



Assessing the Flow of Materials in a Region:

Lessons Learned from Three Massachusetts Communities

Introduction

To promote community-based recycling economic development (see sidebar at right) the Chelsea Center for Recycling and Economic Development (CCFRED) helps communities create and expand reuse and recycling businesses in their areas. Part of this work often includes an assessment of the materials that are already flowing into and out of a community through its residences, businesses, and manufacturers. By evaluating the existing materials flowing through a community, we can identify opportunities to take what one business considers a byproduct or waste and provide that material to another business that can use it as a production feedstock or input.

Creating these synergistic linkages between community businesses creates a more vibrant, sustainable economy while producing significant environmental benefits as well. Existing businesses can save money by creating efficiencies in production; save energy, natural resources, and water by manufacturing with recycled materials; and reduce their disposal costs and the community's need for landfilling and incineration. The information can also be used to attract new businesses that can use the community's recycled materials. And community members benefit from new and retained jobs and a cleaner environment.

This case study outlines the general steps in the process of assessing the flow of materials through an area, based on the experiences of three Massachusetts communities: Adams/North Adams, Springfield, and Taunton. The material flows in each of these communities were studied using Chelsea Center grant resources. While the goals and intended uses for the data varied among the projects, all three studied some aspect of the way materials move through their business communities using the same general methodology described here.

What Is Recycling-Based Community Economic Development?

Recycling-based community economic development (RBED) is the process of creating jobs that pay livable wages, promoting environmentally sound economic growth, and raising the standard of living and quality of life through the use and reuse of recovered materials generated in a town or region.

The Chelsea Center for Recycling and Economic Development (CCFRED) was launched by the Commonwealth of Massachusetts in 1995 to promote recycling-based economic development through a variety of programs and services designed for manufacturers, municipalities, communities, and economic developers.

One of these services is the Chelsea Center's Recycling-Based Community Economic Development grant program, which funded the community projects cited in this case study. The program funds communities that are interested in using their wastes to support or create new recycling-based businesses. Grant funds can be used to update a municipal economic development plan, to identify potential sources and uses of waste materials, to work with the community to determine what types of recycled products manufacturers are appropriate for an area, or for other recycling-based economic development activities.

The RBED program is funded by the Executive Office of Environmental Affairs and by the Clean Environment Fund, which is comprised of unredeemed bottle deposits. For more information about the grant program, please visit www.chelseacenter.org or contact Jennifer Capuano at (617) 884-6237 or jennifer@chelseacenter.org.

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Adams and North Adams

In Adams and North Adams, the nonprofit Center for Ecological Technology worked with community partners to identify the flow of materials generated by businesses as inputs and outputs through the local economy. The project identified several opportunities for businesses in the Northern Berkshire region to help rebuild the area's economy by working cooperatively and to save money by reducing disposal and purchasing costs. The study's inventory of inputs and outputs can be used by economic development professionals and planners to project what materials are available to existing businesses and to new ones that could potentially locate in northern Berkshire County.

Springfield

The City of Springfield is interested in redeveloping a former manufacturing site known as Crane/Chapman Valve into an eco-industrial park. Indian Orchard, the neighborhood that hosts this site, is in need of new jobs, new vitality, and a new reputation as a progressive, non-polluted community. The City and neighborhood residents have together decided that this site will be a new symbol of pride representing the intersection of a clean environment and a thriving economy. Building upon previous community visioning workshops, the City worked with the Work & Environment Initiative at Cornell University to conduct the Springfield Eco-Industrial Baseline Study. The study identified material byproducts of local manufacturers that could be used as feedstock resources for existing

or new manufacturers of recycled and remanufactured products associated with an eco-industrial park or wider eco-industrial network.

