IOWA DNR

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2022 **PHASE II** SMM VISION FOR IOWA

prepared by:
SCS Engineers

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ACKNOWLEDGMENTS

The SCS Team acknowledges the efforts of all who participated in discussions and provided input that led to the development of the final strategies and implementation plan described herein.

The Iowa Department of Natural Resources internal Sustainable Material Management team spent countless hours in initiating/completing Phase I of this project and then moving on to this second phase. Throughout the last two years they have participated in 30 subcommittee, four stakeholder and monthly project status meetings. This is a project that initiates change and with change comes additional interaction with stakeholders working to ensure their understanding of the process and direction. The patience and determination of the team was appreciated and commended.

Subcommittee members have committed numerous hours to the process and participated in subcommittee and stakeholder meetings. The makeup of the subcommittees was intentionally diverse, to gain input from affected parties representing material production through final disposal. This provided interesting discussions and varying perspectives. Engaged subcommittee members are crucial to the on-going success of this vision.

Stakeholders have provided input and feedback to initially set up the subcommittees and subsequently on the work done by the subcommittees. Their perspectives on information presented in stakeholder meetings improved the work done by the subcommittees. Their direction in consent or refocusing the issues to the subcommittees was greatly appreciated and is critical as this vision moves forward.

EXECUTIVE SUMMARY

For nearly 40 years, Iowa's solid waste regulations and systems have focused on managing solid waste at the point of disposal. At the same time, the State's regulations and initiatives encouraged and supported waste diversion efforts to help reduce the quantity of materials being disposed in landfills. These efforts dramatically changed the solid waste management landscape in Iowa and cultivated a societal transformation that focused on diverting waste from disposal through recycling initiatives. While there has been good success in diverting waste from disposal, there has not been much progress in establishing solid waste practices that are focused beyond end of life management.

The Iowa Department of Natural Resources (DNR) initiated discussions with the public and a variety of stakeholders to assess the potential to transition from this traditional integrated waste management system to a sustainable materials management (SMM) approach, using and reusing materials more productively over their entire life cycles. This approach represents a change in how our society thinks about the use of natural resources and environmental protection, and seeks to use materials in the most productive way with an emphasis on using less, using resources more efficiently throughout their life and environmental impacts throughout the material life cycle.

TIMELINE

The DNR began the process with a stakeholder meeting on May 1, 2018. The genesis of the meeting stemmed from a statistic taken from the 2017 Statewide Waste Characterization Report that identified 70% of landfilled materials in Iowa could be reused, recycled or composted. The discussion incorporated stakeholder thoughts and ideas on four specific areas:

1. Infrastructure
2. Logistics
3. Political/Legislative
4. Funding and how to target that 70% number.

The results of the May 2018 stakeholder engagement led to the Phase I Sustainable Materials Management Vision for Iowa. The goal of Phase I was to gather additional feedback on the current status of waste management in Iowa and to envision the future system. This was accomplished through a Think Tank meeting and subsequent facilitated workshops in 2019 that focused on stakeholder interest and potential support for transitioning Iowa to an SMM approach. The results of these workshops indicated a strong interest and support for this transition and encouraged the DNR to move to the next phase of the SMM – Vision for Iowa project.

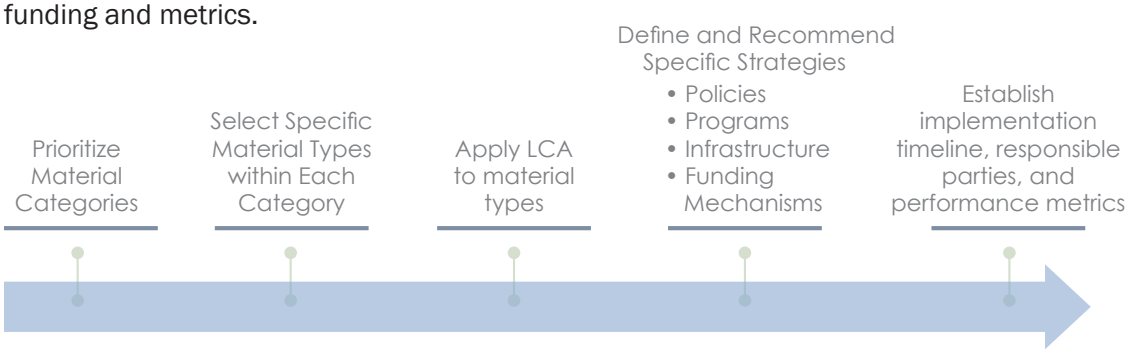
The Phase II SMM Vision for Iowa Initiative began in October 2020. The purpose is to build upon the shared vision developed in Phase I and to transition from the existing solid waste management policies and infrastructure to a comprehensive SMM system. The goal is to establish a clear path to continually develop and build an SMM system in the state over the next 20 years. Phase II included research and a series of facilitated meetings that helped to:

- **Establish SMM Priorities**
- **Evaluate the applicability to Iowa of SMM implementation processes in other states.**
- **Conduct life cycle analysis (LCA) on materials to gauge public health and environmental impacts of materials management from extraction, manufacture, distribution, consumption, reuse, and end of life management**
- **Recommend strategies to implement SMM policies, program, facilities, funding measures, and progress metrics in Iowa.**

Phase II has been a multi-year, stakeholder-driven process to update and modernize Iowa's nearly 40 year solid waste management system. An SMM-based system can help improve public health and the environment, promote new economic development opportunities, and enhance end-of-life management alternatives. This system can also help track the health and environmental impacts associated with material management and goods production.

