RSE USA
Sustainable Product Solutions

Recycling Market Development in the United States – Looking Back and Looking Forward

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1. Introduction

Background

Recycling market development is an activity that has been largely overlooked in recent decades. Recycling programs have been funded at a base level such that basic day-to-day services like collection, processing and marketing have generally been provided, but strategic planning, innovation, program education and outreach and developing local and regional markets for collected recyclables have not been focal points.

Unfortunately, the U.S., like many other countries, became reliant on China and other countries for end markets for material. Often, recyclers would profit by selling material to Chinese markets of lower quality than would be acceptable to domestic markets, thereby putting U.S. processors and manufacturers (end markets) at a disadvantage. Abundant and tolerant Chinese markets helped spur the growth of single-stream recycling in the United States. This (and thus higher contamination rates), relatively low petroleum and natural gas prices (suppressing virgin plastic resin prices) and declining manufacturing in the U.S. for many materials all contributed to lower demand by domestic markets.

Meanwhile, China, with a largely undeveloped recycling infrastructure but a strong manufacturing sector, and thanks to inexpensive return-cargo freight via ocean liners, had become the primary buyer of U.S. (and European) scrap. Since 2007, scrap has been one of the largest exports to China of all USA manufactured products. The Institute of Scrap Recycling Industries (ISRI) reports that, in 2017, 31 percent of U.S. scrap was exported to China, valued at $5.6 billion.[1] In 2013, however, China implemented Operation Green Fence, in an attempt to reduce the level of contamination on incoming material. This meant an increase in inspections of incoming loads, and some containers being rejected. In early 2017, China announced its National Sword policy, which eventually would lead to a January 2018 ban on the import of mixed plastics and mixed paper scrap, impacting $500 million in trade. In March 2018, China launched an extremely strict threshold on bale contamination. The 0.5 percent contamination threshold is much lower than established ISRI bale contamination specs (between one and five percent, depending on the grade of paper, with similar thresholds for plastics), and is currently unachievable, even with today's sophisticated sorting equipment. And, in April, China announced the intent to ban all plastics, small electric motors and insulated wire by the end of 2018 and stainless steel and other metallic scrap by the end of 2019. This is expected to have an impact on an additional $446 million worth of U.S. scrap exports.[2] While some Asian countries like Malaysia have increased the amount of scrap they can accept (i.e., Malaysia became the biggest importer of U.S. scrap plastics thanks to China's January 2018 ban), they cannot currently absorb all of the available supply. It should be noted, however, that Malaysia announced its intent to ban all scrap plastics imports as of 2021. Thailand and Vietnam have also placed strict restrictions on scrap imports.[3] The result: Recyclables have been stockpiling in some locations. Some communities have responded by going back to dual-stream recycling, while others have had to renegotiate contracts with processors, paying them significantly more for processing. Additionally, some communities have dropped certain materials from their recycling programs or ceased providing recycling service altogether.

The situation points to a need for developing recycling markets domestically, especially for selected grades of paper, plastic. Glass also poses market challenges, though not impacted by international market issues directly, it can contaminate paper commodities, and has suffered from domestic market challenges in much of the U.S. for years. Some packaging types that have achieved recycling access rates of greater than 60 percent are now at risk of losing that distinction. It is critical that recycling stakeholders work together to provide a roadmap for market development. This requires protecting current supplies, before they are subject to program cuts. While the market situation, infrastructure, organizations involved, and mix of

[1] Erica E. Phillips, The Wall Street Journal, "U.S. Recycling Companies Face Upheaval from China Scrap Ban," August 2, 2018.
[2] ISRI, http://www.isri.org/advocacy-compliance/china
[3] Plastics Recycling Update, "Exports to Thailand Collapse After Ban," Colin Staub, September 6, 2018.

materials generated has changed since the 1990s, the basic strategy for bolstering recycling markets remains unchanged.

This project aims to benefit current recycling market development (RMD) efforts by building upon the learnings from past efforts. RSE USA (RSE) and More Recycling (MORE) support progress toward a more stable recycling system by making this information available and easily accessible to accelerate recycling market development work.

Project Methodology

The study methodology is as follows:

1) Develop and disseminate a survey instrument to solicit information from current state-level RMD contacts (RSE, with input from MORE);
2) Conduct complementary research about past recycling market development programs and initiatives and information about their effectiveness (RSE, with input from MORE. Authors of this working paper were deeply involved in early RMD efforts);
3) Conduct follow-up interviews with key recycling market development professionals to gain a deeper understanding of thoughts, opinions and experiences (RSE, with input from MORE);
4) Assess findings from research and survey responses (RSE, with input from MORE);
5) Develop working paper (RSE, with input from MORE); and
6) Create an online information exchange (MORE, with input from RSE).

Partners/Funders

This project is being conducted by RSE USA and More Recycling, with RSE USA conducting the majority of the research and writing, with input from More Recycling, and More Recycling developing the platform for sharing tools. The project is supported by funding from the American Chemistry Council, Oregon Department of Environmental Quality (DEQ), and Trex Company, Inc.

Working Paper Purpose and Limitations

The purpose of this paper is to identify, organize, and analyze information to build an online information resource center for recycling market development. It is our intention that the information will be augmented over time with input from stakeholders, as resources permit. The objective of the online information center is to inform current and future RMD efforts by various stakeholders, to enhance their effectiveness. In preparing this working paper, authors relied upon review of published documents, internet research, survey results, and interviews. The information obtained was not always comprehensive, and survey responses reflected respondent's perspectives and were not always complete. Consequently, the working paper findings reflect those limitations.

Working Paper Structure

The remainder of this working paper is structured as follows:

- What is Recycling Market Development?
- History of Recycling Market Development
- Analysis of Recycling Market Development Initiatives
- Current Situation
- Looking Forward – Effective Roles and Strategies

A summary of the survey results is provided in Appendix A.

2. What is Recycling Market Development?

Description

Recycling market development consists of activities and initiatives that enhance the economic vitality of the reuse and recycling industries. Recycling is not just an activity designed to improve the environment, it is also part of an economic system. In a balanced economic system, supply and demand are in equilibrium. Recycling market development economic activities can:

1) Improve the supply of material, such that it is of adequate quality and quantity to be of value to a buyer; and
2) Improve demand for the material and goods made from the material.

Innovation is often adopted to enhance both efficiencies and opportunities to help make collection, processing, and manufacturing with the material as cost effective as possible, without sacrificing (and perhaps enhancing) materials quality. In addition, education, collaboration, and facilitation are important means to enhance markets. Demand-pull strategies include, for example, efforts to:

- Support existing businesses that consume recovered materials and finished goods made with recycled content, so they continue to demand material;
- Encourage manufacturers to convert from virgin to secondary materials to the extent that technology and markets allow (feedstock conversion);
- Encourage existing manufacturers to increase the amount of recovered material they use;
- Attract new businesses that also consume recovered materials (but not at the risk of losing existing businesses); and
- Promote broad consumer engagement in buying products made from recovered materials.

3. History of Recycling Market Development

Historical Overview

Recycling market development came about largely in response to the growth of curbside recycling programs in the late 1980s through early 1990s, with the number of curbside programs increasing by 500 percent from 1989 – 1993.[4] The growth of recycling was successful at diverting material from disposal, but markets for collected materials were not adequate. Therefore, there was a need to expand these markets to consume the collected materials. In addition, there was a need to ensure that collected materials were processed in such a way that they resulted in a saleable, useful product. Thus, there was also a need to develop specifications for processed materials.

Federal Government Initiatives

In 1994, the U.S. Environmental Protection Agency (EPA) launched a three-year effort: “Recycling Means Business: EPA’s Recycling Market Development Strategy.” The program aimed to help bring about the fundamental changes needed to shift to an “environmentally-responsible manufacturing economy that conserves natural resources, energy, and disposal capacity.” The U.S. EPA developed this program because they observed that:

- Recycling businesses often lacked technology, information, and businesses development assistance, and were perceived as risky ventures by many;
- Many state and local government programs needed mechanisms to coordinate their activities and share information.

[4] U.S. EPA, “Jobs Through Recycling Initiative,” September 1994.

- There was a need to build public-private partnerships to work cooperatively;
- Manufacturers and distributors of recycled products often found it challenging to do businesses with governmental entities and large corporations; and
- Recycled products had not achieved widespread public acceptance.

EPA's primary market development goals were:[5]

1) Support and strengthen the link between increased market capacity and sustainable economic growth. This was to be accomplished by:

    - Stimulating interaction and coordination among the economic development, financial, and recycling communities; and
    - Promoting the use of recycled feedstock by assisting recycling businesses.

2) Leverage federal resources and build federal partnerships for market development. Objectives included:

    - Maximize federal purchases of recycled products;
    - Facilitate access to federal information, research and programs; and
    - Mobilize federal participation in market development.

3) Develop infrastructures that support markets for recyclables and recycled products. The objectives under this goal included:

    - Strengthen state, tribal and local government capabilities;
    - Foster the establishment and exchange of market development information; and
    - Maximize public and private sector purchases of recycled products.

The primary initiative of this effort was the Jobs through Recycling (JTR) program. Highlights of the program were:

- Providing >$5 million for state Recycling/Reuse Business Assistance Centers (RBACs) and Recycling Economic Development Advocates (REDAs);
- Funding of Recycling Technology Assistance Partnership (ReTAP) operated by Clean Washington Center and the National Recycling Coalition; and
- Supporting the Chicago Board of Trade in the development of a recyclable commodities trading system.

JTR RBACs were developed in California, North Carolina, New York, and Minnesota. The RBACs provided a combination of technical, business, finance, and marketing assistance to new and existing recycling businesses.

REDAs, business development specialists with recycling background/expertise placed within state economic development departments, were supported in nine states and one tribe, including Arizona, Delaware, District of Columbia, Iowa, Maryland, Nebraska, Ohio, Oklahoma, Oregon, and the Siletz Tribe (Oregon).

EPA also partnered with the National Recycling Coalition (NRC) and the National Institute of Standards and Technology (NIST), within the Department of Commerce, to develop an information network as part of NIST's Recycling Technology Assistance Program (ReTAP). The network's purpose was to provide valuable information to manufacturers, businesses, innovators and entrepreneurs. It would be linked electronically through NIST's network of manufacturing and networking centers. Information shared included technical information, including emerging knowledge, on the use of recovered materials. This program was implemented and operated under contract to the EPA by the Clean Washington Center and NRC.

[5] U.S. EPA, "Recycling Means Business: EPA's Market Development Strategy Fact Sheet" June 1994.

Nonprofit Organization Recycling Market Development Initiatives

Introduction

Several non-governmental organizations were established in past years to lead RMD initiatives either within a state or region. The benefit of non-government-led initiatives is that they can often be more nimble and adaptable. The benefit of regional initiatives is that market issues can vary from region to region, and state to state, so this enables efforts to be focused where they make sense for that region. Also, regional initiatives allow for collaboration and contribution by many states, effectively pooling resources. Of the organizations described below, only four are still in operation: the Northeast Recycling Council (NERC), the Southeast Recycling Development Council (SERDC), NRC, and the Pennsylvania Recycling Markets Center (RMC).

Clean Washington Center

Formed in advance of the EPA's JTR Program, the Clean Washington Center (CWC) was established in 1991 by law within the Washington State Department of Community, Trade and Economic Development (now known as the Washington Department of Commerce). The role of the CWC was to provide or facilitate business assistance, basic and applied research and development, marketing, public education, and policy analysis in furthering the development of markets for recycled products. The CWC focused on five priority materials – mixed paper, plastics, glass, compost and tires.

In fulfilling this mission, the CWC was to primarily direct its services to businesses that transform or remanufacture waste materials into usable or marketable materials or products for use other than landfill disposal or incineration. One of the functional areas within the CWC was the Business Assistance Group. Business assistance specialists were specifically engaged in providing technical and business expertise to companies seeking to either substitute recycled commodities for virgin materials in their products or create new products from the collected resources. The CWC was also tasked with providing technical assistance, funding demonstration projects, and providing assistance with informing buyers of recycled content products, and marketing those products. The CWS developed a *Recycled Products Directory* and a *Directory of Recycled Content Construction Products*, making them available at no cost to interested parties via an electronic bulletin board. It also conducted market analyses for certain materials, and identified policy changes to alleviate burdens on recovered materials markets.

As described previously, the CWC worked under contract with U.S. EPA and NRC under the ReTAP program. The Center had a closure date defined in the Washington statutes as June 30, 1997. Consequently, it is no longer in existence.

Materials for the Future Foundation (California)

The Materials for the Future Foundation (MFF) was a nonprofit organization formed in 1992 by a collective of Bay Area foundations "to support community-based initiatives that integrate the environmental goals of resource conservation through waste prevention, reuse, and recycling, with the economic development goals of job creation/retention, enterprise development, and local empowerment."[6] The organization focused on low-income communities, communities of color, and areas of high worker displacement, especially in the San Francisco Bay Area. At its peak, MFF had 9-10 staff and averaged 5-6 staff annually in its 12 years of operation. MFF focused on arranging for funding the startup of community-based recycling enterprises, such as Fire and Light in Arcadia, which remains in operation today. MFF provided grants, held recycling venture investment forums, operated a revolving loan fund, and performed research that identified 50 small-scale recycling-based businesses and how to set them up. MFF served as a think tank in some respects, and collaborated with the Small Business and Technology Development Center (SBTDC) to allocate several million dollars in loans, with matching funds required. MFF also received some funding from EPA Region 9 for a military base deconstruction/wood waste market development project. It is estimated that MFF helped

[6] The Materials for the Future Foundation, "Manufacturing Reused Recycled Materials: Fifty Small Business Opportunities," 1998.

create and sustain hundreds of jobs per year. MFF helped bring about a shift in bringing investors into the recycling arena, and making investment in recycling businesses mainstream. MFF ceased operation in 2004 due to loss of foundation funding resulting from the economic downturn, as well as a shift in funding priorities, as Chinese markets were consuming a significant amount of west coast recovered materials.

Northeast Recycling Council

The Northeast Recycling Council (NERC) is a nonprofit, membership-based organization working on behalf of 11 Northeastern states to promote sustainable materials management by supporting traditional and innovative solid waste best practices, focusing on waste prevention, toxics reduction, reuse, recycling and organics recovery. NERC's 11-state region is comprised of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. The organization has five staff and is governed by a ten-member board of directors representing the states in the region plus two ex-officio industry representatives. In addition to its member states, NERC has over 70 non-voting advisory members representing the full spectrum of recycling stakeholders.

RMD was NERC's primary function when it began 31 years ago. It has conducted numerous RMD-related projects and efforts, including:

- A regional recycling economic impact study;
- Four Recycling Investment Forums (funded with JTR funds);
- Research on financing barriers and opportunities, training for economic developers and financiers, training for businesses on how to access funding;
- Work with yellow pages to use recycled content;
- Work with Newspaper Association of America and the State of New York to regional newspapers to use recycled content;
- Recycling markets database for New York; and
- Compost marketing assistance for farms in four states.

Recent RMD projects include:

- A workshop in spring 2018 focused entirely on recycling market development;
- Establishment of a Glass Markets Committee in 2017, to help identify opportunities for expanding local and regional markets for glass; and
- Establishment of a RMD Committee (September 2018) to identify priorities and undertake action to improve markets for recovered materials in the northeast, and a paper subcommittee.

Chelsea Center for Recycling and Economic Development (Massachusetts)

The Chelsea Center for Recycling and Economic Development was launched by the Commonwealth of Massachusetts in 1995 to create jobs, support recycling efforts, and help the economy and the environment by working to increase the use of recyclables in manufacturing processes throughout the state. The Chelsea Center provided a range of technical and business services directly to manufacturers who used, or were interested in using, recovered materials. The Center also worked closely with other providers of technical and business services in the state. The Center was part of UMass Lowell's Center for Environmentally Appropriate Materials.[7] The Chelsea Center for Recycling and Economic Development served the Commonwealth of Massachusetts, though much of its work was technical in nature and likely benefitted businesses nationally. The Chelsea Center worked with a consultant to develop Massachusetts' Recycling Market Development Strategic Plan, published a directory of recycled content product manufacturers in Massachusetts, offered testing services, and facilitated technical research through universities. The Center worked with the Massachusetts Office of Business Development, the Massachusetts Department of Environmental Protection and NERC to host a workshop geared toward educating economic development and finance professionals about recycling. The Chelsea Center ceased operating in 2002.

[7] Chelsea Center Newsletter, Spring 1998.

Mid America Council for Recycling Officials

Mid America Council for Recycling Officials (MACRO) was a multi-state member association that encouraged and coordinated the review and development of regionally-effective programs and policies directed at recycling, market development and source reduction. MACRO worked in cooperation with the public and private sectors, placing special emphasis on the following:

- Coordinating with other member state organizations that address recycling, market development and source reduction issues;
- Undertaking cooperative research projects and exchange of information on program accomplishments among member states;
- Developing recommended standards, guidelines and programs to enhance recycling, market development and source reduction; and
- Collecting and disseminating information and activities related to legislation, industry trends, state programs and related issues of relevant interest.

Member states included: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Pennsylvania, South Dakota and Wisconsin.[8] The Midwestern Office of the Council of State Governments served as secretariat to MACRO. There is reportedly a movement to resurrect this organization.

Mid-Atlantic Consortium of Recycling and Economic Development Officials

The Mid-Atlantic Consortium of Recycling and Economic Development Officials (MACREDO) was an organization that brought together recycling and economic development officials from Delaware, Maryland, Pennsylvania, Virginia, Washington, D.C. and West Virginia, with a mission of stimulating the demand for recovered postconsumer materials, promoting economic growth and creation of jobs, and developing an efficient regional recycling infrastructure. The organization researched recycling market issues, offered a forum for exchange among members, and conducted projects and developed publications on a regional basis. MACREDO differed from state and local initiatives in that it sought to combine individual and local recycling and job creation efforts to maximize regional success.[9]

National Recycling Coalition

The National Recycling Coalition (NRC) is a nonprofit organization with the mission to partner with and facilitate activities between and among nonprofit organizations (NGOs), businesses, trade associations, individuals and government to maintain a prosperous and productive American recycling system that is committed to the conservation of natural resources. The NRC had been active in facilitating discussions and hosting learning opportunities about recycling markets and recycling market development as issues have arisen. The organization started hosting daylong discussion sessions with stakeholders about RMD in 2018 and is currently working to create a resource library. NRC is considering how to expand its role in helping to expand and strengthen recycling markets. NRC's Recycling Advisory Council (RAC) was also involved in earlier efforts to develop and expand markets, including formation of the Buy Recycled Business Alliance in 1993 and, through the Recycling Advisory Council, helped to develop the numeric codes for plastic resins. NRC also worked with ReTAP as part of the Jobs through Recycling initiative in the 1990s.

NRC formerly managed the **Buy Recycled Business Alliance (BRBA)**, which was a coalition of more than 3,000 businesses and organizations committed to increasing their use of recycled-content products and materials in their day-to-day operations (as well as reporting purchasing data to the NRC). BRBA offered educational materials, a quarterly newsletter, and product-specific guides. BRBA reportedly launched an advertising campaign with the *Harvard Business Review* to lobby Fortune 1000 company CEOs to buy

[8] "Regional Recyclable Material Prospectus for the 14 Mid-American States Prepared by The Midwestern Office of The Council of State Governments (CSG) and Resource Recycling Systems (RRS) for the Mid-America Council of Recycling Officials (MACRO) with a grant from the U.S. EPA," 1993.
[9] Jacqueline Vaughn, "Waste Management: A Reference Handbook, 2009, page 241.

recycled. Every other month for one year, the CEOs received their copy of the *Harvard Business Review* with a message from BRBA attached to the cover, which emphasized a "buy recycled" theme, such as construction and renovation, remanufacturing and office products. One report indicated that in 1993 the steering-committee members alone had accounted for $3 billion in purchases of recycled-content products and material. Approximately 10 percent of this investment was for internal purchases (such as office supplies and packaging) and 90 percent for external materials (raw feedstock such as recovered paper, bottles, cans, and products for sale to the general public). The BRBA is no longer in operation.

Some states also launched their own BRBAs, including Massachusetts and North Carolina.

Southeast Recycling Development Council

The Southeast Recycling Development Council (SERDC) is a nonprofit organization that works to unite industry, government, and non-government organizations to promote sustainable recycling in the Southeast. The territory includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. SERDC members consist of a diverse array of industry and governmental representatives committed to improving materials capture in both quantity and quality, which will lead to a strengthening of local economies through recycling. SERDC was established in 2005, has two paid staff, and is governed by a 19-member board of directors representing state government, US EPA and recycling industry stakeholders. RMD activities have included mapping processing and end markets throughout the southeast, conducting research to identify infrastructure gaps in order to target RMD efforts, and conducting recycling economic information studies. SERDC hosts conferences, webinars, forums and workshops where RMD-related topics are also covered, and provides links to market directories and other relevant organizations and activities.

Pennsylvania Recycling Markets Center

The Pennsylvania Recycling Markets Center (RMC) is a nonprofit organization that serves as the keystone clearinghouse of environmental, economic development, and manufacturing resources for end-use support of recycled commodities and products in Pennsylvania. The RMC was established in July 2005 after a multi-year recycling markets assessment and market development strategic planning process led by the Pennsylvania Department of Environmental Protection. The RMC's headquarters are at Penn State Harrisburg with satellite offices near Pittsburgh. The RMC has five staff and is governed by a 13-member board of directors, plus three ex-officio board members. The Mission of the RMC is to expand and develop more secure and robust markets for recovered (recycled) materials by helping to overcome market barriers and inefficiencies. One of its programs, the Recycled Materials Processing Center of Excellence, supports innovative markets for recycled materials by providing a network for recycled materials processors, end users of recycled materials, and nonprofit organizations that influence Pennsylvania materials markets. The RMC has formed an exclusive partnership with GreenCircle Certified, LLC to establish a voluntary, independent evaluation process to certify products made with recycled content. The ultimate purpose of this partnership is to enhance the RMC's mission of building recycling markets in Pennsylvania – by driving an increase in the use of recycled raw materials and encouraging the manufacture and sale of more products with recycled content. RMC's key areas of focus include:

- Economic development – Working with existing and potential manufacturers to incorporate recovered materials in their process;
- Accelerated commercialization – Providing assistance to product and process designers to accelerate time-to-market of new products/processes that use recovered commodities;
- Workforce development – Developing vocational and occupational training that impacts efficient end-use of recovered materials;
- Technical assistance – Providing business consultative assistance, often executed with private service providers or other nonprofit partners; and
- Recycling markets intelligence and outreach portal – Enhancing market communications and methods for acquisition and dissemination of recycling markets, markets development, and materials end-use strategies.