Taunton

The City of Taunton's once substantial manufacturing base has diminished over the years. The many abandoned, blighted, and contaminated manufacturing facilities and lots, coupled with a lower-than-median income for the majority of households, has prompted its designation by the state as an Economic Target Area. The City aims to identify new manufacturing opportunities, strengthen existing businesses, and create jobs. Through its study, the City created information for a recycling-based community economic development initiative to be incorporated into the Sustainable Taunton Development Committee's redevelopment strategy. Specifically, the City inventoried selected manufacturers' solid waste and assessed the material as potential feedstocks for new recycled-based manufacturing in the city and for new business opportunities for existing recycling enterprises.

Why Pursue Recycling-Based Community Economic Development?

Recycling-based manufacturing is good for companies, communities, and the environment. Recovered materials can cost less than their virgin counterparts and result in good quality and competitive products. Environmental

Benefits of Recycling-Based Community Economic Development

Environmental Benefits

Manufacturers that use recycled materials:

- Use less energy, water, and natural resources
- Create less solid waste and less air and water pollution
- Reduce the need for mining virgin feedstocks
- Conserve natural resources
- Keep materials out of landfills and incinerators

Economic Benefits

Recycling-based community economic development:

- Reduces manufacturers' cost of raw materials
- Adds value to materials and final products
- Reduces transportation costs
- Provides sales revenue and taxable revenue
- Supports recycling programs
- Supports other businesses (suppliers, retailers, business support firms)
- Creates multi-level and multi-skilled jobs

benefits associated with using recovered materials include reduced water and energy use, less pollution, reduced demand for landfills and disposal facilities, and conservation of natural resources.

In 1999, Massachusetts residents and businesses generated over 13 million tons of solid waste—close to one third more than we did ten years ago. Approximately 38 percent of these 13 million tons were recycled. The rest was discarded in landfills or burned in incinerators.

This waste cost taxpayers millions of dollars in direct costs for disposal, lost economic development opportunity, lost revenues, and environmental costs. Massachusetts' latest Solid Waste Master Plan calls for 70 percent recycling and waste reduction by 2010, making 9 million tons of material available for recycling into new products. Through recycling-based community economic development, cities and towns can turn their trash into an economic and environmental benefit and help the State meet its recycling goals.

Recovered materials are used in the manufacture of a variety of products. In Massachusetts alone, there are almost 300 companies that use recovered feedstocks in their processes. These companies employ nearly 12,000 people and use approximately 4 million tons of recovered glass, metals, plastics, carpet, food, wood, asphalt shingles, electronics, and other materials annually. These companies make everything from printing and writing paper, refurbished toner cartridges and other office products to absorbents, wood flooring, asphalt, decorative glass, toothbrushes, plastic sheet, compost, clothing, machine parts and more. The list of products made with recycled materials is growing every day.

As virgin materials become increasingly scarce in the global market, and as consumers become more interested in environmental issues, more companies are looking toward locally generated recyclable feedstocks as a viable alternative to virgin manufacturing feedstocks. The Commonwealth's Strategic Plan for Recycling Market Development identifies opportunities to create in-state demand for certain grades of recovered glass, paper, tires, wood, food, textiles, carpet, and plastics, as well as other materials. Cities, counties, and community-based organizations throughout the world are using recycling as a vehicle to create jobs and facilitate local economic development, and your community can as well. You can start by assessing the flow of materials within your community.

Assessing the Flow of Materials in a Community

While there are several different ways a community can go about assessing their waste stream, the waste analysis projects funded by the Chelsea Center generally followed these eight steps.

1. Obtaining Community and Stakeholder Participation

If economic development is to be community-based, then community representatives must be involved throughout the process. Participation by a variety of interests helps ensure that the many voices in a community are heard and that their needs and desires are represented and addressed. It also enhances the likelihood for more buy-in from the various community participants, and that the effort will continue after the project is completed. One of the goals of the Chelsea Center Recycling-Based Community Economic Development Program is to build long-term linkages among community entities who do not typically work together, such as economic developers and recyclers. Broad participation from community stakeholders, while more time-consuming at the outset, provides a better opportunity to sustain such efforts.