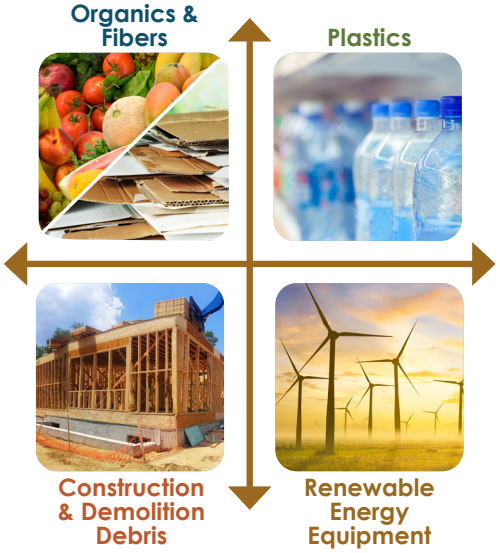
PROCESS

The Phase II process embraced the Systems Thinking approach established during Phase I by creating specific strategies to transform how Iowa manages waste and materials through integrating technology, infrastructure, policies, funding and metrics.



These steps were accomplished through a series of four stakeholder meetings (4 total) and 29 subcommittee meetings in which stakeholders and experts in the given fields provided presentations, discussions, and brainstorming on how to meet the set goals. Through the process, the four material categories selected for further discussion were:

- Organics and Fibers
- Plastics
- Construction and Demolition Debris
- Renewable Energy Equipment

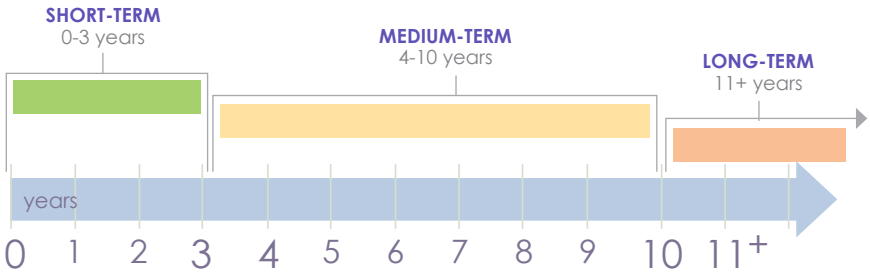


Once the four material categories were selected (Stakeholder Meeting #1), subcommittees were formed to develop the detailed objectives and strategies for each material category. Subject matter experts were engaged for presentations on existing programs in other states, life cycle analysis (LCA), and other pertinent topics. The larger stakeholder group continued their input and feedback throughout Stakeholder Meetings #2 and #3. Final results of the prioritized strategies were presented at Stakeholder Meeting #4.

STRATEGIES

Using the research and discussions, potential SMM strategies were developed based on the following considerations:

- Implementation Approach
- Infrastructure
- Legislation/Policies
- Funding Needs and Sources



The SCS Team led participants through a process in which strategies were refined and prioritized for potential implementation within the immediate (0-3 years), medium (4-10 years), or long-term (11+ years). The results of multiple subcommittee meetings and discussions have led to the prioritization of the strategies. Consideration of needs, opportunities, and challenges in regards to funding, staffing, and overall objectives helped to further define and prioritize the strategies. The final short, medium, and long-term strategies reflect the consensus of the groups that contributed to their design and development.

SHORT-TERM
0-3 years

ORGANICS AND FIBERS

- Provide stores and restaurants documentation on how to reduce food waste.
- Meet with entities such as Iowa State University and EPA to find gaps and reassess how to expand programs already in play in Iowa.
- Institute advocacy campaigns to create food waste awareness.
- Promote food labeling policies if national legislation is passed.
- Evaluate how other states gather information on local food recovery infrastructure.
- Increase storage donation handling and capacity.
- Educate business on the costs associated with food donation collection and awareness of options for food recovery organizations.
- Determine what information wastewater treatment plants currently submit to DNR related to accepting food/organics.
- Evaluate if a rule/code is required to obtain necessary information from wastewater treatment plants related to accepting food/organics.
- Include people from the wastewater world in this conversation.
- Institutionalize Iowa co-digestion successes/challenges.
- Inventory compost facilities and digesters for information on types and quantities of materials accepted, processing methods, and capacity.
- Analyze food waste reduction strategies in other states/nationally.
- Research what other states require for government organic-content procurement.
- Estimate what it would cost to divert organics from landfills to Iowa composting facilities and digesters.
- Create a Food Recovery Master Plan.

