In 2009 a statewide waste characterization and generation study was released by the Illinois Department of Commerce & Economic Opportunity and the Illinois Recycling Association. The study was updated in 2015. This is the main data source used to develop generation and landfilled estimates for this report. Figures 3.1 -3.3 summarize the current status of compostable materials in Illinois.

The Figures show that organics, including compostable yard waste, food waste, and compostable paper make up about 25% of all the material going to the landfill. Compostable paper is often overlooked in organics programs, but it can be an important element in compost production and can divert a substantial amount of organic material from the landfill. Additional amounts of organic material have been diverted from the landfill as well, such as woody yard waste, diapers, and other organics, but are not included in the scope of this report. There are some Illinois EPA reports that show slightly higher diversion amounts for organic materials in past years; however, there are no current statewide reported tonnages.

**Figure 3.1: Illinois Generation Tonnages**

<table>
<thead>
<tr>
<th>Material</th>
<th>Residential</th>
<th>Commercial (ICI)</th>
<th>State Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compostable Paper</td>
<td>216,550</td>
<td>255,100</td>
<td>471,650</td>
</tr>
<tr>
<td>Yard Waste-Compostable (88% from Urban)</td>
<td>553,420</td>
<td>204,690</td>
<td>758,110</td>
</tr>
<tr>
<td>Food Scraps (89% from Urban)</td>
<td>1,013,020</td>
<td>1,134,740</td>
<td>2,147,760</td>
</tr>
<tr>
<td>Organics* Total (YW-comp &amp; FS only)</td>
<td>1,566,440</td>
<td>1,339,430</td>
<td>2,905,870</td>
</tr>
<tr>
<td>Organics* Total (YW-comp, FS, &amp; comp Paper)</td>
<td>1,782,990</td>
<td>1,594,530</td>
<td>3,377,520</td>
</tr>
<tr>
<td>Total All Materials Generated</td>
<td>7,586,290</td>
<td>11,735,930</td>
<td>19,322,220</td>
</tr>
</tbody>
</table>

*ICI (Industrial/Commercial/Institutional)

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2 Study conducted by CDM.
**Figure 3.2: Illinois Tons Material Landfilled***

<table>
<thead>
<tr>
<th>Material</th>
<th>Tons RES</th>
<th>% All RES LF Material</th>
<th>Tons Commercial</th>
<th>% All COM LF Material</th>
<th>Tons State R &amp; C</th>
<th>% All LF Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compostable Paper</td>
<td>206,690</td>
<td>4%</td>
<td>243,840</td>
<td>4%</td>
<td>450,530</td>
<td>4%</td>
</tr>
<tr>
<td>Yard Waste- Compostable</td>
<td>228,770</td>
<td>5%</td>
<td>84,970</td>
<td>1%</td>
<td>313,740</td>
<td>3%</td>
</tr>
<tr>
<td>Food Scraps</td>
<td>995,310</td>
<td>20%</td>
<td>1,123,840</td>
<td>16%</td>
<td>2,119,150</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total Organic (YW &amp; FS)</strong></td>
<td>1,224,080</td>
<td>25%</td>
<td>1,208,810</td>
<td>18%</td>
<td>2,432,890</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Total Organics (YW, FS &amp; Comp Paper)</strong></td>
<td>1,430,770</td>
<td>29%</td>
<td>1,452,650</td>
<td>21%</td>
<td>2,883,420</td>
<td>25%</td>
</tr>
</tbody>
</table>

*All Landfilled Materials* | 4,916,500 | 100% | 6,845,000 | 100% | 11,761,500 | 100% |

*excludes C&D (construction and demolition)*  
*RES (residential); LF (landfill); COM (commercial); R (recycling); C (compostable)*

**Figure 3.3: Illinois Tons Diverted from Landfill (Total Generated Less Total Landfilled)**

<table>
<thead>
<tr>
<th>Material</th>
<th>Tons RES</th>
<th>%*</th>
<th>Tons Commercial</th>
<th>%*</th>
<th>Tons State</th>
<th>%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compostable Paper</td>
<td>9,860</td>
<td>5%</td>
<td>11,260</td>
<td>5%</td>
<td>21,120</td>
<td>5%</td>
</tr>
<tr>
<td>Yard Waste- Compostable</td>
<td>324,650</td>
<td>59%</td>
<td>119,720</td>
<td>58%</td>
<td>444,370</td>
<td>59%</td>
</tr>
<tr>
<td>Food Scraps</td>
<td>17,710</td>
<td>2%</td>
<td>10,900</td>
<td>1%</td>
<td>28,610</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total Organic (YW &amp; FS)</strong></td>
<td>342,360</td>
<td>22%</td>
<td>130,620</td>
<td>10%</td>
<td>472,980</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Total Organics (YW, FS &amp; Comp Paper)</strong></td>
<td>352,220</td>
<td>20%</td>
<td>141,880</td>
<td>9%</td>
<td>494,100</td>
<td>15%</td>
</tr>
</tbody>
</table>

*Percent diverted from generation of that material, (not organics diversion rate)*

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**Tonnage and Green House Gas Impacts from Targeted Organics**

The three target organics materials – food scraps, compostable yard waste (not including woody materials), and compostable paper -- make up 22% of the tonnage disposed of annually in Illinois (see Figure 3.1). This is reason enough to explore options for recovery and diversion. However, we recognize that many communities are revising metrics to reflect additional goals, including sustainability, emissions, triple bottom line, and other more sophisticated metrics than simple tonnage diversion.

One key quantitative factor that can be used to reflect environmental effects from unrecovered materials is “metric tons of carbon dioxide equivalent” (MTCO2e). We used information on MTCO2e per ton factors to convert landfilled tons by material into metric tons of carbon dioxide equivalent represented by the disposed recyclables and organics. This analysis shows that:

- Diverting the three target materials would reduce 22% of tons disposed, and 16% of the MTCO2e available from all the non-recovered recyclables and organics disposed annually in Illinois.

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3 We used SERA’s PRR-E model (see later chapter on PRR or “Percent Recoverables Remaining” metric) as a source for the computations and the factors for MTCO2e/ton. The PRR-E metric computes the environmental and emissions effects from potentially recoverable materials, and helps prioritize “next targets” by programs and policies. The PRR-E model also examines cost per MTCO2e as a priority indicator (see Skumatz and D’Souza, “Colorado’s Buried Value”, SERA 2016 and Burns and McDonnell and Skumatz Economic Research Associates, “Colorado Integrated Materials Management Plan” prepared for CDPHE, 2016.)

4 Note that these are not all the greenhouse gas (GHG) factors represented by the materials, but MTCO2e (or its directly related factor MTCE) is one key component, and one with assignable dollar values, at least in some areas. Prices for other emissions are more difficult to obtain.
• The largest potentially-recoverable source of MTCO2e is paper, with 50% of GHG emissions coming from the eight materials in this category. Paper products make up 26% of the disposal stream.
• Other organics and textiles are another leading source of MTCO2e (15% of the tonnage, and 17% of the MTCO2e).
• Although plastic is 11% of the waste stream, it contributes about 8% of the MTCO2e, and metals are 6% of the waste stream, and 9% of the available MTCO2e.
• Glass is small in tonnage terms (4%) and even smaller in priority in GHG terms (1%).

Using estimates of future prices of carbon dioxide, the value of the carbon dioxide represented by the target food scraps is $54 million - $89 million annually (2020 prices).

Recovering, diverting, processing, and reusing the three target materials has a strong effect on reducing landfill disposal (tons), on addressing MTCO2e emissions potential, and on the cost of addressing carbon dioxide emissions.

**Figure 3.4: Summary of MTCO2E Contributions from Illinois Landfilled Materials**

(metric tons of carbon dioxide equivalent)

<table>
<thead>
<tr>
<th>Category</th>
<th>Tons Landfilled</th>
<th>Percent Tons</th>
<th>MTCO2e/Ton From Recyclables &amp; Organics</th>
<th>MTCO2e</th>
<th>Percent MTCO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>TARGET ORGANICS &amp; COMPOSTABLE PAPER</td>
<td>2,493,680</td>
<td>22%</td>
<td>1.3</td>
<td>3,272,900</td>
<td>16%</td>
</tr>
<tr>
<td>OTHER ORGANICS &amp; TEXTILES</td>
<td>1,717,090</td>
<td>15%</td>
<td>2.0</td>
<td>3,406,900</td>
<td>17%</td>
</tr>
<tr>
<td>PAPER (Excluding compostable)</td>
<td>2,928,670</td>
<td>26%</td>
<td>3.5</td>
<td>10,148,200</td>
<td>50%</td>
</tr>
<tr>
<td>PLASTIC</td>
<td>1,278,560</td>
<td>11%</td>
<td>1.2</td>
<td>1,534,300</td>
<td>8%</td>
</tr>
<tr>
<td>GLASS</td>
<td>409,230</td>
<td>4%</td>
<td>0.3</td>
<td>127,900</td>
<td>1%</td>
</tr>
<tr>
<td>METALS</td>
<td>630,950</td>
<td>6%</td>
<td>2.8</td>
<td>1,783,600</td>
<td>9%</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>194,280</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTRUCTION &amp; DEMOLITION</td>
<td>1,314,830</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECIAL / AUTOMOTIVE, ETC.</td>
<td>194,780</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>11,162,070</td>
<td>100%</td>
<td>2.1</td>
<td>20,273,700</td>
<td>100%</td>
</tr>
</tbody>
</table>

Total Dollars represented by MTCO2e
At $16.50/MTCO2e (low case)
At $22/MTCO2e (medium case)
At $27.50/MTCO2e (high case)

$335 million total, $54 million for target organics $446 million total, $71 million for target organics $558 million total, $89 million for target organics

Sources: 2009 Illinois DCEO Commodity/Waste Generation & Characterization Study (CWGC)
MTCO2e figures from SERA research “PRR-E” model from EPA’s WARM Model and other sources.

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5 Price reflects 2020 forecast prices for carbon dioxide for use in planning for electric utilities and other stakeholders in carbon-intensive industries to use as a reasonable estimate of the future price of carbon dioxide in emissions. Forecasts for the period 2020-2050 are included in the report. Synapse Energy Economics, “2015 Carbon Dioxide Price Forecast”, 3/3/15, The report projects price per ton; we converted these prices ($15, $20, and $25) to price per metric ton in the table above ($16.50, $22, and $27.50) Note that the prices per ton (multiply by 1.1 for metric ton equivalents) for 2030 and 2050 for these three scenarios are $25 and $45 respectively for the low-cost scenario, $35 and $85 for the mid-cost scenario, and $53 and $120 for the high-cost scenario. “Levelized costs” for the three scenarios are $26/ton, $41/ton, and $53/ton.

Skumatz Economic Research Associates, Inc. (SERA)
4. Diversion Program Recommendations

The strategy recommendations consist of two main elements – diversion options, and use options (demand, and supply-side elements). The focus of this section is facilitation of food scrap diversion. Later sections discuss compost production and usage in the farming and the sustainable food markets. Since there currently are not enough facilities to accommodate a large-scale increase in diversion of food scraps in the near term, and since yard waste materials are an important component of compost production, yard waste diversion is also included in the discussion.

The Illinois Food Scrap Coalition Report details successful food scrap and composting programs from across the United States including statewide bans, ordinances and mandates, and permitting and siting regulations. This report touches on some the approaches applicable on a statewide level, but the focus is on how these programs will be used to meet the tiered levels for the economic and market impact discussion. These strategies were augmented with information gleaned from statewide and nationwide interviews, and detailed literature review.

Program Considerations

The development of suitable programs and policies should consider a number of principles to be successful.6

- **Incentives**: Any incentives provided need to support and be consistent with the goal. Taxes, surcharges, etc. should reinforce making trash more expensive relative to diversion, recycling, and composting.
- **Multiple actors**: The responsibility for achieving the goals should be spread across many actors, and all responsibility should not fall on, for instance, the haulers. Affecting multiple actors allows for reinforcement, leveraging, and a sense of fairness and “all” contributing and responsible to the problem and the solution.
- **Enforcement**: Any ordinances or laws that are passed must have enforcement authority, and preferably, an associated revenue stream. Without enforcement, those who follow the law are disadvantaged, and that is an inappropriate outcome.
- **Mandates**: Mandates or requirements need to be clear, and enforceable. Mandates and bans are among the cheapest methods of bringing change, and represent one of the only things that changes the underlying “rules of the existing market”. They can help address the “chicken and egg” problem of supply vs. facilities for new streams.
- **Measurement and Reporting**: Reporting is critical, not only for feedback, but for tracking progress and successful enforcement, and for informing next steps. If Illinois aims for a higher diversion goal, measurement will be even more critical. For example, meeting the 85% food scraps goal requires getting 100% of households/businesses to recycle 85% of materials generated, or 85% of households/businesses to recycle 100% (just for comparison as the two extremes).

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6 Adapted from Skumatz et al, “Commercial Strategies for Dakota County”, SERA, October 2016
Recommendations

“Piggy back” Food on Existing Yard Waste Ban
The tonnage figures presented above show that food scraps make up approximately 20% of all the materials going to the landfill (89% of that coming from urban areas). The statewide ban has led the major urban areas to have some form of process to divert compostable yard waste materials, either through haulers and curbside collection, or drop-off centers. Adding food scraps to that ban would be the most efficient means to “piggy back” on an existing system and divert large tonnages of food waste from the residential sector.

Although not all communities have curbside programs, there are Illinois community examples that have already begun this process of incorporating food scraps with an organics program. Naperville and Highland Park are two such examples.

Extending the existing yard waste ban to banning food scraps from Illinois landfills would be an effective recommendation for diverting food scraps, providing strict enforcement, reporting, and adequate follow-through were added to the existing yard waste ban. Enforcement can be at the landfill, or at the time of collection. Oftentimes the haulers are required to enforce bans at the curb by not collecting the materials. Some communities simply require self-reporting quarterly or annually from businesses on the amount of material generated and a report or receipt of how organics materials are diverted. A schedule of fines or penalties is generally assessed; others enforce through non-renewal of a business license for multiple infractions. Statewide accountability could be required at disposal sites or through a regional or county level reporting.