What Advisory Committees Can Do

In Springfield, the project team built its Eco-Industrial Advisory Council (EIAC) around individuals whose interests and expertise in sustainable economic development and waste management would contribute to the project. The EIAC consisted of business leaders, waste management professionals, community group leaders, and economic development and planning agency members.

The Springfield EIAC met three times during the course of the project. The purpose of the first meeting was to orient the council members with the goals of the study, to present the tools that would be used, and to obtain input on how to refine and use these tools.

During the second meeting, the initial results of the project were shared and the council discussed the Internet-based GIS database the project team had developed. During the final meeting, the council discussed the final project results and the evolving format of the GIS database. The council also generated further

alternatives for how to tap into the City's waste streams to retain and attract new businesses, and discussed options for continuing to build the program beyond the project period.

In Taunton, the Industrial Development Commission and community partners established an advisory committee to help design the project and to identify needs and circumstances within the community with respect to solid waste management, recycling, and economic development. The advisory committee consisted of representatives of the Mayor's Office of Community Development, the Sustainable Taunton Committee, the Massachusetts Department of Environmental Protection and nonprofit organizations involved in community development, employment for disabled citizens, and environmental education. The advisory committee met at the beginning of the project to conceive the project goals and again midway through the project for an update on survey results and database development. Committee members were consulted on an individual basis as needed to give guidance and to serve as a sounding board during the course of the project.

Working with Additional Stakeholders

In addition to formal advisory committees, you can also seek the input and support of community members through other means, both formal and informal.

In Springfield, the project team convened a series of meetings with community groups on the potential for eco-industrial development in Springfield. The purpose of these discussions was to identify community concerns, interests, and ideas about community and economic development. The aim was to gather input on community assets and constraints, underdeveloped opportunities, and potential areas of materials exchange, recycling, reuse, and remanufacturing. Discussion participants included individuals and groups interested in economic development in the larger Springfield community and in the specific development of the Crane/Chapman Valve site located in the Indian Orchard neighborhood.

The Springfield project team also met informally with other groups concerned with economic development in the Springfield area. These individuals and offices provided informed views of the current business climate in the City of Springfield and opinions on the potential for applying eco-industrial development strategies for business recruitment and attraction. Interviewees included representatives of a local college, the office of the local congressman, the chamber of commerce, and other agencies and nonprofits actively involved in economic development.

Convening Advisory Committees That Work

The Center for Ecological Technology (CET) has found a successful formula for convening advisory committees: Seek practical people who also enjoy thinking and working "outside the box" and who will enjoy working together. Using this approach, CET successfully established an active advisory board for the Adams/North Adams project that worked together to discuss and explore the project goals and implementation strategies.

The project's advisory board included representation from the largest manufacturers in the area, as well as economic development agencies and business associations. The board provided substantial direction in conceptualizing the survey instrument, outreach methods, and subsequent steps for putting the information gathered to use.

The full board met quarterly, with each meeting focusing on different objectives. Board members also assisted with publicity by attending interviews with the local newspaper editor and radio station. After the results were in, the board discussed further steps for the project including bringing the findings to others with expertise in recycling businesses to ascertain the feasibility of siting new manufacturing or recycling businesses in the area.

In addition to the work accomplished, the advisory board meetings provided a setting where networking among businesses and economic development agency representatives took place. Meetings were held at the facilities of participating businesses, making attendance more interesting and convenient to members.

2. Identifying Businesses and Compiling Mailing Lists

As in direct mail marketing, the quality of your mailing list is the most important factor in generating a good response to a survey. To determine the flow of materials in your community, you need to ask the right questions of the right people. Who are the right people? Some communities limit their lists to manufacturers, while others include other types of businesses as well. Time constraints for your project will likely limit the amount of time you have to collect information, so targeting your list at the beginning of the process will ensure that you use your time for follow-up wisely. Develop criteria such as the potential amount of waste produced or potential waste streams with high levels of recyclable materials. You might also wish to expand your geographic area to include neighboring communities—by taking a regional approach, you may find additional recycling economic development opportunities.