The RMC has provided assistance in enhancing markets for glass, electronics, paper and plastic, and has hosted forums and webinars on a broad array of topics. The Closed Loop Fund is partnering with the RMC to provide $5 million in infrastructure grants for projects that go through the RMC. The funds will be used to provide low-interest loans to municipalities and below-market loans to private businesses that have substantial operations in the Commonwealth. This is the Closed Loop Fund's first formal partnership with a nonprofit.

State Initiatives

Introduction

State governments, through multiple agencies and organizations, can and have played an active and appropriate role in enhancing markets for secondary materials and recycled products. The role of government is generally to identify and address inefficiencies in the marketplace, using many of the tools described above, including:

- Providing information, collaboration, and facilitation.
- Providing financial assistance/funding.
- Having strong buy-recycled programs.
- Implementing policy/regulations.

Most U.S. states over the course of time have had some form of RMD program in place. Many of these programs were initiated as a result of guidance, support and encouragement provided by the U.S. EPA's JTR program. However, in many cases, resources were reduced over time – largely in response to the growing availability of Chinese markets and shifting political priorities – causing most of these states to end or greatly reduce their programs. States known to have strong programs in place currently are profiled below.

Although not every established state-level environmentally preferable purchasing (EPP) program is covered within this working paper, it should be noted that a majority of states nationwide have an EPP program or activities in place for state agencies and some also have EPP related laws. Often local governments are invited to follow state agency purchasing guidelines and often can take advantage of state contracts. These programs encourage or mandate the purchase of environmentally preferable or "green" products and/or supplies, which often includes a requirement for certain product types to include postconsumer recycled content. The National Association of State Procurement Officers has an established Green Purchasing Guide that provides step-by-step information on how to implement a green purchasing program, as well as sample policies from local and state agencies.

California

California has several strong recycling market development initiatives, most of which are executed by the California Department of Resources Recycling and Recovery (CalRecycle), or with CalRecycle as the lead agency. They include:

State Agency Buy Recycled Campaign (SABRC) – A joint program between CalRecycle and California's Department of General Services (DGS) to implement state law requiring state agencies and the legislature to purchase recycled-content products and track those purchases. Each state agency must ensure that at least 50 percent of reportable purchases are recycled products, increasing to 75 percent for most categories as of January 1, 2020, except for paint, antifreeze and tires. Agencies must report annually to CalRecycle.

There are also postconsumer recycled-content requirements for certain product/packaging types.

Minimum Recycled Content Laws – In California, there are several recycled-content laws, including:

- **Rigid Plastic Packaging Container** (RPPC) **Law** – Rigid plastic containers (exception for food/beverage) must be comprised of at least 25 percent recycled content. There are, however, multiple ways to satisfy this requirement.

- **Recycled Content Trash Bag Program** – This program requires that trash bags sold in the state must include 30 percent postconsumer resin or they are not eligible to be purchased by state government or its contractors, nor is the manufacturer/wholesaler allowed to bid on state contracts. This is somewhat of a hybrid between recycled-content law and buy-recycled requirement. The state provides a list of compliant and non-compliant manufacturers and wholesalers.
- **Fiberglass Minimum Recycled Content Law** – Fiberglass insulation manufacturers must use at least 30 percent postconsumer glass. In recent years, the two industries in California have used more than 700,000 tons of cullet annually. In 2016, this was an average of 52.2 percent recycled content for fiberglass insulation produced in state.
- **Glass Packaging Minimum Recycled Content Law** – California manufacturers of new glass containers must use at least 35 percent postconsumer recycled glass, or 25 percent if the cullet (at least half of it) is mixed-color. According to the 2016 report, the average recycled content is 51.2 percent.
- **Expanded Polystyrene Recycled Content Law** – Enacted in 2008, this law prohibits a wholesaler or manufacturer from selling, or offering for sale, expanded polystyrene loose-fill packaging in California unless it is comprised of a specified amount of recycled material as provided in a schedule that increased over time until January 1, 2017, when it reached 100 percent recycled material. The statute, however, does not give CalRecycle authority to enforce the mandate, therefore it would have to be enforced by the State's Attorney General.
- **Newsprint Recycled Content Law** – Like many states, California implemented a recycled content requirement law for newsprint. The law states that at least 50 percent of the newsprint used for printing and publishing by each commercial printer and publisher ("consumers") in California must be recycled content newsprint (although the law was implemented in tiers). The law is still being enforced and entities still report and are expected to meet mandate. However, staff is behind in analyzing data. Preliminary results show six of eight consumers requested exemptions in 2017.
- **Reusable Retail Bag Recycled Content Law** – California voters in November 2016 passed Proposition 67, which ratified a ban on the use of single-use plastic bags at retail establishments established by the passage in 2014 of Senate Bill 270. The law allows stores to sell reusable bags, at a charge of at least 10 cents per bag. Bags must be usable for at least 125 times, and must be machine washable or made from a material that can be cleaned and disinfected. Postconsumer recycled content of reusable/recyclable bags must currently be at least 20 percent, increasing to 40 percent as of January 1, 2020. Bag manufacturers must have their bags certified on a biennial basis, and the manufacturer name and other information must be printed on the bags.

Grants – CalRecycle offers grants to expanding markets for recovered materials, including the Tire Incentive Program, which provides a reimbursement (incentive payment) to eligible businesses that use (recycled) crumb rubber in products or substitute crumb rubber for virgin rubber, plastic, or other raw materials in products. The incentive is $0.10 to $0.50 per pound, depending upon the type of material used in manufacturing. Similarly, the Rubberized Pavement Grant provides grants to local government agencies, state agencies, and tribes to encourage and subsidize the use of tire-derived paving products. In FY 2019, $7.75 million was made available to this program. Another grant program, the Tire-Derived Aggregate (TDA) Grant Program, provides assistance to civil engineers in solving a variety of engineering challenges. TDA, which is produced from shredded tires, is lightweight, free-draining, and a less expensive alternative to conventional lightweight aggregates. In FY 2019, $850,000 was available for this program.

Recycling Market Development Zones – CalRecycle administers a Recycling Market Development Zone (RMDZ) Loan Program to encourage California-based recycling businesses to site new manufacturing facilities and expand existing ones. This program provides low-interest loans for the purchase of equipment and other relevant business costs with the intention of helping California manufacturers increase their processing capabilities and create additional markets for recycled-content products. CalRecycle does this through the RMDZ program. The program provides attractive loans, technical assistance, and direct marketing of products if they are located in a specified zone. Having zones allows CalRecycle to encourage development in appropriate areas, and staff programs locally. In FY 2019, $9.5 million in loans was available at an interest rate of four percent.

Quality Incentive Payments – CalRecycle provides processors of glass collected from curbside and drop-off programs with a per-ton payment of up to $60/ton to facilitate end markets for glass from glass beverage containers. $10 million is appropriated annually for this program.

Information Facilitation and Dissemination – CalRecycle has held and sponsored many forums, workshops and other events to expand the use of recycled content. One example is "lunch and learns" that were held to inform builders about building products made from recycled tires. Another is recycled content product and manufacturer directories, which are made available online, as well as fact sheets regarding benefits of the use of recycled materials. In recent years, recovered tires have been a strong focus. CalRecycle develops RMD-related marketing information for certain recycled materials, including compost and mulch.

Research and Development – CalRecycle has commissioned several studies to help identify valid uses for recovered materials and alleviate concerns about the use of recovered materials. Examples include publications on tire-derived aggregate, appropriate uses for TDA, and benefits of using TDA for sound dampening.

Massachusetts

The Commonwealth of Massachusetts has several types of RMD initiatives and programs currently in place, and additional initiatives that were once in place but no longer are (e.g., a Recycling Markets Directory and RMD grants specifically aimed to overcome market barriers). Current initiatives include:

Environmentally Preferable Purchasing Program – Massachusetts has a strong Environmentally Preferable Purchasing (EPP) program, in which the Operational Services Division (OSD) provides overall EPP program management, oversees efforts to institute minimum standards for the procurement of EPPs, and establishes environmental procurement goals. The primary goal of the EPP Program is to use the Commonwealth's purchasing power to reduce environmental and health impacts of state government and to expand markets for EPPs. It promotes EPPs to local governments and state agencies, allowing local governments and nonprofits to purchase goods and services through state contracts. Containing recycled content is just one product trait supported through the EPP program.

Massachusetts OSD provides the following resources:

- Environmentally Preferable Products and Services Guide
- EPP Products and Services Quick List

All executive agencies in Massachusetts must make all purchases through a state contract or petition to do otherwise, therefore all purchases by these agencies would, by default, include required EPP specifications.

In 2016, $300 million was spent through Massachusetts' EPP program, including over 50 contracts. The Commonwealth does not have the ability to track the purchase of environmental attributes as closely as it would like, due to limits of its purchasing software system, therefore much evaluation has to be done manually. The Commonwealth requires all of its executive agencies to purchase through state contracts, so these entities are purchasing at least the minimum required standards. Massachusetts has a full-time staff person with a strong environmental background dedicated to the EPP program.

Product specifications, including environmental attributes, are reconsidered when a contract is due to be rebid. The EPP staff person is able to then research innovative products and, if needed, put together a committee with more in-depth technical expertise to provide input and review specifications. Massachusetts is also working to allow vendors of environmentally preferable products to enter into a state contract after it has closed, so that preferred products can be made available as soon as possible.

Massachusetts does not have a price preferential, but instead requires the environmental attributes be included as a condition of selling to the Commonwealth.

Buy Recycled Business Alliance – Massachusetts established a Buy Recycled Business Alliance and produced a "Buy Recycled" guide for businesses in 1996 to encourage and provide technical assistance to help them purchase recycled-content products, as well as recognized them when they did so. The Alliance

was affiliated with NRC's national BRBA, and was managed by the Center for Ecological Technology and WasteCap of Massachusetts.

While that program no longer exists, the Massachusetts Department of Environmental Protection (Massachusetts DEP) does encourage businesses to buy recycled through the Business Assistance Program.

Recycling Market Development Grants – The Massachusetts Recycling Market Development Grant program provides grants of $50,000 to $400,000 to eligible recycling-related entities. To be eligible, companies or corporations (for-profit or not-for-profit), must meet certain criteria, including processing/manufacturing certain types of materials, which may change with each grant cycle. The current materials of focus include:

- Container glass;
- Comingled recyclables handled by MRFs;
- Mattresses;
- Clean construction and demolition-generated wood; and
- Bulky rigid and mixed 3-7 plastics.

Recycling Revolving Loans – Administered by BDC Capital, and funded by the Massachusetts DEP, the Recycling Loan Fund provides loans to recycling-related businesses to obtain capital needed. General program parameters include:

- Loans from $50,000 to $500,000 for recyclers;
- Loans up to $1.5 million for anaerobic digestion projects;
- Terms up to ten years;
- Direct loans to solid waste recycling or re-use businesses; and
- Funds can be used for permanent working capital, refinancing, real estate, machinery and equipment, and acquisition financing.

There is priority for food-waste-related businesses, who can receive favorable terms, including an interest rate as low as two percent.

The loan program has helped a diverse array of recycling businesses, including an asphalt plant, an electronics recycler, a paper shredder/recycler, a composting facility, an anaerobic digestion facility, a scrap metal recycler, a foundry, a manufacturer of recycled-content plastic products, a carpet recycler, and a recycled-content paper converter.

Other Incentives – Massachusetts DEP indicates that there is also a permitting fee waiver in place to encourage the development of recycling facilities. There was once a recycling reimbursement program in place, designed to "move the needle" for targeted materials, but that program is no longer in place.

The Chelsea Center used to operate in Massachusetts (described above), and conducted supply-and-demand analyses, technical studies, and provided technical assistance to businesses. The Commonwealth also had developed a RMD strategic plan through the Chelsea Center, along with a statewide supply-and-demand analysis and a recycled-content product manufacturing opportunities assessment.

Massachusetts DEP also supports RMD activities through its involvement with NERC and their regional RMD efforts.

Reducing Contamination – Massachusetts DEP is striving to help reduce the amount of contamination in the recycling stream through a variety of tactics. The state launched its "Recycle Smart" initiative to help generators of materials, particularly residents, understand what materials are acceptable in their municipal recycling program and how the materials are to be prepared. It emphasizes the importance of emptying and rinsing containers, not placing materials in plastic bags, not including plastic film in the recycling, and checking the "Recyclopedia" to see what materials are included in specific programs. Massachusetts DEP also worked closely with The Recycling Partnership for several years on a plan that systematically tackled contamination in numerous towns/cities (both curbside and drop-off), a partnership that would eventually

translate into the creation of a Recycling IQ Kit available to communities across Massachusetts. Based on this work The Recycling Partnership went on to develop a Contamination Kit for national use.

Michigan

Michigan has several RMD efforts in place and currently under development. Re:Source is a state initiative that promotes the use of recycled materials in economic and business opportunities in Michigan. The program selected tools and services to offer based on a survey of 291 manufacturers by the Michigan Economic Development Corporation (MEDC) and the Michigan Department of Environmental Quality (Michigan DEQ). They include the following:

The Recycled Materials Market Directory – The directory was launched in December 2017. It connects businesses looking to recycle materials they generate with recycling businesses who can process those materials.

Re:Source Materials Marketplace Exchange – Currently under development, this exchange will allow for interactivity and communication between businesses looking to find recycled materials for production processes and/or recycle their production waste.

Specialized Training – Training occurs through partnerships with industry associations on sustainable materials management, recycling of waste, and using recycled commodities in manufacturing.

Michigan Recycling Markets Profile – Michigan DEQ will collect and share recycling markets data by industry sector and commodity.

State Agency Staff Outreach and Technical Assistance – State agency staff communicate with Michigan businesses to understand their needs to have access to recycled commodities, and staff provide technical knowledge in the areas of materials management and recycling.

Market Development Grants – Michigan DEQ is working with state lawmakers on statutory amendments to establish a market development grant program to extend to materials beyond tires, and anticipates progress by the end of the year. The market development grants will encourage the growth of the industry and provide research and technology development assistance.

Private Activity Bond Program –The Re:Source program, through the MEDC, provides private bond financing, which provide profitable firms with capital cost savings stemming from the difference between taxable and tax-exempt interest rates. The Michigan Strategic Fund issues private activity bonds on behalf of the borrower and lends the bond proceeds to the borrower. These loans can be made for manufacturing projects, not-for-profit corporation projects and solid or hazardous waste disposal facilities. Loans can be for up to $10 million, although there are no limits on bonds for nonprofits and those funding hazardous and solid waste disposal facilities.

Environmentally Preferable Purchasing – A Memorandum of Understanding (MOU) between the Michigan Department of Management and Budget and the Michigan DEQ created a statewide purchasing partnership to increase the use of environmentally preferred products in state government. As a result of this 2001 MOU, an EPP Work Group was established to provide information and guidance for purchasing environmentally preferred products. In support of this partnership, several fact sheets and environmental purchasing bulletins were released highlighting products that were tested and certified to meet performance and environmental standards. EPP does not appear to be a current focus of Michigan DEQ or the Department of Technology, Management and Budget.

Minnesota

The Minnesota Pollution Control Agency (MPCA) helps start-up and expanding businesses in Minnesota develop uses for recycled materials by offering technical, financial, and marketing assistance. Services and resources offered include the following:

Information About Recyclable Materials – MPCA staff provides information about recyclable materials**,** including glass, plastic, paint, construction-related products, metals, paper, and wood wastes. Market

development specialists provide information through fact sheets, directories, report, conferences, presentations, and on-site visits. Examples of publications include:

- Market Development Guide
- Recycling Activity Summary (2002)
- Value-Added Recycling Manufacturers Industry Profile (2000)
- Innovative Project Information

Research – MPCA conducts research on recycling market conditions, manufacturing technology, and product testing.

Recycling Markets Directory – Provides information about companies that purchase recyclable materials.

Recycled Products Directory – Provides information about companies that manufacture and sell products made using recycled materials.

Referrals for Financing, Business Plan Development, and Facility Siting – Minnesota houses a number of Small Business Development Centers that provide technical assistance to all kinds of businesses.

MPCA often serves as a catalyst for businesses, referring them to other resources. Additional resources in MN include:

MnTAP – Funded by MPCA, the Minnesota Technical Assistance Program (MnTAP) helps Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution and reduce costs.

Minnesota LTAP – The University of Minnesota Local Assistance Program (Minnesota LTAP) conducts workshops and seminars, conferences, customized training, demonstrations, and distance learning to improve the skills and knowledge of local transportation agencies. The goal of Minnesota LTAP is to foster a safe, efficient and environmentally sound transportation system and the program has worked to test the use of glass aggregate in road construction, for example.

Minnesota Small Business Assistance Office – Provides in-depth information that is crucial to business success, yet too costly for many businesses to obtain on their own.

MN Department of Employment and Economic Development – Assists with business financing and guidance.

Enterprise MN – An ISO 9001:2008 certified consulting organization that works with medium and smaller manufacturing enterprises to help them compete and grow profitably.

Additionally, more broad resources might include Port Authorities, Service Corps of Retired Executives, Industry trade associations, applicable federal agencies, and local economic development organizations.

An MPCA representative indicates that in the 1990s the state invested in businesses that manufacture products using recovered materials – including several plastic lumber companies, a deinking mill and an old corrugated cardboard factory. These businesses are still operating, employing many and injecting revenues into the state's economy. The state, according to an MPCA representative, has invested over $10 million over the years, including staff time, to assist these businesses. They would likely not have developed without the investment.

Sustainable Purchasing – In Minnesota, most sustainable purchasing requirements are implemented at the local government level. However, Minnesota Statute 16C.073 requires all public entities to follow environmentally preferable printing practices, including use of paper with a minimum of 30 percent postconsumer recycled content. Per Executive Order 17-12, state agencies must establish sustainability goals and ensure that 25 percent of total expenditures on priority contracts are sustainable purchases by 2025. There is also a 10 percent price preference for recycled content products, to encourage purchasers to specify products containing postconsumer recycled content and durable, reusable, recyclable, and less-toxic products. Minnesota encourages municipalities to maximize value by leveraging state contracts.

According to the 2017 MN Department of Administration's Enterprise Sustainability Report, the state has reached 64 percent of its procurement goal, with six priority contracts being 100 percent sustainable. One barrier is that reporting at the agency level is not possible due to the "SWIFT" software system in use. The program also includes a goal to achieve an agency-generated solid waste compost/recycling rate of 75 percent by 2030. State officials estimate that they have reached 40 percent of the goal (30% recycling and composted).

North Carolina

North Carolina has a robust recycling market development program, which includes the cooperation of many entities and has successfully grown the recycling industry. RMD resources include:

Recycling Business Assistance Center -- North Carolina DEQ has a Recycling Business Assistance Center (RBAC), which conducts research on recycling markets to help find in-state markets for recyclable materials and to analyze business opportunities in the recycling industry. Recycling Market Development Grants are also offered annually. In 2018, 21 companies received a total of more than $570,000. The maximum award is $40,000, with a 50 percent matching requirement. Projects involving the collection, processing or end use of materials in the solid waste stream are eligible for funding. Private and public entities may apply. Grants are intended to fund sustainable investments in equipment and buildings necessary for increasing the capacity of a recycling business to divert more materials from disposal and into economic use, not operating costs. With a staff of six FTE (when fully staffed), the RBAC also provides tools and services to help expand markets for recyclable materials, including:

- **NC Recycling Markets Directory** – Provides essential links between businesses, industries, and local governments searching for markets for recyclables and the companies that accept the materials for reprocessing and reuse. The directory is continuously updated and fully searchable.
- **North Carolina Waste Trader** – A free online marketplace for discarded or surplus materials and products, designed to divert recoverable materials from disposal, while providing feedstocks and supplies to potential users.
- **Pricing Information** – RBAC tracks pricing trends for basic recyclable commodities. Market pricing is gathered through contact with three recycling processors located in the eastern, central and western regions of the state.

RBAC works with businesses to assess their needs and point them to additional recycling market development resources, including:

The Economic Development Partnership of North Carolina (EDPNC) – A nonprofit public-private partnership between the N.C. Department of Commerce and private companies throughout the state EDPNC serves as the state's economic development organization, with a goal of creating jobs and by recruiting and supporting businesses, providing international trade assistance, and providing assistance to small-business start- ups. EDPNC offers financial incentive programs to help local communities attract and support new, expanding, or relocating businesses.

The North Carolina Department of Commerce (DOC) – DOC is North Carolina's lead agency for economic, community and workforce development. In partnership with the DOC, RBAC employs an industrial recruiter dedicated to recruiting new recycling industries to North Carolina.

Waste Reduction Partners (WRP) – WRP provides technical assistance to businesses through the expertise of retired and volunteer engineers. WRP conducts on-site waste and energy reduction assessments and provides consulting services to improve efficiency and identify cost-saving strategies. Services are confidential and at no cost to the client. Services are provided with the support of government and utility-sponsored grants.

Polymers Center of Excellence (Polymers Center) – The Polymers Center is a Charlotte-based nonprofit that supports the plastics industry by providing training, material testing, and technical support using its state-of-the-art molding, extrusion and testing equipment.

NC Small Business and Technology Development Center (SBTDC) – The SBTDC provides knowledge, education, and other support to entrepreneurs and small businesses to enable them to innovate and succeed. Examples include counseling services, trainings, technical assistance and online resources. As an inter-institutional program of the University of North Carolina System, the SBTDC has the ability to leverage the resource of the state's 16 campuses, which includes access to faculty, staff, graduate student teams and interns for client-centered projects.

NC Industry Expansion Solutions (IES) – IES is an extension unit of NC State University's College of Engineering, serving industries ranging from manufacturing, healthcare, education and research, government, military, energy and nonprofits to make them more efficient, profitable, environmentally sustainable and globally competitive.

NC Department of Transportation Resource Conservation Program – An initiative that promotes and tracks use of recovered materials in transportation uses. District, resident and roadside environmental engineers, as well as any other working sections within the DOT that may have utilized recycled solid waste, or reused materials in construction and maintenance projects are asked to report annually to the program.

Additional resources include Waste Reduction Partners, which provides environmental/waste reduction consulting to businesses, and the Carolina Recycling Association, the Carolinas-based trade association that offers educational and networking opportunities and encourages public-private partnerships to advance recycling throughout the Carolinas.

NC DENR estimates there are more than 16,200 direct recycling industry jobs in North Carolina, and that total estimated annual payroll for North Carolina recycling businesses is $664 million.

South Carolina

South Carolina has a strong manufacturing base, and the Department of Commerce, with cooperation from the Department of Health and Environmental Control (DHEC), have worked to strengthen the recycling industry in South Carolina.