There are multiple examples of statewide organics bans that include food scraps: Connecticut (Commercial), Vermont (Residential and Commercial, R&C), California (Commercial), Rhode Island (Commercial) and several major metropolitan areas, San Francisco, CA (R&C), Austin, TX (R&C), New York City, NY (Commercial), King County, WA (Residential), Portland, OR (R&C).

Tip Fee Incentives
Although landfill tipping fees vary across Illinois ($33-$73 from our review), they average only a little higher than the average composting facility tip fee of approximately $43/ton. In urban areas, there tends to be a higher differential between landfill and organics tipping fees and this can provide financial incentive to urban residents and businesses. Where tip fees are sufficiently lower for food waste, diversion is relatively more financially attractive. Where they are not, some cities and counties with aggressive diversion goals have used two strategies to create or enhance differentials: forgiving sales tax on diversion streams but not landfilling; or imposing substantial surcharges on disposal (either on landfill tip fees or residential and commercial disposal service rates). This works especially well with volume-based trash pricing (PAYT, described below, on the residential side), where businesses or households pay by the amount of trash set out. They save by recycling and composting more and putting out less trash. Since nearly 90% of food scraps are generated in urban areas, these types of incentives can prove very successful in increasing food scrap diversion.

7 Skumatz, “Comp-Plan-In-A-Box”, a tool kit to determine a community’s best fit of programs, SERA
8 The maximum value of $73 came from a transfer station and includes fees other than just the tipping fee. Tipping fees used in our model and for all other calculations fell within the range of $43-$46.
9Skumatz, et. al, and Taitt, “The Costs and Benefits of Minnesota K-12 School Waste Management Programs”, MPCA, July 2014 SERA statistical analysis found that uptake of organics programs was three times higher in counties with higher incentivized tip fee differentials between disposal and organics programs.
Pay-As-You-Throw (PAYT)

There are numerous examples of residential PAYT programs across the country, with more than 9,000 programs nationwide\(^\text{10}\) and programs especially plentiful in states such as Massachusetts, Minnesota, and California. Three states in the US have mandated residential PAYT, but PAYT can be mandated at the city, county, or state level, using ordinances at the local level. PAYT is one of the most effective and cost-effective strategies for increasing recycling and organics diversion in communities.

Portland, OR estimates that it is capturing about 45% of the available organics through its programs. Recycling and organics are included in the price for trash which is based on the size of the trash container. “Although not necessary for success, PAYT serves as an encouragement to recycling, organics diversion (both curbside and backyard), and source reduction and can increase participation.”\(^\text{11}\) Establishing PAYT with organics in the residential sector can help encourage haulers to incorporate that into commercial service as well by establishing organics routes and processing centers. Variations of residential programs can include small businesses along the routes as well.

Grant Programs

Based on data from the Illinois Comptroller’s Office, over the past five fiscal years (FY 10, 11, 12, 13, and 14) the Illinois Solid Waste Fund has received approximately $12.78 million of revenue that has not been expended\(^\text{12}\). Although this money may have been re-appropriated, the infrastructure and funding mechanism exists and can be reestablished. These grants can provide communities with funds for establishing programs, reimbursements to businesses that start composting and food scraps programs, or for large generators to purchase dewatering machines to reduce diversion cost. For the compost industry, grants could help provide additional infrastructure for food scrap composting in the form of startup assistance or additional equipment purchases.

Urban Gardens / Backyard Composting/ Education

Urban gardens are some of the best ways to divert local food waste materials and provide a variety of benefits. Community gardens not only provide a place to grow local produce, but leaving the material on the vine until needed reduces food waste. Urban gardens are also used as a way to bring neighborhoods together and help with food security. Urban gardens can help provide education to encourage backyard composting and good diversion practices. Education alone does not ensure behavior

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\(^\text{11}\) Freeman, Skumatz “Best Practices in Food Scraps Composting”, US EPA Region 5, 2011

\(^\text{12}\) Report from the Task force on the Advancement of Materials Recycling to the Governor
change or result in significant diversion, but can be an important part in promoting food scrap diversion. Education and outreach is most effective if combined with other programming.

Beyond the reduction in food waste that a community composting site at an urban garden can achieve, some communities are turning brownfields into community gardens. Adding compost to these brownfields and starting community gardens can increase surrounding real estate value 30% according to the Go To 2040 Plan for Chicago Land. Examples of community gardens already exist in Illinois and grant money or education would go a long way in establishing new projects. The Illinois Department of Agriculture (IDOA) hosts the Illinois State Fairgrounds Community Garden to “provide residents a space to grow fresh produce, herbs and flowers in a friendly and safe environment”.

Another approach that is gaining ground is “vertical stores” where a produce or farmers market on the street level is co-located with the garden and maybe classrooms on the floors above. Growing Power is an example of that type of business and has small farms throughout the Mid-West and the Chicago area. They are an example of the growing interest in the local, sustainable food market.

**Diversion Goal**

Should the State of Illinois not wish to establish a statewide ban, setting a food waste diversion goal for the State and counties could encourage participation. Goals with specific requirements are more effective and would result in a higher diversion rate and should be easily measurable and achievable. A two-tiered goal may be best suited for Illinois, with a higher diversion level required for higher generating/more densely populated areas and closer access to compost facilities. A lower diversion goal could be set for more rural, less populated areas. There are other states such as Florida and Iowa that have food scrap diversion goals and have chosen not to require bans. One of the top reasons communities become early adopters of organics programs is to meet state goals.

**Commercial PAYT for Organics**

PAYT is one of the most successful strategies in the commercial sector. Although the traditional model for trash billing in the commercial sector is volume-based, this strategy adds a requirement that organics

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13 Skumatz, Freeman, “Getting the Most from Colorado’s Recycling Programs & Infrastructure: Social Marketing Outreach and Education Toolkit-A Guidebook for Communities”, for CDPHE, SERA May 2011

14 GO-TO-2040-short-plan_10-7-10_FINAL.pdf

15 https://www.agr.state.il.us/garden/bbb/forum.php?open=0&start0&date_show=2016-04-20&mNr=99&tNr=19

16 EPA Region 9, “Beyond Recycling Composting Food Scraps and Soiled Paper” by The Center for A Competitive Waste Industry, January 2010

17 Commercial PAYT makes one major change to traditional commercial sector volume-based trash collection prices (which vary based on the volume and frequency of trash collection): they embed the cost of recycling into the cost of the trash collection, eliminating the barrier of higher cost for trash plus recycling vs. trash only. The ordinances setting
service must be paid (or embedded) in the trash bill, so compost service is not more expensive than trash-only service. This is an aggressive approach, but works well to encourage businesses to divert compostable materials. We recommend starting this requirement in those businesses that have the largest generation of food scraps. Phasing the program in helps reduce burden on local staff, as well as helping haulers with the up-front costs for bins and service / routing changes. Coverage and enforcement for all businesses could be implemented if it is determined to be needed for performance or equity reasons. This has been found to be an extremely effective strategy in other communities, as it removes the barrier of paying “extra” costs for composting as compared to trash-only service. The costs are minimal to the State (or County); the costs for the haulers are recovered through revised customer rates.

**Organics Requirement by Business Type**

Another high-performance strategy is to require organics diversion programs for businesses with food licenses or specific NAICS codes that generate the largest percentages of food waste. The generation of commercial organics is largely food, and is very concentrated in just a few industries. Concentrating administration, outreach, education / assistance, and enforcement on few businesses is very effective at redirecting these streams out of the landfill. When coupled with incentives (such as embedded fees or differential tips fees), the businesses can potentially see benefits. Phase-in is recommended (starting with businesses in these industries generating 10 Cubic Yards or more weekly) to help reduce implementation impacts, and to help haulers handle the container and routing effects. As with other types of mandatory programs, enforcement is key. Examples include the non-renewal of annual liquor or business licenses for restaurants or bars or restrictions on business licenses. Alternatively, the ordinance could require each business to submit a brief one-page recycling plan to the community or state documenting what materials they generate and what materials they divert and provide documentation (bills) showing they are contracting for at least a minimum level of organics service. Businesses would be subject to fines if they do not meet the minimum requirement.

**Generator Database/ Material Exchange**

Many states with a focus on diverting food waste have established a generator database (and some have recipient information) in order to facilitate food donations. Iowa has an easily accessible website link through the Department of Natural Resources to encourage waste diversion. The Iowa Waste Exchange (IWE) database maintains a list of over 13,000 materials that users can search for materials they need or have in excess. There are multiple entries for organic waste including food waste. This database has been included as a key success to their food scrap diversion program. Massachusetts maintains a database and other states such as California are trying to establish an exchange specifically for food waste and food donations.

**Regulations for Food Donation**

Often caterers or hotels claim that “government regulations” prohibit the donation of food. However, the 1996 Federal Bill -The Bill Emerson Good Samaritan Food Donation Act- promotes food recovery by limiting the liability of donors to instances of gross negligence or intentional misconduct. States often go beyond up commercial PAYT usually set a limit to the amount of recycling or organics service included, which is usually set as a percentage of the trash volume (e.g. 100%, 150%, etc.). See Skumatz, L. and Freeman, D. “Pay-As-You-Throw (PAYT) in the US: 2006 Update and Analyses” for U.S. EPA and SERA, by Skumatz Economic Research Associates, 2006
this to clarify donations and encourage this type of diversion. In Colorado, the Cottage Food Act allows foods such as excess fruits and vegetables to be sold from “home kitchens” without permits. Colorado’s Charitable Crop Donation Act supports agriculture communities, food banks, food pantries and Coloradans who are impacted by hunger. The Act “not only boosts local, fresh-food donations but also provides struggling Colorado families with additional access to fresh fruit, vegetables, dairy products and meat products”\(^{18}\). Local producers who donate food to food pantries and food banks can receive a 25% tax credit for the wholesale value of their goods.

**Tracking and Measuring**

Strong tracking and reporting is needed to clarify position and progress and determine if enforcement or further steps are needed. Since the Illinois EPA stopped collecting tonnage information in 2010, reports such as the Illinois Statewide Waste Characterization and Generation Study are the best estimation of types and amounts of materials, but this type of information does not necessarily account for, or track, areas where successful programs may be in place.

Basic tracking for material tonnages for recycled, composted, and landfilled materials at minimum would help for future analysis and determining the source (residential or commercial) would allow for direction or resources. Considering how local landfills and recycling facilities are set up is important - if there are local material bans, then many of these items may already be separated out from the waste stream and therefore may be easier to report. It is important to keep in mind that haulers may not be able to report quantities of certain materials if the required hauler report is too detailed. A clear system of enforcement must be included with the program and the severity of penalties for not reporting should be determined. This could be tied to hauler licenses, to permits, or other funding.

Several pieces of information, if regularly reported, will add depth and accuracy to future economic analysis specifically for the composting and sustainable foods industries. Subsequently, increased awareness of this industry’s dynamics will allow the state of Illinois to make relatively high impact and low cost program changes to improve further market development. Tracking and reporting of the following information is recommended for understanding the progress of programs, economic implications and addressing future goals:

**Collection / Processing Businesses:**

- Information from haulers to facilities describing material type, tonnage, and source
- Tipping fees and processing costs (per ton or total)
- Conversion ratio of organic waste to compost (i.e. % of input material weight that becomes a final usable product)
- Facility Profit and Loss Statement (breakdown of various sources of revenue and expenses and what % of each were from in-state (aka local) purchases)
- Current number and types of processing facilities (*lists found were not accurate or up to date*)
- Employees (Overall #, hours worked, wages)
- Volunteers (Overall #, hours worked)
- Overall tonnage of through-put, % characterization of waste, facility capacity

\(^{18}\) Hunger Free Colorado -www.hungerfreecolorado.org
Percent Recoverables Remaining (PRR)

Because traditional metrics measure fairly narrow elements of the wide range of goals communities care about (tons, not sustainability, reduction, toxicity, and other elements that are of renewed interest), communities, counties, and states are exploring updated measurement metrics. A new metric, called “Percent Recoverables Remaining” (PRR)\(^\text{19}\) provides a variety of advantages over traditional tracking. PRR measures the Percent of Recoverables (recyclables, and separately organics) remaining in trash using a simplified waste characterization study, and reflects how well households and businesses are doing at getting recyclables and recoverables out of the disposal stream. In several ways, this can out-perform traditional recycling rates in that it weathers economic upturns and downturns better, measures directly what you’re asking generators to do, minimizes data requirements as it requires sorts and information on only the trash stream,\(^\text{20}\) but most importantly, tells you how well you are doing, what to do next, and what is / is not possible. This metric is being implemented in Portland Metro, and is already in place in Alameda County’s StopWaste (where they dub it “Percent good stuff”).

PRR Enhanced - This enhanced metric addresses the amount of materials in the waste stream and the Metric Ton Carbon Equivalent generated by landfilling that material. This type of PRR analysis shows how important food waste is to get out waste stream in terms of GHG generation and can track progress from programs or materials to target next.

Program Practices at the Jurisdictional Level

The focus of the report is on diversion and programs for the State of Illinois, but there are many programs that local jurisdictions can adopt to improve diversion in their own communities. Below are a set of recommendations for communities that can be applied for both the commercial and residential sectors and potentially in addition to (or while waiting for) state programs. Case studies for implementing a community food scrap program can be found in Appendix B.

- **Hauler incentives**: Jurisdictions have made haulers partners in reaching goals. They have received financial incentives for reaching recycling threshold goals; in some areas of California, they receive discounts or rebates on franchise fees, and other areas have had various bounties and other rewards (inducing much-valued extensions of residential contracts). Establishing a goal for the hauler that they can achieve for their entire (commercial) customer base is more “efficient” than setting a goal for each business, because the haulers can act for the community and identify those businesses with greatest (and/or cheapest) diversion potential and work closely with them toward the goal. Achieving 85% from a few large businesses is usually much cheaper than achieving 50% from hundreds of small ones. The financial incentive must be big enough to modify behavior, and they can be step goals – with bigger rewards for next thresholds.