For the Adams/North Adams assessment, CET used several different lists to generate a project database. Sources included the Northern Berkshire Chamber of Commerce member list, the UMass Economic Sustainability Plan for Adams, the City of North Adams Assessor's Office list of registered businesses, the Massachusetts Materials Exchange database, and business listings from Tower Publications and Dunn and Bradstreet. The data from these sources were integrated into one database of 782 businesses.

In Springfield, the team relied on the Chamber of Commerce database and used specific criteria to develop a list including those companies identified as manufacturers, construction-related businesses, repair services (e.g., machine, auto, equipment), machine shops, and businesses that might generate wastes that are commonly recycled (glass, plastics, paper, cardboard, textiles, wood, etc.) or remanu-

factured (machines, electronic equipment, computers, etc.). The list also included some retailers and wholesalers, particularly those that might use substantial packaging or generate organic wastes.

In Taunton, the project team identified 200 local industries through the Taunton Industrial Development Commission database. Non-manufacturers (distributors, assemblers, etc.) were eliminated from the list, leaving 130 manufacturers. Manufacturers were targeted with the intention of identifying unique components of their waste streams that are not typically captured in residential or commercial waste recycling programs.

Finding Contact Information for a Survey Mailing List

The following sources can often provide good information to use in creating your mailing list:

- Business Registration and Permitting Offices
- Chamber of Commerce
- Dunn and Bradstreet
- Economic Development Offices
- Tax Offices
- Thomas Register
- Trade Associations
- Trade and Commerce Agencies

3. Developing a Survey

Creating a survey is both an art and a science. Your questions should be clear and concise, while still eliciting the information you need. Your instructions should be easy to understand without biasing the answers in a particular direction.

CET developed its survey to gather information on the generation and use of materials, as well as water and energy use. The project's advisory board and CET believed that detailed responses were less important than broad participation among a wide range of businesses. Therefore, instructions emphasized that respondents could leave areas blank and not include information they considered confidential. CET's survey asked for contact information; a description and the quantity of material inputs and outputs; the frequency of input purchasing and output generation; whether outputs are recycled, reused, or discarded; the amount and type of energy used; and the amount of water consumed. To assess the usability of the survey, several drafts were sent to advisory board members to complete and provide comments about the experience.

The project team in Springfield developed a survey to identify partnership opportunities within Springfield's business community. The

survey included questions regarding general company information, product lines, materials flows (i.e., primary inputs and outputs), waste disposal and recycling, and water. The survey packet contained a list of materials that can be exchanged, recycled, or reused, and a description of other potential areas of eco-industrial networking. Both the Chamber of Commerce and the Eco-Industrial Advisory Council assisted with development of the survey instrument.

In Taunton, the team's survey sought to obtain contact information, to classify and quantify the waste generated by the targeted manufacturers, and to identify current recycling practices. The survey form was kept brief so that companies would be more likely to respond. The project team promised to keep survey responses confidential and ensured the businesses that their responses would have no regulatory implications.

The Importance of a Good Cover Letter

Businesses are often wary of surveys from government agencies or nonprofits that work closely with government. To increase cooperation, endorsement of the survey and the project itself by influential members of the business community is important. Ideally, these business leaders are already serving on your advisory committee or have endorsed the project in some other way.

What Information Should You Collect?

Below are some of the types of information you may want to collect in a materials flow survey.

- business/contact information
- product lines
- type and quantity of material inputs and frequency of purchasing
- type and quantity of material outputs and frequency of disposal
- recycling, reuse, and waste disposal practices
- type and quantity of energy use
- quantity of water consumption
- employment/skills data (workforce requirements)
- other business needs

In Adams/North Adams, the survey's cover letter was signed by the directors of the Northern Berkshire Chamber of Commerce and the Northern Berkshire Manufacturers' Network. The letterhead also listed the project's advisory board members to provide even more credibility to the project.