Recycling Market Development Advisory Council – South Carolina has a Recycling Market Development Advisory Council (RMDAC) comprised of 14 governor-appointed members representing the solid waste and recycling industries, government, higher education, and citizen-based affiliations. This council tracks the success and growth of the state's recycling industry and makes annual policy and program recommendations to the governor and South Carolina General Assembly. The South Carolina Department of Commerce provides staff resources to the RMDAC.

SC Department of Commerce – The Recycling Market Development staff at the South Carolina Department of Commerce provides business matchmaking support, administers one-on-one materials management consultation, works with existing and emerging markets for materials, and tracks the economic impact of the recycling industry. Over the last five years, the Department of Commerce has helped facilitate the recycling industry recruitment of 2,477 jobs, $1,129 million in capital investment, and 42 new or existing companies investing in South Carolina. In calendar year 2017, five recycling firms announced more than $500 million in capital investment and approximately 200 new jobs in South Carolina. With more than 500 recycling-related companies now calling South Carolina home, this $13 billion sector has become an important pillar of the state's economy. SC Department of Commerce also helps provide information regarding business siting, industrial park development, speculative building development, regional water and sewer development, and product and infrastructure development.

Coordinating Council for Economic Development – The SC Coordinating Council for Economic Development, administered by SC Department of Commerce and established in 1986 by the General Assembly, was formed in response to a general need for improved coordination of economic development efforts by those state agencies involved in the recruitment of new business and the expansion of current enterprises throughout the state. The Council consists of the heads or board chairs of 11 state agencies concerned with economic development: SC Department of Commerce, SC Ports Authority, SC Department of Parks, Recreation & Tourism, SC Department of Agriculture, SC Technical College System, SC Research

Authority, SC Department of Employment and Workforce, SC Department of Revenue, SC Jobs-Economic Development Authority, SC Department of Transportation and Santee Cooper.

Tools that South Carolina uses to attract manufacturing, recycling, and other businesses include:

- Workforce training
- Property tax exemptions (at the discretion of local governments)
- Property tax abatements (for certain types/sizes of businesses, at the discretion of the local government)
- Grants and incentives
    - **Economic Development Set-asides** – Discretionary funding for site assessments and road development, managed by the Coordinating Council for Economic Development.
    - **Governor's Closing Fund** – Generally awarded to assist with the costs of real property improvements or other road or infrastructure improvements. This fund is dependent on annual appropriations from the South Carolina General Assembly.
    - **Rural Infrastructure Fund** – Funds to assist qualified counties in the state's rural areas by providing financial assistance for infrastructure and other activities that enhance economic growth and development. It can be used for job creation and/or product development.
    - **Job Development Credit** – Through South Carolina's Enterprise Program, this credit provides companies with funds to offset the cost of locating or expanding a business facility in SC. It allows South Carolina to lower the effective cost of investment and positively contribute to a company's bottom line and profitability. Personal withholding taxes of new employees are used to reimburse qualified, approved companies that add value to South Carolina and the community in which they locate. These reimbursements are for eligible capital expenditures (e.g., land, building, site development, pollution control equipment or infrastructure) associated with projects creating new full-time jobs that also provide health care benefits for South Carolina citizens.
    - **Port Volume Increase Credit** – South Carolina provides a possible credit against income taxes or withholding taxes to entities that use state port facilities and increase base port cargo volume by five percent over base-year totals. To qualify, a company must have 75 net tons of non-containerized cargo or 10 loaded TEUs transported through a South Carolina port for their base year. This is at the discretion of the Coordinating Council for Economic Development.
    - **Funds for Retraining Available Employees for Existing Industry** – Eligible businesses engaged in manufacturing, processing or technology intensive industry may be eligible for a refund of up to $1,000 per eligible full-time employee per year for retaining costs. The retaining must be necessary for the business to remain competitive or to introduce new technologies. The retraining must be approved and coordinated by the technical college(s) under the jurisdiction of the State Board for Technical and Comprehensive Education serving the designated region where the company is located.

Business Recycling Directory – Provides information about businesses in the recycling industry in South Carolina.

The state of South Carolina has an "Environmentally Preferred Purchasing Policy (2009)," under which all South Carolina state agencies and publicly funded colleges and universities are to consider environmental factors of a product/service (including recycled content). The state has an agency-wide goal that 25 percent of all products purchased statewide include postconsumer recycled content. A price preferential of 7.5 percent shall be applied to recycled-content products. Also, the highest recycled content practicable should be purchased, and should be at least that stipulated in the EPA's Comprehensive Procurement Guidelines. SC also has a guide for recycled-content products.

It is estimated there are over 500 recycling companies in South Carolina, including collectors, processors, recycled product manufacturers and equipment makers. The economic impact of recycling in SC exceeds $13 billion. Additionally, for every 10 jobs in recycling, there are 14 others created in the SC economy. A

brief review of the most recent RMDAC minutes indicates that minimizing food waste and growing compost markets is a current focus in South Carolina, as is the "Your Bottles Means Jobs" campaign and glass, particularly in upstate South Carolina.

Your Bottle Means Jobs – The Your Bottle Means Jobs campaign promotes the importance of recycling plastic bottles in North and South Carolina, as the Carolinas' plastics recycling industry currently employs roughly 3,500 (and growing). It is estimated that only roughly 30 percent of the bottles and jugs generated within the Carolinas are being captured for recycling.

The campaign is sponsored by several corporations, industry organizations and local governments, including the American Chemistry Council, More Recycling, and the Solid Waste Association of North America.

Local Government Initiatives

Introduction

Local governments can be effective actors in spurring the expansion and development of recycling markets. Effective and appropriate roles for local governments include:

- Encouraging or mandating local agencies' purchase of recycled-content products;
- Funding and facilitating business incubation projects;
- Creation of resource recovery parks and/or offering permitting assistance; and
- Implementing recyclable materials quality campaigns.

Examples of specific programs are provided below.

Alameda County, California EPP Program

Alameda County passed an environmentally preferable purchasing policy resolution in 2011. The resolution acknowledges that, with a purchasing power of $100 million annually, the county is in a position to influence the marketplace to support environmentally preferable alternatives and foster green jobs. The EPP policy describes four priority product categories, one of which is products with recycled content. The General Services Agency serves as the lead in implementing the policy framework and assessing and reporting on its success annually. Some of the specifications and recommendations that have been successfully implemented include those for office paper, carpet and janitorial and office supplies. Products must be on par with non-EPP products in terms of pricing and quality.

King County, Washington EPP and LinkUp Programs

King County, Washington has a sustainable purchasing program in place that focuses on clearly communicating to employees, suppliers, and other stakeholders, that the county desires products and services that deliver key sustainability benefits and will increasingly be a criterion in purchasing. The Sustainable Purchasing Program provides county personnel with information and technical assistance to help identify, evaluate and purchase economical, effective and sustainable products and services. The Sustainable Purchasing Guide provides guidance on the types of products that contain recycled content, and the goals the county has adopted by product type. For example, the county has a goal of purchasing only 100 percent recycled-content office paper and was in 97 percent compliance in 2017. Some goals are presented in the King County Strategic Climate Action Plan. The guide uses federal recommendations for environmental labels and certifications. The county provides periodic sustainable purchasing training sessions as well.

King County also has a program called LinkUp that works to expand markets for recyclable and reusable materials by facilitating an interactive community of businesses, public agencies and other organizations. Each year LinkUp selects focus materials that are identified as priorities for King County. The current materials are:

- Carpet,
- Mattresses,
- Asphalt shingles, and
- Textiles.

Projects may include technology validation, technical assistance, networking, supply chain facilitation, education and training, and strategy development. In addition, the program provides free technical and/or marketing assistance to selected businesses, agencies and organization in order to achieve market development goals. Recipients of LinkUp assistance are selected through a competitive process. The LinkUp program also distributes a quarterly newsletter to keep stakeholders up to date on emerging news.

California Recycling Market Development Zones – Oakland/Berkeley and Southern Alameda County

As described above, CalRecycle has a Recycling Market Development Zone loan program that is administered locally through field staff in each designated zone. CalRecycle established the Oakland/Berkeley and Southern Alameda County areas as two of 40 Recycling Market Development Zones eligible for state-assistance in the development of recycling-related businesses. The zones have provided loans for the expansion of 10 businesses and the creation of 109 jobs in the local economy. Some of the companies that have expanded in Alameda County include:

- **Ecology Center**: A nonprofit recycling center in Berkeley;
- **Sutta Company**: A for-profit commercial recycling service in Oakland;
- **McCoy Sanitary Supply**: An industrial supply house that is expanding to recondition bulk industrial bags; and
- **Schnitzer Steel:** A major scrap metal dealer that is expanding to process appliances and other metallic discards.

The program has been instrumental in providing financing and technical assistance to new and existing recycling-related businesses.

Phoenix, Arizona Resource Innovation and Solutions Network (RISN) Incubator

Reimagine Phoenix is the city's initiative to increase its waste diversion rate to at least 40 percent by 2020 and to better manage its solid waste resources. As part of that initiative, the city and Arizona State University (ASU) launched the RISN. The RISN Incubator is an example of a public/private partnership that aims to bring the city closer to reaching its diversion goals. The RISN Incubator is a niche business accelerator for entrepreneurs in the early stages of waste-to-product innovation, with the goal of moving a circular economy in the Phoenix area forward further and faster.

Selected ventures that focus on waste diversion and improvements in processing or utilization of waste as a raw material for new products or energy will have access to resources and support from ASU and the City of Phoenix, to develop new solutions that establish products and services that contribute to the regional development of a vibrant circular economy. Venture concepts eligible for the incubator include, but are not limited to:

1) Conversion of solid waste into new material or energy;
2) Services that divert, reuse, or recycle;
3) Software applications around sustainability (waste, organic material, reuse, recycling); and
4) Design services that focus on sustainability.

The RISN Incubator assists and mentors aspiring new ventures within a wide range of developmental stages, and has two sub-programs for ASU students:

- Design Challenges; and
- Design Hacks – A competition in which teams can develop technologies, products, services, solutions, methods, etc., that reduce, reuse, or divert a targeted material. The inaugural Trash Hack, which took place in fall 2017, involved 46 students – across several different majors – finding solutions to overcome plastic waste. The winning team, Recycleanse, won with an idea that incorporates hardware and software to provide data analytics to decrease contamination in recycling.

As of May 1, 2018, the Reimagine Phoenix initiative has resulted in:

- Ten products being launched;
- Two patents being filed;
- The creation of 19 internships, 26 full-time jobs and four part-time jobs;
- Raising $1.34 million in capital; and
- Generation of $3.15 million in revenues.

The RISN Incubator is funded by:

- U.S. Economic Development Administration,
- City of Phoenix,
- ASU Rob and Melani Walton Sustainability Solutions Initiatives, and
- ASU Entrepreneurship+Innovation.

Charlotte, North Carolina

Circular Charlotte is a new circular economy model designed to produce "zero waste" and boost economic development. The city indicates that the 900,000 tons of waste it disposes annually represents a residual value of roughly $111 million per year. By adopting a comprehensive waste diversion strategy, Charlotte could create more than 2,000 jobs by harnessing material instead of disposing this material in landfills. The city has goals of becoming a global leader in environmental sustainability, balancing economic growth, while preserving natural resources. Part of this commitment includes using innovative ways to achieve this mission. Circular Charlotte is a way to achieve all environmental goals, as well as improve the quality of life for all (current and future) Charlotteans. As part of this effort, the following “business cases” will be developed:

- **Innovation Barn** – Envision Charlotte, a public-private organization, will build and maintain the Innovation Barn. The Innovation Barn will assist entrepreneurs (who might not otherwise be able to afford to develop their circular economy business ideas) by providing them with equipment, expert advice and commercial feedback, to develop circular economy business ideas at a startup incubator based at the Innovation Barn. It is slated to open in August 2019.
- Creation of 300 jobs by developing a circular industry based on feeding 50,000 tons of food waste to black soldier fly larvae, which can be converted into pellets to use as feed on North Carolina poultry farms.
- Savings of 345,341 gallons of water by developing a closed-loop textiles chain for linens and uniforms used in hotels and hospitals, cutting demand for environmentally damaging cotton and polyester production and offering opportunities to work in a whole new industry.
- Avoidance of 41,186 metric tons in CO_2e emissions by transforming concrete from demolition sites and powder created from discarded glass into new concrete, also creating new jobs.

Community partners that support these initiatives include the University of North Carolina-Charlotte, Wells Fargo, Chef Clark Barlowe (Heirloom Restaurant), and Charlotte-Mecklenburg Schools. As Circular Charlotte grows, so will the amount of community partners.

The concept for Circular Charlotte has been under consideration for several years and stems from research conducted on cities in the Netherlands and via the Reimagine Phoenix initiative.

Austin, Texas Local RMD Initiatives

The City of Austin's Recycling Market Development program is a joint initiative between Austin Resource Recovery and the city's Economic Development Department (EDD). Through this program, the city:

- Provides and actively facilitates an online materials exchange, which is run by the U.S. Business Development Council through a contract with the City;
- Provides a reuse directory for profits and nonprofits;
- Hosts an annual competition to challenge social entrepreneurs to create business solutions for repurposing other businesses' waste -- [Re]Verse Pitch Competition;
- Implements a Buy Recycled Program;
- Distributes a monthly email, *Zero Waste Entrepreneurs*, for reuse/recycling-related businesses;
- Provides several financial tools/services, including a Family Business Loan Program, as well as an Enterprise Resource Guide, which points businesses to financing opportunities and other resources;
- Revises economic development policy to encourage innovative small-business startups (e.g., affordable commercial space for small businesses, middle-skill job creation, and increased employment for hard-to-employ populations);
- Provides small business assistance.
- Develops/identifies recycling-related data (e.g., economic benefits) to garner support; and
- Identifies recycling-related manufacturing in Texas.

The City of Austin, as described above, also has a "Recycle Right" campaign, where the city succinctly provides information about what can and cannot be placed in the blue recycling cart.

Current Private-Sector Initiatives

Several private industry initiatives have implemented programs that strengthen domestic markets, either by increasing or improving supply, or by stimulating demand for recovered materials. Organizations and initiatives may focus on cross-commodity efforts, or be commodity-specific in nature. Known initiatives are described below.

Cross-Commodity Organizations and Initiatives

ASTRX

ASTRX: Applying Systems Thinking to Recycling is a joint initiative between The Recycling Partnership and The Sustainable Packaging Coalition (SPC) that aims to "build a roadmap for a stronger American recycling industry." ASTRX will examine each element of the recycling system, identify barriers to recovering more high-quality materials and develop solutions that support each element and thus help the recycling system as a whole, including end markets. To that end, ASTRX is coordinating the SPC's End Market Industry Leadership Committee called "Next Markets." Consisting of brands, retailers, suppliers, manufacturers and other companies, this group is working together to explore how companies can create more demand for recycled materials. Participants in the committee must be Sustainable Packaging Coalition (SPC) members. The goal of the committee is to identify ways to increase demand for recycled content in durable goods and packaging. ASTRX is also conducting research on material flow issues at the MRF and reprocessor levels.

Closed Loop Partners

Closed Loop Partners invests in sustainable consumer goods, advanced recycling technologies and the development of the circular economy through various means. Funded by corporate investors, initiatives of Closed Loop Partners include:

- **Closed Loop Fund** – Project finance that invests in scaling recycling infrastructure and sustainable manufacturing technologies that advance the circular economy.

- **Closed Loop Ventures** – Investing in sustainable consumer goods companies, advanced recycling technologies and services related to the circular economy.
- **Closed Loop Leadership** – Private equity fund investment to "scale up" circular economy businesses.
- **Center for Circular Economy** – Research and development initiative that links entrepreneurs to academia, industry and government and is a hub for business acceleration, investment, research and policy across four verticals: food, textiles and apparel, packaging, and the built environment. Sub programs include:
    - **NextGen Consortium** – A multi-year partnership of food-service industry leaders to address single-use food packaging waste globally. (A current focus is on the next generation of hot and cold-beverage paper cups – the NextGen Cup Challenge); and
    - **The Circular Innovation Accelerator** – brings together industry experts, academic researchers, and entrepreneurs who are solving for today's most pressing challenges in design and re-use – also focused on the NextGen Cup Challenge.
- **Circulate Capital** – An investment management company that originated as Closed Loop Ocean, with the focus of facilitating investments in waste management and recycling solutions in Southeast Asia. The Ocean Conservancy is a partner in the effort.

The Ellen MacArthur Foundation

The Ellen MacArthur Foundation was launched in 2010 to accelerate the transition to a circular economy. Since its creation, the charity has emerged as a global thought leader, establishing the circular economy on the agenda of decision makers across business, government and academia. It has established core philanthropic and academic partners to fulfill its mission. Its global initiatives focus on textiles, plastics, and food. The New Plastics Economy, for example, aims to create a circular economy for plastics. Through this initiative, many global brands have pledged to use all reusable or recyclable packaging by 2025, and many have also included commitments to increase their use of recycled-content plastic. Additional brands have made this commitment outside of the New Plastics Economy framework. The foundation is supporting innovation through innovation contests with substantial financial awards and membership in an accelerator program.

Materials Recovery for the Future Project (MRFF) Program

The Materials Recovery for the Future (MRFF) research program is sponsored by the Foundation for Chemistry Research & Initiatives (a 501(c)(3) research organization administered by the American Chemistry Council) that seeks to demonstrate the technical and economic feasibility of recycling household flexible plastic packaging from municipal residential single-stream recycling programs. To date, the project team has formed a partnership with J.P. Mascaro and Sons, Inc. (Berks County, PA) to conduct a pilot project to test the recovery of flexible plastic packaging, including films, wraps, bags and pouches, which are generally not recycled, but are touted as being the fastest growing type of packaging. The initiative is being funded by packaging manufacturers, brand owners, chemical companies, and plastic industry organizations including the Canadian Plastics Industry Association, ACC, and the Plastics Industry Association.

New End Markets Opportunities (NEMO) for Film Project

The New End Markets Opportunities for Film project is being undertaken by the Plastics Industry Association, and aims to identify new, cost-effective markets for postconsumer low-density polyethylene (LDPE) and high-density polyethylene (HDPE) film, which is typically collected at retail drop-off locations. To date, the project has identified a potential alternative to plastic lumber and new bags – the common end markets for recovered film and wrap – a binding agent in asphalt. The NEMO project also tested less costly ways of processing recovered plastics to make recycling of postconsumer plastic film more cost effective, and additional work will consider other end uses, too.

The Recycling Partnership (TRP)

The Recycling Partnership is a nonprofit organization supported by industry that aims to improve recycling systems nationwide. One of The Recycling Partnership's current initiatives is to develop tools and provide direct technical assistance to communities to help them reduce contamination in single-stream recycling – thus improving the marketability of recovered materials.

The Sustainable Packaging Coalition (SPC)

The SPC is a joint member of ASTRX, as described above, but has developed its own tools and projects aimed at ensuring that packaging is designed and managed in a sustainable way all along the supply chain. SPC's How2Recycle labeling campaign encourages brand owners and packaging manufacturers to include recycling instructions on packaging. SPC, in cooperation with the Center for the Circular Economy (Closed Loop Partners), has launched an innovation challenge to identify recovery solutions for multi-material flexible packaging.

Commodity-Specific Organizations and Initiatives

Multiple trade associations and initiatives, which often are established collaboratively with multiple organizations, have worked on enhancing markets for their respective commodities or overcoming barriers impeding sustainable recycling of their commodities. Examples of these organizations and initiatives are described below.

The Association of Plastic Recyclers (APR)

APR is a national trade association representing companies who acquire, reprocess and sell plastic for recycling, and whose members provide more than 90 percent of the postconsumer plastic processing capacity in North America. APR initiated the Recycling Demand Champions program to help establish "demand pull" for postconsumer residential mixed plastics, in response to China's import limitations, and in order to reduce reliance on export markets and to boost the circular economy. Through this program, companies signing up as demand champions commit to purchasing "work in process" products such as pallets, bins, etc.) made from postconsumer plastic. At the time of this writing, the effort had 15 participants, such as Procter & Gamble, QRS, Berry Plastics, Denton Plastics, Envision Plastics and Target. And, in the first year of the program, the 10 inaugural participating companies increased their total use of postconsumer resin (HDPE, LDPE, Polyethylene Terephthalate and Polypropylene) by 6.8 million pounds.

The Carton Council

The Carton Council, formed in 2009 by a group of carton manufacturers including Tetra Pak, Elopak, SIG and Evergreen Packaging, has spent the last decade developing markets for North American postconsumer cartons by:

- Facilitating the linkage of supply to brokers/end markets;
- Identifying opportunities to make improvements in the quality of supply;
- Working to expand collection infrastructure; and
- Identifying and promoting practices that encourage recycling.

Foodservice Packaging Institute

Founded in 1933 as the Cup and Container Institute, the Foodservice Packaging Institute (FPI), as it is known today, is the trade association for the North American foodservice packaging industry, representing 70 converter and suppliers and approximately 90 percent of the North American market. FPI represents all forms of foodservice packaging and, similar to the Carton Council, spends its time working to increase the recyclability and compostability of foodservice packaging.

FPI also has an offshoot entity, the Foam Recycling Coalition, which was launched in 2014 to support increased recycling of foodservice packaging made from expanded polystyrene foam.

Glass Recycling Coalition

The Glass Recycling Coalition (GRC) is an organization comprised of roughly four dozen glass manufacturers, haulers, processors, materials recovery facilities, capital markets, end markets and brands, among others, that use glass to showcase their products. The GRC works to enhance glass recycling markets and provides information and tools and conducts research for local and state government agencies and state recycling organizations, such as its glass recycling map, which lists end markets, MRFs, processors and drop-off locations across the US that accept glass.

American Chemistry Council

Representing the leading companies and organizations in the business of chemistry, the ACC supports a number of initiatives aimed at increasing the quality and quantity of plastic collected for recycling, such as the Terms & Tools Project, the Polystyrene Food Packaging Group, the Flexible Film Recycling Group and its Wrap Recycling Action Program. ACC funds extensive research efforts to benchmark the plastic recycling infrastructure and how much material is collected annually. It supports resources such as plasticsmarkets.org and technical assistance to businesses and communities across the U.S.

4. Analysis of Recycling Market Development Initiatives

In order to analyze the effectiveness of recycling market development initiatives, it is helpful to have a framework for understanding specifically the purpose of RMD and RMD tools and mechanisms. Effective recycling market development entails the use of tools and mechanisms strategically aimed at overcoming barriers impeding movement of recyclable materials from the waste stream into viable end markets. In this section, key barriers and mechanisms for addressing them are described, and examples from past and current recycling market development programs are provided to help demonstrate more concretely how this is accomplished.