PLASTICS

- Conduct education and awareness campaigns on littering, recycling contamination, and Extended Producer Responsibility (EPR).
- Identify problematic packaging and options for recycling and composting.
- Research opportunities for Post Consumer Recycled (PCR) content purchasing for state and local agencies.
- Monitor EPR policy framework for packaging in other states.
- Inventory recycling methods and facilities throughout the state.
- Develop reuse and refill pilots and funding.
- Review and revise existing state definitions, standards, and labeling for biodegradable, compostable, and recyclable.
- Research Health & Safety Codes regarding reusable containers.
- Support research on methods to transform plastics into new products, fuels, etc.
- Incentivize development of facilities that manufacture new products using recycled plastics.

RENEWABLE ENERGY EQUIPMENT

- Monitor technologies for managing (production and end-of-life) wind turbine blades and solar panels that are available and under development worldwide.
- Monitor other states' and national legislation for solar PV and wind turbine end-of-life management.
- Continue/expand the subcommittee work to consider legislation for end-of-life management of renewable energy equipment.
- Collaborate with counties, non-governmental organizations (NGO's), generators, manufacturers and state agencies (affected stakeholders) to review policies and procedures regarding end-of-life management for REE.

CONSTRUCTION AND DEMOLITION DEBRIS

- Conduct studies and evaluate data on C&D materials in Iowa; prioritize materials.
- Implement policies and programs for reduction, recovery, reuse and recycling.
- Review and update local building policies, programs, and codes to implement Sustainable Construction and Demolition practices.
- Research and identify barriers and incentivize development of C&D processing facilities.
- Research potential markets for C&D materials.

MEDIUM-TERM
4-10 years

ORGANICS AND FIBERS

- Find investors to utilize food remaining in post-harvest collection.
- Encourage schools to purchase imperfect foods.
- Educate industry on other options such as compost and AD rather than relying on landfill disposal.
- Work with K-12 institutions in conjunction with the United States Department of Agriculture (USDA) standards/expectations to create smaller size menu options, particularly for younger grade levels.
- Inventory what agencies are managing educational and institutional food waste.
- Institute advocacy campaigns to create awareness about food waste recovery facilities.
- Assess if Iowa needs legislation for food labeling.
- Implement food waste recovery plan.
- Begin creating multi-county organic waste sheds.
- Require the State to procure organic-content products.
- Develop regulations that define compostable and biodegradable.

- Establish compost standards.
- Create a robust compost/AD facility data base.

PLASTICS

- Develop and implement policies to reduce single-use food service ware in public spaces.
- Develop and adopt incentives to use alternatives to single-use plastic bags.
- Require post-consumer recycled content purchasing for government agencies and policies that encourage environmental preferable purchases.
- Incorporate all non-carbonated beverage containers into Bottle Bill or implement other methods to reduce the environmental impact of single use beverage containers.
- Reconsider Ban on Bans.
- Develop and implement EPR for plastic packaging.

RENEWABLE ENERGY EQUIPMENT

- Coordinate workshop(s) of national and international renewable energy equipment recycling technology providers to share information, policies and procedures.
- Begin working with the Iowa Economic Development Authority to identify opportunities for REE recyclers to locate in Iowa.
- Develop end-of-life management policies/legislation/ordinances for local or statewide consideration.
- Incentivize the use of REE that has the greatest potential for recovery at end of life.

CONSTRUCTION AND DEMOLITION DEBRIS

- Educate building community on deconstruction principals, practices, facilities and services.
- Review and update building policies, programs, and codes to prioritize building reuse and incentivize material reuse.
- Adopt builder/contractor certification program (National program standards).
- Adopt recycling certification institute methods.

LONG-TERM
11+ years

ORGANICS AND FIBERS

- Adopt food recovery legislation.
- Provide food waste collection to all residents.
- Adopt food waste to livestock regulations.

PLASTICS

- Conduct public opinion survey regarding incentives, fees, and bans.
- Develop and adopt policy to ban single-use plastic bags.
- Develop and adopt PCR content requirements for packaging.
- Establish producer registry and reporting for packaging.

RENEWABLE ENERGY EQUIPMENT

- Potentially adopt and implement end-of-life policies/legislation/facilities/programs at local or state level.

CONSTRUCTION AND DEMOLITION DEBRIS

- Identify, evaluate, and implement incentives for purchasing deconstructed materials.

SHORT-TERM IMPLEMENTATION PLAN

Once the short, medium, and long-term strategies were developed, focus was shifted to identifying the implementation requirements for the short-term strategies. The SCS Team prepared and reviewed with the DNR a short-term implementation plan for the four material categories. This plan was discussed and reviewed in subcommittee meetings in August 2022. A key factor of this process was working towards actionable goals that will move Iowa closer to a SMM model. The short-term implementation plan will establish the next steps in the vision and transition to SMM in Iowa.

ORGANICS AND FIBERS

1 ASSESS ORGANICS PROCESSING CAPACITY IN IOWA

Inventory Existing Compost Facilities

Action Steps:

- **Research** how other states inventory compost facilities
  - Does the state or local government gather the data?
  - Is reporting mandatory?
  - How frequently is data gathered?
  - Is the survey process codified?
- **Work with DNR** to identify contacts of any compost facilities and municipal programs within Iowa.
- **Design a survey** that **assesses**:
  - Types and quantities of organics accepted;
  - Material specifications;
  - Tipping/processing fees;
  - Service area;
  - Local capacity for organics collection;
  - If methane recovery is occurring at landfills;
  - Daily and annual processing capacity;
  - Existing processing methods;

- Ability/plans for expansion (quantities/material types); and
- Current and future material marketing plans.