In Springfield, the survey was sent out with a cover letter on Chamber of Commerce letterhead encouraging participation. This letter emphasized that the survey was an educational tool to help the city identify ways to save businesses money. The active support of the Chamber of Commerce and the use of its letterhead contributed to a response rate of 24 percent, higher than a typical direct mail survey.

In Taunton, the surveys were distributed by the Taunton Industrial Development Commission under a cover letter signed by the executive director.

4. Collecting the Data

Simply mailing out surveys is not enough to ensure a good response rate. Some type of follow up is usually required, from reminder phone calls or postcards to in-depth interviews over the phone or in person. People are busy, and optional, time-consuming activities like filling out surveys often fall down the to-do list. Many companies are also unfamiliar with the composition and quantity of their waste streams and will ignore a survey simply because they do not know the answers to your questions. If they do fill out the survey, the answers may be incomplete. With a follow-up plan in place, you can address these barriers.

CET sent its survey to 782 businesses. Follow-up postcards were sent to 175 of the businesses two weeks later as a reminder to return completed surveys or to contact CET if the survey was not received or was lost. The full mailing list included virtually all businesses in the Adams and North Adams area, and the list was later honed to a target group of larger employers and manufacturers. During the process of following up with the target group, calls were made to 56 target businesses to encourage completion of the surveys and to answer questions. By the end of the project, 10 percent of the full list had returned surveys, and 48 percent of the target businesses had returned theirs.

In Springfield, the project team conducted follow-up calls to remind and encourage businesses to respond and to schedule in-person interviews. During the course of the project,

seven interviews were conducted with businesses to follow up on their survey responses. The project team limited interviews to those companies expressing interest in participating in a waste exchange network. The objective of the interviews was to obtain more detailed information on materials flows and other possible interconnections. These discussions focused on labor requirements and the availability and skills of the local workforce, as well as infrastructure and transportation concerns.

In Taunton, follow up consisted of several phone calls and a faxed follow-up letter asking for their participation. Twenty-five completed surveys were received for a 19 percent response rate. The team initiated more intense follow up, such as a site visit, when there were incorrect answers on the survey form, large volumes of waste generated, and/or materials listed that had potential for recovery. After conducting the follow-up site visits with several companies, the project team decided to again request that 25 non-responding companies complete the survey, with the hope that these firms might generate comparable materials to those already identified in the responding companies. Five more companies responded with completed surveys, bringing the final response rate to 23 percent.

5. Compiling the Data

Once data has been collected, it must be compiled into a database so that it can be easily accessed and analyzed. Each of the three communities used a different system to best meet their individual project goals.

CET used its existing Massachusetts Materials Exchange database software to compile the survey data for Adams/North Adams. The Materials Exchange database tracks similar information to that in the surveys, and with minor modifications, was an effective tool for

categorizing, storing, and analyzing the data. The database is in Lotus Approach version 9.5 and is made up of three associated Dbase IV files.

The Springfield project team developed an interactive database in Microsoft Excel to document and analyze the survey and interview results. The database includes separate worksheets with company information, company inputs, and company outputs. The survey data was also linked to geographic information systems (GIS) data using ArcView, allowing the

creation of maps of potential webs of exchanges. For the identification of geographic partnerships, the city's street theme was used as a base. The companies were then loaded onto the GIS according to their addresses.

Springfield decided to use GIS for two reasons: 1) to look for geographic partnerships and 2) to create a user interface to find material exchange possibilities. Using GIS will be a useful visual tool in stimulating thinking about potential partnerships and waste exchanges. Because distance and logistical

considerations can affect the financial viability of byproduct exchanges, the mapping will show spatial relationships between potential exchange partners, allowing users to identify partners that are conveniently located. The Springfield project team plans to place the database on a web site, allowing businesses and other users to search for possible resource matches between local firms.

The Taunton team used Microsoft Access 97 due to its popularity and widespread availability of support services. The database was designed for ease of data entry and preparation of standard reports so that a novice could perform these tasks. The database includes five main screens: company information, manufacturing processes, waste composition, feedstocks, and record maintenance. The database produces three kinds of reports: total tons by material, tonnage detail by material, and tonnage detail by company.