Potential Barriers to be Addressed

There are numerous barriers to marketing or expanding markets for recovered materials. In some cases these barriers impact more than one material type (cross-material barriers) and in some cases these barriers are material specific. Types of potential barriers and examples of each are provided below.

Imperfect Information and Information Flow

Market players may make inappropriate or uninformed decisions due to a lack of information, lack of access to existing information or misinformation. Imperfect flow of information can impede both supply and demand. For example, if generators are unaware that a certain material type can be recycled (e.g., PET containers), then they will not recycle them. Similarly, if they are not aware that materials must be rinsed, then quality is impacted. More broadly, if generators mistakenly believe that materials they place in the recycling bin end up in the landfill anyway, they will not separate them out, impacting supply. On the demand side, manufacturers may have the misconception that recycled-content resins are inferior or not suitable for use in their products. Similarly, consumers may shy from recycled-content products if they have a false idea that the product is of lesser quality.

In some cases, a lack of technical information may need to be overcome in order to formulate a product with recycled content or with an increased percentage of recycled content. Significant testing, for example, may be required to show that asphalt made with recycled glass is safe and strong enough to withstand all seasons of weather and driving impacts. Similarly, new technologies (e.g., depolymerization) are continuously being developed and perfected that enable currently non-recycled plastics to be chemically recycled into resins that behave like virgin resins.

Some entrepreneurs may have technical knowledge about how to manufacture a product using recycled content, but may not have the business skills to develop a business plan, jump through all of the

administrative and regulatory hoops required to start up a business, or may lack information about financing and funding opportunities.

Uncertainty about Future Market Conditions

Uncertainty of future market conditions can also impact both supply and demand. If a MRF is not sure it can generate adequate quantities of a particular grade of material to sell full truckloads on a timely basis (e.g., polypropylene tubs), it may not go through the effort of sorting the material out. The material may then end up as residue or in a lower-value mixed plastic bale, thereby reducing supply or potentially increasing the cost of supply. On the supply side, a manufacturer may not wish to go through the process of retooling its plastic thermoform line to manufacture a product with recycled resin if the company is uncertain it will be able to purchase adequate quantities of resin at a quality and price that will allow fulfillment of customer orders effectively and profitably.

Mispricing Due to Undervaluing Public Benefits and Costs

In efficient markets, the prices of goods fully reflect the costs and benefits of those goods to society. In actuality, however, the prices of goods usually only reflect the costs and benefits to the buyer and seller – not the impacts to the rest of society. The benefits of recycling that are borne by the public (conservation of resources, reduced pollution, avoided landfill costs, reduced greenhouse gas emissions) are not reflected in the product price. Similarly, some would argue that those that mine or extract virgin materials do not take into consideration the long-term environmental damages caused by such efforts, such as the harming of wildlife that results when extracting resources, and the eventual resource depletion. Failure to internalize environmental and resource depletion-related costs makes it more difficult for secondary materials to compete against virgin materials in the marketplace.[10] Similarly, failure to incorporate the associated environmental and resource depletion-related costs of landfilling can inhibit recovery of secondary materials, which impacts the relative price of secondary materials.

High Transaction Costs

Each transaction in the marketplace carries a certain cost, such as time to conduct research and legal and regulatory activities. High transaction costs may impact supply, for example, if a MRF is unwilling to purchase an optical sorter to positively sort out a material and instead allows that material to end up in residue. High transaction costs might also limit demand if, for example, a manufacturer wants to include crumb rubber from recycled tires in its manufacturing process, but must install a costly infeed mechanism in order to do so – this might be deemed cost prohibitive.

Difficulties Reaching Economies of Scale

A manufacturer or processor may resist including recycled content in its product if it believes it will not be able to source an adequate supply of the recovered material, or if it is uncertain about the ability of the technology developed on a small scale to “scale up” without adverse results. A manufacturer of glass pavers, for example, may not have adequate capital (or ample supply of suitable feedstock) to construct a facility with sufficient production capacity to make a profit.

Aversion to Risk

Many buyers and generators of recyclable materials (particularly municipalities), as well as product suppliers, avoid risk. If a type of package has been adequately working for a customer for years, a packaging manufacturer may not want to suggest that the customer switch to a package that includes a postconsumer recycled-content resin. Both parties may fear upsetting the apple cart. Moreover, the supplier may fear losing the customer to a different manufacturer, therefore risk can impact demand. Risk can also affect supply if a processor is unwilling to implement a new technology or process to deliver processed material into the marketplace.

[10] Thepriceofoil.org.

Unrestricted Nature of Technical Information

Technical innovation can lead to new levels of recycling activity by developing new recycled-content products and new collection, processing and manufacturing technologies. However, despite the protections afforded by the patent system, technology development can be inhibited if it is thought that competitors can replicate innovations at a low cost. Technical information is a “public good” and is therefore inexpensive or free to obtain and use unless guarded by legal protections.

Regulatory/Policy Barriers

In some cases, regulatory barriers can hinder recycling market development. Recycled content for food contact packaging, for example, requires U.S Food and Drug Administration approval (i.e. letter of objection or a no objection letter), through its Food Contact Notification Program. Using some postconsumer materials requires additional administrative processes. Similarly, many highway departments require significant testing of new road mixtures (e.g., those using recycled crumb rubber or glass), even if significant testing has been conducted elsewhere.

While these barriers are intended to protect the public, they can also discourage manufacturers from using recycled-content feedstock. Another example is local and state regulations that treat processing of recovered materials as waste, thereby requiring restrictive zoning, reporting, and special permits. This can make siting a facility challenging, add to costs, and discourage processing businesses. Also, some states have implemented polices intended to enhance recycling markets that were not updated over time or were weak to begin with, so they do not serve their intended purpose of advancing the use of recycled materials. For example, many recycled-content newsprint laws are no longer monitored and enforced because they have become less significant (or obsolete) and less feasible, with the decline of demand for newsprint and its manufacturing infrastructure.

Tools Used to Address Recycling Market Barriers

In order to analyze the effectiveness of recycling market development initiatives, it is first important to understand specifically the specific purpose of RMD and of specific initiatives. Effective recycling market development entails the use of tools and mechanisms strategically aimed at overcoming barriers impeding movement of recyclable materials from the waste stream into viable end markets. In this section, key barriers and mechanisms for addressing them are described and examples from past and current recycling market development programs are provided to help demonstrate more concretely how this is accomplished.

There are several tools and mechanisms that recycling market development programs can use to address market barriers. These are described below, with best practices and practices to avoid, as identified. These barriers and examples of strategies to address them are summarized in Table 1.

Table 1: Market Inefficiencies and Tools to Address Them

Mkt. Inefficiency	Market Development Tools				
	Information and Technical Assistance	**Buy Recycled**	**Finance & Funding**	**Taxes, Fees and Other Incentives/Disincentives**	**Regulation/Policies**
Imperfect Flow of Information	Market Data Recycling Mkt. Directories Waste Exchanges Business Outreach Procurement Training Newsletters Best Practices Guidance Facilitation, Workshops, Conferences; Facilitate/Sponsor Innovation Competition	Directory of Recycled Product Vendors Purchasing Policies and Guidelines Promotion to Consumers, Retailers, Manufacturers	Grants (to address information gaps) Loan Guarantee Investment Forum Preparation of Prospectus Innovation Competition Awards		Product Labeling (recyclability, how to recycle, recycled content labeling) Specifications Certification Requirements
Uncertainty About Markets/Aversion to Risk	Market Projections Studies Demonstration Projects Testing Model Contracts	Guaranteed Purchases Cooperative Purchasing Price Preferences	No/Low Interest Loans and Loan Guarantees Bond Financing Equity Financing Royalty Financing Risk-Sharing Via Contract Terms Subsidies		Utilization Requirements (e.g., paper must be 50% PCRC) Voluntary Use Agreements (e.g., re PCRC) Removal of Overly Burdensome/Restrictive Regulations (add somewhere)
Mispricing Due to Undervaluing Public Benefits/Costs and Subsidies to Virgin Material Extraction	Outreach, Education GHG impact analysis information LCA information Certification System	Bid and Material Specs Price Preferences	No/Low Interest Loans Grants Public/Private Cost-Sharing	Tax Credits Tax Exemptions Incentive Payments (e.g., subsidy, rebates) Tax on Virgin Materials Carbon Credits Permit Fee Waivers	Product Labeling Utilization Requirements Voluntary Use Agreements
High Transaction Costs	Market Data Recycling Directories Waste Exchanges	Cooperative Purchasing	No/Low Interest Loans Equity Financing Royalty Financing Grants Subsidies Risk-Sharing Via Contract Terms		Utilization Requirements Voluntary Use Agreements
Difficulties Reaching Economies of Scale	Recycled Products Directory Outreach, Education Cooperative Marketing Feedstock Availability Studies Business Incubator Support	Guaranteed Purchases Cooperative Purchasing	Grants Business Incubator Support	Tax Credits Tax Exemptions Incentive Payments Permit Fee Waivers	Utilization Requirements Contractual Arrangements (e.g., franchising) Voluntary Use Agreements Minimum Recycled Content Policies Regionalization
Unrestricted Nature of Information	Third-Party Data Management		R&D Grants	R&D Tax Credits	Patent Protection Public/Private partnerships Confidentiality Guarantees

Information and Technical Assistance

Description and Examples

Information and technical assistance can help equalize supply and demand. Examples include:

1) **Information about recycling processors.** Many states publish information about recycling facilities, or have directories that indicate what materials processors will accept, and where they are located.
    - North Carolina Department of Environmental Quality, for example, provides a map of recyclers, including contact information and links to websites.
2) **Information about markets for recovered materials/material exchanges**. Material exchanges provide a forum where generators and potential users of materials can "meet" and materials that would otherwise be wasted can become beneficially used. These sites are often beneficial for industrial generators and users. Many of these sites existed years ago, some of which were regional in nature, while others were state specific. Many have not been promoted or maintained. Some still exist, however, such as:
    - The Southern Waste Information Exchange (SWIX) is a long-standing materials exchange where users post the need for/availability of materials. Examples include HDPE scrap, used shoes, LDPE film scrap, and post-industrial plastic regrind. Postings on this exchange are from all over the world.
    - The Tennessee Materials Marketplace is a relatively new forum that replaced a prior online marketplace. It is industry-led and actively facilitated. It is developed and maintained as a joint project between Tennessee Department of Environment and Conservation and the U.S. Business Council for Sustainable Development. It targets the following sectors: automotive industry, construction and demolition, and food, agriculture and organics.
    - IMEX is the Pacific Northwest's largest industrial materials exchange, with a wide variety of both available and wanted materials. Based in Seattle, it primarily serves businesses in the Oregon, Idaho, and Washington region.
    - PlasticsMarkets.org has been connecting buyers and suppliers of scrap plastic for nearly 20 years. It is powered by More Recycling and funded by APR, ACC and the CPIA.
    - PlasticFilmRecycling.org has information about where to drop off or find markets for polyethylene film. Supported by the American Chemistry Council, there are also decision tools and best practices for establishing new collection programs. Similar mapping tools have been created by More Recycling for the recycling of PP and PS. Those maps can be found at RecycleMorePlastic.org.
3) **Information about products containing recycled content.** Some buyers would like (or are mandated) to purchase goods manufactured using postconsumer recycled content but do not know where to locate them. Recycled-content product directories are a way to share information to stimulate demand. Examples include:
    - The U.S. General Services Administration provides information about environmentally preferable products via its Green Procurement Compilation. This includes some recycled content goods, but also products that meet other environmental criteria, such as low-energy appliances, low-water fixtures and non-toxic cleaning products.
    - SWIX provides a "Green Procurement Vendor" list, which provides information about manufacturers of recycled-content products.
    - The Buy Recycled Products Directory lists products for personal or business use made from postconsumer plastic resin. It is powered by More Recycling and has received incubation funds from the American Chemistry Council.
    - California provides many recycled-content product directories, including a Tire-Derived Product Guide, Recycled Content Products for Construction Catalog, and a searchable online Recycled Content Products Manufacturers Directory.

- APR, in support of their Recycled Demand Champions Program, provides a list of vendors that supply work-in-process items made with postconsumer resin.
- The Minnesota Pollution Control Agency maintains an online searchable Recycled Products Directory.

4) **Sponsoring and sharing studies about the safety, appropriateness of and/or benefits of using recycled content in products**. Sometimes lack of information about the efficacy or safety of recycled-content products can be a barrier to their use. Objective, science-based, third-party studies can help alleviate concerns. Examples of such studies include:

   - CalRecycle realized that a barrier in growing markets for crumb rubber made from recycled tires was that citizens were concerned about the safety of the material used as infill in artificial turf fields. To address this barrier, CalRecycle contracted an independent third party to conduct a study to determine whether the material posed an inhalation or skin infection hazard. The study determined that crumb rubber did not pose such hazards, although artificial turf use has resulted in higher levels of abrasions and that it is recommended those abrasions be treated and covered immediately.[11]
   - The Chelsea Center supported a study of the *Performance of Paving Units Made from Recycled Glass with a Mineral Additive* in 2001, in hopes of identifying an additional use for recovered glass.[12]

5) **Technical and business assistance.** Sometimes businesses require technical assistance in order to perfect a manufacturing or material processing method. Many states offer recycling and manufacturing businesses technical assistance to enhance the use of recovered materials. In addition, municipalities may benefit from technical assistance in understanding the potential to use recycled content products, or in helping to ensure collected materials are marketable. Examples include:

   - Minnesota Technical Assistance Program provides technical assistance, through University of Minnesota's Engineering Department, to help recycling and waste reduction efforts.
   - The Pennsylvania Market Center provides business, technical, and financial assistance to businesses using recovered materials – in some cases through other entities.
   - The Chelsea Center provided links to innovative research through universities.
   - The Recycling Partnership has worked to develop tools to help municipalities implement a successful education and outreach campaign to fight contamination, and to increase recycling participation.
   - ACC and APR provide assistance to businesses and communities on best practices in education and collection.

6) **Information Compilation, Dissemination, Networking/Collaboration.** RMD can often benefit from information compilation, sharing information, networking and collaboration/facilitation. Conferences, webinars, and facilitated discussions provide opportunities for interested parties to share information and collaborate interactively to resolve challenges in marketing recovered materials. Examples include:

   - NERC has held several forums and workshops for specific materials in recent years (e.g., glass, electronics, organics, etc.), including sharing information and experiences on market development.
   - NERC developed a resource for recycling businesses in their member states, providing information about resources that could be of assistance to recycling businesses, including entities that provide technical assistance, tax incentives, grants, and loans. This is a

[11] CalRecycle, Contractor Report, "Safety Study of Artificial Turf Containing Crumb Rubber Infill Made From Recycled Tires," October, 2010.
[12] Robert J. Kirby, The Chelsea Center, Technical Report #29, An Investigation of the Performance of Paving Units Made from Recycled Glass with a Mineral Additive," August 2001.

valuable resource, as each state has many entities that could be of assistance to startup recycling businesses, or businesses that are expanding to incorporate increased use of recovered materials.

- SERDC has offered many conference sessions and workshops (including at the Summit in November 2018) regarding recycling markets.
- The Tennessee Department of Environment and Conservation hosts the annual Environmental Show of the South conference, which often includes sessions regarding materials markets.
- The Pennsylvania Recycling Markets Center has held nine market development forums on topics that include glass recycling and markets, agricultural and film plastic markets, rigid plastic markets and recycling options, and tire and rubber scrap markets.

7) **Education and Outreach.** There is an opportunity to conduct education and outreach for all involved in the material supply-and-demand chain. This includes generators of recyclable materials (what and how to recycle properly, to retain material value), processors (what new technologies, grants, other assistance exist to help improve processing), manufacturers (studies on the use of recycled content, product test results, environmental benefits) and consumers of products made with recycled content (who supplies, where to purchase, environmental benefits, quality of product). Development and dissemination of this information can impact both the supply and demand of recovered materials.

- CalRecycle, as part of its Tire-Derived Product Grant Program, developed a tire-derived product catalog, and conducted "lunch and learns" with those in the building industry to inform them of building products that include rubber from recycled tires.
- Education and outreach regarding how to recycle is an important aspect of ensuring that collected materials are marketable, and is important in reducing the cost of processing, making recycling more cost effective. Some states and regions are also harmonizing the list of recyclables to simplify education and outreach, in an effort to avoid "wishcycling" and the inclusion of items that are harmful to processing equipment, like film plastic/plastic bags, hoses, and other "tanglers." The Recycling Partnership has developed a replicable approach and customizable tools to help communities effectively address contamination.
- SPC's How2Recycle program encourages brand owners and packaging manufacturers to include clear, concise language about how to recycle a package on the label.
- ACC's Terms & Tools Project is a product of broad stakeholder engagement to define common terminology for consumer outreach and commodity terms. It's available through RecycleYourPlastic.org.
- ACC has supported an extensive list of case studies on non-bottle rigid plastics, film, and polystyrene. One example is the What Who How Series.

Many states have conducted recycling economic impact (REI) studies or campaigns. While this is not a direct recycling market development activity, such studies and campaigns help citizens, elected officials, and other decision makers, understand that healthy recycling programs, including developing strong domestic markets, help create jobs and drive economic growth. This can direct resources to assisting recycling businesses and ensuring adequate feedstocks exist.

South Carolina, for example, has conducted and updated REI studies, through the College of Charleston and the University of South Carolina. In addition, a group of plastic recycling industry participants and government agencies in North Carolina and South Carolina joined forces under the name, "the Carolinas Plastics Recycling Council," to create a campaign called "Your Bottle Means Jobs." As previously noted, this campaign strengthens the message of plastic recycling (focusing on PET and HDPE bottles and jugs), by expanding the message beyond environmental benefits to the economic benefits, especially job creation, which may resonate more strongly with some generators and other stakeholders. The campaign, launched in 2016, saw a 2% increase in these materials its first

three months.[13] Other states that have conducted REI studies include Texas (2017), Iowa (2007), and Montana (2004). The U.S. EPA. (2016) and ISRI (2017) have conducted national studies, with ISRI also providing state-by-state results (2017). Some local regions, like the Kansas City metro area, have also conducted similar studies. NERC also conducted a multi-state REI study in 2000.

Best Practices

Information and technical assistance are key to helping businesses and communities improve recycling markets. Basic best practices for information and technical assistance include:

- Ensure information is accurate and up-to-date.
- Leverage existing information as possible, for efficiency.
- Make information as easy to find and understand as possible.
- As appropriate, target the "bottom line' to a specific audience, to keep information relevant.

More specific best practices, based on observation and survey results include:

- Facilitation, conferences, workshops, whitepapers, etc., should include a broad array of stakeholder input, particularly across regions, if applicable. For example, it is important to include those not only with sustainable materials management experience, but those with economic, finance and specific technical knowledge as well, as appropriate.
- It can be beneficial to work regionally in order to develop markets for materials regionally, but individuals and organizations outside of the region may be able to serve as informational resources, based on their experiences.
- Recycling and environmentally-focused professionals are not typically well-versed in economic development and financing mechanisms. It is critical to include all of these players to ensure all are well-informed across competencies, and speaking the same language.
- Technical assistance should be structured to include follow-up reporting, as appropriate, such that there is feedback on the effectiveness of the assistance.
- Ideally, information is shared such that efforts can be leveraged against each other, rather than being duplicative in nature.

Buy-Recycled Programs and Campaigns

Description and Examples

Buy recycled programs include programs that require or mandate that governmental agencies purchase (and ensure their contractors purchase) goods with recycled content. Usually these are part of a broader environmentally preferable purchasing program. Environmentally Preferable Purchasing (EPP) or "Green Purchasing" is generally defined as purchasing a product that has a lesser or reduced negative effect or increased positive effect on human health and the environment, when compared with competing products that serve the same purpose.

EPP programs provide an opportunity for federal, state and local government agencies to make a commitment to the environment through purchasing practices and to encourage other agencies/local governments/nonprofits to do the same. Collectively, federal state and local governments have a buying power of nearly $7 trillion annually – therefore governments are in a position to bring about change if aligned on what is being asked of industry.

The U.S. EPA's EPP program is designed to provide federal agencies with knowledge and tools to identify products and services that minimize negative impacts to the environment. It includes standards and ecolabels and allows for agencies to leverage the buying power of the U.S. government. The program began in 1988 when the EPA issued its *Guideline for Purchasing Paper and Paper Products*. Several additional efforts were made to strengthen EPP at the federal level, including executive orders and the

[13] Waste 360, "Recycling Campaign Focused on Jobs Hits Home with Communities," Arlene Karidis, June 7, 2018.

development of additional tools and certification programs by the EPA. The most recent Executive Order regarding EPP is #13693 of March 2015, and states:

"Each agency shall meet statutory mandates that require purchase preference for, among other things, recycled content products designated by EPA."

The EPA's Comprehensive Procurement Guideline Program (CPG) defines recycled content preference items and lists products manufactured with recycled material that EPA deems equivalent to virgin material for standard applications. The Green Procurement Compilation provides information about product requirements, including postconsumer recycled content requirements, by product category. Most state EPP programs involve a partnership between the purchasing agency (often the Department of General Services or DGS) and the state's environmental agency. Typically the DGS has more direct authority as it is the entity that drafts proposals and contracts, and the environmental agency acts in an advisory role regarding technical considerations (such as appropriate recycled-content levels), although the environmental agency may spearhead the effort initially. Often local governments are able to use state contracts and specifications.

- Massachusetts has an active EPP program, which stipulates certain product categories that must have certain levels of postconsumer recycled content, and whether the guidance is mandatory or desirable. For example, cardboard boxes must contain at least 50 percent postconsumer recycled content, except for file storage boxes, which must contain at least 35 percent postconsumer recycled content.

Recycled content tends to be just one component of EPP programs. Therefore, it can be beneficial to have a distinct "Buy Recycled" campaign in order to help drive demand for recycled content products, and therefore recovered materials.

Some local governments also have their own recycled content/buy recycled programs in place. Examples include:

- Alameda County, California
- Portland, Oregon.

Best Practices

Most would agree that implementing a mandatory program is more effective than a voluntary one, but implementing legislation is challenging. Also, implementing such a program at the state level, and conducting outreach to local governments to encourage them to use state contracts, if allowed by the vendor, is likely to be more impactful than focusing on trying to implement programs solely at the local level. However, some local governments are more proactive in this arena, and are making strides within their purview. Best practices for buy-recycled campaigns and policies include:

- A purchasing system is in place that allows for the tracking of recycled-content purchases – including direct purchases and contractor purchases.
- All purchases must be input into the purchasing system.
- A price differential is in place, allowing buyers to pay more for recycled content, or specifications for certain products require a certain recycled-content level.
- Easy-to-use (e.g., visually appealing and searchable by product/product category) information about recycled-content items is provided to all buyers.