- **Pay-As-You-Throw**: This type of program can be adopted for both business and residential programs and relies on volume-based trash services. Typically, commercial accounts already pay by the amount of trash they contract for disposal, but often pay extra for recycling or organics services.

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\(^{19}\) As part of work for a number of clients nationwide that were looking for a better metric, SERA developed the PRR metric. The pros and cons and comparisons to other metrics are described in detail in the Skumatz article in *Resource Recycling*, September 2016.

\(^{20}\) And can therefore track residential vs. commercial by sorting trucks or containers (vs. landfilled material), and can work in areas in which communities do not have sufficient control over haulers or facilities to mandate good tracking and reporting.
Embedding (or including) recycling, and in this case, food scraps or organics into the trash bill encourages usage. The more residents or businesses divert into the “free” or at no additional charge bins of recycling or organics, the less they put into the trash. This allows businesses and residents to then cut down on the amount of trash generated, reduce the size of their trash container, and pay a lower fee.

- **Contracted Collection**: Some communities have established contracts for commercial collection. Even though laws in many places can make that complicated, it can be done, for instance, by a large business association that lines up participants (a downtown area might be deemed an “improvement district”) and secures a contract. Communities can contract or partner with a particular hauler just for food and organics, helping provide route density and encouraging a hauler to collect food scraps. Contracts can prioritize food waste, charge incentive-based rates, and undertake programs that encourage or require food waste diversion.

- **Reimbursements / Grants**: Organics or food scrap reimbursement programs can be beneficial in helping organics haulers establish route densities by encouraging businesses to sign on. Businesses would, for example, receive a reimbursement for the first few months of service if they sign on for a year, or receive money for signage and containers. For outreach, organizations such as chambers of commerce and economic development councils can be strong advocates and partners to help contact businesses and encourage them to sign up. By working together, communities can avoid “reinventing the wheel” when it comes to commercial organics diversion.

- **Surcharges / Incentives**: In this program, taxes or surcharges are imposed on specific disposal streams or Municipal Solid Waste (MSW) to increase tipping fees relative to recycling or compost stream tip fees. Currently, Illinois has a solid waste fee, but this is a central fee that goes to the state. Counties often impose their own surcharges to drive diversion locally. Surcharges can help provide financial incentive for choosing a less expensive option by increasing the cost of the landfilling. The purpose is to reduce the tipping fees of those streams relative to the cost of disposing of the materials as trash to encourage the separation and diversion. There are several main ways this economic incentive is structured. Taxes may be waived from recyclable streams (organics and recycling); or surcharges may be added to the trash tipping fees (either directly added, or added in order to fund a subsidy or allow discounts on recyclable and composting tipping fees). Note that some communities have also allowed discounted tipping fees to qualified haulers or communities (entities reaching a specific recycling goal). One design consideration of note is that, if there are public and private facilities, the surcharge or tax incentives should be able to be imposed at all facilities, or the incentives will drive streams to the cheaper options, which may not suit the program goals.

- **Bans, Mandates, Voluntary Options, Universal Ordinances, and Targets**: Bans are in place around the nation. Several are mentioned above (Vermont’s progressive bans on recyclables, yard wastes, and food); other states ban yard waste and source separated recyclables, cardboard, and other subsets of recyclables. The State of Minnesota currently bans yard waste materials, hazardous materials, and electronics. On the other side, mandates for offering recyclables service is helpful, but without the economies of scale from mandates for providing recycling service, the impact is small. Voluntary programs, with an associated fee, rarely result in more than about 10% uptake – unless the economics is already there (high tip fee differential, etc.). Mandatory, embedded service is more effective at diverting tons. This is in place in many locations around the nation for recycling, and in some locations in the commercial sector (e.g. Mecklenburg County, NC requires
recycling for businesses that contract for 16 cubic yards or greater trash). Universal ordinances requiring recycling and/or organics for all sectors is in place in communities and counties in California and in Vermont, and the practice is growing; targeted recycling is also in place (see ABC law). Organics programs and mandates targeted at specific sectors (grocery, restaurants, food license firms, etc.) is not uncommon and is growing steadily in other states and localities (California; Boulder, CO; etc.).

Each of the recommended programs will help move Illinois towards increased organics diversion. The following recommendation can incorporate the other programs and allows for adjustment periods for various stages on a statewide scale. “The Phased-In” approach program involves a multiyear implementation plan for statewide diversion programs, using the State of Vermont’s approach as an example.

**“Phased-In” Approach**

Vermont recently passed a law at the state level that included a five-year phased-in process for residential and commercial diversion, including incentives, mandates, and bans. It starts with “opportunity and access” and moves to requirements. The steps are outlined in the figure below.

**Figure 4.1: Vermont Legislation Five Year Plan**

<table>
<thead>
<tr>
<th>Year 1:</th>
<th>Year 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Food scrap generators of 104 tons per year (TPY) must divert material to any certified facility within 20 miles</td>
<td>• Leaf, yard and clean wood waste banned from landfill</td>
</tr>
<tr>
<td>• Transfer stations and drop-offs must accept recyclables at no fee</td>
<td>• Haulers must offer leaf and yard debris collection</td>
</tr>
<tr>
<td>Year 2:</td>
<td>Year 4:</td>
</tr>
<tr>
<td>• PAYT statewide (volume or weight)</td>
<td>• Transfer stations and drop-offs must accept food scraps</td>
</tr>
<tr>
<td>• Recyclables banned from landfill</td>
<td>• Haulers must offer food scrap collection</td>
</tr>
<tr>
<td>• Transfer stations/drop-offs must accept leaf and yard debris</td>
<td>• Food scrap generator threshold at 26 TPY.</td>
</tr>
<tr>
<td>• Haulers must offer residential recycling at no extra charge (embedded)</td>
<td>Year 5:</td>
</tr>
<tr>
<td>• Public buildings must provide recycling containers adjacent to solid waste containers (except restrooms)</td>
<td>• Food scraps banned from landfill.</td>
</tr>
<tr>
<td>• Food scrap generators of 52 TPY must divert material to any certified facility within 20 miles.</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Vermont’s 2012 Legislation²¹

1. Generators of 104 tons/year must separate food scraps starting July 1, 2014
2. Generators of 52 tons/year must separate food scraps starting July 1, 2015
3. Generators of 26 tons/year must separate food scraps starting July 1, 2016
4. Generators of 18 tons/year must separate food scraps starting July 1, 2017
5. Food scraps must be collected at solid waste facilities starting July 1, 2017
6. Food scraps must be collected at curbside by haulers starting July 1, 2017
7. All food scraps are banned from landfill starting July 1, 2020, including residential sources.

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¹⁴Note that the Vermont legislation requires all transfer stations in the state to accept recyclables from residents for free but may charge for commercial recyclables including those from haulers, and implement the other requirements, even though there is a mix of both public and private transfer stations.
5. Diversion Estimates from Program Recommendations

An understanding of the existing situation provides a basis to identify gaps and targets for program design. The lack of tonnage reporting in Illinois complicates this analysis, but two sources provide useful information.

The Statewide Waste Characterization study is a good tool for estimation purposes. SERA’s tonnage estimation model (“Commercial WasteComp Proxy”) includes formulae to estimate tonnages based on the number and distribution of commercial employment in a community, county, or state. We used this model to compare and select waste composition and tons per employee (TPE) factors that are best suited to the State of Illinois. The selection among sources is based on the quality of the derivation of the factors (data collection), and the similarity to business groupings and other factors.

We used SERA’s model to match the industries based on NAICS codes and employee number with those from the US Census Bureau for Illinois. Using these data from Figure 5.1, the generation of food waste only is somewhat higher (1.42 million tons per year vs. 1.11 million tons per year, 21% different) than when using the Illinois Statewide Waste Characterization and Generation Report.

**Figure 5.1: Generation of Food by Employee Commercial Sector (source: SERA estimates)**

<table>
<thead>
<tr>
<th>Illinois Industry by NAICS Codes</th>
<th># Firms</th>
<th>Total Employees</th>
<th>Tons/Employee/year</th>
<th>Tons Generated/year/sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care and social assistance</td>
<td>30,420</td>
<td>757,786</td>
<td>0.74</td>
<td>560,762</td>
</tr>
<tr>
<td>Retail trade</td>
<td>37,489</td>
<td>596,493</td>
<td>0.30</td>
<td>178,948</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>13,199</td>
<td>538,942</td>
<td>0.46</td>
<td>247,913</td>
</tr>
<tr>
<td>Administrative and support and waste management and remediation services</td>
<td>13,081</td>
<td>469,223</td>
<td>0.16</td>
<td>75,076</td>
</tr>
<tr>
<td>Accommodation and food services (retail food trade) *</td>
<td>24,623</td>
<td>457,124</td>
<td>0.389</td>
<td>177,821</td>
</tr>
<tr>
<td>Professional, scientific, and technical services</td>
<td>31,541</td>
<td>347,052</td>
<td>0.068</td>
<td>23,600</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>17,456</td>
<td>302,324</td>
<td>0.02</td>
<td>605</td>
</tr>
<tr>
<td>Finance and insurance</td>
<td>20,520</td>
<td>295,024</td>
<td>0.068</td>
<td>20,062</td>
</tr>
<tr>
<td>Other services (except public administration)</td>
<td>29,300</td>
<td>240,578</td>
<td>0.235</td>
<td>56,536</td>
</tr>
<tr>
<td>Transportation and warehousing</td>
<td>10,516</td>
<td>222,771</td>
<td>0.02</td>
<td>4,455</td>
</tr>
<tr>
<td>Construction</td>
<td>22,350</td>
<td>180,266</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Management of companies and enterprises</td>
<td>2,081</td>
<td>168,603</td>
<td>0.13</td>
<td>21,918</td>
</tr>
<tr>
<td>Educational services</td>
<td>3,457</td>
<td>157,319</td>
<td>0.3</td>
<td>47,196</td>
</tr>
<tr>
<td>Information</td>
<td>4,939</td>
<td>118,183</td>
<td>0.068</td>
<td>8,036</td>
</tr>
<tr>
<td>Arts, entertainment, and recreation</td>
<td>3,659</td>
<td>74,817</td>
<td>0.304</td>
<td>22,744</td>
</tr>
<tr>
<td>Real estate and rental and leasing</td>
<td>9,988</td>
<td>72,169</td>
<td>0.068</td>
<td>4,907</td>
</tr>
<tr>
<td>Utilities</td>
<td>440</td>
<td>28,810</td>
<td>0.235</td>
<td>6,770</td>
</tr>
<tr>
<td>Mining, quarrying, and oil and gas extraction</td>
<td>525</td>
<td>8,189</td>
<td>0.235</td>
<td>1,924</td>
</tr>
<tr>
<td>Agriculture, forestry, fishing and hunting</td>
<td>265</td>
<td>1,899</td>
<td>0.235</td>
<td>446</td>
</tr>
<tr>
<td>Totals</td>
<td>275,849</td>
<td>5,037,572</td>
<td>.22 (average)</td>
<td>1,459,720</td>
</tr>
</tbody>
</table>

*the average of the generation for retail food and restaurants

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22 One key source we used was CalRecycle 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California. These data were based on relatively strong methods (volume-tracking cameras) and reasonably large samples specifically for the commercial sector.
For the purpose of this report, the more conservative tonnages are from the Illinois Waste Characterization report are used in the economic calculations, but this highlights the need for better tracking and reporting throughout the state. When developing programs for the commercial sector, there are usually just a few industries that contribute the largest percentage of material generation. Accommodation and food services is typically one of the highest producing food scrap producers. It is also one of the top five sectors in Illinois by employees. Based on the number of firms and employees from the U.S. Census, there are four industries that contribute 10% or more of the food generation in the commercial sector and the data show these top generators combined generate nearly 80% of all the food from the commercial sector in Illinois:

- Health care and social assistance (38%)
- Manufacturing (17%)
- Retail trade (12%)
- Accommodation and food services (retail food trade) (12%)

Photo credit USnews.com

**Diversion Scenarios**

For the economic modeling of the impacts to Illinois with increasing diversion and compost production, three levels of diversion were established. These levels represent percent diversion of the materials and are not diversion rates. The materials are the ones included in Figure 3.1, compostable yard waste, compostable paper, and food waste.

Currently, approximately 15% of the combined residential and commercial amounts of material yard waste, food scraps, and compostable paper generated is being diverted (Figure 3.3). The low-end target for our scenarios was set at 35% diversion of the three targeted organics materials generated. This represents a substantial increase, but is not overly ambitious. The mid-level scenario was set at 65% material diverted which reflects the fact that the yard waste ban is presently achieving about 60% for yard waste alone, without strict enforcement. The most aggressive option modeled was set at diverting 85% of the three organic materials, which will require additional programs such as enforced bans and PAYT.

Our national research and database of organics diversion programs finds that high-achieving communities or states do not have only one specific program to accomplish goals, but rather a collaboration or progression of initiatives. The recommendations in Section 4 are presented here in “Scenario Program Packages” designed to reach the levels proposed for the three scenarios and used later in this report to estimate the economic impacts for Illinois.

The timing of the implementation of the three scenarios will need to take into account (or be coordinated with) Illinois’ food scraps processing infrastructure and capacity. The three Scenario Program Packages are described below and in Figure 5.2.

**35% Scenario Program Package**

This 35% Scenario Program Package is the least aggressive of the program package scenarios. Since the total amount of food waste, yard waste, and compostable paper diverted is 15% (Figure 3.3), this scenario package is within reach through the least stringent set of programs, but still affords progress from the status quo. This package would include establishing as statewide diversion goal or organics with clear, and achievable expectations; establishing a state or region-wide generator database to facilitate food donations to those who can use the product; clarifying or relaxing food donation rules and providing incentives
through tax breaks for farmers donating usable crops; encouraging and educating communities on the importance of organics diversion and supporting backyard composting and urban gardens; reinstating a grants program to help communities and businesses invest in organics diversion; and residential PAYT. A well-designed and enforced residential PAYT program could move the level of diversion above this scenario\(^{23}\), but these programs work well together and would allow for flexibility in design and political commitment.