The Benefits of Site Visits

In-plant walk-through visits and interviews can provide a more detailed and accurate picture of a company's materials flow. While site visits are more time-consuming and resource intensive than mailings or phone calls, they often produce far superior results.

In Springfield, business interviews proved highly effective in eliciting further information on business operations, recycling activities, waste management issues, and available byproducts. Interviews combined with facility tours were particularly helpful in revealing materials that had been overlooked in the survey. The personal interaction also created a foundation for relationship building to help facilitate an eco-industrial network.

6. Analyzing the Data

Once material flow data has been collected and compiled into a database, it can be analyzed to identify trends, potential partnerships or waste exchanges, and opportunities to attract or develop businesses which could use this material.

From its surveys, CET identified a total of 113 material inputs and 224 material outputs in the Adams/North Adams area. CET assessed the prospects for matching generators of waste materials with other businesses that could use these materials as feedstocks. CET staff then gathered detailed information about inputs and outputs that were deemed to have a high likelihood of being reused within the project area.

In Springfield, the project results point to several materials that could drive the recruitment of recycling-based industries and provide exchange opportunities for existing companies. Working material by material, the Springfield team analyzed the potential for reusing or recycling the materials in the local area. Byproducts most often mentioned by survey respondents include paper products, cardboard, equipment and electronics, metals, plastics, and wood. Chemicals/paint, rubber, and glass were also mentioned.

The top three materials identified by the Taunton team, in terms of tonnage generated, are “other organic waste” (primarily food processing wastes), newspaper, and sludge. Together these three materials comprise 88 percent of the total tonnage generated by the responding companies. Other materials identified include cardboard,

shipping pallets, and plastics. Of these, both cardboard and plastics have high recycling rates of over 80 percent and shipping pallets of greater than 60 percent.

Using the survey data, the Taunton team conducted an opportunities assessment that reviewed the potential for new or expanded business opportunities for several major materials types (e.g., paper, metals, plastics, glass, textiles, and wood.) The team concluded that the material generated in the largest quantity that was not currently being recycled was textile waste. Additionally, with the exception of cardboard, significant improvements could be made in paper recycling.

7. Putting the Results to Work

After collecting, compiling, and analyzing the data, your project team can formulate new projects to take advantage of the flow of materials of community.

CET used the data it collected in Adams/North Adams to move forward on three fronts: expanding the listings in the Massachusetts Materials Exchange and facilitating some of those exchanges; launching a business paper recycling partnership to serve northern Berkshire businesses; and studying the feasibility of starting up a wood pallet refurbishing facility.

For example, CET facilitated an exchange between two companies, Specialty Minerals, Inc. and Crown Vantage, Inc., of a half-million gallons of water per day. Specialty Minerals uses the water as a coolant for processing limestone and Crown Vantage needs water for its papermaking

Beware of Database Complications

Selecting the software and designing your database are important decisions that will either help or hinder your ability to use the data you have collected. When making database decisions, beware of these potential pitfalls:

- Incompatibility between the software and operating system. As with all computer programs, some software works better with certain operating systems and hardware. Be sure that the version of your database software is compatible with the version of operating system and your hardware.

- Programs that are not user friendly. Be sure that users with different levels of computer and database experience will be able to use your database, from junior staff who may do data entry to senior staff who may require complex data analysis.

- Expensive training and technical assistance. Customized programming may produce reports that meet your specific needs, but customization can also demand expensive training and technical assistance. Evaluate and plan for training and technical assistance needs in your program budget.

process. The exchange could prevent Specialty Minerals from being required to spend \$1 million on a new water cooling system, while Crown Vantage saves on its water costs.