- **Work with the Iowa Composting Council to test and ultimately promote the survey.**
- **Assess service gap areas.**
  - Target service gap areas for technical and financial support.

Evaluate the potential to expand the co-digestion of food scraps and biosolids

Action Steps:

- **Create an inventory of entities in Iowa** including municipalities, agricultural operations, and/or industry that are currently co-digesting organics.
- **Meet with entities** to ascertain**:**
  - What is/is not working
  - Costs associated with co-digestion, such as depackaging equipment
  - Energy production
  - How are food scraps delivered
  - Specifications for food scraps
  - Competition for feedstock (interstate facilities)
  - Current throughput of facilities
  - Potential for expansion
- **Interview other wastewater treatment plants** to assess interest in co-digestion.
- **Discuss with DNR** wastewater permitting section design, permitting, and construction challenges/considerations.
- **Map areas of Iowa** that have the **potential for co-digestion** based on these criteria:
  - Amount of capacity available
  - Food scrap specifications
  - When capacity could come online
  - Use 2022 Iowa Statewide Waste Characterization data to estimate the quantity of food scraps in the region
  - Identify large generators of food scraps that align with food scrap specifications
- **Work with legal counsel** to assess the potential to use funding from the National Infrastructure Law to retrofit Iowa wastewater treatment plants to co-digest food scraps.
- **Research other potential funding sources** for infrastructure and program expansion.
- Based on the results of **previous tasks**, convene a **work group** to progress co-digestion in Iowa.

2 PRESENT THE CURRENT AND FUTURE ORGANICS INFRASTRUCTURE

Prepare a Statewide Organics Management Plan

Action Steps:

- **Determine contents/outline of the plan**
- **Prepare plan sections**
- **Circulate draft plan to key stakeholders for review and comment**
- **Finalize draft plan**

3 INCREASE AWARENESS OF FOOD WASTE

Expand existing food waste awareness campaigns with an Iowa based message

Action Steps:

- **Research effective national and state food waste campaigns** available for entities to use. Information to summarize could include:
  - Content
  - Target audiences
  - Costs
  - Results
- **Identify project partners** to champion an Iowa-specific campaign.
- **Work with a marketing firm** to design Iowa-specific campaigns.
- **Pilot campaign** to assess results. May include:
  - Conduct pre-campaign market research on food waste awareness/concern
  - Communicate with food waste generators to understand current initiatives to reduce food waste
  - Implement campaign(s)
  - Measure campaign results on reducing food waste
- **Modify campaign(s) if needed and launch statewide.**

PLASTICS

1 INVENTORY RECYCLING METHODS AND FACILITIES IN IOWA

Conduct a study of existing recycling methods, materials and facilities

Action Steps:

- **Update the facility list and map** developed for the 2017 Iowa DNR Hub and Spoke study, utilizing solid waste planning areas to confirm recyclers present in their areas.
- **Convene a work group** to assist with design of survey questions. Questions will include but not be limited to:
  - Location of facility
  - Service area of facility
  - Objective of facility (single stream vs dual/multiple, consolidation and transport, sort and market, etc.)
  - Materials accepted at the facility to include detail on:
    - Plastics
    - Glass
    - Paper
    - Metal
  - Equipment within facility (for example level of equipment, robotics, AI, etc.)
  - Capacity of facility, current utilization level, plans to expand
  - End user of materials
- **Identify best method** for administering survey
- **Test the survey** on the work group members' facilities

- **Promote** the need for the survey/data
- **Conduct study and analyze data.** Update on annual or other regular basis.

Establish reporting system for recyclable materials

Action Steps:

- **Research how and how often** other states obtain recycling data.
- **Develop methodology for recyclers to report on regular basis** the types and quantities of materials collected and processed in Iowa. Include information on how much material is brought into Iowa to process and how much processed material is recycled in Iowa.
- **Request recyclers to report on an annual basis** the types and quantities of materials managed.
- **Evaluate data received under voluntary system** to determine next steps.

2 REVIEW EXISTING REGULATIONS

Review existing state definitions, standards, and labeling for biodegradable, compostable, and recyclable terminology

Action Steps:

- **Conduct a comprehensive review** of state policies, codes, and regulations for definitions and references to terminology related to recycling, composting, and materials management. Maintain awareness of unintended consequences with affecting other existing codes.
- **Review other states' definitions** for options/input.
- **Identify need for revisions/updates** or new definitions.
- **Develop proposed standard definitions** for consideration and adoption.

3 CONDUCT PUBLIC OPINION SURVEY

Determine which relevant/representative policies and programs have produced tangible, desired results in other states

Action Steps:

- **Identify states to conduct research** on relevant/representative policies and programs.
- **Contact states and gather data** for use in designing survey. Consider what has already worked or not in other locations.