**65% Scenario Program Package**

In order to reach this level of diversion of the three organic materials, more rigorous initiatives will need to be added to those programs included in the 35% package. Illinois diverts nearly this amount of yard waste with the current ban. Food scrap and compostable paper can be more difficult to divert and, as with yard waste, will need to include both the residential and commercial sectors. Added to the above package to reach the 65% Scenario are Tip Fee Incentives to provide financial motivations for choosing diversion over landfilling; PAYT programs for the commercial sector with embedded organics fees; requiring businesses in specific industry codes to divert organic material with enforcement through haulers, landfills, or businesses themselves reporting; and establishing PPR (Percent Recoverables Remaining) metrics to determine how effective businesses and households are at diverting organics. These programs require a higher level of involvement from the state or regions and may get more “push-back”, but will also lead to higher diversion. Some of the resistance to the business requirement can be eased by phasing in the program, starting with the very largest generators.

**85% Scenario Program Package**

This scenario package adds the most aggressive program recommendations in pursuance of the highest, but achievable, diversion scenario. Following the examples of other states such as Vermont, the organics material ban would be phased in over a series of years and generation thresholds. The basic infrastructure is in place through Illinois’ yard waste ban, but thephasing process would allow for composting facilities to adjust to food scrap methods; allow businesses, haulers, and communities to establish programs; and provide time for public education and time to adjust to the new requirements. This would lead to the final recommendation of a full food waste, yard waste, and compostable paper ban from landfills with tracking / reporting and enforcement as described in the 65% Package. Without tracking / reporting and enforcement it will be difficult to achieve this significant diversion level (and all of its environmental and economic benefits).

The progression of the total amount of organic material diverted per program addition is represented in Figure 5.2. Each level builds on the one before and the new programs added to each Scenario Program Package is designated with a leaf.

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\(^{23}\) In addition, implementing residential PAYT helps establish infrastructure needed to establish commercial programs. SERA, BMD “Colorado Statewide Integrated Materials Management Plan” for CDPHE, 2016
### Figure 5.2: Programs Additions for each Scenario Package

<table>
<thead>
<tr>
<th>Program Recommendation</th>
<th>35% Scenario</th>
<th>65% Scenario</th>
<th>85% Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statewide Organics Diversion Goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator Database / Materials Exchange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education / Urban Garden/ Backyard Composting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donation Regulations or Farm Tax Incentives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip Fee Incentives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential PAYT with Embedded Organics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial PAYT with Embedded Organics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organics Requirement by Business Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phased in Statewide Organics Ban</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statewide Organics Ban w/ Measurement/ Enforcement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Discussion of Economic Impacts and Implications

The Statewide Economic impacts from the seven food diversion strategies are presented in Figure 6.1. The results reflect changes from, or net of, the status quo and include the opportunity costs of a statewide shift from disposal to diversion practices. However, this model does not include the cost to the public or private sectors of developing source-separated food scraps collection. Those costs will depend on geography, demographics, as well as the specific type of composting infrastructure already developed at each locality, and can be shared by government entities, businesses, and residential consumers. Some results of this Impact Analysis seem obvious, yet others seem counterintuitive. Starting with total employment we see a statewide increase under every scenario. This result agrees with existing literature on the subject and essentially says that compost processing and subsequent use as an agricultural product produces more jobs than simply taking that material with other trash to the landfill. However, the breakdown of the total effect into its three components (direct, indirect, and induced effects) produces results that appear less intuitive and potentially problematic.

The direct and induced effects seem straightforward, but there is a loss of several full-time employees (FTEs) for indirect effects under the agriculture end-use scenarios. There are two main reasons for this unexpected result: one based on the construction design of the model, the second due to differences in market flows between the compost and traditional waste disposal industries.

Modeling Complications: Compost collection and processing is not an individual sector identified by the US SICs or NAICS codes. These activities are generally accounted for by fragments wrapped up in other sectors including general waste remediation and chemical fertilizer mixing. Although such industries are related, input-output models would incorrectly assume that compost processing and traditional waste remediation, as well as compost production and chemical fertilizer manufacturing are substitute goods, identical in their market flows and economic ripple effects, if SERA did not design the model otherwise. That being said, our model required that portions of various sectors be aggregated in order to create a compost sector as similar as possible to the current state of the industry in Illinois (as understood from literature review and stakeholder interviews). Indirect effects are a measure of business-to-business transactions; therefore, by aggregating multiple sectors together, the model loses some ability to measure inter-industry linkages. The negative result for employment only occurs in the agricultural end-use scenarios because we aggregated the sustainable food industry out of preexisting sectors, and highway remediation already has its own unique sector code. The new national EPA work to develop better NAICS codes will help address this issue going forward.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Employment</th>
<th>Labor Income ($millions)</th>
<th>Total Value Added ($millions)</th>
<th>Output ($millions)</th>
<th>State and Local Tax ($millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35%Ag</td>
<td>1,599</td>
<td>$85.0</td>
<td>$114.3</td>
<td>$152.2</td>
<td>$2.9</td>
</tr>
<tr>
<td>35%Hwy</td>
<td>1,715</td>
<td>$81.5</td>
<td>$119.4</td>
<td>$156.3</td>
<td>$5.6</td>
</tr>
<tr>
<td>65%Ag</td>
<td>2,970</td>
<td>$158.0</td>
<td>$212.3</td>
<td>$282.6</td>
<td>$5.5</td>
</tr>
<tr>
<td>65%Hwy</td>
<td>3,185</td>
<td>$151.4</td>
<td>$221.8</td>
<td>$290.2</td>
<td>$10.4</td>
</tr>
<tr>
<td>85%Ag</td>
<td>3,884</td>
<td>$206.6</td>
<td>$277.6</td>
<td>$369.6</td>
<td>$7.2</td>
</tr>
<tr>
<td>85%Hwy</td>
<td>4,165</td>
<td>$198.0</td>
<td>$290.0</td>
<td>$379.5</td>
<td>$13.6</td>
</tr>
<tr>
<td>85%Ag / Hwy</td>
<td>4,024</td>
<td>$202.2</td>
<td>$283.87</td>
<td>$374.5</td>
<td>$10.4</td>
</tr>
</tbody>
</table>
Market Flow Complications: Aside from model construction, the indirect effects can be explained through the market flow of food scraps for diversion as opposed to disposal. Compost, when used in agriculture, has a circular commodity chain. Therefore the material, and subsequently the revenue, tends to stay in one industry and promote the development of that sector. Traditional trash disposal is a less self-sustaining industry as materials tend to only move through the sector in one direction. Therefore, there is more cash flow in and out of the BLS defined sector, or in other words more business-to-business transactions between two sectors, and the modeling work picks this up as a change in indirect economic effect. The overall total effect is still positive, which means that the model is successfully picking up the opportunity cost of the program (both in magnitude and sectors affected), but also showing that the program benefits significantly outweigh these costs. Keep in mind that there are many co-benefits from the improved composting and sustainable food industries that the input-output model is not designed to measure. These benefits include soil conservation, reduced GHG emissions, improved state water quality, and higher soil fertility.

**Net Impacts of the Food Diversion Scenarios**

This section discusses the net results of programs used to achieve the three scenarios (see Figure 5.2) of diversion. The results shown in Figure 6.1 of the net effects are explained in the following section.

**Output and Total Value Added:**
Illinois received the largest increase under scenario 85%Hwy with $379 million and $290 million in output and total value added or ‘net increase in value’, respectively. Essentially this means that the program generated $379 million in economic activities, but after subtracting the opportunity costs of what would have occurred under normal conditions, Illinois gains a net added value of $290 million to the state economy.

### Metrics and Multipliers

- **On a per-ton basis, composting in Illinois employs 5 times more workers than landfilling.**
- **On a per-ton basis, the composting industry in Illinois generates $25k - $47k in state and local tax revenue for every 10,000 tons per yard of organics processed, depending on end-use.**
- **For every 12,250 tons of organics processed, 1 new business will be created and will sustain 18.3 employees annually with an average salary of $50k.**
- **For every $10 million in revenue gained, the composting industry in Illinois returns $21-$22 million to the state economy, whereas landfilling only returns $10.9 million to the state economy.**
- **Because transporting compost long distances is expensive, two new industries are emerging: urban food scrap processors and rural compost spreaders. Both of these industries present opportunities for in-state manufacturing, locally sustained jobs, and increased revenue that will remain within Illinois.**
As of 2015, the compost sector is adding $35 million in value to the Illinois state economy: the current level is only 15% of the estimated potential value of this industry. The majority of the value added would be received by the compost industry; however, the model results show that the ripple effects of such programs would reach a majority of active economic sectors in Illinois, thereby improving living conditions for people of all walks of life within the state. Achieving 85% diversion of organic materials will require substantial initial leg-work. This result shows that composting and sustainable food production have the capacity to become significant industries in the Illinois economy and should not be considered unprofitable.

Tax Revenue Effects:
In addition to general economic output, our model shows that pursuing these food scrap composting programs has significant impacts on local, state, and federal tax revenue.

- On the local and state level, total tax revenues increased by a range of $3 million - $13.6 million for the different scenarios.
- Total federal tax revenue increased by a range of $16 million - $42 million for the different scenarios.

These increased tax collections are not game-changers as far as total government revenues, but they do represent opportunities to recirculate tax money back into the industries from which it was generated and bolster, both short- and long-term, market development through the funding of grant programs. The main distinction in tax impact between the different end-use application scenarios was found under the ‘Tax on Production and Imports’ category. For the agricultural end-use scenarios, this category witnessed a decrease in revenue, while the ‘Tax on Production and Imports’ revenue from non-agricultural end-use scenarios remained positive. When compost is used agriculturally, there is a lower demand for fertilizer. Given that Illinois imports most of its fertilizer (there is $598 million trade deficit for this sector, as explained below), when the demand for this product goes down, less is imported and also less is produced locally. This leads to a loss in tax revenue from the ‘Tax on Production and Imports’ category. However overall tax revenue still increases under each agricultural end-use scenario. It should be noted that ‘Tax on Production and Imports’ revenue increases under the split end-use scenario (Ag/Hwy).

The Figure below shows the top industry sectors affected by the different scenarios run through the input / output model. “Ag” represents the agricultural model with all compost used for agricultural purposes, “Hwy” describes the model used for the compost end use on highway projects and the “Ag/Hwy” refers to the 50/50 model. “All” includes all three model end-use scenarios.

Figure 6.2: Significant Food-Related NAICS Sector Impact by Metric Based on End-Use Application
<table>
<thead>
<tr>
<th>Code</th>
<th>Sector</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Total Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>157</td>
<td>Asphalt paving mixture and block manufacturing</td>
<td>Hwy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>399</td>
<td>Retail - Building material and garden equipment and supplies stores</td>
<td>Hwy.</td>
<td>Hwy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>Retail - Food and beverage stores</td>
<td>Ag.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>405</td>
<td>Retail - General merchandise stores</td>
<td>Ag.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>406</td>
<td>Retail - Miscellaneous store retailers</td>
<td>Hwy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>411</td>
<td>Truck transportation</td>
<td>Ag.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>433</td>
<td>Monetary authorities and depository credit intermediation</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>436</td>
<td>Other financial investment activities</td>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>437</td>
<td>Insurance carriers</td>
<td>Ag.</td>
<td>Ag.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>441</td>
<td>Owner-occupied dwellings</td>
<td>All</td>
<td>All</td>
<td></td>
<td></td>
</tr>
<tr>
<td>494</td>
<td>Architectural, engineering, and related services</td>
<td>Hwy.</td>
<td>Hwy. &amp; Ag/Hwy.</td>
<td>Hwy.</td>
<td>Hwy.</td>
</tr>
<tr>
<td>473</td>
<td>Junior colleges, colleges, universities, and professional schools</td>
<td>Ag.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>475</td>
<td>Offices of physicians</td>
<td>All</td>
<td>All</td>
<td></td>
<td></td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>All</td>
<td></td>
<td></td>
<td>Hwy.</td>
</tr>
</tbody>
</table>

**Economic Implications of Reduced Fertilizer Demand**

A key opportunity cost of increased compost application on small-farms is decreased chemical fertilizer use. Compost and chemical fertilizer are not exactly substitute goods, but the presence of compost gives fertilizer more physical material to cling to, subsequently reducing the amount of fertilizer that escapes farmland via runoff. By using compost, farmers can reduce their chemical fertilizer demand by up to 50%[^24].

The main business effect of increased on-farm application of compost is reduced revenue for the chemical fertilizer manufacturing industry. This sector has a strong political influence in the state of Illinois. However, it should be noted that while the specific magnitude of effect on the chemical fertilizer mixing industry varies with the amount and location of compost application, the net effect on the state economy is positive for the following reasons:

- Compost spreading supports more FTEs per dollar of investment than overhead spraying.
- Illinois is currently running a $598 million trade deficit in NAICS Sector 3253 ‘Pesticide, fertilizer, and other agricultural chemical manufacturing’, essentially $598 million more flows out of the state every year for chemical fertilizer products than is generated in-state annually by sector 3253.
  - Bureau of Trade and Investment reported $374 million in exports, and $972 million in imports for this commodity sector.

- Fertilizer is also following a trend of becoming a higher percentage of average farm production expenses.
- Compost application is better than chemical fertilizer spraying for the long-term health of the soil, which will hopefully continue to support Illinois’ agriculture intensive economy for many decades to come. Focusing efforts on in-state compost application for agricultural uses will keep more money in the Illinois state economy, for a longer period of time.
- State of Illinois and 11 other Midwestern states are required to submit a long-term action plan for reducing excess nutrients in soil and water. Investing in composting infrastructure is an excellent option for long-term mitigation of excess agricultural nutrients.
7. Industry Barriers and Market Development

Based on extensive literature review, stakeholder interviews and data analysis, the composting industry in Illinois faces two main industry barriers:

- A lengthy and expensive permitting process25, and
- Low end-use demand particularly in agricultural sectors.

These major barriers represent the most critical areas of focus for state policies aimed at sustainable market development.