Buy-recycled campaigns and policies are less effective when:

- They are voluntary versus mandatory.
- Information about recycled-content products is lacking.
- There is no system in place to track recycled-content goods.
- Buying recycled content is a small part of a broader EPP program and other environmental attributes overshadow the recycled content goal, or make finding information about recycled content expectations and products more challenging.

- Service contracts are not subject to the policy and/or accurate, complete information about contractor purchases does not “roll up” in the system.
- Contracts are very long term, such that new recycled-content products cannot penetrate the marketplace.
- Departments and agencies have latitude to purchase a significant amount of goods and services outside of the “system.”

Some public agency buy-recycled programs are voluntary in nature, as are some industry-led programs such as the APR Recycling Demand Champions program. Though voluntary programs are likely to have less of an impact than mandatory buy-recycled policies, they are more widely accepted and easier to implement. Voluntary programs are more likely to garner participation if participation in them provides a benefit to the participant, such as a positive impact on specific company/corporate goals, reduced costs, and customer or public good will.

Finance and Funding

Description and Examples

Financing to support recycling markets includes various financial assistance tools;

1) **Loan programs** can help businesses overcome their “lack of access to capital” barrier, enabling them to develop or expand their recycling enterprise. Some states, and more recently industry-funded nonprofit organizations, have developed attractive loan programs for recycling businesses, or businesses that manufacture products with recovered materials. No- and low-interest loans and loan guarantees can help businesses develop or expand their capacity. Many RMD loan programs are revolving loan programs, where funds that are paid back are reinvested into the loan program to help another recycling-related business. The Materials for the Future Foundation operated a successful revolving loan program funding numerous recycling ventures in the San Francisco Bay area.

    - Closed Loop Partners (CLP) brings together the world's largest consumer product, retail and financial companies committed to bringing about the circular economy, to help fund projects that work toward achieving that goal. To that end, the Closed Loop Fund division of CLP provides no-interest loans to municipalities and low-interest loans to businesses in an effort to help develop a circular economy. One company they supported through a loan of up to $3 million was GreenMantra Technologies in Ontario, Canada. The loan allowed GreenMantra to expand the capacity of its plant, which converts postconsumer and post-industrial waste plastics, including hard-to-recycle films and bags, into high-value waxes.
    - In California, CalRecycle’s Recycling Market Development Zone program provides attractive loans in one of 40 designated development zones. The program also provides technical assistance, as needed. The program has been successful in helping recycling and recycling-related businesses obtain financing when they would otherwise not be able to.

    Best Practices

    Loan programs for RMD have been critical in helping both start-up and existing companies obtain capital when they otherwise would not be able to. Best practices associated with loan programs include:

    - Repaid funds are returned to the program (e.g., “revolving loan”) to help keep the program sustainable.
    - Loans are made available to companies that would otherwise not be able to obtain them, or obtain them as favorably (e.g., seen as “too risky” to mainstream private lenders).
    - Economic development and financing specialists administer the loan program.
    - Due diligence is conducted to minimize risk (examples include review of business plan, review of permits required, and feedstock availability analysis).

- Loan program requirements are not overly onerous, such as to be burdensome to the applicant, and application reviews and funds distribution are done in a timely fashion.
- It is verified that capital is indeed what is needed, not technical or business assistance or some other type of assistance.
- Loans are available at a value adequate to make a difference – to provide adequate capital necessary for a facility to be constructed, a piece of equipment to be purchased, or otherwise finance the needed activity.

2) **Grants** can help both public and private entities overcome financial barriers. Several states issue or used to issue grants to help improve recycling programs, including recycling market development efforts. In some cases (e.g., Alabama), private entities are not eligible for grants. In many cases, grants are provided on a matching funds basis. Typically grant recipients must report on the impact of the grants for a defined period of time after funds have been expended. Incentive payments are not common in the U.S., but provide a direct payment to processors and/or users of a recovered material, based on the amount of material processed and sold or manufactured into a new product. Examples include:

   - North Carolina, through its Recycling Business Assistance Program, awarded more than $570,000 in grant funding in 2018 to 21 companies that collect, process and manufacture new products with recycled materials. Bromley Plastics, for example, was awarded $40,000 to purchase a chopper/shredder that will eliminate downtime and increase productivity and processing capacity by 33 percent. Envirovision was awarded $40,000 to purchase a wash line to expand their post-industrial and postconsumer plastics recycling program, and Foothills Sanitation was awarded $30,000 for an optical sortation system to improve sorting at its MRF.
   - Indiana's Recycling Market Development Program includes a grant program, which is funded by half of the $0.50 per-ton disposal fee on MSW landfilled or sent to a waste-to-energy facility. In 2018, approximately $1 million was available in funds. The Indiana Recycling Market Development Board approves the use of funds. Examples of projects funded (with a 50 percent matching requirement) include:
     - Reflective Industries LLC, a secondary processor of postconsumer waste glass, received a grant for $150,000 to expand the capacity of its facility.
     - Petoskey Plastics, Inc. received a grant of $175,000 to enable them to recycle commingled and contaminated plastic film scrap into usable feedstock.

3) **Business incubation programs and innovation contest awards** can provide an opportunity for entrepreneurs to establish or expand their business. For example**:**
   - The Ellen MacArthur Foundation, through the New Plastic Economy, launched a Circular Materials Challenge with a $2 million award. The goal is to identify and develop ways to make, use and re-use plastics so that they don't become waste in the first place. The winners will also join a 12-month accelerator program.

Best Practices

Grant programs help public and private entities overcome financial barriers. Many states make RMD grants available to both private and public/nonprofit entities. Best practices for grant programs include:

- Grants are used to cover capital expenses or specific research and development needs, not operating expenses.
- Programs target the needs of the state/region.
- Programs are revisited regularly to assess their effectiveness and whether the strategy/targets need to be adjusted.

- Grants are matched by the applicant, to ensure they are committed and have a financial incentive to succeed.
- Grant programs require some follow-up and reporting for a specified time period, such that results are known, but such requirements are not overly onerous.
- Grants are of a large enough dollar value to make a real difference in the applicant's ability to use recovered materials (or a greater quantity of recovered materials).
- A grant is the only form of assistance suitable for the applicant or the market for the material type – direct funding should be a "means of last resort" for expanding markets. Other strategies should be considered first.
- The recipient is expected to be financially self-sufficient after the grant has been expended.

Debt vs. Equity Financing
Debt financing is essentially borrowing money for a fee. Typically, regular payments are required and interest rates are charged based on perceived risk. Equity financing involves selling partial ownership in the company for an investment of funds.

4) **Equity financing** refers to the process of raising capital through the sale of shares in an enterprise. Ownership is sold to raise funds for business purposes. This includes venture capital, which is financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential.

    - Closed Loop Partners, through Closed Loop Ventures, provides venture capital in early-stage consumer goods, advanced recycling technologies and services supporting the circular economy. For example, CLP invested in AMP Robotics, a Denver-based company creating robotics-based technology for recycling and industrial applications.

5) **Royalty financing** is an alternative to regular debt and equity financing, in that it is structured more like a cash advance that investors provide to a business for a certain percentage of future revenues over a specified period of time. It allows for up-front capital for a business, without having to give up ownership, and may be beneficial for investors in that they do not have to sell their equity to gain revenues.

6) **Bond financing** is a type of long-term borrowing that state and local governments frequently use to raise money, primarily to raise capital infrastructure assets with a long-term lifespan. Bonds are sold to investors, and the governmental entity is obligated to repay the funds with interest over the time period specified in the agreement. These are considered to be low-risk investments. Bonds can also be issued by corporations.

7) **Preparation of prospectus and investment forums** can help potential funders better understand the strengths and potential growth, as well as actual risks, such that they can make better informed decisions.

8) **Risk-sharing via contract terms** can have financial implications (e.g., a materials purchasing contract that does not allow revenues to go below a certain level nor price floor) or a guarantee to conduct business for a certain length of time, which provides a certain level of financial assurance, making additional investment (e.g., to better process materials) more attractive.

9) **Subsidies** can be used to offset costs of equipment or other costs that enable a processor or manufacturer to expand their ability to use more recovered materials.

10) **Public/private partnerships** can make projects more affordable to a private or public entity. For example, a municipality may allow a private business to develop a facility on public land, making development of the facility more cost effective.

Taxes, Fees and other Incentives/Disincentives

Tax incentives are often used by state economic development agencies to attract businesses to a certain area, incentivize their expansion and help businesses address the lack of capital barrier**.** Recycling tax incentive programs typically provide benefits for the purchase of equipment, but not for operational costs

related to recycling. The federal Internal Revenue Service offers businesses a tax credit for the depreciation of recycling machinery or equipment. However, according to the EPA, historically, at least 25 states have offered property, sales and income tax incentives for businesses that purchase recycling equipment. Each state program varies and may limit the types of businesses that can qualify for incentives. Examples of tax programs include:

- **State income tax credit** – States such as Arkansas, Colorado, Kentucky and Virginia provide an income tax credit for the purchase of recycling equipment. States may differ in the amount of credit allowed annually and whether unused credit can be used in a future year.
- **Property tax exemptions** – States such as Iowa, Louisiana, North Carolina and Nevada offer property tax exemptions for machinery and equipment used for recycling. In some states, the exemption may be limited strictly to recycling businesses, while in others it applies to any industry.
- **State sales tax exemption** – States such as Iowa, New Jersey and North Carolina offer a sales tax exemption on purchases of recycling equipment and machinery. This is often offered tor major recycling facilities.
- **Tax on virgin materials** – In theory, a state could tax the use of virgin material or the use of virgin material beyond a certain limit. Although such a program is not known to operate in the U.S. (Denmark, Sweden and the United Kingdom all have some form of a tax on virgin material use), some survey respondents did indicate such an undertaking would help put recycling businesses on a level playing field with other businesses/manufacturers.

Examples of incentive payments and programs include:

- In the late 1990s, California implemented a Quality Glass Incentive Payment program to improve the quality and marketability of glass. In 2007 the program was expanded to include HDPE, PET and aluminum beverage containers and was renamed to the Quality Incentive Payment. In 2010 the program was scaled back to only include glass beverage containers once again. CalRecycle is authorized to pay those who sort and clean glass into amber, green and clear streams up to $60 per ton of clean material, subject to the availability of funds (currently $10 million annually). Strategic Materials Incorporated, a secondary processor, receives most of this revenue, but indicates it passes some along to municipalities and other suppliers of material.
- CalRecycle's Tire Incentive Program (TIP) incentivizes the use of recycled tire rubber in products, particularly fine mesh crumb rubber. Similar programs are in place in several Canadian provinces.
- **Carbon credit programs**. These programs can incentivize the use of recycled-content products, to the extent that they result in a reduction of carbon emissions (and/or other environmental benefits). No program for recycled-content products is known to be operating currently in the U.S.

Some states, like Massachusetts, offer recycling businesses a permit fee waiver, while others allow for a disposal fee waiver in order to encourage recycling business development and expansion. This is a benefit often granted to nonprofit entities, and was likely extended to such businesses to help reduce cost burdens.

Best Practices

Though there are many potential types of incentive payments or other forms of incentives, some broad best practices for such an approach include:

- The incentive is needed in order to bring about behavior change/business expansion.
- The incentive has a sustainable funding source.
- The receiving entity reports accurately and entities are audited regularly.

Regulations/Policy

Description and Examples

Regulations and policies are another tool used to offset market inefficiencies in order to improve markets for recovered materials. Some examples of regulations and policy that can be used to enhance markets for recycled materials (not simply increase recycling) include:

1) **Product Labeling** –The Federal Trade Commission has policies that define what is suitable to say about recycled content and recyclability on product labels.
2) **Voluntary Use Agreements** – Brands are making bold commitments to ensure that they use a certain level of postconsumer material and that their packaging/products are recyclable by a certain date. Additionally, members of APR's Recycling Demand Champions program are voluntarily committing to increase the use of postconsumer resin by using work-in-process products that contain recycled content. Brands are seeing that making such commitments makes good business sense. In the 1990s, through NRC's Buy Recycled Business Alliance, brands made commitments to use postconsumer recycled-content material for their products, services and packaging.
3) **Specifications/Utilization Requirements** – As previously noted, state and local governments may enact policies to ensure that certain product types purchased have at least a certain level of postconsumer content, or that only recycled-content products are allowed to be purchased or used by contractors. Another example is LEED certification requirements, which encourage the use of recycled-content building products as well as other green building products and practices.
4) **Processor Contracts** – It may be possible to structure contracts and agreements such that they create more market stability. MRF processing contracts, in particular, should be structured such that both parties share in the reward and the risk.
5) **Ensure Existing Regulations are Not Overly Onerous** – In some cases recovered materials are managed like a waste, not a resource, which extends to overly onerous regulations on processors or end users of recovered materials. Additionally, in some cases, states have implemented beneficial use determinations, which allow for recovered materials meeting certain specifications to be used beneficially in pre-determined ways. This can bolster the demand for materials, and can help the generator incur cost savings by avoiding disposal fees.
    - Revision of Compost Regulations – Several states, such as Ohio and Pennsylvania, have revised their composting regulations such that regulations are suitable, not overly onerous, for various types of facilities located on certain types of land (e.g., on-farm composting). This helps reduce barriers to entry for processors, which can expand the array of processors for a material.

Best Practices

- Collaboration with industry can ensure specifications are realistic, that quality material/products meeting the requirements are available and that the cost does not impose undue burdens on agencies. Revisit and update requirements regularly.
- A process needs to be in place to accommodate buyers if/when specified products are not available.
- Clear, up-to-date information needs to be available about suppliers and requirements.
- Reporting and verification requirements need to be actively monitored to ensure full participation. Requirements should not be overly burdensome to either party.

6) **Recycled-Content Policies** – These policies are not widely used, but are typically implemented at the state level in the U.S. They require those who sell a certain product in the state to ensure it has a certain level of recycled content. Many state representatives indicate that the recycled content newsprint policies and programs that were implemented to help develop markets for recovered newspaper were successful. For example:

- In just two years (1992-1994), the number of recycled market pulp mills doubled and production capacity increased by over 280 percent (with additional capacity beyond that announced).[14]
- Demand for old newsprint (ONP) by U.S. mills increased from 7.28 million tons in 1993 to 11.12 million tons in 2006.[15]
- The portion of newsprint manufactured that contained recycled content increased from 10.5 percent in 1990[16] to about 30 percent currently.

These marketplace changes occurred in part because many states implemented such policies, marked progress in de-inking technology, and increasing consumer desire to purchase goods made with recycled content. Eventually, however, the recycled-content newsprint laws became obsolete and many states stopped managing them as markets for paper declined and the availability of recycled-content newsprint was reduced.

Best Practices

There are certain features of recycled-content polices that made those programs (and more recent programs for other materials) more successful, or less successful. Best practices include:

- Work with industry to identify what is realistic pertaining to:
  - available feedstock supply in the region;
  - pricing, quality/suitability;
  - technical feasibility;
  - infrastructure implications; and
  - changes in market over time.
- Allow for the gradual increase of recycled content over time. It takes time for infrastructure to develop, markets to evolve, and existing contracts for feedstock to expire.
- Mandatory goals send more direct confirmation to industry that demand will exist, thereby reducing their financial risk to invest as needed.
- Ensure that the law/program is administered by an agency that has authority and budget to monitor and enforce the policy and expertise in subject area.
- Require regular reporting, but not overly onerous.
- Consider establishing a reliable way to verify recycled content is reported accurately and a means to spot-check with random audits.
- Fees for non-compliance (barring allowed exceptions) can help make a mandatory program more effective. Any fees collected should be dedicated to helping develop recycling infrastructure or otherwise advance the recycling program.
- Initiatives need to be made in a coordinated fashion across a broad enough geographic region to be impactful – a state-by-state approach does not make sense if markets span beyond the state borders, which is the case for most material types. Additionally, a state with a relatively small demand for a material is not going to make as significant of an impact as a state that collectively has a larger demand.
- Goals are announced in advance, particularly if industry needs to increase infrastructure in order to achieve the goal. They may be phased in over time.
- Ample communication and outreach is conducted to all pertinent stakeholders in advance of the program or policy being implemented.

[14] Jane L. Erkenswick and Paul Hood, "Recycled Market Pulp Mills: Explosive Development in the '90s," Resource Recycling, November, 1992.
[15] Moore & Associates, "The Cost of Eliminating the Recycled Content Mandate on Newspaper Manufacturing and the Environment," for Wisconsin DNR, July 8, 2014.
[16] Final Report of the Dept. of Waste Management on the Commonwealth of Virginia Recycled Newsprint Advisory Task Force, 1991.

- Goals and acceptable ways to achieve them are established such that the policy has the desired effect of increasing demand for additional material. Goals are not set at the current level of recycled content or allow an activity that is already taking place to be sufficient means of complying.
- A formal process in place to revisit policy on a regular basis (every two years, for example) or after a specific period of time (e.g., a sunset clause that forces reexamination of the policy after a period of time).
- Reasonable, well-defined exemptions are in place to protect industry from unnecessary financial burdens or inability to obtain supply, and require documentation to support the exemption.
- It can be advantageous to set industry-wide goals (rather than company-specific goals), which provides flexibility in how individual companies contribute to achieving the goal. Reporting can also be simplified if industry is responsible for administering the reporting regarding compliance of use or potential trading of content credits.
- Consider the need to increase demand for both postconsumer and post-industrial material needs.

Recycled-content laws and policies are less effective or ineffective when:

- They are administered by an agency that lacks expertise in the product/area;
- Industry's input is not considered;
- Efforts are not coordinated and harmonized, at least across a market region;
- There is no enforcement authority by an agency that is interested in achieving the goal;
- There are no reporting requirements;
- Goals and the applicability and relevance of the policy are not re-visited on a regular basis; and
- Such policy requires recycled content even in cases where doing so results in more negative environmental impacts.

Structure of a Recycling Market Development Program

Recycling market development can entail implementing a single project or can be the focus of an ongoing program. A successful recycling market development program has the following key characteristics or elements.

Market Intelligence System

Market intelligence includes monitoring supply, recovery, processing and demand trends and issues for recoverable materials, as well as identifying opportunities to address recycling market development barriers. The marketplace for recovered materials is dynamic. Supply, demand, and technology are constantly changing, largely in response to consumer desires, policies and other market factors. Particularly in a world where brands are global, it is important to keep up with:

- Policies that may influence global brands;
- Consumption trends;
- Resource constraints and their causes;
- The outlook for material markets;
- Technological barriers and advances regarding materials production, processing, and manufacturing with recovered materials; and
- Other efforts to expand markets, whether they be government or industry-led.

Market intelligence enables adjustment of the RMD strategy as needed, before a market crisis develops. The volatility, global nature, constant change, and variability among different commodities can make it challenging to keep up with market intelligence. Methods to gather information might include the following:

- Conducting online surveys or phone interviews among municipalities, processors, end markets and potential end markets;
- Participating in advisory committee meetings or other relevant groups;

- Attending conferences and workshops regarding RMD;
- Conducting research;
- Reading relevant trade journals and news publications; and
- Reviewing reports and publications from governmental entities and industry groups.

Even when markets for specific material types are local or regional in nature, market intelligence ideally spans a broader base to identify innovative ideas and trends that may eventually become relevant. In some states, staff might specialize in certain material/commodity types. Targeted research can be used to address specific information gaps.

An Ongoing Strategic Planning Effort

To be effective, a RMD program should have an ongoing strategic planning effort. Because markets are so dynamic, planning efforts need to include current market intelligence, as described above. Strategic planning is coherent and ongoing, and includes prioritizing materials, identifying and prioritizing strategies and tactics for expanding markets, which organizations to engage, what role each entity should play, and how those involved can best interact and collaborate to share and leverage RMD efforts. An annual strategic planning session can be used to help ensure that the strategic plan considers emerging market nuances. Budgetary planning also needs to be included and coordinated among agencies.

For example, in its Recycling Market Development Strategic Plan (1999), Massachusetts adopted the following approach for capacity building recognizing that:

- Markets are the most efficient mechanism for allocating resources;
- The primary function of the state government in RMD is to develop the capacity to identify and address market inefficiencies;
- The workings of the markets for secondary materials are ever-changing; and
- To be effective, the state needs to be in touch with and flexibly responsive to changing circumstances as they occur.

Market Development Tools and Staff

Organizations need to build institutional capacity to catalyze effective recycling market development. This will take place over the course of time, and will likely include:

- Hiring/training staff with RMD knowledge and the desire to continuously learn;
- Identifying sources of pertinent information and ensuring staff stay apprised of information that can potentially impact markets;
- Developing rapport and ongoing collaboration with other agencies and organizations that also have a role in RMD, and continuously looking for additional entities with whom to collaborate;
- Establishing political support for RMD efforts, which may include educating decision makers about the economic benefits of recycling and of developing local and regional markets versus relying upon foreign markets;
- Ensuring the program is well implemented and managed; and
- Ensuring funding and resources are sufficient to develop and deploy appropriate tools.

Resources and staff require adequate funding and collaboration to best leverage resources and knowledge from other states, multiple in-state agencies, and the private sector, in order to develop financially efficient programs.

When states developed RMD strategic plans in the past, some began the process by first conducting an assessment of recyclable materials markets and the market system. This helped to identify problematic materials, barriers that were cross-material and material-specific, and to begin to prioritize needs and means to address them.

Means for Evaluating Program Impacts

RMD programs should have observable, measurable goals and a means to evaluate them. Being able to do so helps show progress, thus garner support for programs, and/or can show the need to improve or adjust the program. To the extent possible, data that facilitates evaluation of program goals should be collected on an ongoing basis. This might involve data regarding the number of market participants in the state, commodity pricing, and information pertaining to commodity marketing challenges. EPP programs may have goals regarding the quantity or dollar value of goods purchased using recycled content, for example. An example of a broader goal is to increase by a certain percentage total tons of recovered material (or specific material types) processed in state, consumed in state, or marketed to regional/domestic markets. A steering committee might set such targets.