Conduct public opinion survey regarding policies, such as EPR, incentives, fees and bans and programs previously determined to produce tangible results

Action Steps:

- **Seek input from survey specialists to determine survey methodology.**
- **Develop survey questions.**
- **Identify stakeholders to survey.**
- **Identify distribution method for survey.**
- **Implement survey.**
- **Review and analyze survey results.**

4 PLASTIC PACKAGING

Identify problematic packaging and options for recycling and composting and use this information to reduce littering, recycling contamination, and design education campaigns

Action Steps:

- **Review available studies to understand how to assess plastic packaging sold and purchased in Iowa.**
- **Review waste characterization data to identify types and quantities of plastic packaging disposed in Iowa.**
- **Review consumer sales data regarding plastic packaging sold in Iowa.**
- **Establish baseline of plastic packaging issues as they relate to littering and recycling contamination in Iowa.**

Use study data to identify the types of materials to be targeted for education campaigns addressing littering, recycling contamination, and potential policies

Action Steps:

- **Assess existing education resources to identify enhancements and/or need for new content.**
- **Prepare scope of work for development of new outreach campaigns.**
- **Develop new outreach campaigns using internal or external resources.**
- **Identify preferred methods for delivering campaigns**
- **Implement new campaigns.**
- **Evaluate effectiveness/impact of outreach campaigns.**

RENEWABLE ENERGY EQUIPMENT

1 TECHNOLOGY

Monitor the Status and Production and End-of-Life REE Recycling Technologies

Action Steps:

- **Identify potential Iowa partner organizations** and possibly leverage their resources.
- **Create a repository of REE technology developers**, research organizations, and funding sources.
- **Notify those entities** of the Iowa SMM project and begin assembling information on their technologies and research.
- **Share information with key stakeholders** and obtain feedback on feasibility to implement in Iowa.
  - Update research and outreach quarterly.

2 LEGISLATION, POLICIES AND PROCEDURES

Leverage Local Expertise.

Action Steps:

- **Continue/expand the subcommittee work** to consider legislation for end-of-life management of

renewable energy equipment.

- **Collaborate with counties, NGO's, generators, manufacturers and state agencies** (affected stakeholders) to review policies and procedures regarding end-of-life management for REE.

Learn from Others

Action Steps:

- **Monitor other states' and national (including international) legislation and policies** for solar PV and wind turbine production and end-of-life management.
- **Become active in REE trade associations** such as the American Council on Renewable Energy (ACORE), the American Clean Power Association, the European Renewable Energy Council, and European Renewable Energies Federation (EREF).

CONSTRUCTION AND DEMOLITION DEBRIS

1 C&D MATERIAL EVALUATION

Conduct studies and evaluate data on C&D materials generation, disposal and diversion in Iowa

Action Steps:

- **Include C&D materials in future Iowa Statewide Material Characterization studies as was done in 2022.**

Prioritize material types for reduction, recovery, reuse and recycling.

Action Steps:

- **Utilize Iowa Statewide Material Characterization study data** and additional research/LCAs to understand costs, and benefits of various policies and programs.

Implement policies and programs for reduction, recovery, reuse and recycling.

Action Steps:

- **Implement policies and programs for reduction, recovery, reuse, and/or recycling.** Monitor activities' outcomes and modify as necessary.

2 C&D PROCESSING FACILITIES AND MARKETS

Research and identify barriers to developing C&D processing facilities, including required throughput and potential markets for C&D materials.

Action Steps:

- **Gather data** on previous and existing C&D material processing operations/facility development issues in Iowa, including environmental, economic, feedstock, end market and social aspects.

Research opportunities to develop C&D material processing operations/facilities

Action Steps:

- **Gather and analyze data** on existing building codes, policies, programs and permitting, and existing facilities/ operations. Analyze material generation and determine throughput of successful facilities and criteria for success.

Conduct facility study

Action Steps:

- **Use materials generation data and existing facility data to identify building cycles** and material variation where C&D materials processing facilities/operations are presently located and where they are needed. Include evaluation of building cycles and material variation in study.

Market Study

Action Steps:

- **Conduct market analysis of C&D materials.**

3 EXISTING SUSTAINABLE CONSTRUCTION AND DEMOLITION POLICIES AND PRACTICES

Review Iowa and other states and local building policies, programs, and codes for Sustainable Construction and Demolition practices

Action Steps:

- **Review Iowa state and local building policies,** programs, and codes Sustainable Construction and Demolition practices.
- **Review similar state and local building policies,** programs, and codes for Sustainable Construction and Demolition practices.
- **Summarize existing active Sustainable Construction and Demolition practices** and which have tangible positive outcomes both within Iowa and in similar states.

Evaluate existing Sustainable Construction and Demolition projects in Iowa

Action Steps:

- **Collaborate with Iowa USGBC and construction industry** to gather information on the existing Sustainable Construction and Demolition practices found in public and private sectors.

Update building programs, incentives, policies and codes, if possible, to establish consistent statewide Sustainable Construction and Demolition practices

Action Steps:

- **Work with agencies and building industry** to develop templates and guidance for these Sustainable Construction and Demolition practices and make available to agencies.

NEXT STEPS

The process of transitioning to a SMM system is not a small feat. It will require use of available resources that are restricted in scope and availability. DNR staff is now working to develop the detailed path forward on the execution of the short-term implementation plan. Considerations include:

- Determination of the entity best suited to complete each task;
- Continued stakeholder and subcommittee input;
- Personnel resources available to complete in a timely manner;
- Knowledge and past experience; and
- Associated costs.