Only 10 of the 40 or more composting facilities in the state are currently permitted to process food waste (most only handle organic yard waste material), in part because of the extra processing techniques and equipment required, but also because of the state’s lengthy additional permitting process for adding food waste to the diversion stream. The time-consuming and costly permitting process discourages new composting operations from establishing themselves and creates a barrier for existing facilities wishing to add food scraps to their processing capabilities. Likewise, “[a] Catch-22 exists in food scrap facilities, program managers and haulers are hesitant to start new programs without existing facilities to process the collected materials and at the same time, facility operators are reluctant to start new facilities without an existing waste stream.” (Econservation EPA Region 5 Report)

As in other states, farmers in Illinois operate on a very small profit margin. Therefore, agricultural demand for locally-produced compost would not be expected to increase until using this product makes farms more competitive with other farms still using traditional chemical fertilizer. The sustainable food market in Illinois is competing against two strong industries and their associated lobby groups: industrial agriculture/food processing, and chemical fertilizer manufacturing. Both of these industries have profits to lose as the compost market develops and will subsequently be a source of resistance to any political initiatives that support organics diversion, processing and end-use.

Based on our analysis of the literature review and stakeholder interviews, the most critical areas of focus for the State of Illinois in further developing the composting industry are:

- Simplifying the permitting process for food scrap composters, and

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25 Although we have identified the permitting barrier, some argue that collecting a consistently clean feedstock is the primary supply-side barrier, noting that the combination of low landfill tipping fees and the cost of additional service levels has made large-scale food scrap generators with clean waste streams, like breweries, reluctant to establish a diversion program. SERA acknowledges the debate, but this report focuses on permitting for two reasons: a majority of composting stakeholders interviewed reported permitting as their primary supply-side barrier, and in order to truly improve the viability of commercial composting ventures in Illinois, with emphasis on the local food economy, policy should be tailored so that establishing small-to-medium sized food scrap processing facilities is more financially feasible.
Driving the local economic engine by increasing small-scale farmer demand for compost as an agricultural product.

### Permitting Process as a Barrier

Permitting is the important process that compost facilities go through to ensure that their final product meets a certain quality standard and is safe to use on food crops and in other applications. Even though this process is a public health necessity, it is currently quite complex and the required time and monetary investments tend to impede market development.

Composting facilities in Illinois need a site-specific permit, meaning they have to secure a property and display that their specific location and business plan meet the standards outlined by the Illinois EPA. The first step is getting the site permit, which takes up to six months, and the second step is getting the operator permit, which can take up to three months. Some new operations have to pay overhead costs for up to nine months before they can begin operations and create a viable revenue stream. Nine months is too long for most start-up businesses to go without a revenue stream to support their original capital investment. Because this permitting process increases start-up costs, one interviewee explained that he now has to plan to develop a larger facility than he originally intended: “Now I have to go back to the drawing board and find more investors to support my vision.” Permitting inefficiencies are a legislative issue and therefore most of the solution revolve around policy alterations.

### Agricultural Demand Barrier

The second major barrier to market development of composting and sustainable food production is end-use demand, particularly for agricultural applications. In order for this industry to truly get off the ground, it will require consistent buyers of compost (preferably farmers) during season variations of compost availability and quality.
Increasing agricultural demand for compost is complicated because of the slim profit-margins on which farmers in Illinois operate. From SERA interviews, we have gathered that compost is expensive to spread over crops because of the required machinery. Purchasing a spreader is only economically viable by a group of farmers because the marginal revenue gained by one farm from using compost is not great enough to justify spending on the entire cost of a new machine. Compost spreading is sometimes a cheaper alternative to fertilizer and pesticide spraying, but most farmers choose to use traditional chemical methods because they have historically done so, and they typically have established relationships with the companies or individuals who provide their service. However, the slight price advantage to chemical spraying persists because it is a much more established industry that has had time to successfully develop. Compost pricing will quickly become competitive as this market progresses. Additionally, Illinois has a long-term interest in substituting compost for chemical fertilizer and pesticide in order to maintain agricultural and economic productivity. Increasing agricultural demand for compost is mostly about price and level of convenience experienced by local farmers.
8. Permitting Recommendations

In order to improve the complex permitting process to compost facilities in Illinois we provide three main recommendations:

- Standardize a food scrap processing technique for expedited permitting,
- Minimize regulatory constraints on on-farm composted materials and urban food scrap collection and processing facilities, and
- Encourage local zoning to allow compost facilities as a normal agricultural or commercial operation.

**Expedited Permitting for Standardized Facilities:** The requirement of a site-specific permit means that each potential processing facility has to be reviewed individually by engineers and state officials. This is an expensive and time-consuming process both for the businesses navigating the bureaucracy and state employees. If the state could standardize at least one process, such as an In-Vessel processing system, then new operations could stick to this template and expedite the permitting process, saving valuable time and effort. To accomplish this, the state would need to document that In-Vessel operations (or their preferred process to have standardized) do not do environmental harm when they adhere to the state template. Additionally, it is necessary to classify the quality and potential end-uses of the final product. In-Vessel machines run a spectrum for final product and it has been suggested to SERA that one potential strategy could be to establish different standard feedstocks for different machines and to classify the various end-uses for the final product. These standards could be created without stifling innovation if the state were to keep the site-specific permit option available.

**Simplified Regulatory Constraints:** The second recommendation for simplifying and improving the compost facility permitting process in Illinois is to minimize regulatory constraints on on-farm composted materials and urban food scrap collection and processing facilities. A good way to do this is to establish group permits for agricultural composting operations and urban food scrap composting operations less than a certain size. The size threshold gives preference to small-business and also tends to stream material to those involved in farmers’ markets and the sustainable food industry. By increasing the amount of small-scale food scrap collection facilities, particularly in urban areas, the state of Illinois can help the development of the ‘hub and spoke’ model for food scrap collection and processing. A second specific strategy for minimizing regulatory constraints is to increase the volume and types of material that farms and urban food scrap facilities can handle without a permit. For example, the state could add compostable paper and cardboard to the list of minimally regulated materials. This can be more difficult for urban food scrap operations, due to higher levels of contamination, but the state can establish standard processes that are documented to not cause environmental damage and produce a quality final product.

**Local Zoning:** Lastly, SERA recommends that Illinois encourage local zoning to allow compost facilities as a normal agricultural or commercial operation. Currently, composting operations are zoned as pollution control facilities, which are subjected to heavier, more extensive regulation than agricultural or commercial operations. By allowing rural and urban compost facilities to be zoned as agricultural and commercial operations, respectively, emerging and existing enterprises will be impeded less by the state bureaucracy. A successful example of a simplified state permitting process for compost facilities can be found in Ohio. Some of the specific regulations are designed to fit the situation in Ohio, but reviewing their accomplishments would be a good way to discern what might work best in Illinois.
Case Study: Ohio Permitting Process
A brief description of the highlights of the Ohio EPA compost facility permitting process and the Ohio Food Scrap Recovery Initiative follows. For starters, composting at a residence and activities using less than 300 sq. ft. at non-residential locations are not subject to regulations. The remaining operations are sorted into four facility classes based on the characterization of their material inputs:
- Class I: Mixed solid waste
- Class II: Source-separated yard waste, agricultural waste, animal waste and food scraps
- Class III: Source-separated yard waste, agricultural waste and animal waste
- Class IV: Source-separated yard waste

For Class II (food scrap) facilities there are three steps to the permitting process:
1. Registration
   a. Must be completed at least 30 days before business plans to start. No fee, but requires business plan, and other description.
2. Licensing
   a. Annual license fee is based on daily tonnage capacity.
3. Financial Assurance
   a. Requires assurance that funds are available to pay for closure, cleanup and after-closure care.

The Ohio Food Scrap Recovery Initiative is based on the US EPA Food Recovery Hierarchy, which prioritizes actions organizations can take to prevent and divert wasted food. The top levels of the hierarchy are the best ways to prevent and divert wasted food because they create the most benefits for the environment, society, and the economy. The hierarchy appears as follows:
1. Source Reduction
2. Feed Hungry People
3. Feed Animals
4. Industrial Uses
5. Composting
9. Market Development Recommendations

This section discusses the various business and market effects related to food scrap collection and processing, food production, and their associated costs. Additionally, this section recommends potential strategies for improved market development. Through research and interviews, SERA has gathered information, specific to Illinois, on what the result of increased food scrap collection would be on various stakeholders in the compost industry.

Ideally, composting is a totally self-sustaining, circular market wherein increased food scraps collection leads to increased compost processing and usage, which increases local fruit and vegetable crop yields, subsequently increasing the potential stock for more food scraps collection. Further discussion of each market segment is provided below. This section is qualitative discussion, and the specific magnitudes of effects can be found in Appendix C, which provides modeling results for each different scenario.

Specific Business Effects and Related Market Development Strategies

Food Scraps Generators- Partnerships and Permitting

As a policy-driven food scrap program or ban is phased in, the first group of affected entities are businesses and institutions producing the majority of food scrap waste. These producers include venues like stadiums and arenas, breweries, malls, and schools and universities. While these entities may have to take a few steps in order to alter their diversion methods (i.e., capital investment), potential partnerships between food scrap producers and processors represent an opportunity to dispose of organic waste for a more competitive price than landfills can offer.

An example of such a partnership could be a brewery producing spent grain, which is a very clean stock of compostable material, and a local satellite model composting operation. Residents would also have to change their disposal behaviors somewhat, but this change could be achieved for relatively little expense through an education campaign. One option for improving the quality and usefulness of this stock is to use compostable paper and cardboard as a carbon amendment. Food scraps and manure are high in nitrogen content, and require extra carbon additions for agricultural use. By altering permitting regulations to allow a standard process for the inclusion of paper, cardboard, woodchips and spent grain (a common brewery by-product in Illinois) as carbon amendments, food scrap compost will have a more appropriate carbon-nitrogen ratio for agricultural use.

Food Scrap Collection and Processing -Grants and Startups

The next subset of market and business effects mainly impacts waste haulers, landfills and compost facilities. A landfill ban, or increased diversion of food scraps, means that waste haulers transporting organic waste for traditional disposal will now take that material to a processing facility and will therefore pay a compost tipping fee instead of a landfill tipping fee. Landfills will experience a loss of tipping fee revenue, which is on average $43/ton. Additionally, landfills will lose stock for methane recapture from landfill seepage, but the Illinois EPA has emphasized that landfill methane collection is an emissions mitigation strategy and is in practice not as efficient in terms of economic, social, or environmental benefit as emissions prevention strategies like composting. Some of the tipping fee revenue will shift to compost processors, assuming they generally charge a lower tipping fee ($30-$40/ton). As far as job creation, our model matches the literature and provides further evidence that compost processing employs more people per ton than simply disposing of organics in a landfill.
Food scraps, like yard waste, are compostable, but they require different machinery and go through a different process. Composting facilities or large food scrap generators will have to invest in new machinery (one $50k dewatering machine processes roughly 2,500 lbs. of food scraps per day), but the actual purchasing of this equipment will spark consumption and stimulate the local economy. For example, if a major food scrap generator like a stadium, hospital, or school acquired an on-site dewatering machine they could save money on collections through a reduction of their total waste stream, while at the same time increasing hauler revenue by taking care of the first processing step and providing a more valuable material, by weight, for curbside pickup therefore significantly reducing transportation costs. Investing in food scrap processing equipment through state grants and general funds is a major opportunity for the state of Illinois to develop the composting industry. Some examples of potential grants include: equipment sharing with municipal composting facilities for machines like a specialized windrow turner, cooperative purchasing of mechanical compost spreaders by groups of farms and food scrap composters potentially through Soil & Water Conservation Districts, grants for targeted demonstration pilots for new techniques or processes, and grants for private companies to provide ‘custom composting’ service combining spreading, fertilization, and pesticide application.

Non-Agricultural Uses - Highway and Construction

In order for the compost industry to develop fully, it will be necessary to supplement local demand for compost with non-agricultural uses of the product, especially during periods of low farm demand. There are two main reasons for this:

- Demand for compost on local farms is low because spraying chemical fertilizer and pesticide is typically a cheaper, easier and more traditional method, and
- Agricultural demand for compost fluctuates seasonally peaking in the summer and falling to almost zero during the harsh winter months.

Therefore, establishing avenues to use composted products during periods of low-demand will help stabilize the industry and protect it against inevitable economic shocks.

The main way to generate non-agricultural demand for compost is to require that certain construction projects, like DOT highway remediation and general landscaping, use a minimum percentage of Illinois compost in the fill material. When used in construction projects, composted material supports more local jobs than simply hauling organic waste to a landfill. In addition to job creation, non-agricultural use of compost also creates more economic output than traditional landfill disposal. SERA recommends that Illinois develop policy in the form of procurement guidelines for state agencies to utilize compost in preference to peat and topsoil. This will require cooperation between several state agencies including: IL EPA, DOT, Pollution Control Board, Public Health and others. For more information on the usage of compost in state highway projects see Appendix A. There is also a brief overview of The State of Texas’ very successful highway compost project.

In multiple states, such as Colorado and California, communities are requiring use of compost in any new construction. This includes residential projects, with law in place for compost requirements for new lawns in order to reduce the amount of water used. Some communities have included compost requirements for golf courses and parks to not only conserve water, but to reduce the amount of fertilizer and subsequent runoff pollution.
Local Farmers - Small-Scale vs. Large-Scale

One of the most beneficial results of these programs is to divert more Illinois compost to the local, sustainable food industry. This industry includes small fruit and vegetable producers and other entities providing food to farmers’ markets and local food hubs. In this subsection, we discuss the market effects of local farmers using more Illinois produced compost and the critical linkages between compost processing and small-scale, sustainable farmers.

Increasing on-farm compost use has the ability to increase crop yield per acre, especially in areas of severe top-soil erosion. By concentrating compost application on the most severely eroded areas of farmland, it is possible to increase crop-yield per acre approximately 11% - 21%. Compost application not only increases yield - it has also been known to improve both the actual nutritional quality and taste of a crop therefore increasing the value of produce on a per unit basis. The combination of increased yield per acre and improved quality provides additional revenue for farmers. This additional revenue allows local small-farm owners, who operate on very slim profit-margins, to be a little more resistant to economic shocks.26

Another way to increase the number of local farmers using compost is to support research and demonstration programs, which explore new applications and related methods/technologies for compost in the agricultural sector. New applications could include: erosions control, groundwater protection, soil fertility management, and biological control of soil-borne disease.