A Mechanism for Ongoing Communication, Consensus and Coordination

Communication, coordination, and consensus building are all important activities for moving RMD initiatives forward. These activities increase the likelihood of success by information-sharing, garnering political support, establishing priorities, understanding strategies likely to successfully overcome barriers, developing useful RMD tools and programs, and leveraging existing resources efficiently. Many organizations could potentially play a role in strengthening markets for recovered materials, as different entities bring different skills to the process. The ongoing mechanism for communication among entities is ideally established mutually, takes place regularly, and is convenient for all involved. In some cases, this has been achieved through the establishment of a Recycling Market Development Steering Committee with members from state agencies, nonprofit entities, recycling industry members, and other relevant stakeholders. The steering committee could be a limited timeframe committee that sets priorities and develops the strategic plan. Some states have a Recycling Market Development Board, which makes decisions about selecting RMD projects to help fund and otherwise assist.

Not only do successful RMD initiatives involve sharing knowledge across disciplines (e.g., environmental, manufacturing/technical, business, economic development, purchasing, policy, etc.) but RMD efforts also typically involve (or should involve) a region, as recycling markets are generally regional in nature. The geographic breadth of the region is dependent upon many factors, including transportation costs, the value of the commodity and availability of alternative markets. Therefore, while institutional capacity to develop markets should be strengthened in each state, there should be coordination among states as regional markets warrant.

Additional Suggested Best Practices for RMD Efforts

Based on survey responses and stakeholder interviews, additional “advice” or learnings from those experienced in the industry include:

- It is important to spur innovation, innovative use of materials, and to the extent possible, focus on higher-value end uses.
- Remember that RMD is an economic development initiative that requires economic development expertise, tools and strategies.
- Ensure there is a diverse array of funding sources and that funders receive information about the RMD program’s accomplishments.
- Be sure to target feedstock conversion, as well as attracting new businesses and expanding existing businesses.
- Different strategies make sense in urban versus rural areas, in part due to the different amount of materials needing markets as well as proximity to markets.

Effectiveness of Past and Current RMD Efforts

Federal – Jobs Through Recycling

A third-party assessment of EPA's JTR Program[17], which operated from FY 1994 – FY 1996, concluded the following positive elements of the program that rendered it worthy of being a model for any governmental entity:

- Team-based and field-led approach;
- Thorough and broad-based needs assessment;
- Leadership and facilitator role for government; and
- A document clearly guiding program operators and constituents.

Issues with the program, based on interviews with states, include:

- The original JTR design used an integrated set of tools, grant funds, information, and facilitation – but later turned to just funds, which was not as helpful.
- EPA lacked an ongoing means of staying in touch with markets, market changes, and key barriers.
- Once federal support ended, there were no resources to support or strategize with grantee staff to help states obtain ongoing funding from other sources. Several states' programs ceased.
- EPA did not use external expertise on the economic development agency side in designing the program, which would have been helpful in grant program design, proposal review, and implementation of evaluation methodology.
- The evaluation methodology was not well designed. In particular, the methodology should show that the government is seeking to address market failures, making the market work better, not replacing the market.

A key element missing from the program was a means of identifying and disseminating information about what types of efforts work, do not work, and why. The study determined that the program filled important unmet needs and had a positive environmental, economic and institutional impact to date (18 months into the program). It was recommended that the program be continued, but enhanced. Interviewees indicated that the EPA grants helped reduce risk and brought about positive impacts, including institutional impacts. It was recommended that EPA should provide assistance through facilitating connections, relationships, and networks, among those involved in RMD. Also, EPA should focus its market development grants on capacity-building activities that cannot be addressed by the information and facilitation tools.

Originally the ReTAP program was to establish 100 centers, but this goal was not reached.

State Initiatives

Very few states have conducted actual assessments of RMD programs. Two publications that purport to assess RMD programs are described below, but are historic in nature. For this project, a survey was conducted that asked respondents to describe current activities and the effectiveness of their RMD programs.

Through the survey conducted for this study, several states reported that they previously had RMD programs and/or initiatives in place but no longer do. It is clear that even several states that still have certain policies and programs on the books (e.g., recycled-content mandates and EPP programs) have ceased focusing on these programs, as the recycling markets issue became less critical. While some states continued their RMD programs after the JTR funding ended, other states, especially those with Recycling Economic Development Advocates, ceased funding the initiative.

[17] Mt. Auburn Associates, "EPA's Jobs Through Recycling Program: An External Evaluation," 2000. Note: This review focused on the RBAC and REDA programs.

Many efforts appear to have been successful during the timeframe in which they were a focus, including newsprint recycled-content initiatives, which were implemented by many states and NERC in the early 1990s. Also, many states have had recycling economic impact (REI) studies conducted, which have likely helped inform legislators and other decision makers about the benefits of recycling, garnering increased and/or sustained support. Most states that have conducted such studies, unfortunately, do not appear to update them regularly. Of the 18 states that responded, 11 reported they have conducted REI studies, while six indicated they had "previously" conducted such studies. Three reported they have never conducted an REI study.

Ten of 18 responding states indicated that they have recycling market development grant programs in place to support "recycling market development initiatives." This was considered to be one of the more effective RMD initiatives. Others include tax credits, technical assistance, and recycling loan programs.

Thirteen states indicated that they have grant programs for processing equipment, while two additional indicated that they once did but no longer have them in place.

Only four states indicated that they have grants for RMD research and development, while four states indicated that they previously did, but no longer do.

In the past, many states, and some regional organizations, had online recycling markets directories. However, the number of active materials market exchanges available has declined, as these tools require resources to update and maintain. Six states indicated they currently have materials exchanges in place, while another eight reported they once did, but no longer do, out of 18 states responding.

Most survey respondents (68% indicated they have some type of recycling market development program in place in their state, with the most common type of initiatives being grants to purchase processing equipment followed by environmentally preferable purchasing requirements. More than half of respondents indicated that the RMD programs helped enable them to meet their stated goals. However, the stated goals were not all RMD-related, as many were more general diversion or recycling related.

When asked how they would describe the effectiveness of their state recycling market development efforts, 43% of respondents reported "moderately effective" and 5% responded "highly effective." Approximately 24% responded "not very effective" and 29% did not know.

Of the 18 states responding, only four indicated they have strategic plans in place, while three others indicated they once did but no longer do.

Survey respondents indicated that the top barriers to implementing or expanding RMD initiatives include:

1) Lack of funding resources
2) Lack of staff resources
3) Lack of expertise.

Only one state (North Carolina) reported having have RMD training for economic development professionals. About five percent of respondents indicated that lack of coordination and lack of institutional support are also issues. Additional barriers include a lack of political will and/or support.

Anecdotally, through this survey and other recent RMD discussions, it is clear that states see a need to coordinate and share information regionally, as well as open communications between the state environmental protection agencies and state and local economic growth agencies.

North Carolina

In 1991, North Carolina conducted an assessment of market development initiatives via surveys, interviews and conducting a literature review. Although the study was conducted relatively early in the RMD program, and was more of an inventory of existing and planned programs than anything, it clearly conveys the focus of expanding material market systems (generation, recovery, transportation and processing) and describes how most directives were steered by legislation (1989's SB 1111 required the state to complete the development of a state comprehensive solid waste management plan by January 1,1991, as well as

establish a state solid waste management policy). The report indicates that, in NC, the agencies that had the mission, resources and understanding to play a role in RMD included:

- Business/Industry Development Division,
- International Trade Division, and
- Energy Division.

Agencies that had the mission and resources to carry out RMD work but needed further education to do so, included:

- Small Business Development Division,
- Commerce Finance Division,
- Division of Community Assistance,
- Division of Employment and Training,
- Science and Technology Research Center, and
- Technological Development Authority.

The report noted that, the Departments of Administration, Transportation and Agriculture had plans to continue efforts to "research and encourage the reuse and recovery of recyclables and the purchase of products with recyclable material content. It also indicated that local governments were held largely responsible for achieving the recycling rate goal, and suggests that raising tipping fees and using diversion credits are two strategies to incentivize greater recovery rates. It also suggested that councils of governments (planning commissions that assist multi-county regions) provide technical assistance and research for economic and community planning and that The Development Center provides some financial assistance.

The report also noted the major efforts used in other states to expand markets for recovered materials include:

- Technical assistance to foster tools for use by the private and public sector.
- Financial assistance through grants.
- Loans and tax incentives to encourage market development.
- Legislated or mandated preferential procurement at the state government level.

Wisconsin

In 2011, Wisconsin assessed the effectiveness of its RMD programs that were largely implemented in the 1990s, but were subsequently discontinued due to a number of reasons ranging from budget limitations to the perceived program effectiveness. The Assessment tracked the amount of funds distributed through three grant/loan programs:

- The Recycling Market Development Board Program (RMDB),
- The Solid Waste Research Program, and
- Waste Reduction and Recycling Demonstration Grant (WRRDG).

Combined, these programs were responsible for distributing 481 grants ($27.3 million) and providing 35 loans ($9.2 million) from 1989 – 2008, with the RMDB grant program responsible for the greatest portion of grant funding, at 55 percent. All 35 loans were through the RMDB program.

Number and amount of awards by category were examined. The highest dollar amounts were for 1) Construction; 2) Plastic; and 3) Education. Category of recipient was also examined, with businesses receiving the most (237 awards, $22.6 million), government entities receiving the next significant amount of awards (225 awards, $10.6 million), followed by nonprofits (50 awards, $3.1 million) and unknown (four awards, $0.1 million).

Of the 385 RMDB and WRRDG awards received by 246 entities, 70.7 percent were still viable in 2011. This included businesses, government agencies and nonprofit organizations that provide citizens with enhanced

recycling opportunities and lower cost for recycling. Of the 70.7 percent, it is not certain how many completed the award objectives and were still recycling at the time of the assessment, which the study authors indicated may be an area suitable for further study.

Survey responses indicate that two of the original investments were still in use at the time of the assessment, with a third company reporting they updated the worn out equipment, but were still recycling the same material. Collectively, the three entities have diverted 276,700 tons of material from landfills. They have also collectively created 40 in-state jobs with employee compensation totaling $1,441,000. This is $56,843 more than what the 10 Wisconsin entities received combined.

Two companies reported making a combined $7 million in gross revenue during 2010, providing federal, state and local governments with substantial tax revenues. According to the assessment, recycling market development efforts in the State of Wisconsin have seen a significant funding decline over the past decade due to the eliminations of the RMDB and the diversion of WRRDG funding allocations. This means Wisconsin entities have to search elsewhere for recycling project funds and compete with other non-recycling projects. The funding decline has unfortunately placed Wisconsin in the lower echelon of states for recycling market development with 34 other states that also do not provide funding. This is because much of the $7-per-ton disposal fee in Wisconsin that was to pay for this program is currently diverted to the general fund.

Buy Recycled

It was reported in 2000 by the GrassRoots Recycling Network (now known as Zero Waste USA) that, in 1986, only 13 states and a handful of cities and counties had some sort of buy-recycled policy in place. Just five years later, the other 37 states had followed suit and more than 250 local jurisdictions were known to have buy-recycled policies in place. However, of the 18 states that responded to the survey, only 11 indicated they currently have a buy-recycled program in place.

Through prior research, we found that some states have not updated their requirements for buy-recycled products, therefore requirements are minimal and may only apply to one product (e.g., copy paper), nor are the laws/mandates fully enforced or enforceable. For example, some departments may make significant expenditures outside of the “purchasing system.” While a handful of states continue to appear to have strong “buy recycled” or EPP programs in place, there is an opportunity for other states to strengthen or re-establish their programs and enforce them, and to share information about recycled-content products with local governments, allowing them to use state contract terms, as allowed by the vendor.

RSE USA has conducted research that shows many states have EPP programs in place, but recycled-content products are often not a significant focus. Additionally, many states lack adequate systems to track EPP purchases, therefore there is little accountability, unless all specifications include a threshold for recycled content, and purchases cannot be made “around” the purchasing system. However, there is also often an opportunity for states to update recycled-content policies and procedures as additional products become available over time, and to inform agencies of these products.

Recycled Content Laws

The newsprint recycled content laws that were in place in the 1990s were successful in spurring demand for recovered ONP and developing processing infrastructure for recovered ONP. However, these mandates are largely not enforced today due to the loss of ONP mills in the U.S. and reduced demand for and generation of newsprint. Based on prior research, six states claimed they currently have recycled content laws for newsprint in place, while 16 indicated their states have repealed or no longer actively monitor the regulations/agreements for recycled content ONP.

A CalRecycle representative indicates that California’s recycled-content law for rigid plastic containers is successful, as well as the glass container recycled content law. Unfortunately, other states’ recycled content laws for rigid plastic containers (e.g., Oregon, Wisconsin and Washington) have not been strengthened and enforced over time. These policies may have achieved original recycled-content goals and spurred the development of infrastructure to incorporate postconsumer resins in the manufacture of plastic containers,

but, an opportunity to further increase the level of recycled content is potentially being missed, and it is possible that recycled-content usage has slipped where programs are no longer monitored.

California's recycled-content law for plastic garbage bags is more of a hybrid program in that it requires wholesalers and manufacturers of plastic garbage bags to use a certain level of postconsumer recycled content resin (10 percent postconsumer, by weight), in order to be eligible for participation in state procurement contracts (including as a supplier/subcontractor). Therefore, some manufacturers choose to comply, and others do not.

California Incentive Payments

A CalRecycle representative indicated that the state's current quality incentive payment (QIP) program has been successful in ensuring single-stream glass has markets, as it provides a payment to glass processors. The QIP program presently allows CalRecycle to spend up to $10 million per year, or $60 per ton, for the sorting and cleaning of glass recovered through the California Refund Value (CRV) program, the state's beverage container redemption program. The major recipient of funds in California, Strategic Materials, who has six in-state glass beneficiation facilities, is essentially subsidized to process glass.

From 2007 through 2009, QIP payments were also paid to collectors/sorters of plastic and aluminum. This was due in part to a large fund balance in the CRV program. The QIP was as high as $180 per ton for sorted, contaminant-free bales of plastic containers. A CalRecycle representative indicated that this brief expansion of the QIP program did not increase the amount of plastic recovered through curbside recycling programs or consumed by manufacturers in the state, but merely provided additional revenues to sorters of plastic.

No other states are known to have implemented incentive payments to processors and manufacturers for processing/use of "curbside" recyclable materials.

Nonprofit Initiatives

Nonprofit entities have made some strides in RMD. At the national level, **The Recycling Partnership (TRP)** has been working for several years to expand infrastructure and provide communities with tools and resources to improve programs. By the end of 2018, TRP expects to have served 750 communities with tools, resources and technical support, provided 500,000 recycling carts, reached 40 million households, and helped companies and cities invest more than $33 million in recycling infrastructure. Tools to reduce contamination are available for communities to use at no cost, and the impacts and reach of these tools is unknown. TRP initiatives, therefore, focus on expanding and improving the quality of materials supply, not increasing demand for recovered materials.

The **Pennsylvania Markets Center** indicates, in its 2011 Five-Year Report that it had accomplished the following in its first five years of operation:

- Facilitated at least $21M of capital investment or sales growth in recycled materials markets.
- Facilitated the diversion of approximately 150,000 tons of recyclable materials.
- Provided 32 presentations on Pennsylvania-produced, recycled-content products to various audiences, totaling approximately 1,000 attendees.
- Hosted nine markets development forums.
- Hosted the PA REMADE Exposition (REcycling MArkets DEvelopment), a first of its kind in PA. This business-to-business exhibit of PA produced, recycled-content products boasted 130 attendees and 24 exhibitors.

Private Companies/Industry Associations

Many individual companies, including brand owners (generally global brands), packaging manufacturers, and retailers, have made commitments to use recycled content, recyclable materials in their packaging/products, and/or compostable/reusable packaging. Many of these commitments have been made through the New Plastic Economy initiative, led by the Ellen MacArthur Foundation. It was recently

announced that the New Plastics Economy has obtained commitments from over 275 brands, retailers, recyclers, governments and NGOs that have made commitments to "close the loop" on plastic waste. Some change will also require consumer acceptance and changes in behavior. It is unknown what the exact impact will be, and many companies' commitments are for 2025. Also, this effort focuses on plastic only, not other material types.

Plastics present significant challenges in terms of marine debris. Fiber has a heavy carbon footprint. The big issue with plastic is that, as the cost of extraction has declined, there is a greater supply of virgin plastic resin, and the cost to process scrap often exceeds the cost of buying virgin material. There is also increasing pressure to eliminate plastics, particularly single-use plastics such as packaging, cutlery, and other food-service items. However, replacing plastic with alternative materials without finding ways to change activities will lead to far greater environmental impact. According to a Trucost study titled, "*Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement*" using alternatives to plastics may lead to four times the impact.

Many current private/industry recycling market development efforts are exploratory, pilot-scale, and project specific in nature and have not yet resulted in moving significant tonnage into markets. In many cases, the same entities "step up" to fund and participate in initiatives, while others (e.g., medium and smaller-sized businesses) do not participate leading to a "free rider" effect. Without addressing the economic fundamentals, developing sustainable funding sources, and establishing protocols to track claims such as recycled content, money spent on pilot-scale projects may not pay off, as the projects are challenged in becoming economically viable in the long term.

The marketplace has a chicken or the egg syndrome. Presently, there simply isn't enough supply of PCR, due to limited collection, sorting and processing activity, to provide the supply needed by companies striving to meet their recycling goals. Making the case for investment in the infrastructure, with no other incentives or interventions, is challenging with the low "return on investment" scenarios. Companies are challenged to pay a premium for PCR when the market does not directly reward them for using PCR. Without demand for PCR from end users, or the ability of suppliers of PCR to compete with virgin pricing, which is very low as a result of an imbalance in subsidies for fossil resource extraction compared to subsidies for recycling, the collection infrastructure will likely shrink. The cost of collection, sorting and processing is expected to grow. Solutions for marine debris and litter are dependent on a system to absorb the growing supply of scrap materials.

The APR Recycling Demand Champions program announced that, in its first year of operation, program participants increased their PCR purchasing by 6.8 million pounds. This results in reducing the production of greenhouse gas emissions equivalent to 1,747 passenger vehicles driven for one year, the creation of 92 jobs in plastics recycling, and all of the plastic recyclables collected from a city the size of Cambridge, Massachusetts (population 113,333), the association adds. Unfortunately, the need for additional new demand is much greater. The surplus of scrap plastic that was left after the decline in demand from export buyers is approximately one billion pounds.

The intertwined issues of marine debris and climate change could be addressed by society placing greater value on recycled content for its environmental attributes. This requires policy and traceability.

5. Current Recycling Markets Situation

Current Status

Today's recycling collection infrastructure is different from the past (e.g., the 1990s, when RMD was initially a focus), in that the U.S. recycling collection and processing system has largely been converted to single-stream, which is not the case in Europe. According to SPC's *2015-16 Centralized Study on Availability of Recycling* report, curbside recycling is available to 73 percent of the U.S. population (though that number has most likely increased since the report was issued). And, of the single-family residences across this country that do have curbside collection of recycling available to them, almost 90 percent of that population has their recyclables collected in a single-stream manner. Conversely, though curbside commingled collection is widespread throughout the UK, a majority of the EU still operates under a separate collection

approach, as it is regarded as the collection system that best promotes high-quality recycling. Also, in the U.S., the types of materials collected has expanded significantly, as have the types of packaging being put on the market – often leading to consumer confusion about what is and is not recyclable. Most confusion seems to be around plastics.

Single-stream collection may reduce collection costs, but it increases contamination levels, which increases costs on the processing side and negatively impacts the marketability of resulting materials. Ironically, most of the largest haulers of recyclable commodities are vertically integrated with MRF operations, so while they stood to reduce costs (and thus increase profits) through single-stream collection, they now face increased recycling costs (and decreased sales revenues) at their recycling facilities, particularly as they face a decline in demand due to China's National Sword policies.

Recycling companies that are vertically integrated (e.g. Pratt Industries, Sonoco, etc.) are better positioned to weather fluctuating market conditions. Vertical integration is becoming more common in Europe. It leads to stronger market feedback loops, plus a focus on design for recyclability, increased collection, and quality materials.

Manufacturing interests have decreased in some regions (e.g., New England) but increased in others (e.g., the Southeast and Texas), which may have potential market implications.

Overall demand and generation of certain materials has also changed over time. For example:

- Packaging has become more lightweight (especially plastic and aluminum, and newer packaging formats such as cartons and flexible packaging). Therefore MRFs must sort more items to create the same weight bale. This reduces cost effectiveness.
- The use of plastic in packaging has increased significantly.
- The generation of ONP has decreased significantly in the U.S. For example, North American newsprint shipments were 19.221 million tons in 2000, and only 5.662 million tons in 2017.
- Demand for OCC has been increasing, which is largely attributed to the growth of e-commerce. For example, consumption of recovered paper at U.S. paper and paperboard mills rose 1.1 percent in 2017 and increased in four of the past five years, resulting in a cumulative increase of nearly five percent since 2012.
- The amount of glass used in packaging/generated in the recycling stream has declined. While there is high demand for high-quality glass cullet in the U.S. (often from states with bottle bills in place), much glass from single-stream MRFs is of low quality, and some municipal programs have ceased accepting glass at the curb.
- New types of packaging have emerged or grown in usage, such as multi-material/flexible and single-serve/small format packaging. These are not widely recyclable using today's MRF equipment, and impact MRF efficiency and disposal costs.

Because the U.S. has not been optimizing its recycling system for circularity and sustainability, when China's National Sword hit, it put tremendous pressure on mixed paper and mixed plastic suppliers; China no longer accepts these materials unless they have virtually unobtainable contamination rates. While some nations have followed suit, others (e.g., India, Malaysia, Turkey, and Vietnam) have become outlets for some of our material, but at higher transportation costs and generally with low pricing. Also, they cannot come close to closing the gap. Furthermore, sending mixed bales to countries with underdeveloped recycling and resource management systems contributes to the marine debris issue.

Due to tighter restrictions around the exportation of mixed fiber, 2018 saw numerous announcements of investments in the U.S. recycled paper processing infrastructure, especially by Asian paper companies such as Zhangzhou Sanlida Environmental Technology Corp. (dba Ecomelida), Shanying International (dba Global Win Wickliffe LLC), and Nine Dragons Paper (Holdings) Ltd. (dba ND Paper), who is not only the largest paperboard producer in Asia, but one of the largest in the world in terms of production capacity. Expanding capacity and building/upgrading mills will help with demand for certain fiber grades, such as cartons and OCC.

Cities and towns have been forced to consider making changes in their MRF contracts (or risk losing their MRF), cease accepting certain materials, or cease operating a recycling program altogether. Some communities have ceased accepting glass, plastics beyond bottles and even water bottles in curbside programs. Some communities have ceased offering curbside and/or drop-off programs. Many communities have made an effort to educate residents about the importance of reducing contamination in the recycling stream, and some states are trying to harmonize recycling programs in order to simplify recycling. Due to poor markets, many MRFs have been stockpiling some material grades (notably lower-value plastics and mixed paper). This has been noted in California, Massachusetts, North Carolina, Oregon, Washington and other states. In some cases, MRFs have been granted approval to dispose of collected, sorted material by the state environmental protection agency (e.g., Oregon). However, some recycling representatives indicate that while they had to stockpile earlier in 2018, they are now able to move material, but at low prices.