It is important to understand this document is a living guideline to how to proceed forward. Changes in legislature, new products or technologies, availability of grant funding, and other factors can directly impact the strategies. It is also important to acknowledge ongoing implementation of existing programs, as well as other initiatives that have similar and related goals that will impact, or be impacted by, the transition to SMM. The process will be fluid and dynamic, and will require the dedication and commitment of all involved to reach the overall goal of a system that shifts from managing material based on tonnage to using materials in the most productive way with an emphasis on using less, using resources more efficiently throughout their life and reducing environmental impacts throughout the material life cycle.

INTRODUCTION AND PURPOSE

For nearly 40 years, Iowa's solid waste regulations and systems have focused on managing solid waste at the point of disposal. At the same time, the State's regulations and initiatives encouraged and supported waste diversion efforts to help reduce the quantity of materials being disposed in landfills. These efforts dramatically changed the solid waste management landscape in Iowa and cultivated a societal transformation that focused on diverting waste from disposal through recycling initiatives. While there has been good success in diverting waste from disposal, there has not been much progress in establishing solid waste practices that are focused beyond end of life management.

The Iowa Department of Natural Resources (DNR) initiated discussions with the public and a variety of stakeholders in regards to addressing waste management methods to keep the estimated 70% of materials in Iowa landfills that can be reused, recycle, or composted (based on the 2017 Iowa Statewide Waste Characterization Study), from disposal.

These discussions led to a series of facilitated workshops in 2019 that sought to better understand stakeholder interest and potential support for transitioning Iowa to a sustainable materials management (SMM) approach. The results of these workshops indicated a strong interest and support for this transition and encouraged the DNR to move to the next phase of the SMM – Vision for Iowa project.

The purpose of the SMM – Phase II initiative is to build upon the shared stakeholder vision identified in the SMM Phase I effort to direct the state of Iowa to transition from its present solid waste management policies and infrastructure to a comprehensive SMM system.

The goal is to establish a clear path to continually develop and build an SMM system in the state over the next 20 years.

Phase II included research and a series of facilitated meetings that helped to:

- **Establish SMM priorities**
- **Evaluate the applicability** to Iowa of SMM **implementation processes in other states**.
- **Conduct life cycle analysis** (LCA) on materials to **gauge public health** and **environmental impacts** of materials management from extraction, manufacture, distribution, consumption, reuse, and end of life management
- **Recommend strategies to implement SMM policies, program, facilities, funding measures**, and **progress metrics** in Iowa.

Phase II was a multi-year, stakeholder-driven process to update and modernize Iowa's nearly 40 year solid waste management system. An SMM-based system can help improve public health and the environment, promote new economic development opportunities, and enhance end-of-life management alternatives. This system can also help track the health and environmental impacts associated with material management and goods production.

BACKGROUND

The Iowa 1987 Groundwater Protection Act and Iowa 1989 Waste Reduction and Recycling Act established groundbreaking environmental protection regulations and policies; they also established new opportunities for expanded environmental conservation efforts in the state. These Acts authorized the DNR to adopt groundwater rules, establish environmental monitoring and planning requirements, and provided funding for waste diversion initiatives.

The DNR established the Iowa waste management hierarchy in 1987 (updated by House File 544 on June 18, 2015) which includes the following:

- Volume reduction at the source
- Recycling and reuse
- Waste conversion technologies
- Combustion with energy recovery
- Other approved techniques of solid waste management including but not limited to combustion for waste disposal and disposal in sanitary landfills

This waste management hierarchy provides guidance on the management of materials at the end of their useful life. However, the hierarchy does not address public health and environmental impacts that occur at each step of a material's life cycle.

The framework for the current solid waste management system in Iowa is based on laws and regulations adopted nearly 40 years ago, with only minor revisions since then. These laws and regulations primarily focus on solid waste discards and how to manage a material at the end of its useful life (recycle, compost, landfill). Over this time, waste management systems and policies have evolved, and SMM approaches are becoming more prevalent.

SMM focuses on the best use and management of materials based on how they benefit the environment and public health throughout their life cycle. Recognizing the need to update waste-related policies and programs, the DNR implemented several inter-related initiatives to foster a shared vision for an SMM system in Iowa. Resulting reports and material from this process can be viewed on the DNR's Sustainable Materials Management - Vision for Iowa website (https://www.iowadnr.gov/Environmental-Protection/Land-Quality/Waste-Planning-Recycling/Sustainable-Materials-Management).

THESE INITIATIVES INCLUDED:

- **Citizen Awareness and Opinion Survey**
  DNR designed the survey to assess statewide residential awareness and perceptions of solid waste management, household behaviors regarding recycling, and inventory citizen opinions related to sustainability. Survey results provided direction for future public awareness efforts.

- **Sustainable Materials Management**
  Vision for Iowa – Phase I: This was a stakeholder-driven first step towards adopting an SMM system in Iowa. Phase I convened Iowa stakeholders to discuss and develop a preferred vision to guide future Iowa solid waste management policy and programs using SMM as the foundation. Phase I involved multiple meetings that highlighted the need to identify long-term sustainable funding mechanisms, comprehensive State policies, programs and infrastructure, and a meaningful set of metrics for measuring the impacts of SMM on public health and the environment. The results of Phase I indicated that stakeholders believed it was important to transition Iowa from a solid waste management policy to a SMM policy approach. These findings led the DNR to pursue Phase II of the SMM project.