Increased Yield and Revenue - Food Hubs

With increased yield and revenue per acre, small-farms will be producing more food and will have greater flexibility as to where and to whom they choose to sell it. The general trend is that these small-farms tend to focus more on growing fruits and vegetables, rather than mono-cropping corn and soy, and are more likely to sell to small-scale, local food-hubs like farmers’ markets. There may be some loss in revenue in the local food processing industry, but the gains to the local sustainable food industry will outweigh these losses. In addition, small-scale farms and local food-hubs support more FTEs per dollar of revenue than large-scale monocrop farms and industrial food processing facilities that tend to buy mostly corn and soy.

An increase in fruit and vegetable yield from small farms will also increase the amount of sales at community farmers’ markets. These markets are vibrant hubs for the local economy and for community building in general. Food sales revenue directly contributes to the economy and supports many jobs, but there is growing research that shows local food-hubs also have a significant indirect impact. For one, a

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26 Land Connection http://thelandconnection.org/farmers/
majority of farmers’ market customers make purchases at at least one other local business during their visit thereby supporting small-scale entrepreneurship. Additionally, these markets are centers for community education and an excellent opportunity to increase public knowledge on composting and the sustainable food industry. Finally, farmers’ markets are saturated with networking, and have a proven business incubation effect.

Bringing the commodity chain full circle, the waste stream from farmers’ markets has a higher percentage of compostable content than the waste stream created by industrial, processed foods. This compostable waste stream will further add to the stock of material available for food scrap collection and compost processing.

**Market Data Tracking and Reporting**

Another major barrier to improving the compost industry at the national and state level is the lack of consistently tracked and reported data. In order to improve their own system and contribute to the existing research on organics diversion and processing, we recommend that Illinois pursue a comprehensive data tracking and reporting initiative. Specifically, it is recommended that Illinois pursue tracking requirements for the following:

- **From farms using Illinois produced compost:**
  - Employees (Overall #, hours worked, wages)
  - Profit and Loss Statement (breakdown of various sources of revenue and expenses and what % of each were from in-state purchases)
  - Tonnage of compost used
  - Estimated increase in yield / revenue due to increased compost use (per acre or total)
  - Estimated decrease in chemical fertilizer use due to increased compost use (per acre or total)
  - Specifically, for IMPLAN analysis software: Output, Employee Compensation, Proprietor Income, Other Property Type Income, Tax on Production and Imports

- **From farmers’ markets, vendors of locally produced food, and other entities considered by the state to be a part of the sustainable food industry:**
  - Employees (Overall #, hours worked, wages)
  - Volunteers (Overall #, hours worked)
  - Profit and Loss Statement (breakdown of various sources of revenue and expenses and what % of each were from in-state purchases)
  - Specifically, for input-output analysis: Output, Employee Compensation, Proprietor Income, Other Property Type Income, Tax on Production and Imports

**Additional Co-Benefits and Impacts not accounted for in Input-Output Modeling**

Input-output modeling is a great way to see the impact of different economic activities on traditionally measured variables like employment, output, and total value added. However, the modeling software does not possess the capacity to measure other important co-benefits. SERA research and structured interviews suggest a plethora of co-benefits associated with increased food scraps collection, processing, and reuse as an agricultural product. Although quantification of these effects is not included in the scope of this project, they are worth mentioning in order to recognize the wide range of social, environmental, and economic
impacts of the proposed program. This study led us into multiple tangents worth exploring in future studies. Additional benefits of composting include:

- GHG emissions reduction from landfill
- CO2 reduction from soil
- Soil conservation/fertility/disease control
- Groundwater quality/runoff mitigation
- Decreased fertilizer usage
- Increased soil productivity
- Brownfield improvements
APPENDIX A: Supplementing Demand with Non-Ag Uses

Farmers have a high demand for compost during the planting and growing seasons, but that demand tends to almost disappear after their crops have been harvested. The supply of yard waste material mirrors this summer high and winter low, but the supply of food scraps does not and actually increases during the winter holiday season. Because agricultural demand for compost experiences dramatic fluctuations seasonally, it is important to be able to supplement demand during winter months with non-agricultural uses. Establishing auxiliary avenues for end-use of the final composted product will keep the market more consistent year-round and allow for more even development.

In-state, non-agricultural uses for this material are a great way to supplement demand during low seasons and when market fluctuations favor farmer use of fertilizer over compost. The best method for ensuring demand upkeep during lull periods is to require that state DOT projects use a certain percent or a certain overall amount of Illinois produced compost in all of their highway remediation projects. Texas has had great success with this strategy.

**Texas DOT Case Study:**

**Overview:**
In order to increase demand for compost, the Texas Department of Transportation (TxDOT) began using recycled organic material in their construction projects through topsoil manufacturing and the revegetation of badly eroded slopes. The objective of the project was to show the importance of non-agricultural applications of recycled organic materials for increasing compost demand and overall market development, while also proving the benefits of using compost for erosion control and revegetation.

**Specific Methods:**
In May 1999, TxDOT undertook this project along a badly eroded strip of highway that had been barren for almost 30 years. Previous attempts at seeding, hydro-mulching and blanketing the site had been unsuccessful, so state officials decided to test a new method: organic compost. The specific compost used for this site was produced from feedlot manure, cotton burrs, and yard trimming wood chips. This product is defined as “Furnishing and Placing Compost” under the TxDOT compost specification system, which require intensive testing on metrics such as: particle size, pH, time and temperature standards, etc. The woods chips were added, at a 3 parts compost to 1 part wood chips (on a volume basis) mixing ratio, in order to help the material resist wind erosion. Compost, along with the seeds of native grasses, was applied, through a hopper attached to a Rexius blower truck, at a depth of 3”.

**Project Results:**
The first end result of the project was that the site was successfully revegetated and is now significantly more resistant to erosion. On a larger scale, TxDOT has now committed to using more compost in highway remediation and other construction projects. Not only do these types of initiatives have specific ecological benefits at, and downstream of, the project site, but also TxDOT has proven that using compost for non-agricultural applications can significantly increase demand for the product and strengthen the industry by promoting market development.
APPENDIX B: Case Studies Jurisdictional Programs

Adding Food Waste to Existing Yard Waste

El Cerrito, CA
Since July 1, 2010, residents of El Cerrito have had the option of putting food scraps and food-soiled paper into their green carts along with their yard waste. The city was able to provide this additional service for a minimal cost increase by using the existing every other week yard waste pick-up. The slight increase in cost of approximately $.34 per month came from switching from a yard waste mulching facility to a composting facility. All residents currently pay for the yard waste in their Integrated Waste Management (IWM) Fee that comes with their garbage bill. The fee varies slightly depending on the size of trash cart used. The IWM fee also pays for the city’s in house recycling program which has been single stream since 2008.

<table>
<thead>
<tr>
<th>Garbage Container Size</th>
<th>Collection rate</th>
<th>IWM Fee</th>
<th>Disposal Rate</th>
<th>Total Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-gallon cart</td>
<td>$11.25</td>
<td>$7.68</td>
<td>$4.77</td>
<td>$23.70</td>
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<tr>
<td>35-gallon cart</td>
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<td>64-gallon cart</td>
<td>$37.48</td>
<td>$15.36</td>
<td>$15.24</td>
<td>$68.08</td>
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</tbody>
</table>

There was some concern as to whether every other week would be sufficient for food scraps, but the initial cost increase for weekly service would be closer to $1 per household and the city felt the smaller cost increase using the existing program would be better received. With this year’s unusually cool summer, every other week appears to be working and El Cerrito can later switch to weekly should it be needed.

Unlike neighboring Alameda County, El Cerrito does not receive help from the County for their program. They are part of the West Contra Costa Integrated Waste Management Authority (now Recyclemore) which includes the cities of Richmond, Hercules, El Sobrante, Pinole and San Pablo. This collaboration has been a tremendous help in getting their program off the ground. Richmond also kicked off their yard waste/food waste program July 1st, and San Pablo begins theirs September 2010. Each community receives help for outreach of approximately $20,000 from the SWA. Garth Schultz of El Cerrito estimated the cost of outreach to be in the area of $23,000 although it was helpful that residents were already familiar with the green carts with yard waste. They also purchased kitchen food scrap pails for those residents who call in and request them.

With local landfills closing and neighboring counties adding surcharges or refusing to service out-of-county waste, tipping fees continue to go up. El Cerrito currently pays $148 per ton for trash. The food and green waste costs only $60/ton. This savings can be passed on to residents as they reduce the size and therefore the cost of their garbage service by recycling, and composting their yard and food waste.

San Ramon, also of Contra Costa County, but not in the same Solid Waste Authority, is one of those communities that was able to take advantage of the changing landfill conditions. Their neighboring county enacted laws that prohibited their hauler from using their yard waste as ADC (Alternative Daily Cover). The new facility where they now take their yard waste includes food.
scraps at the same rate as yard waste alone. They worked with their hauler to pick up the food scraps at the same time and now have a successful program.

Alameda County, CA
Communities in Alameda County have the benefit of StopWaste.org to help implement food waste programs. StopWaste.org is a public agency comprised of Alameda County Waste Management Authority and the Alameda County Source Reduction and Recycling Board. StopWaste began helping communities set up food waste programs in 2002. There are currently 16 communities in the county that offer food scrap programs. Most of those were introduced during franchise negotiation so there were no additional rate increases, especially if they were already collecting yard waste on a weekly basis. StopWaste is able to provide funding to these communities provided they meet certain conditions. The residential green cart must not cost more than $8 per household, they must call the program “food scraps” so as to better facilitate future marketing campaigns. Pick up must be once a week with no pilot programs, and kitchen pails and outreach material must be provided to each household and materials must go to a permitted facility. Nicole Almaguer of Albany said that StopWaste has been extremely helpful, especially with outreach. They have had their program since 2004 with yard waste and food scrap collection. StopWaste has provided twice a year flip lid audits, feedback, and reminders to residents with stickers and other materials. Overall, more than 400,000 households in Alameda County have access to curbside food scrap collection with an estimated 163,956 tons of organics being collected in 2008.
APPENDIX C: Project Model Construction & Assumptions

The inputs for each scenario were chosen based on SERA analysis of the effects on collection of food waste bans and other policies, as well as the various potential end-uses of composted material. SERA ran scenarios which assumed that collection and processing of food scraps increased to 35%, 65%, and 85% of current statewide organics stock (standard thresholds for a material ban with and without enforcement). For each of these percentage increases we ran two individual scenarios based on different end-use applications of compost: agricultural and non-agricultural (i.e. highway remediation) uses. SERA also chose to run one additional scenario, at the 85% of stock processed level, but with a 50/50 split for the end-use application between agriculture and highway remediation. This last scenario essentially shows the optimal situation for the organics diversion industry in Illinois with 85% of the material being processed annually, half of it being used for highway remediation (during winter months), and the other half being used for agricultural application (during planting and growing seasons).

Data tracking and reporting on the compost industry is poor at the local, state, and national levels. Illinois is no different. The BLS is now developing a NAICS code for compost collection and processing, until completion, the industry is currently accounted for in pieces tucked into multiple other sectors including general waste remediation and chemical fertilizer mixing. SERA drilled down on the contents of various NAICS codes, examined peer-reviewed studies, and conducted detailed interviews in order to develop suitable assumptions for the modeling work. The assumptions are:

- Illinois could successfully collect the additional amount of organic material diverted away from landfill efforts.
- Current Illinois compost (or diversion) facilities have the capacity to handle increased amount of food waste. The number of compost facilities is well documented, but their capacity and tonnage through-put is not (SERA discovered a lot of different numbers from different sources). There are only 10 facilities in the state currently permitted to process food waste.
- All additional compost would mostly be sold in-state - but not all 86%.
- This model also assumes that any compost produced will be used for agricultural activities that do not flow into industrial food processing. We have labeled this aggregated sector sustainable food production. While this does not only mean farmers’ markets, and includes certain agricultural activities that some may consider unsustainable, it was the most feasible way to model the sector.
- Opportunity costs like loss of landfill tipping fees and decrease in fertilizer use due to increased farm-application of compost were accounted for in the model as to avoid double counting of any economic or employment benefits.