Nationally, there is concern that the public is losing faith in recycling. Because changing behavior is so challenging, removing materials from recycling programs or ceasing them altogether can have long-term implications on recycling programs.

Some states report more serious issues with markets than others. For example, the following **13 states** reported experiencing a **"heavy impact"** from China's National Sword:[18]

- Alaska
- Arizona
- California
- Hawaii
- Idaho
- Massachusetts
- Montana
- New Hampshire
- New Mexico
- New York
- North Carolina
- Oregon
- Washington

These states include those that relied heavily on Asian markets, as well as some Northeastern states, plus North Carolina. The following **28 states** indicate they are experiencing a **"noticeable impact"** from China's National Sword, although several of them did not report a noticeable impact until well into 2018[19]:

- Alabama
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Illinois
- Indiana
- Iowa
- Kansas
- Maine
- Maryland
- Michigan
- Minnesota
- Missouri
- Nebraska
- Nevada
- New Jersey
- Pennsylvania
- Rhode Island
- South Carolina
- Texas
- Utah
- Vermont
- Virginia
- Wisconsin
- Wyoming

[18] Waste Dive, "What Chinese Import Policies Mean for All 50 States," September 21, 2018.
[19] Waste Dive, "What Chinese Import Policies Mean for All 50 States," September 21, 2018.

Current Needs

Today's current primary RMD needs with respect to residential recycling programs include:

- Expand domestic markets for container glass, plastics #3 – #7, non-bottle PET, film plastics, and residential mixed paper;
- Minimize contamination, so recycling is more cost effective; and
- Develop collection systems and markets for new packaging materials not currently included in curbside recycling programs such as multi-layer flexible packaging. Such systems would ideally be developed in a manner that does not contaminate or degrade other material types (e.g., with current MRF technology, flexible packaging would tend to be sorted with paper, as a two-dimensional item, which, if not further sorted, would degrade paper bales).

Secondary needs, which can also help support materials markets include:

- Enhance the understanding that recycling usually costs money, but is still preferable to disposal;
- Ensure MRFs are using appropriate technology to sort materials;
- Understand that markets will go up and down – to not make long-term decisions based on short-term circumstances;
- Expand funding for RMD activities;
- Ensure that legislators, other elected officials, and other decision makers understand the economic and environmental benefits of recycling and developing end markets domestically;
- Secure funding to develop and implement tools and strategies to expand markets; and
- Develop and disseminate information about outlets for secondary materials, and specifications for each outlet, including the flow of materials, such that strategies for expanding markets can be better targeted.

Based on survey responses of state recycling market development professionals and telephone interviews (with current and past state and nonprofit entity representatives along with state and local environmentally preferable purchasing program directors), what is needed, specifically, to expand recycling markets includes:

- Funding and staff resources to develop RMD strategies and programs;
- Regional cooperation and coordination to implement and fund RMD grants;
- Sharing of information regarding outlets for materials, and more specific quality standards and pricing information for different buyers, who may accept varying levels of quality. Some of this information needs to be shared regionally, based on markets.
- Political will and legislative support to fund recycling programs and RMD programs until adequate markets are developed, with the understanding that there is a cost to recycling, and the net cost will rise and fall with markets, and that market costs exclude certain externalities.
- Establishment of relationships between recycling professionals and economic development professions (in many states/regions).
- Training among economic development staff regarding recycling markets and issues, and among recycling professionals regarding economic development tools and strategies to grow markets.
- Information and coordination to reduce transportation costs, especially for rural areas where communities may be unable to generate full truckloads.
- Research and innovation to develop regional, cost-effective markets, and enhance the recyclability of packaging.
- Adoption of effective policies to increase the demand for recycled materials.

6. Looking Forward – Effective Roles and Strategies

Introduction

While we can learn from past RMD efforts, given the changes in the marketplace and stakeholder involvement, today's current market situation will likely require more significant interventions in the marketplace. Below are potential roles and strategies to address today's RMD needs, based upon the research conducted for this study and insight from experts tracking industry changes on a global scale.

National-Level Efforts

At the national level, **coordination, facilitation, and information-sharing** are essential. Some broad **education and outreach** may also be appropriate at the national level (such as a national "Buy Recycled" campaign), as could some **research and development** to spur innovation. Below are feasible roles, by sector. Some interviewees expressed an interest in national-level efforts for **funding recycling market development efforts**. National level efforts could also include **strengthening policy**, such as updating buy-recycled requirements and strengthening guidance documents available for buyers, as many states refer to the U.S. EPA CPG for their buy-recycled specifications. Tax incentives and subsidies commensurate with those of the virgin material industry would have a dramatic impact on leveling the playing field and turning the economic case for recycling right side up.

Regional investments are needed to address fundamental handling challenges. Additionally, a funding source is needed for long-term maintenance. Cities and states compete every day for funds for community services whether it be for solid waste management, education, disaster relief, police and fire departments, etc. As revenue sharing in recycling programs shrinks due to lower commodity values and higher collection costs, municipalities must add to their budgets in order to cover costs.

One policy that includes a funding mechanism that is being implemented and expanded upon in many countries (and in some states, at least for difficult-to-manage items) is Extended Producer Responsibility (EPR). This policy makes the producer/brand owner have some financial responsibility for managing a product/package at the end of its life. Global brands must respond to updates to the Packaging and Packaging Waste Directive in Europe, which requires certain levels of recycled content in packaging. With little support for the collection and recycling infrastructure, companies will be increasingly challenged to meet such policies. The United States is likely to fall behind other parts of the world in innovation and sustainability without strong market signals that stimulate systematic improvements.

An American-centric policy that combines carbon impacts and end-of-life impacts, and which awards companies that have more sustainable packaging, reduced GHGs and an increased use of recycled content (a combination of the Circular Economy and Sustainable Materials Management), could provide the stimulus needed to drive innovation and action toward achieving goals set by companies and organizations in the United States and beyond.

Public-Sector

The federal government can play an important role in **education and outreach/information sharing and coordination**. Through survey efforts, it is clear that there may be opportunity for the federal government to assist with providing RMD resources to states, including information about strategies, and how to develop a strategic plan for RMD initiatives, including establishing and assessing goals. Other possible roles for federal government include:

- **Broad economic benefit campaign** – A national campaign to broadly tout the economic benefits/jobs created through recycling could help encourage participation.
- **Buy-recycled specifications and certification standards/methods** – The U.S. EPA developed the Comprehensive Procurement Guideline (CPG), which many states have adopted or refer to for their buy-recycled programs. More work is needed to certify recycled-content levels in products as

well as whether such recycled content is postconsumer or pre-consumer (i.e., post-industrial) in nature.

- **Materials directory** – It may be possible to develop a national materials directory, where users could select their location and materials markets that make sense for that material type would populate, or, the user could indicate the number of miles that material could travel and still be cost effective. Such a directory might also serve as a means for rural areas to communicate to consolidate loads.
- **Recycled products directory** – While some state purchasing agencies and the EPA have worked to develop some information about recycled-content products, a national directory that is easy to use, comprehensive and visually appealing could make the purchase of recycled-content products more convenient and common.
- **Communication, facilitation, information sharing, stakeholder convening** – National conferences, webinars and tool development, dissemination could help state and local governments move further along in RMD. Sharing studies and tools nationally can help enhance the effectiveness and efficiency of resource expenditure. There is also an opportunity to provide training and a forum for information sharing among state agencies regarding RMD, and to bring recycling and economic experts together.
- **Research and development** – There may be some areas where national research could spur innovation in how to recycle problematic materials or to find new uses for recovered materials that need markets. This might include the expansion/scaling up of emerging technologies such as those used for chemical recycling (e.g., Agilyx for PS). The EPA could host a national competition to resolve a specific recycling or end-use issue, for example.

The EPA would be the agency responsible for carrying out these functions, including EPA regions. Others that might also be involved include the Department of Commerce (DOC). As was the case in past years, there might also be an opportunity for funding to be addressed nationally. If this were to be considered, the DOC might also be involved. The National Association of Counties and their state chapters and the National League of Cities and corresponding state organizations could also be entities that help convene stakeholders and gather and share information. At the local level, the U.S. Conference of Mayors, and their Municipal Waste Management Association might be involved.

Private Sector/Industry Trade Associations

Individual businesses can work nationally (and globally) to support recycling market development in many ways, including by **directly creating demand for recovered materials**. Many are already announcing goals to use recycled content and ensure materials are recyclable, as is currently being done through the Ellen MacArthur Foundation's New Plastics Economy and APR's Recycling Demand Champions program.

Private brands can also support nonprofit and trade organizations' efforts with expertise and financial support to expand markets and improve the quality of recovered materials. Examples of private entity roles include:

Information/Outreach/Technical Assistance/Collaboration – Industry organizations and trade associations can play a critical role in providing/sharing information and convening information-sharing opportunities, allowing brand owners, processors, and public-sector interests to better understand each other's concerns, challenges and efforts. Examples include:

- As is currently being done by The Recycling Partnership, recycling-oriented organizations and businesses can develop tools and share information to help reduce contamination and publicize the economic benefits of recycling. Information about how to construct processing contracts to mitigate risk when markets are uncertain could also be beneficial.
- National purchasing organizations can share information about recycled-content programs, and how to make them successful, sharing case studies as appropriate.

- Organizations that represent certain material types can focus on disseminating information about how and where to recycle those materials, market information about them, and environmental impacts of recycling those materials.
- Economic development agencies can share tools, strategies, and case studies of economic tools that created markets and enhanced a regional economy.
- Recycling-oriented and economic development-oriented entities can collaborate to better understand one another's issues, concerns, and to establish relationships.

Research/Development/Innovation – Private-sector businesses such as resin producers, processors, equipment manufacturers and others can also play a role in advancing innovation, so that materials are more compatible with recycling systems, and so recycling systems can advance to suit different packaging and product types.

Funding – Some interviewees indicated they feel the private sector should also play a role in funding recycling market development, either through EPR or some other mechanism. Some industry organizations, funded by private companies, have provided grants for processing equipment in the past, for example. They may also be able to fund additional research and development initiatives by colleges/universities (some research in this arena is already taking place, funded by private companies and the U.S. Department of Energy's Advanced Manufacturing Office). Some private entities might also be engaged in helping administer funding and loan programs through state agencies, as is done in Massachusetts, and might help educate the recycling community about funding options.

Examples of organizations that are/can be involved in RMD efforts on a national level include:

Recycling/Sustainable Packaging (Multi-Commodity):

- Closed Loop Partners
- Environmental Research and Education Foundation
- Institute of Scrap Recycling Industries
- Keep America Beautiful
- National Association of Counties
- National Association of Regional Councils
- National League of Cities
- National Recycling Coalition
- National Waste & Recycling Association
- Solid Waste Association of North America
- Sustainable Packaging Coalition
- The Recycling Partnership
- U.S. Conference of Mayors

Business and Purchasing

- American Sustainable Business Council
- National Association of State Procurement Officers
- Responsible Purchasing Network
- Sustainable Purchasing Leadership Council
- U.S. Chamber of Commerce/U.S. Small Business Council

Commodity-Specific

- Aluminum Association
- American Chemistry Council
- American Forest and Paper Association
- Association of Plastic Recyclers
- Can Manufacturers Association
- Carton Council

- Flexible Packaging Association
- Glass Recycling Coalition
- International Bottled Water Association
- Plastics Industry Association
- Recycling Works in Publishing
- Steel Recycling Institute

Regional Efforts

Regional Nonprofit Organizations

Regional nonprofit organizations that exist and help with RMD efforts include:

- Southeast Recycling Development Council
- Northeast Recycling Council

These organizations serve an important role in bringing stakeholders from different states and sectors together to share information, facilitate discussion, and undertake regional projects. They can also serve a role in bringing together recycling professionals with economic development professionals. Such organizations can host innovation and investment forums to inform attendees about innovations regarding RMD and introduce them to financing opportunities.

Public Sector

The U.S. EPA regions can (and do) help facilitate and **convene stakeholders within each region and share information among regions**. RMD has not been a focus of the regions in recent years, however, there is a potential role for U.S. EPA regions to convene stakeholders, facilitate information sharing, and "roll up" regional RMD information nationally. EPA, through its 10 regional offices, can also provide training to state and local agencies, as appropriate. It is clear, through research, that some state-level recycling contacts are unfamiliar with the purpose of RMD and with how to establish RMD-specific goals.

Convening recycling and economic development experts to share information and issues on a regional basis could be helpful for better understanding the range of tools available to enhance markets, and would help entities leverage existing information, thus using resources more effectively.

Research and development and innovation could also be led by EPA regionally, and could involve engaging public and private colleges and universities.

State-Level Efforts

Although markets do not follow state lines, some efforts naturally take place at the state level due to state regulations, policies, and agency authority. State-level efforts are generally led by the state's environmental protection agency and/or its economic development agency. Activities that can take place at the state level include business development, research and development, education and outreach/technical assistance and facilitation.

Public Sector

State environmental protection agencies have historically been the regulatory agency and data gathering agency. Many state environmental protection agencies also have a very strong education and outreach component – often working through counties and local governments (e.g., South Carolina). Economic development agencies generally have strong outreach and interaction with the business community, but often lack collaboration with the environmental agency.

All in all, states that have continued to focus on capacity building for RMD and assessing markets for materials locally as an economic development strategy have been more successful in diversifying markets

beyond export. Conversely, reliance on export markets and detachment from materials markets (i.e., many communities rely on MRFs to market materials, with little to no feedback regarding end markets, including markets issues) have led to complacency and lack of focus on RMD over time. As a result, some states/regions were/are left with limited or no markets for some materials, as was the case along the West Coast when China's National Sword policy severely impacted plastics and mixed paper export markets for MRFs operating in California, Oregon and Washington.

Efforts undertaken by state agencies might include:

- **Education and Outreach/Technical Assistance** – Many state-level education and outreach campaigns could take place at the state level – including:
    - Efforts to ensure recyclables are low in contamination through direct outreach and outreach/provision of tools to local governments
    - Promotion of "buy recycled" (and recognition of businesses that achieve certain levels of buying recycled)
    - Building public awareness of the importance of recycling as an economic driver – to the public, state legislators and other decision makers/REI studies
    - Contracting with processors to retain markets while sharing risk
    - Building information exchange and collaboration across agencies and organizations
    - Business assistance, including sharing information about funding opportunities, incentives for businesses that use recovered materials, plus providing technical assistance
    - Workforce training
    - Recycled market database
    - Recycled products directory
    - Establish information about existing infrastructure in state for collection, processing, manufacturing, including manufacturers that could convert to recycled materials
    - Facilitate information sharing from the federal government, other states, and private entities/industry organizations to relevant parties
    - Share recycling market intelligence
- **Policies** – Many policies/regulations/programs that generate demand for recycled content might be undertaken at the state level including:
    - Mandatory recycled-content purchasing specifications/goals
    - Recycled content laws
    - Mandatory recyclables/disposal bans/waivers in limited circumstances
    - Develop/promote legislation to fund RMD activities
    - Development of model ordinances for local governments to adopt
    - Review of regulations to ensure they are not overly onerous, and do not unnecessarily impact processors or potential end markets negatively
- **Funding** – Funding for RMD initiatives often takes place at the state level. Examples might include:
    - RMD grant programs, directing funding to the prioritized materials and determined needs.
    - Development of low-interest/no interest loans
    - Development of fee waiver programs for businesses that use recycled content/process recyclables
- **Facilitation – Research and Development/Innovation** – State environmental agencies might support or facilitate an innovation competition or serve as a liaison for a national innovation challenge. State colleges and universities can play a role in research and development/innovation. Such efforts might include private support, including technology incubators, such as through ReTAP programs.

Entities to potentially involve at the state level in the public sector include:

- State economic protection agencies;
- State economic development agencies/RMDACs;
- State purchasing agencies/general services;
- State departments of transportation (and other large users of materials that can or may be consumers of large quantities of material, such as glass for asphalt application, tire-derived aggregate and rubberized asphalt);
- State departments of commerce/finance authorities (as applicable);
- Public colleges and universities;
- State legislatures;
- Offices of sustainability (if applicable);
- Governors offices where applicable;
- National Association of Counties – and their state chapters;
- National League of Cities and corresponding state organizations; and
- Councils of government (as applicable).

Private Sector

Most private-sector efforts are national, and sometimes global, in scope, although there may be opportunities for public-private RMD partnerships at the state level with mid-sized companies, or companies headquartered in a specific state. Examples might include a voluntary agreement to include a certain amount of recycled content from in-state processors, with the state providing positive public relations for the company.

Research and Development/Innovation – Private colleges and universities can also play a similar role as public colleges and universities, conducting research and innovation regarding recycling technologies and recyclable packaging and goods, as well as policy and economic tools and recycling economic impact studies.

Financing/Funding – Private financing organizations can administer RMD loan programs (e.g., MA), as they have the expertise to do so, while the public environmental agency can provide initial funding and promote the loan program.

Education and Outreach – Some businesses, like haulers and processors, might help educate residents about how to recycle properly, to help reduce contamination. Some state entities, like chambers of commerce, might help host forums to discuss the importance of buying recycled-content products. They might also promote the recycled-content products they sell to consumers.

Entities in the private sector that might play a role include:

- Individual businesses (as recyclers and consumers of recycled-content goods);
- Recycling businesses/processors/manufacturers;
- Financial institutions (to the extent they can help with providing services to help fund RMD initiatives);
- Chambers of commerce – state and local;
- Private colleges and universities; and
- Industry associations, as appropriate.

Nonprofit Organizations

The Pennsylvania Recycling Markets Center is an example of a state-level nonprofit entity focusing on developing recycling markets in state. Other entities that might play a role include state chambers of commerce and state recycling organizations (SROs).

SROs can serve the following role:

- **Education and Outreach/Coordination/Technical Assistance** – SROs may undertake statewide contamination reduction efforts. SROs may also play a role in working with local governments in developing processing contracts and providing information about market pricing. Another important role undertaken by many SROs is informing the legislature about the importance of recycling, both environmentally and economically, and finding support for appropriate legislation/policies.

State-level chambers of commerce may provide:

- **Business Assistance** – This may include conducting a networking forum for businesses and entrepreneurs and lobbying the state legislature for business-friendly legislation. It may also provide a forum for financing entities and entrepreneurs to network and share information.
- **Education and Outreach/Coordination/Facilitation** – Chambers of commerce may be able to "match" investors with investment opportunity and identify potential end markets for collected materials.

The PA Recycling Markets Center performs the following activities (which are somewhat in alignment with the role state agencies can play, as noted above):

- **Economic Development** – Works with manufacturing facilities in the Commonwealth that utilize recycled commodities for feedstock conversion into a new product. Provides assistance with the start-up of new processes. The RMC is involved in national standardization committees, to strengthen demand for recycled-content products.
- **Workforce Development** – Provides vocational training that impacts processing and use of recovered materials.
- **Technical Assistance** – Provides business consultative assistance, which is often executed with private service providers or other nonprofit partners.
- **Recycling Markets Intelligence & Outreach Portal** – Develops and disseminates information about recycling markets, markets development and material(s) end-use strategies.

Local-Level Efforts

Local government representatives indicated during the interview process for this study that they often feel powerless in what materials are generated, how they are designed, and what must be recycled, but they are tasked with managing whatever materials are generated within their jurisdiction. Most local governments have some sort of communication and outreach responsibility and many have direct materials management responsibility, which may mean contracting with the hauler and/or processor. Innovation and research can also be facilitated through the local government.

Public Sector

Entities that are involved or potentially involved with recycling market development at the local level include:

- **Education and Outreach** – The local government, having direct contact with the public and/or service provider, is often the entity responsible for providing residents with information about how and what to recycle. Local governments also have contact with state environment and economic agencies. Appropriate roles for local governments include:
    - Develop and disseminate information about how/what to recycle, including how to avoid contaminating recyclables.
    - Conduct audits (at curb and/or MRF) to identify contamination issues and provide immediate feedback to residents (If contracted service, this may be responsibility of service provider).
    - Ensure programs are in place and are well publicized for "tanglers" and other materials that might be erroneously included in recycling carts.

    - Promote the use and purchase of recycled goods, plus share information about such goods (perhaps via a recycled product directory) to purchasing agencies such as schools, department of public works/highway, administration, recycling website to consumers)
    - Initiate an innovation competition to solve a recycling/marketability issue (with the participation of a local college/university).
- **Policy** – Local governments can play a role in developing local policy and, as appropriate, supporting state-level policies.
    - Ensure contracts for materials processing are structured to share risk and strengthen marketability, as appropriate.
    - Develop policies that allow for non-collection of contaminated recyclables, as appropriate.
    - Develop and support policies that mandate the local government purchase recycled content products, developing and updating product specifications.

Entities to work with at the local level include:

- Sustainability department (if applicable)
- Schools/school department
- Purchasing department/general services/administration department
- Department of public works
- Local economic development agency
- Local councils of government (as applicable). For example, TX and NC have COGs, which allow for multiple local governments to share resources
- Association of counties
- League of cities
- U.S. Conference of Mayors (Municipal Solid Waste Association)
- County administrator

Private Sector

Private sector efforts could include public/private partnerships with the hauler or MRF and/or other local businesses. MRFs can partner in providing feedback to haulers and municipalities regarding issues with loads, such that contamination issues can be better targeted, and can help develop education and outreach materials.

- **Education and Outreach/Facilitation** – Some businesses, like haulers and processors, might help educate residents about how to recycle properly, to help reduce contamination. Some local entities, like chambers of commerce, might help host forums to discuss the importance of buying recycled-content products. They might also promote the recycled-content products they sell to consumers. Local chambers of commerce can also facilitate forums for local businesses to discuss the benefits of buying recycled content goods and to provide networking opportunities for RMD entrepreneurs and potential investors/funders.

Entities to engage in the private sector at the local level include:

- Individual businesses, as buyers of recycled-content products, recyclers, processors and manufacturers;
- Local colleges and universities, and
- Local chamber of commerce.