- **Communications Plan**
  The Communications Plan, still under development, has two main objectives:

  – The first objective was designing and distributing a series of citizen awareness messages to increase recycling participation, reduce recycling contamination, and increase public understanding of the recycling process and the importance and value of recycling. These public awareness messages were created to allow local solid waste agencies, private sector recyclers, and others to personalize them with local program information, thereby expanding their reach. The result of these efforts was the #IAmARecycler Campaign, which was launched in the summer of 2021.

  – The Communications Plan's second objective is to raise citizen awareness and understanding of the SMM approach to solid waste, and how an SMM system will improve public health and environmental quality. The Communications Plan will provide general updates of Phase II actions and recommendations through social media and DNR website postings. This second objective has not yet been developed.

Existing Integrated Solid Waste Management System

The DNR's solid waste compliance and waste diversion initiatives are funded by landfill disposal fees paid by customers of the landfill with a portion of collected fees remitted to the DNR as required in Iowa Code 455B.310 Tonnage Fee Imposed – Appropriations - Exemptions. Disbursement of the received funds are allocated by Iowa Code 455E.11 Groundwater Protection Fund Established - Appropriations. This allocates $1.55 per ton disposed in Iowa to the following initiatives.

DISPOSAL FEES RECEIVED FROM IOWA LANDFILLS - DISTRIBUTION

$1.55/ton
Allocated to the following initiatives

$0.74 DNR Compliance & Operations

Solid waste permitting, comprehensive planning, special waste authorization, solid waste activities at field offices, solid waste legal services, and $8,000 Department of Health transfer.

$0.25 Iowa Waste Reduction Center (IWRC)

Provides environmental consulting services to businesses including on-site reviews; air emissions compliance assistance; energy efficiency programs; Green Brewery Certification program; food waste studies, and more.

$0.10 Iowa Waste Exchange (IWE)

Iowa Waste Exchange representatives help businesses divert their potential waste materials from disposal for reuse and/or recycling. This also includes $30,000 to IWRC for technical support.

$0.05 Regional Collection Center Establishment

DNR staff identify potential resources and/or provide grant funding to help establish and grow access to household hazardous material management programs throughout Iowa.

$0.15 Regional Collection Center Collection and Transportation
(household hazardous waste disposal reimbursement)

This program provides partial reimbursement to regional collection centers to help with the disposal costs of household hazardous materials.

$0.13 Pollution Prevention (P2) Services

This program matches engineering students with industries to assist with evaluation of existing processes in order to determine opportunities to improve efficiencies and reduce waste.

$0.05 Department of Economic Development Transfer
(Recycle Iowa Office)

This program is for the Economic Development Authority to establish, in cooperation with the DNR, a marketing initiative to assist Iowa businesses producing recycling or reclamation equipment or services, recyclable products, or products from recycled materials to expand into national markets.

$0.08 Waste Reduction and Assistance Program

This program is for the provision of assistance to public and private entities in developing and implementing waste reduction and minimization programs for Iowa industries

Remaining funds are then used for the following initiatives:

- Special waste authorization program
- Iowa Waste Exchange
- Solid Waste Alternatives Program (SWAP)
  - Environmental Management Systems (EMS)
  - Derelict Building Grant Program

These DNR initiatives have continued to support waste diversion efforts throughout the state of Iowa. This funding system does not support an SMM approach that is focused on waste reduction and diversion.

Unique Characteristics

Iowa's solid waste management system is unique in many ways compared to surrounding states. These characteristics include the following:

Public vs. Privately Owned MSW Landfills

A majority of the Iowa municipal solid waste (MSW) landfills and transfer stations are municipally owned.

Number of Landfills and Volumes Received

Iowa has 40 permitted MSW landfills. Surrounding states have fewer landfills with a system of transfer stations that send waste to large regional landfills. Large regional landfills can receive between 200,000 and 500,000 tons per year of waste. In contrast, of the 40 MSW landfills in Iowa, only nine receive more than 80,000 tons per year of waste.

Waste Flow Control

Iowa has flow control regulations – These regulations require waste generated within a solid waste planning area to be managed by permitted solid waste facilities within that same planning area or to be managed by an out of state facility.

Recycling Requirements

DNR regulations stipulate that cities and counties are responsible for providing recycling for glass, paper, plastic, and metal.

Bottle Bill

Iowa currently has a $0.05 deposit for carbonated beverages, wine, alcohol, and beer containers. Consumers receive their deposit back when they deliver the container to a redemption center or to the retail facility from which the container was purchased.

Infrastructure

Iowa's current solid waste management infrastructure includes solid waste (MSW) landfills, transfer stations, and recycling facilities. Permitted solid waste facilities include:

40	1	1	42	6
MSW Landfills	Energy Recovery Facility	C&D Landfill	Transfer Stations	Solid Waste Composting Facilities

There are also multiple public and private recycling facilities that accept recyclable materials (i.e., paper, plastic, metal, and glass) for processing. The 2017 Hub & Spoke Recycling study inventoried existing recycling facilities throughout the state, including their location, processing capabilities, and materials accepted. The DNR does not regulate facilities that process materials for recycling. Therefore, these facilities are not required to submit to DNR information regarding the types and quantities of materials managed.