The primary way that double counting occurs is by failing to construct the model in a way that prevents aggregated industries from selling their outputs to each other, thereby doubling the actual magnitude of impact. This model avoids such double counting of economic benefits via customization and controlled use of the various coefficients, like the regional purchase coefficient (RPC), which alter industry production, commodity production, and regional trade flows.
APPENDIX D: Expanded Composting Model Results

Results: Scenario 35%Ag

Economic Impacts:

Employment: (FTEs)
- Direct Effect: 1,190
- Indirect Effect: -2.1
- Induced Effect: 411.3
- Total Effect: 1,599.1
- Positively Affected Sectors: Compost Industry (1,201), Sustainable Food Production (222.6), Support Activities for Agriculture and Forestry (26.3)
- Negatively Affected Sectors: Waste Management and Remediation Services (-226.1), Business Support Services (-3.9)

Output:
- Gross Output: $152 million
- Total Value Added: $114 million
- Positively Affected Sectors (TVA): Compost Industry ($85 million), Sustainable Food Sector ($25 million), Owner-Occupied Dwellings Sector ($4.5 million)

Tax Impact:

State and Local Tax Impact:
- Employee Compensation: $104,730
- Tax on Production and Imports: -$155,109
- Households: $2,569,807
- Corporations: $556,456
- Total: $2,975,884

Federal Tax Impact:
- Employee Compensation: $4,863,635
- Proprietor Income: $1,839,948
- Tax on Production and Imports: -$30,821
- Households: $7,449,601
- Corporations: $2,207,982
- Total: $16,330,345

Figure A.1: Scenario 35%Ag

Impact Summary of 35% of Organics Stock Processed, applied to Agriculture

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Total Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>$ 611,286</td>
<td>$ 4,694</td>
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<td>Induced Effect</td>
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<tr>
<td>Total Effect</td>
<td>1,599.1</td>
<td>$ 85,053,149</td>
<td>$ 114,286,448</td>
<td>$ 152,172,008</td>
</tr>
</tbody>
</table>

Skumatz Economic Research Associates, Inc. (SERA)
762 Eldorado Drive, Superior, CO 80027 303/494-1178 skumatz@serainc.com
**Results: Scenario 35%Hwy**

**Economic Impacts:**

**Employment: (FTEs)**
- Direct Effect: 1,279.3
- Indirect Effect: 34
- Induced Effect: 401.4
- Total Effect: 1,714.8
- Positively Affected Sectors: Compost Industry (1,201), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels (290.1), Hospitals (23.5)
- Negatively Affected Sectors: Waste Management and Remediation Services (-225.9), Business Support Services (-3.4)

**Output:**
- Gross Output: $156 million
- Total Value Added: $119 million
- Positively Affected Sectors (TVA): Compost Industry ($85 million), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels ($25 million), Owner-Occupied Dwellings Sector ($4 million)

**Tax Impact:**

**State and Local Tax Impact:**
- Employee Compensation: $139,169
- Tax on Production and Imports: $2,380,758
- Households: $2,422,560
- Corporations: $664,760
- Total: $5,607,285

**Federal Tax Impact:**
- Employee Compensation: $6,462,969
- Proprietor Income: $1,049,959
- Tax on Production and Imports: $287,629
- Households: $7,022,858
- Corporations: $2,637,724
- Total: $17,461,139

**Figure A.2:**

**Impact Summary of 35% of Organics Stock Processed, applied to Highway Remediation**

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
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<th>Output</th>
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<td>34.0</td>
<td>$2,472,412</td>
<td>$3,703,737</td>
<td>$8,410,237</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>401.4</td>
<td>$20,110,080</td>
<td>$35,446,153</td>
<td>$60,203,520</td>
</tr>
<tr>
<td>Total Effect</td>
<td>1,714.8</td>
<td>$81,495,660</td>
<td>$119,428,635</td>
<td>$156,274,058</td>
</tr>
</tbody>
</table>

**Results Scenario 65%Ag**

**Economic Impacts:**

**Employment: (FTEs)**
- Direct Effect: 2,209.9
• Indirect Effect: -4
• Induced Effect: 763.8
• Total Effect: 2,969.8
• Positively Affected Sectors: Compost Industry (2,230.6), Sustainable Food Production (413.5), Support Activities for Agriculture and Forestry (48.9)
• Negatively Affected Sectors: Waste Management and Remediation Services (-419.9), Business Support Services (-7.2)

Output:
• Gross Output: $282 million
• Total Value Added: $212 million
• Positively Affected Sectors (TVA): Compost Industry ($157 million), Sustainable Food Sector ($47 million), Owner-Occupied Dwellings Sector ($8 million)

Tax Impact:
State and Local Tax Impact:
• Employee Compensation: $194,498
• Tax on Production and Imports: -$473,774
• Households: $4,772,499
• Corporations: $1,033,418
• Total: $5,526,641

Federal Tax Impact:
• Employee Compensation: $9,032,466
• Proprietor Income: $3,417,046
• Tax on Production and Imports: -$57,239
• Households: $13,834,974
• Corporations: $4,100,538
• Total: $30,327,785

Figure A.3:
Impact Summary of 65% of Organics Stock Processed, applied to Agriculture

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Total Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>2,209.9</td>
<td>$118,585,408</td>
<td>$144,885,844</td>
<td>$162,797,698</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>-4.0</td>
<td>$1,135,245</td>
<td>$8,718</td>
<td>$5,432,885</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>763.8</td>
<td>$38,235,196</td>
<td>$67,351,699</td>
<td>$114,374,575</td>
</tr>
<tr>
<td>Total Effect</td>
<td>2,969.8</td>
<td>$157,955,849</td>
<td>$212,246,261</td>
<td>$282,605,158</td>
</tr>
</tbody>
</table>

Results Scenario 65%Hwy

Economic Impacts:
Employment: (FTEs)
• Direct Effect: 2,375.9
• Indirect Effect: 63.2
• Induced Effect: 745.5
• Total Effect: 3,184.6
• Positively Affected Sectors: Compost Industry (2,230.5), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels (538.7), Hospitals (43.6)
Negatively Affected Sectors: Waste Management and Remediation Services (-419.5), Business Support Services (-6.3)

Output:
- Gross Output: $290 million
- Total Value Added: $222 million
- Positively Affected Sectors (TVA): Compost Industry ($157 million), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels ($46 million), Owner-Occupied Dwellings Sector ($8 million)

Tax Impact:

State and Local Tax Impact:
- Employee Compensation: $258,456
- Tax on Production and Imports: $4,421,408
- Households: $4,499,111
- Corporations: $1,234,554
- Total: $10,413,529

Federal Tax Impact:
- Employee Compensation: $12,002,657
- Proprietor Income: $1,949,923
- Tax on Production and Imports: $534,169
- Households: $13,042,450
- Corporations: $4,898,630
- Total: $32,427,829

Figure A.4:
Results Scenario 85%Ag

Economic Impacts:

Employment: (FTEs)
- Direct Effect: 2,889.9
- Indirect Effect: -5.2
- Induced Effect: 998.8
- Total Effect: 3,883.6
- Positively Affected Sectors: Compost Industry (2,916.9), Sustainable Food Production (540.7), Support Activities for Agriculture and Forestry (63.9)
- Negatively Affected Sectors: Waste Management and Remediation Services (-549.2), Business Support Services (-9.4)

Output:
- Gross Output: $369 million

Impact Summary of 65% of Organics Stock Processed, applied to Highway Remediation

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Total Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>2,375.9</td>
<td>$109,410,169</td>
<td>$149,089,098</td>
<td>$162,797,702</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>63.2</td>
<td>$4,591,623</td>
<td>$6,878,369</td>
<td>$15,619,011</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>745.5</td>
<td>$37,347,292</td>
<td>$65,828,569</td>
<td>$111,806,538</td>
</tr>
<tr>
<td>Total Effect</td>
<td>3,184.6</td>
<td>$151,349,083</td>
<td>$221,796,037</td>
<td>$290,223,250</td>
</tr>
</tbody>
</table>

Results Scenario 85%Ag

Economic Impacts:

Employment: (FTEs)
- Direct Effect: 2,889.9
- Indirect Effect: -5.2
- Induced Effect: 998.8
- Total Effect: 3,883.6
- Positively Affected Sectors: Compost Industry (2,916.9), Sustainable Food Production (540.7), Support Activities for Agriculture and Forestry (63.9)
- Negatively Affected Sectors: Waste Management and Remediation Services (-549.2), Business Support Services (-9.4)
• Total Value Added: $277 million
• Positively Affected Sectors (TVA): Compost Industry ($205 million), Sustainable Food Sector ($61 million), Owner-Occupied Dwellings Sector ($11 million)

Tax Impact:
State and Local Tax Impact:
• Employee Compensation: $254,344
• Tax on Production and Imports: -$619,550
• Households: $6,240,961
• Corporations: $1,351,393
• Total: $7,227,148

Federal Tax Impact:
• Employee Compensation: $11,811,686
• Proprietor Income: $4,468,445
• Tax on Production and Imports: -$74,850
• Households: $18,091,888
• Corporations: $5,362,242
• Total: $39,659,411

Figure A.5:
Results Scenario 85%Hwy
Economic Impacts:
Employment: (FTEs)
• Direct Effect: 3,106.9
• Indirect Effect: 82.7
• Induced Effect: 974.9
• Total Effect: 4,164.5
• Positively Affected Sectors: Compost Industry (2,916.8), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels (704.5), Hospitals (57)
• Negatively Affected Sectors: Waste Management and Remediation Services (-548.6), Business Support Services (-8.2)

Output:
• Gross Output: $379 million
• Total Value Added: $290 million
• Positively Affected Sectors (TVA): Compost Industry ($205 million), Maintenance and Repair Construction of Highways, Streets, Bridges, and Tunnels ($60 million), Owner-Occupied Dwellings Sector ($10 million)
Tax Impact:

State and Local Tax Impact:
- Employee Compensation: $337,981
- Tax on Production and Imports: $5,781,841
- Households: $5,883,453
- Corporations: $1,614,416
- Total: $13,617,691

Federal Tax Impact:
- Employee Compensation: $15,695,782
- Proprietor Income: $2,549,899
- Tax on Production and Imports: $698,528
- Households: $17,055,512
- Corporations: $6,405,901
- Total: $42,405,622

Figure A.6:

| Impact Summary of 85% of Organics Stock Processed, applied to Highway Remediation |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Impact Type                   | Employment | Labor Income  | Total Value Added  | Output                      |
| Direct Effect                 | 3,106.9    | 143,074,836   | $194,962,667       | $212,889,302                |
| Indirect Effect               | 82.7       | 6,004,430     | $8,994,791         | $20,424,860                 |
| Induced Effect                | 974.9      | 48,838,766    | $86,083,514        | $146,208,550                |
| Total Effect                  | 4,164.5    | 197,918,032   | $290,040,971       | $379,522,712                |
## APPENDIX E: Detailed Input-Output Results (Tables): Employment

### Top Ten for Employment 65% Organics Stock Processed, applied to Highway remediation

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,230.5</td>
<td>$111,400,979</td>
<td>$156,947,564</td>
<td>$162,798,068</td>
</tr>
<tr>
<td>64</td>
<td>Maintenance and repair construction of highways, streets, bridges, and tunnels</td>
<td>538.7</td>
<td>$34,233,753</td>
<td>$46,373,529</td>
<td>$100,987,852</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>43.6</td>
<td>$3,247,154</td>
<td>$3,912,859</td>
<td>$6,853,672</td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>34.3</td>
<td>$668,332</td>
<td>$1,685,296</td>
<td>$2,948,328</td>
</tr>
<tr>
<td>449</td>
<td>Architectural, engineering, and related services</td>
<td>33.8</td>
<td>$3,171,840</td>
<td>$2,906,194</td>
<td>$5,385,862</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>31.2</td>
<td>$765,250</td>
<td>$834,424</td>
<td>$1,497,125</td>
</tr>
<tr>
<td>406</td>
<td>Retail - Miscellaneous store retailers</td>
<td>30.9</td>
<td>$737,997</td>
<td>$812,090</td>
<td>$1,229,001</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>27.7</td>
<td>$472,078</td>
<td>$4,753,446</td>
<td>$6,329,876</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>25.7</td>
<td>$2,484,098</td>
<td>$4,747,737</td>
<td>$6,611,089</td>
</tr>
</tbody>
</table>

### Top Ten for Employment 65% Organics Stock Processed, applied to Agriculture

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,230.6</td>
<td>$111,405,099</td>
<td>$156,953,368</td>
<td>$162,804,089</td>
</tr>
<tr>
<td>1</td>
<td>Sustainable Food Production</td>
<td>413.5</td>
<td>$48,149,021</td>
<td>$46,775,043</td>
<td>$112,015,178</td>
</tr>
<tr>
<td>19</td>
<td>Support activities for agriculture and forestry</td>
<td>48.9</td>
<td>$2,510,105</td>
<td>$2,671,620</td>
<td>$3,285,879</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>44.2</td>
<td>$3,293,889</td>
<td>$3,969,175</td>
<td>$6,952,313</td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>34.3</td>
<td>$684,405</td>
<td>$1,680,564</td>
<td>$2,940,049</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>30.5</td>
<td>$519,468</td>
<td>$5,230,625</td>
<td>$6,965,307</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>30.0</td>
<td>$734,633</td>
<td>$801,038</td>
<td>$1,437,225</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>29.1</td>
<td>$2,810,279</td>
<td>$5,062,304</td>
<td>$7,479,175</td>
</tr>
<tr>
<td>400</td>
<td>Retail - Food and beverage stores</td>
<td>22.4</td>
<td>$664,076</td>
<td>$986,559</td>
<td>$1,455,001</td>
</tr>
<tr>
<td>405</td>
<td>Retail - General merchandise stores</td>
<td>22.0</td>
<td>$627,183</td>
<td>$1,017,801</td>
<td>$1,556,448</td>
</tr>
</tbody>
</table>
### Top Ten for Employment 85% Organics Stock Processed, applied to Highway Remediation

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,916.8</td>
<td>$145,678,203</td>
<td>$205,239,122</td>
<td>$212,889,781</td>
</tr>
<tr>
<td>64</td>
<td>Maintenance and repair construction of highways, streets, bridges, and tunnels</td>
<td>704.5</td>
<td>$44,767,215</td>
<td>$60,842,308</td>
<td>$132,061,037</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>57.0</td>
<td>$4,246,278</td>
<td>$5,116,816</td>
<td>$8,962,494</td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>44.9</td>
<td>$897,512</td>
<td>$2,203,849</td>
<td>$3,855,506</td>
</tr>
<tr>
<td>449</td>
<td>Architectural, engineering, and related services</td>
<td>44.2</td>
<td>$4,147,791</td>
<td>$3,800,407</td>
<td>$7,043,051</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>40.8</td>
<td>$1,000,712</td>
<td>$1,091,170</td>
<td>$1,957,779</td>
</tr>
<tr>
<td>406</td>
<td>Retail - Miscellaneous store retailers</td>
<td>40.4</td>
<td>$965,073</td>
<td>$1,061,964</td>
<td>$1,607,155</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>36.2</td>
<td>$617,333</td>
<td>$6,216,045</td>
<td>$8,277,531</td>
</tr>
<tr>
<td>399</td>
<td>Retail - Building material and garden equipment and supplies stores</td>
<td>34.4</td>
<td>$1,270,653</td>
<td>$1,990,919</td>
<td>$3,142,231</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>33.7</td>
<td>$3,248,436</td>
<td>$5,851,579</td>
<td>$8,645,270</td>
</tr>
</tbody>
</table>