The Springfield team identified a number of opportunities for the attraction and development of recycling-based business

Sharing Materials, Sharing Space: The Eco-Industrial Park

The Springfield project was initiated to create data for the development of an eco-industrial park. Eco-industrial development adds value to businesses and communities by optimizing the use of energy, materials, human, and other community resources in a single location or through a network of nearby locations. For businesses, value is added as waste byproducts, water, and energy are cycled back into the production stream to be used as raw materials for another product or firm. In a community development context, lower costs for businesses translate into greater opportunities to reinvest in new jobs, training, and environmental management practices.

Many current eco-industrial projects aim to revitalize and improve economically distressed communities, with particular focus on redevelopment of brownfields and decommissioned federal properties such as military bases. The benefits for communities are improved environmental health, enhanced resource efficiency, increased jobs, and viable businesses.

The eco-industrial approach has many applications. At a most basic level, it can be used to develop a strategy where each organization seeks higher performance within itself. Most eco-industrial activity, however, involves moving to a new level of performance by increasing interconnections between companies. Variations occur based on the different issues affecting participating companies and communities, such as the natural and market ecology, or how closely businesses are willing to work together for their mutual advantage.

A materials flow assessment identifies a stream of byproduct resources that can both attract new recycling-based manufacturing firms and provide opportunities for existing businesses to create exchange networks.

opportunities in the Springfield area. They also recommended additional research including further investigation of alternative reuses of specific byproduct materials within Springfield's waste stream; identification of potential end users of existing waste streams who are already located within the state, as well as out-of-state companies that could be recruited to move to the area; and establishment and facilitation of business networking about byproduct exchanges, including workshops with industry clusters and follow up with individual businesses.

In Taunton, the team identified two potential opportunities to expand the capability of existing Taunton area end-users to consume locally generated organic materials and wood shipping pallets. The team also identified several opportunities for new businesses:

- Manufacturing of molded pulp products, cellulose insulation, and/or kitty litter from old newspapers
- Producing sewn goods or specialty craft paper products using local textile scrap
- Producing garden products such as plant stakes and trellises, "fat wood" for fire starting, furniture, and/or finger joined lumber products from used pallets as well as other scrap lumber.

8. Sharing the Results

Sharing the results of a materials flow assessment is a critical step in ensuring that the data is used to the community's greatest advantage. Each of the communities mentioned in this case study conducted some sort of outreach during the project, ranging from press releases and press conferences to one-on-one briefings and conference presentations.

Presenting project data and analysis to both economic development organizations and members of the business community who participated in the survey are equally important. Community development corporations, chambers of commerce, planning commissions, manufacturers' associations, and solid waste management agencies should each receive information about the project results.

Taking the Next Step

Completing a materials flow analysis will often lead to new questions and ideas for a community. Here are some recommended next steps:

Integrating the materials flow data with economic development information. Compare your newfound knowledge about the materials in your area with other community and economic data. For example, what potential relationships exist between the materials in your community and your area's transportation networks and infrastructure? What are your area's major markets and employers? What networks are already in place? What are your area's labor needs and training opportunities? How does the materials flow affect the need for recycling and waste disposal services?

Expanding your knowledge about the business community and their materials. It will require more than one survey to fully understand the flow of materials in a community and how those

materials can be used to generate community-based economic development opportunities. Continue to seek out and add information to your database. The more you know about the industrial and commercial waste stream, the better position you are in to respond to and create development opportunities.

Promoting awareness about the materials within your community and their value to businesses. As exchanges between businesses develop, publicize them and other environmental business practices. Early successes can jump start other businesses to participate, especially if cost savings and other economic, environmental, and community benefits are documented.

Additional Lessons Learned

The experiences of the three communities profiled in this case study provide some important lessons in ensuring that a community can use the information obtained in a materials flow assessment for its greatest potential:

- Plan for a multi-year effort, with the materials study taking place in the first year. Economic development is a long-term process and it will take time to integrate recycling and materials flow data into that process. Make the development of an implementation plan, including how the work will be funded, an integral part of your project.
- Ensure there is person or organization within the community who is committed to leading the effort beyond the initial study. This person will ideally be a creative thinker who can get other community leaders to act on the potential opportunities that a materials flow study can uncover.
- Help the business community identify the economic gains that are possible by using your study's data. Business leaders will be more likely to participate and support follow-through if they can see both short-term and long-term economic advantages. Show businesses how they can save money, and show government agencies how they can help the business community, and you are more likely to find cooperation.
- If your industrial base is small, consider broadening your geographic area by including neighboring communities.