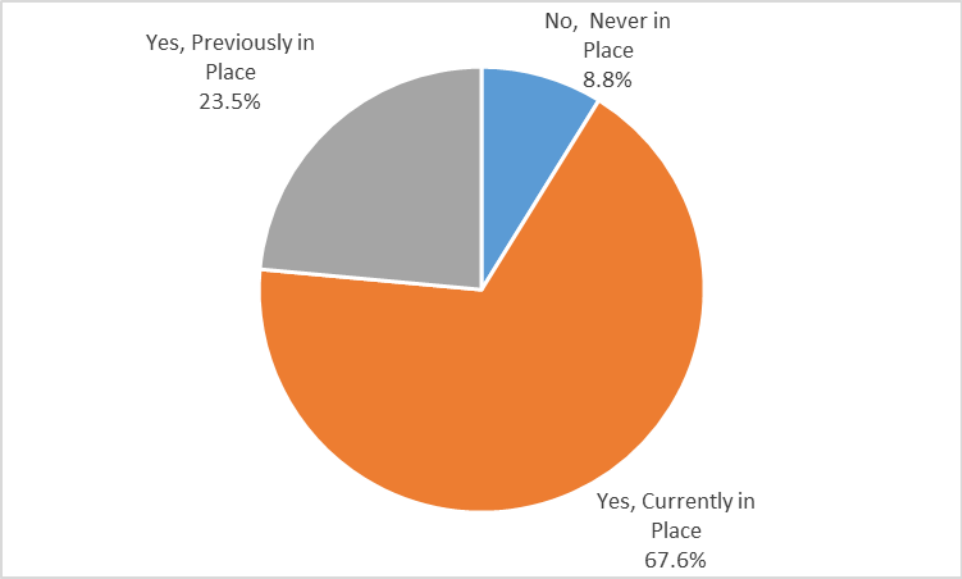
Appendices

Appendix A

Introduction

RSE USA conducted an online survey, targeting state recycling market development professionals to gain their insights as to the success of past RMD programs, whether RMD programs are ongoing, and current needs relative to RMD. Twenty four complete responses were obtained, representing 20 states. The following is a summary of the results. (Beginning with Question #5, as prior questions were identifying questions).

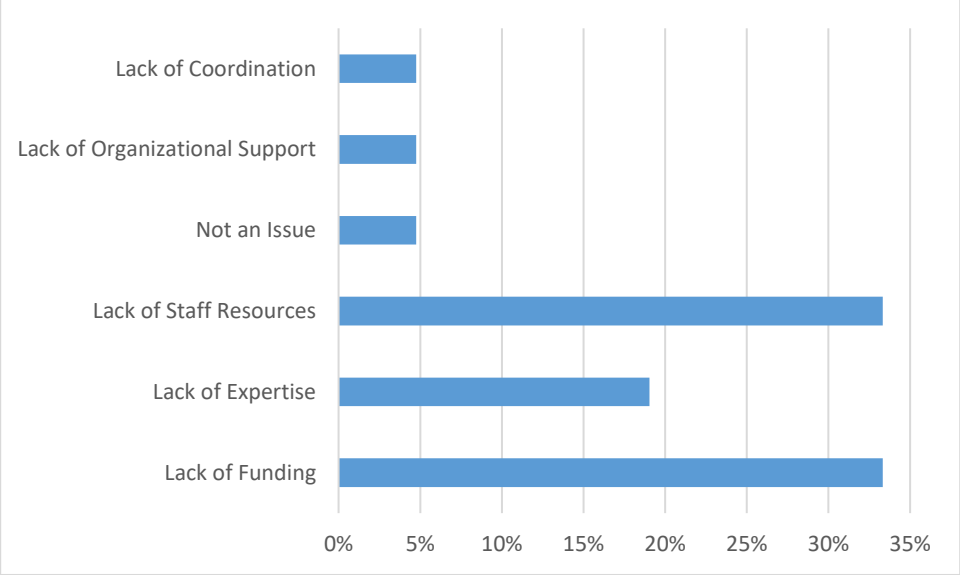
5) Does your state have now, or has it in the past had any recycling market development (RMD) programs/initiatives in place?



6) If no recycling market development program is now in place, is your state planning to establish a recycling market development program?

Value	Percent
Yes	40.0%
No	60.0%

7) What are the top 3 barriers to implementing market development programs in your state? (Check up to 3).



Other Responses:

- Lack of legislative support
- Lack of political will
- Not certain that it is believed that it is needed in this state
- Spending appropriation for existing recycling grant fund
- Would require legislation

8) In your opinion, what would be the single most effective way to address the RMD barriers and improve markets for recovered materials in your state?

- Need help on a regional basis.
- Return the Recycling Grant program.

- If this were identified as a priority within the legislature and/or Governor's office, it could change the prospect for our state having/developing a market development program nearly instantaneously.
- Having an organization other than [state environmental protection agency] provide this service on either a state or regional level.
- Support for improving markets, including resources, from legislators.
- Not sure, perhaps a large education campaign.
- Add staff.
- Coordinated campaign to stop contamination.
- Grants and tax incentives
- Find a way to directly provide funds and grants to companies. Or a work around for the current law prohibiting this. Also needing to build support for the proposed bill and getting it to pass. Also provide our department of commerce with specific education and actions they could take to help.

8) What is the timeframe for program implementation?

- 12 months
- 12 months
- Possibly 12 months – upcoming legislature
- 60 months

9) In your opinion, what would be the single most effective way to address the RMD barriers and improve markets for recovered materials in your state?

- Add staff for education and outreach
- Coordinated national effort to combat contamination
- Grants and tax incentives

11) Please indicate the type of program(s) provided by your state in the table below. (Please be sure each row includes a response) [Note: Data represents a single response per state responding].

	Currently in Place	Previously but No Longer in Place	Never in Place	Do not Know	Number of States Responding
Government Recycled Products Procurement Program (could be part of Environmentally Preferable Purchasing Program)	61.1%	16.7%	11.1%	11.1%	18
Cooperative Purchasing Agreements (e.g., to allow local governments to purchase recycled content goods using state contracts)	44.4%	5.6%	16.7%	33.3%	18

	Currently in Place	Previously but No Longer in Place	Never in Place	Do not Know	Number of States Responding
Buy Recycled Promotion Program (i.e, government promotes public and private entities purchasing recycled content goods)	22.2%	22.2%	27.8%	27.8%	18
Online Materials Exchange	33.3%	44.4%	11.1%	11.1%	18
Recycling Markets Directory	38.9%	27.8%	11.1%	22.2%	18
Cooperative Marketing of Recovered Materials	11.1%	5.6%	66.7%	16.7%	18
Grants to Purchase Processing Equipment	72.2%	11.1%	16.7%	0.0%	18
Grants for Market Development Initiatives	55.6%	5.6%	22.3%	16.7%	18
Grants for Research and Development related to Overcoming Market Barriers or Increasing Use of Recovered Materials	23.2%	22.2%	27.8%	27.8%	18
Other Recycling Market Development Grants	33.3%	11.1%	27.8%	27.8%	18
Low Interest Loans/Loan Guarantees	27.8%	11.1%	33.3%	27.8%	18
Recycling Equipment Income Tax Credits	11.1%	0.0%	55.6%	33.3%	18
Property Tax Credits	5.6%	0.0%	55.6%	38.9%	18
Sales Tax Exemptions	11.1%	0.0%	50.0%	38.9%	18
Disposal Fee Waiver	11.1%	0.0%	61.1%	27.8%	18

	Currently in Place	Previously but No Longer in Place	Never in Place	Do not Know	Number of States Responding
Permitting Fee Waiver	11.1%	5.6%	55.6%	27.8%	18
Other Tax Credit, Incentive or Fee Waiver	5.6%	0.0%	50.0%	44.4%	18
Incentive Payments or Rebates to Manufacturers and/or Processors	0.0%	0.0%	66.7%	33.3%	18
RMD Training for Economic Development Professionals	5.6%	0.0%	55.6%	38.9%	18
New Business Development Technical and Facilitation Assistance	55.6%	0.0%	16.7%	27.8%	18
Recycling Investment Forums	0.0%	11.1%	61.1%	27.8%	18
Recycling Market Development Zones	0.0%	0.0%	72.2%	27.8%	18
Supply and Demand Assessments	5.6%	16.7%	50.0%	27.8%	18
Material-Specific Barriers and Opportunities Assessments	16.7%	5.6%	50.0%	27.8%	18
Recycling Economic Impact Studies	27.8%	33.3%	16.7%	22.2%	18
Recycling Market Development Plan	22.2%	16.7%	33.3%	27.8%	18

11) # of FTEs dedicated to RMD:

- Many could not provide a response, in some cases indicating other agencies involved
- Other responses:
  - 0
  - 0.5
  - 1
  - 1

  - 1.5
  - 2
  - 2.25
  - Approximately 3
  - 2 FTE for recycling, not just RMD

12) Please indicate annual budget for RMD work:

- $675,000
- About $1 million grants + about $2 million revolving loan fund
- $4,000,000
- $600,000
- $1.7 million
- $0 (indicated by 3 respondents)

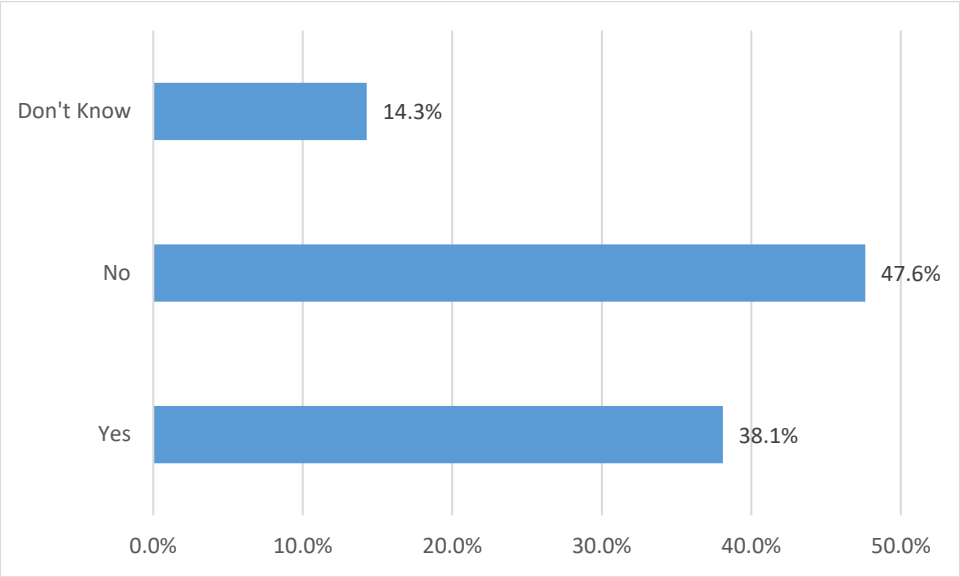
13) Other types of government entities involved (specific names removed)

- Department of Transportation (DOT)
- Department of Health and Social Services (DHSS)
- Office of Management and Budget (OMB)
- Department of Corrections (DOCC? – Delaware)
- Operational Services/Purchasing Agency
- School districts
- Economic Development Agencies/Departments
- State Market Development
- State Department of Commerce
- State Environmental Protection Agency
- Local Waste Management Districts
- State Department of Community Affairs (past)
- State Environmental Finance Authority

14) What non-governmental agencies, entities are also involved in RMD?

- Private financial institutions (e.g., to administer loan program)
- RecyclingWorks in Massachusetts (supported by MassDEP and Center for EcoTechnology)
- Southern Waste Information Exchange
- State recycling organizations
- State zero waste groups/organizations

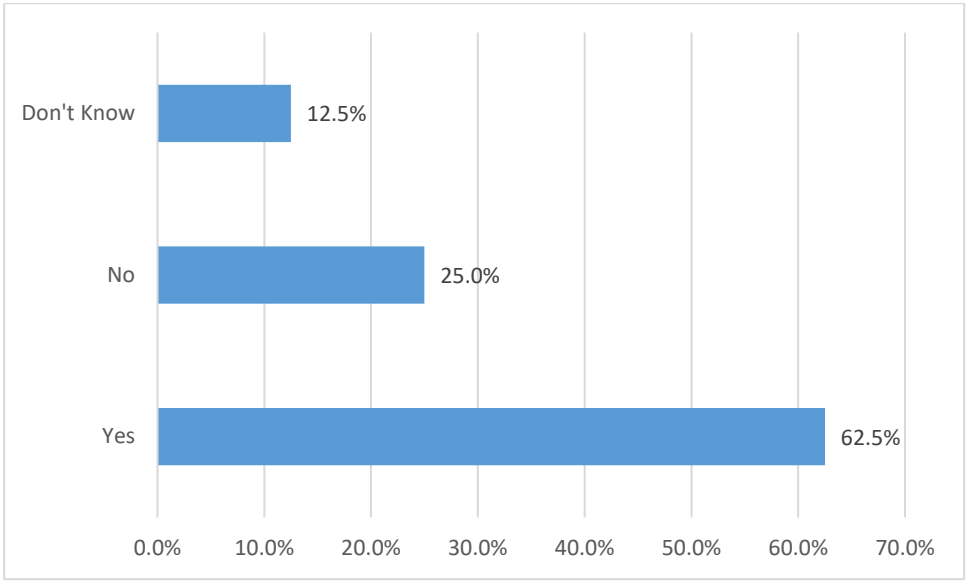
15) Did /do the RMD program(s) implemented in your state have specific goals or performance metrics? (Examples might include goals to increase tons recycled, increase tons recycled locally or regionally, a specific return on investment (ROI), establishment of a new facility that could become financially self-supporting, etc.)



Examples of RMD Goals:

- 28% diversion rate by 2021, 35% diversion rate by 2026, 45% diversion rate by 2036
- 50% state recycling goal
- State Statutes
- Reduce the amount of solid waste disposed of in landfills
- Develop self-sufficient in-state markets for targeted materials
- Increase plastic bottle recycling, increase food waste recovery, develop new markets for materials, match business/industry waste streams to recycling industry, etc.
- Increase tons recycled
- Tons recycled or tons of recycling capacity created

16) Was the state able to achieve its stated goals?



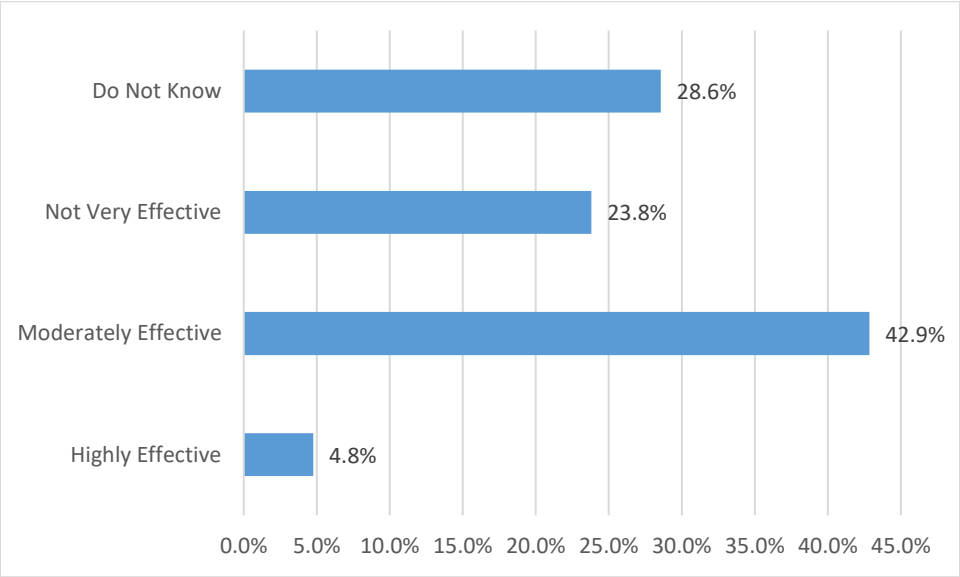
Description – Yes Responses/Other Comments

- The statutes are not measured goals.
- This was effective to a degree - recycling markets have had a major impact on the ability to recycle certain materials within the state currently.
- We track the performance of our grant programs and report on the annual tons recycling capacity created, jobs created and amount of private investment leveraged.
- Current grant programs are still ongoing, but have been successful at building infrastructure for packaged food materials.
- It's a work in progress and depends on the commodity.
- Still working toward goal(s).

Description – No Responses

- Current recycling rate is at 17%.
- Still working toward goals.

17) How would you describe the effectiveness of your state recycling market development efforts at achieving defined program targets?



18) What RMD programs do you consider to be particularly **beneficial/effective** in increasing demand for recovered materials?

- Mandatory Buy-Recycled incentives, incentives to encourage local markets development, and understanding the flow of materials to support non-state located buy-recycled initiatives.
- Recycling Loan Fund - initial principal has been invested four times over, current Recycling Business Development Grants are still being assessed but some initial successes, successful EPP program
- Recycling Business Development Grant program; property tax incentive
- Recycling Loan Program
- Grant programs promoting use of tire derived products, rubber-modified asphalt, and increased use of TDF
- Quality Based
- Scrap plastics
- Grant funding, tax credits, technical assistance/data collection
- Grants for equipment
- Technical assistance and collaboration with economic development agencies
- Food waste ban, helped encourage development of processing infrastructure (anaerobic digestion facility),
- Our technical assistance to local solid waste authorities
- RMD Grant program by State Environmental Protection Agency
- Government purchasing program.
- One “Unknown”

19) What RMD program(s) (current or past) do you consider to be particularly **ineffective** in increasing demand for recovered materials?

- Mandated goals without any tracking/enforcement (they don't happen!)

- Previous Recycling Industries Reimbursement Credit grant program was replaced with more targeted RBDG program intended to "move the needle" on certain targeted materials
- N/A
- Straight infrastructure based
- Rebates
- Subsidized projects
- None. Our program is limited to grant funding which has proven effective.
- Technological complications delayed opening of anaerobic digestion facility
- Single steam recycling programs
- None
- Three “Unknown”

20) What advice do you have, or learnings, for others trying to implement RMD program?

- Government recycling market development programs need the support and partnership of the state/local economic agency.
- Incentivize or provide grant funding to end users rather than processors. Healthy end users will then help processors grow and prosper.
- Plan and research before initiating.
- Organizations that want to have "buy recycled" goals / campaigns should plan to dedicate a procurement professional to this cause. To expect the recycling program staff responsible for collections and other operational activities to also specialize in "buy recycled" initiatives hasn't worked well in our state.
- A rounded program includes market development grants, education and outreach, and online reporting of state solid waste and recycling metrics.
- We do not have one in place, but I believe programs would benefit from a formal strategic plan.
- Work with economic development agency.
- Programs should be designed to work statewide overall but a heavy emphasis on local challenges.

21) Please provide information about the recycling markets development needs for certain materials in your state/region:

	Poor Quality	Low/No Regional Demand	Material Value Too Low	Market Volatility	Less Than Truckload Quantities	Lack of Processing Capacity in Region	No Issues	Other
Residential Mixed Paper	4	10	12	8	0	3	2	2
Cartons	1	10	5	4	5	3	3	6
Glass Containers	9	11	13	2	1	4	2	4
HDPE Jugs	1	3	3	3	1	3	12	2
PET Bottles	1	4	2	3	1	3	12	2
PET Non Bottles	6	11	7	6	3	1	4	4
#3 - #7 Bottles and $=# 1 - # 7 Small Plastics	7	13	13	8	2	2	2	2
PP Bottles and Non-Bottle Containers	2	11	6	4	4	3	3	4
Plastic Bags and Film	5	7	9	3	4	9	3	4
Other Plastic Containers	6	10	9	5	3	4	3	4
Other Materials	2	4	2	1	2	3	8	9

As the results show, the most responses pertained to material value being too low for glass containers and #3-#7 plastic containers and small plastics #1 - #7, as well as demand being too low for the latter material type. This was followed by low value for residential mixed paper. The next most significant issues based on survey responses are low/no demand for glass containers and PET non bottle material. A fair amount of

respondents also indicated that PP and other plastic containers also have low/no demand, and that plastic bags and film is of low value/suffers from low or no demand. HDPE jugs and PET bottles appear to have the least issues.

22) If you indicated "other" in the above question, please describe the barrier you face, indicating the material type(s) impacted:

- Our State has some [opportunities for] growth in the non-curbside categories. I think that because our State doesn't have capacity for things like electronics and/or textiles, we struggle in maximizing diversion of them. In both cases, significant amounts of these types of materials are still being landfilled. Additionally categories like paint, mattresses and non-lead acid batteries are also areas where regional support could increase diversion.
- Cardboard - strongest, steadiest market, but still a lot disposed of
- Do not have enough information on the commodity (in one state pertained to all commodities – due to lack of resources, in some pertained to other plastics or #3 - #7 plastics).
- Collection infrastructure is a significant factor. Also, our state is a large state that is rural in character. Hauling costs are a significant barrier.
- Education and outreach
- Barriers include education and outreach, contamination, and cost of shipping.
- Organics (compost) quality is poor
- Market prices
- Unable to answer due to lack of adequate baseline information; currently the State Environmental Protection Agency does not track this information due to resource limitations.

23) Please provide any additional comments about RMD efforts or needs in your state/region.

- Currently just the private sector develops markets.
- Welcome partnerships with other industry groups to provide additional funding for market development grant program in our state.
- Incentives and public/private partnerships are needed to expand market demand.
- We are starting to delve into RMD. Need to work with Economic Development people.
- We are a rural state with a small population. Logistics getting material to end markets can be very challenging.
- Environmental Protection Agency's Stakeholder group, the Waste and Materials Management Study Group, has identified recycling market development as a mid-level priority. However, I'm not sure what, if anything, they will advocate for or suggest as next steps.
- State Environmental Protection Agency has in the past offered very modest grants to projects that propose to enhance or create new markets for materials collected for recycling. This need might be better met by a regional organization like NERC or NEWMOA.
- We are a rural state with many counties lacking in markets. Market prices have also affected recycling.

24) Please provide any additional comments about RMD efforts or needs in your state/region:

- Want to leverage university research assets more
- We need it!
- Our state has primarily promoted market development for scrap tires. We have also provided significant grant funding for recycling infrastructure to county and local governments, but do not really consider that "market development."
- We are [using] Hub and Spoke Technology to improve collection and cooperative marketing of materials.
- We are in the process of launching a new program specifically geared to helping recycling markets development. We are several months away from formally launching the program.
- Circular economy benefits are helpful to develop state recycling efforts.
- The interplay between cost/value and the development of new collection and processing capacity cannot be ignored. Global markets create global price floors/ceilings, which sometimes limit opportunities for investment. The theme of the day is: focus on quality and focus on local relationships with end use markets. Also, the role of corporate sustainability goals is important in driving markets. Regarding end users or potential end users, specialized technical assistance is necessary. These are the efforts that our state is working on and could use assistance with.
- We have a state Recycling Steering Committee That will be looking into RMD needs as well as other issues.

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