### Top Ten for Employment 85% Organics Stock Processed, applied to Agriculture

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,916.8</td>
<td>$145,683,591</td>
<td>$205,246,712</td>
<td>$212,897,655</td>
</tr>
<tr>
<td>1</td>
<td>Sustainable Food Production</td>
<td>540.7</td>
<td>$62,964,104</td>
<td>$61,167,364</td>
<td>$146,481,386</td>
</tr>
<tr>
<td>19</td>
<td>Support activities for agriculture and forestry</td>
<td>63.9</td>
<td>$3,282,445</td>
<td>$3,493,656</td>
<td>$4,296,918</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>57.8</td>
<td>$4,307,393</td>
<td>$5,190,460</td>
<td>$9,091,487</td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>44.8</td>
<td>$894,992</td>
<td>$2,197,661</td>
<td>$3,844,680</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>39.8</td>
<td>$679,304</td>
<td>$6,840,048</td>
<td>$9,106,478</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>39.2</td>
<td>$960,673</td>
<td>$1,047,512</td>
<td>$1,879,448</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>38.1</td>
<td>$3,674,980</td>
<td>$6,619,935</td>
<td>$9,760,459</td>
</tr>
<tr>
<td>400</td>
<td>Retail - Food and beverage stores</td>
<td>29.3</td>
<td>$868,407</td>
<td>$1,290,115</td>
<td>$1,902,694</td>
</tr>
<tr>
<td>406</td>
<td>Retail - General merchandise stores</td>
<td>28.8</td>
<td>$820,162</td>
<td>$1,330,970</td>
<td>$2,035,355</td>
</tr>
</tbody>
</table>
APPENDIX F: Results of Models - Top Ten

Figure D1: Split Scenario for 50/50 Ag/Hwy at 85%

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Total Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>2,998.4</td>
<td>$149,074,031</td>
<td>$192,214,385</td>
<td>$212,889,300</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>38.7</td>
<td>$3,744,490</td>
<td>$4,503,095</td>
<td>$13,764,701</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>986.9</td>
<td>$49,419,319</td>
<td>$87,079,406</td>
<td>$147,887,651</td>
</tr>
<tr>
<td>Total Effect</td>
<td>4,024.0</td>
<td>$202,237,840</td>
<td>$283,796,887</td>
<td>$374,541,652</td>
</tr>
</tbody>
</table>

Figure D2: Top Ten for Employment for 85%

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,916.9</td>
<td>$145,680,897</td>
<td>$205,242,917</td>
<td>$212,893,718</td>
</tr>
<tr>
<td>64</td>
<td>Maintenance and repair construction of highways, streets, bridges, and tunnels</td>
<td>352.2</td>
<td>$22,383,608</td>
<td>$30,321,154</td>
<td>$66,030,518</td>
</tr>
<tr>
<td>1</td>
<td>Sustainable Food Production</td>
<td>271.7</td>
<td>$31,644,278</td>
<td>$30,741,279</td>
<td>$73,618,100</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>57.4</td>
<td>$4,276,836</td>
<td>$5,153,638</td>
<td>$9,026,990</td>
</tr>
<tr>
<td>502</td>
<td>Limited-service restaurants</td>
<td>44.9</td>
<td>$896,252</td>
<td>$2,200,755</td>
<td>$3,850,093</td>
</tr>
<tr>
<td>501</td>
<td>Full-service restaurants</td>
<td>40.0</td>
<td>$980,693</td>
<td>$1,069,341</td>
<td>$1,918,613</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>38.0</td>
<td>$648,319</td>
<td>$6,528,046</td>
<td>$8,693,004</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>35.9</td>
<td>$3,461,708</td>
<td>$6,235,757</td>
<td>$9,212,865</td>
</tr>
<tr>
<td>19</td>
<td>Support activities for agriculture and forestry</td>
<td>32.2</td>
<td>$1,654,563</td>
<td>$1,761,027</td>
<td>$2,165,922</td>
</tr>
<tr>
<td>405</td>
<td>Retail - General merchandise stores</td>
<td>30.5</td>
<td>$866,780</td>
<td>$1,406,623</td>
<td>$2,151,046</td>
</tr>
</tbody>
</table>
## Figure D3: Top Ten for Labor Income

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,916.9</td>
<td>$145,680,897</td>
<td>$205,242,917</td>
<td>$212,893,718</td>
</tr>
<tr>
<td>1</td>
<td>Sustainable Food Production</td>
<td>271.7</td>
<td>$31,644,278</td>
<td>$30,741,279</td>
<td>$73,618,100</td>
</tr>
<tr>
<td>64</td>
<td>Maintenance and repair construction of highways, streets, bridges, and tunnels</td>
<td>352.2</td>
<td>$22,383,608</td>
<td>$30,321,154</td>
<td>$66,030,518</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>57.4</td>
<td>$4,276,836</td>
<td>$1,513,638</td>
<td>$9,026,990</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>35.9</td>
<td>$3,461,708</td>
<td>$6,235,757</td>
<td>$9,212,865</td>
</tr>
<tr>
<td>475</td>
<td>Offices of physicians</td>
<td>27.1</td>
<td>$2,838,326</td>
<td>$2,780,743</td>
<td>$4,149,963</td>
</tr>
<tr>
<td>449</td>
<td>Architectural, engineering, and related services</td>
<td>14.8</td>
<td>$1,345,922</td>
<td>$3,478,745</td>
<td>$4,529,599</td>
</tr>
<tr>
<td>19</td>
<td>Support activities for agriculture and forestry</td>
<td>21.7</td>
<td>$2,035,840</td>
<td>$1,865,335</td>
<td>$3,456,905</td>
</tr>
<tr>
<td>433</td>
<td>Monetary authorities and depository credit intermediation</td>
<td>22.3</td>
<td>$1,259,653</td>
<td>$1,434,714</td>
<td>$3,709,781</td>
</tr>
</tbody>
</table>

## Figure D4: Top Ten for Value Added

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>Total Employment</th>
<th>Total Labor Income</th>
<th>Total Value Added</th>
<th>Total Output</th>
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<tbody>
<tr>
<td>8</td>
<td>Composting</td>
<td>2,916.9</td>
<td>$145,680,897</td>
<td>$205,242,917</td>
<td>$212,893,718</td>
</tr>
<tr>
<td>1</td>
<td>Sustainable Food Production</td>
<td>271.7</td>
<td>$31,644,278</td>
<td>$30,741,279</td>
<td>$73,618,100</td>
</tr>
<tr>
<td>64</td>
<td>Maintenance and repair construction of highways, streets, bridges, and tunnels</td>
<td>352.2</td>
<td>$22,383,608</td>
<td>$30,321,154</td>
<td>$66,030,518</td>
</tr>
<tr>
<td>441</td>
<td>Owner-occupied dwellings</td>
<td>0.0</td>
<td>$</td>
<td>$10,894,618</td>
<td>$16,670,421</td>
</tr>
<tr>
<td>440</td>
<td>Real estate</td>
<td>38.0</td>
<td>$648,319</td>
<td>$6,528,046</td>
<td>$8,693,004</td>
</tr>
<tr>
<td>395</td>
<td>Wholesale trade</td>
<td>35.9</td>
<td>$3,461,708</td>
<td>$6,235,757</td>
<td>$9,212,865</td>
</tr>
<tr>
<td>482</td>
<td>Hospitals</td>
<td>57.4</td>
<td>$4,276,836</td>
<td>$5,153,638</td>
<td>$9,026,990</td>
</tr>
<tr>
<td>433</td>
<td>Monetary authorities and depository credit intermediation</td>
<td>14.8</td>
<td>$1,345,922</td>
<td>$3,478,745</td>
<td>$4,529,599</td>
</tr>
<tr>
<td>475</td>
<td>Offices of physicians</td>
<td>27.1</td>
<td>$2,838,326</td>
<td>$2,780,743</td>
<td>$4,149,963</td>
</tr>
<tr>
<td>437</td>
<td>Insurance carriers</td>
<td>7.0</td>
<td>$823,465</td>
<td>$2,387,527</td>
<td>$3,936,303</td>
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</table>
APPENDIX G: Tonnage and Emissions Calculations

The following table provides the detailed calculations underlying Figure 3.4.

Table 1 - Listing of Materials Recovered by Percent Recovered (CWGC Study)

<table>
<thead>
<tr>
<th>Material</th>
<th>Disposed Tons</th>
<th>Subtotals Tons</th>
<th>MTCO2e/ton</th>
<th>MTCO2e Tons</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>TARGET ORGANICS &amp; COMPOSTABLE PAPER</td>
<td></td>
<td>2,493,680</td>
<td>1.31</td>
<td>3,272,877</td>
<td>16%</td>
</tr>
<tr>
<td>Food Scraps</td>
<td>1,838,100</td>
<td></td>
<td>0.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard Waste-Compostable</td>
<td>204,130</td>
<td></td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compostable paper</td>
<td>451,450</td>
<td></td>
<td>3.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER ORGANICS &amp; TEXTILES</td>
<td></td>
<td>1,717,090</td>
<td>1.98</td>
<td>3,406,923</td>
<td>17%</td>
</tr>
<tr>
<td>Treated wood</td>
<td>604,270</td>
<td></td>
<td>1.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard Waste-Woody</td>
<td>184,750</td>
<td></td>
<td>1.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallet-wood</td>
<td>149,810</td>
<td></td>
<td>1.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing</td>
<td>315,860</td>
<td></td>
<td>2.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other textiles</td>
<td>462,400</td>
<td></td>
<td>2.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAPER (Excluding compostable)</td>
<td></td>
<td>2,928,670</td>
<td>3.47</td>
<td>10,148,182</td>
<td>50%</td>
</tr>
<tr>
<td>Uncoated OCC/kraft</td>
<td>1,524,280</td>
<td></td>
<td>1.2</td>
<td>1,534,272</td>
<td>8%</td>
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<tr>
<td>Newspapers</td>
<td>418,690</td>
<td></td>
<td></td>
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<tr>
<td>Mixed recyclable paper</td>
<td>418,360</td>
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<tr>
<td>Magazines/catalogs</td>
<td>241,750</td>
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<tr>
<td>High grade office paper</td>
<td>144,112</td>
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<td></td>
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<tr>
<td>Other paper</td>
<td>137,210</td>
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<td></td>
</tr>
<tr>
<td>#2 other HDPE containers</td>
<td>11,870</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Juice &amp; milk boxes-coated</td>
<td>32,400</td>
<td></td>
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<tr>
<td>PLASTIC</td>
<td></td>
<td>1,278,560</td>
<td>1.2</td>
<td>1,534,272</td>
<td>8%</td>
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<tr>
<td>Other rigid plastic product</td>
<td>500,970</td>
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<td></td>
</tr>
<tr>
<td>Other plastic</td>
<td>272,460</td>
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<td></td>
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<tr>
<td>#1 PET bottles/jars</td>
<td>146,630</td>
<td></td>
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<tr>
<td>#3-#7 other plastic all</td>
<td>118,400</td>
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<td></td>
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<tr>
<td>#2 HDPE bottles/jars- color</td>
<td>87,180</td>
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<tr>
<td>Grocery bags-plastic</td>
<td>80,250</td>
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<tr>
<td>#2 HDPE bottles/jars- clear</td>
<td>60,860</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1 other PET containers</td>
<td>11,810</td>
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<tr>
<td>GLASS</td>
<td></td>
<td>409,230</td>
<td>0.31</td>
<td>127,884</td>
<td>1%</td>
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<tr>
<td>Glass bottles/jars</td>
<td>401,210</td>
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<tr>
<td>Other glass</td>
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<tr>
<td>METALS</td>
<td></td>
<td>630,950</td>
<td>2.83</td>
<td>1,783,576</td>
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<td>Other ferrous</td>
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<tr>
<td>Ferrous (tin cans)</td>
<td>143,510</td>
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<td>1.64</td>
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<tr>
<td>Other metal</td>
<td>118,230</td>
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<td>4.31</td>
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<tr>
<td>Aluminum beverage cans</td>
<td>57,910</td>
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<td>9.14</td>
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<tr>
<td>White goods - not refrigerated</td>
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<tr>
<td>White goods - refrigerated</td>
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<td>1.64</td>
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<tr>
<td>ELECTRONICS</td>
<td></td>
<td>194,280</td>
<td>2%</td>
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<td>Electronic equipment</td>
<td>132,830</td>
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<td>Computer equip</td>
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<td>Computer monitors</td>
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<td>Televisions</td>
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<td>CONSTRUCTION &amp; DEMOLITION</td>
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<td>Reinforced concrete</td>
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<td>Gypsum board</td>
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<td>Shingles</td>
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<td>Concrete</td>
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<tr>
<td>SPECIAL / AUTOMOTIVE, ETC.</td>
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<td>194,780</td>
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<td>Household bulky items</td>
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<td>Tires</td>
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<td>Used oil/filters</td>
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<td>Latex paint</td>
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<tr>
<td>Ash, sludge, industrial waste</td>
<td>7,750</td>
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<td>Household batteries</td>
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<td>Automotive fluids</td>
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<tr>
<td>Lead acid batteries</td>
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<tr>
<td>TOTALS</td>
<td>11,162,070</td>
<td>11,162,070</td>
<td>100%</td>
<td>20,273,714</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX H: Sources Used

Web Links

- http://www.gordonlab.net/composting/?page_id=193 (disease)
- http://calag.ucanr.edu/Archive/?article=ca.v057n02p48 (general benefits)
- http://macongreen.com/landfills/
- https://www.wbez.org/shows/wbez-news/is-chicago-breaking-a-state-yard-waste-law/b16d70a4-cad1-48f0-ae86-fe8b4049bd54

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- Illinois Food Scraps Coalition, “Food Scrap Composting Challenges and Solutions in Illinois” Report prepared by Seven Generations Ahead, January 2015
• Skumatz, Freeman, “Getting the Most from Colorado’s Recycling Programs & Infrastructure: Social Marketing Outreach and Education Toolkit-A Guidebook for Communities”, for CDPHE, SERA May 2011
• Skumatz, Lisa, “Percent Recoverables Remaining”, Resource Recycling, September 2016
• Synapse Energy Economics, “2015 Carbon Dioxide Price Forecast”, 3/3/15,
• Task Force on the Advancement of Materials Recycling, “Reporting to the Governor Pat Quinn and Illinois’ 98th General Assembly”, January 1, 2015