Helping Manufacturers Help Each Other: Creating a Materials Exchange

Materials exchanges are matchmaking services that connect businesses that have reusable materials with other businesses that can use them. For example, the Massachusetts Materials Exchange is a statewide online service managed by the Center for Ecological Technology (www.materialsexchange.org).

In the last four years, the Exchange has moved over 2,000 tons of materials, saving participants more than \$100,000 in avoided disposal and purchasing costs. Materials exchanges have many benefits: capturing the value of byproducts and surplus materials, reducing disposal and purchasing costs, and reducing waste and environmental pollution. Items commonly listed in materials exchanges include manufacturer's byproducts, surplus stock, scrap and overrun material, used equipment, used office furnishings, packaging and transport materials.

- Be sure to perform a thorough economic development analysis following your materials flow study to learn how the materials data fits into the community's economic development needs and plans. Incorporate findings and strategies towards recycling-based economic development into community's strategic economic development plan or Master Plan.

Additional Resources

The Chelsea Center for Recycling and Economic Development has a number of resources available to communities, including a grant program (see box on page 1). You may also find the following information useful.

- **Community Materials Inventory Database**

The Chelsea Center has developed the Community Materials Inventory Database (CMID), designed to assist communities, economic development and recycling professionals, and stakeholders to gather, aggregate and analyze information about recyclable materials in their areas.

Based on the Taunton project database, CMID (Microsoft Access) includes fields for general company information, processes, waste composition, feedstock information, and record maintenance. Report options generated by CMID include, but are not limited to: total tons by material (report converts all data into tons); tonnage detail by material; and tonnage detail by company. Additional reports can be produced that might include aggregated data by SIC code, number of employees, processes used, or feedstock used.

Other features include the ability to add or edit a company, process, hauler (it contains a current list of all Massachusetts' haulers) or material at any point in the data entry process. The Community Materials Inventory Database is currently being used and tested by two Massachusetts' communities: Greater New Bedford and Amherst. For more information about CMID, contact Jennifer Capuano at (617) 884-6237 or jenniferfc@chelseacenter.org.

- **Survey Instrument**

The Survey Instrument, developed by the Chelsea Center, was designed to be used with the CMDI. The survey is one tool communities can use to gather information about industrial materials used and generated in their areas. The survey contains four main parts: company information, company trash generation, recyclable material generation, and manufacturing operations (for manufacturers only).

The survey is the key vehicle for obtaining desired information about a company's use and generation of materials. It is recommended that the survey be accompanied by a brief cover letter signed by a high-ranking official within the community to ensure credibility of this effort.

- **Database and Survey Guide**

The Chelsea Center has developed a Database and Survey Guide to provide basic, instructional information for the Survey Instrument and the Community Materials Inventory Database. The Survey and Database were designed to be used together, and changes in one would necessitate changes in the other.

- **Chelsea Center Library**

Visit our office library for more information and ideas for community-based recycling economic development and other resources.

- **Massachusetts Guide to Services for the Recycling Industry**

This guide provides information on obtaining assistance with business plan reviews, financing, referrals to additional sources of information, technical assistance in identifying and maximizing the use of recycled feedstock, materials sourcing, identifying and obtaining required permits, tax credit opportunities, setting up recycling programs, and more.

- **Chelsea Center Website**

Visit www.chelseacenter.org for additional information about Chelsea Center programs and services, grant programs, publications, case studies, statistics, and more.

Additional Information About the Projects in This Case Study

To learn more about the projects featured in this, case study please contact the following organizations:

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AND ECONOMIC DEVELOPMENT**