SMM STRATEGIC VISION FOR IOWA - PHASE I

In late 2018, the Iowa DNR embarked on a comprehensive Visioning Project for the future of sustainable materials management in the State of Iowa. The DNR worked with Burns and McDonnell and Future iQ to facilitate a series of stakeholder meetings, research, and outreach activities.

The process included:

- Background research on existing laws, policies and programs;
- A state-wide stakeholder survey of views on waste and materials management in Iowa;
- Facilitation of Future Think-Tank;
- Production of an Iowa DNR Vision for Iowa Think-Tank Report;
- Stakeholder engagement in the form of focus groups;
- Data collection, analysis and visualization; and
- Production of an Iowa DNR SMM – Vision for Iowa Report with a roadmap and next step recommendations for sustainable materials management in Iowa.

The **next steps for the DNR and Iowa** to consider included:

1. **Solicit input and feedback from the general public** as part of the planning process.

2. Use the deliverables from Phase I to **inform and educate** key legislators and associated staff about the **importance of Iowa's vision to transition to SMM**.

3. Establish a **roundtable** with environmental agency representatives from select states making the transition to SMM as a forum **to discuss critical transition issues** (e.g. metrics, funding) and lessons learned.

4. Reconvene the Think-Tank to **review the results** from the stakeholder meetings and **identify a shortlist of strategies** for more **detailed evaluation and strategy development**.

5. Upon identifying the shortlist of preferred strategies, **establish a set of working committees** composed of applicable stakeholder representatives to develop a description of each **strategy, applicable actions, timeline**, and responsible parties to **formulate a specific roadmap** for Iowa to transition to sustainable materials management.

PROGRESSING THE SMM VISION IN IOWA | PHASE II

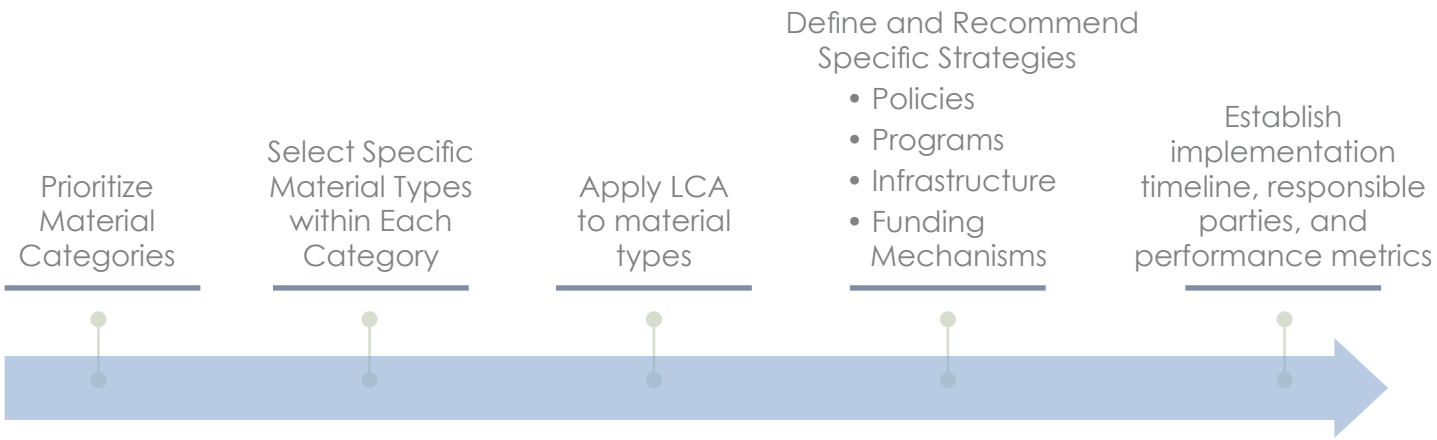
To build upon the efforts completed in Phase I, in October 2020 the DNR retained Sterns, Conrad, and Schmidt Engineers (SCS Engineers) to initiate Phase II.

PROCESS

The Phase II process embraced the *Systems Thinking* approach established during Phase I by creating specific strategies to transform how Iowa manages waste and materials through integrating technology, infrastructure, policies, funding and metrics.

The process utilized for Phase II is shown in Figure 1.

Figure 1. SMM Vision for Iowa – Phase II Process



STAKEHOLDER ENGAGEMENT AND MEETINGS

The project plan proposed holding stakeholder and subcommittee meetings throughout the project. The stakeholder group would provide feedback and guidance to the subcommittees which would be tasked with developing strategies, action items, priorities, and schedules for consideration. A general description and role of each of these groups is summarized below.

STAKEHOLDER

Description

Made up of representatives from various industries, associations, public and private entities, and the public. Each stakeholder meeting was promoted and open to the public.

Role

Provide perspectives on SMM adoption and implementation; consult and advise DNR on establishing SMM; provide guidance to subcommittees

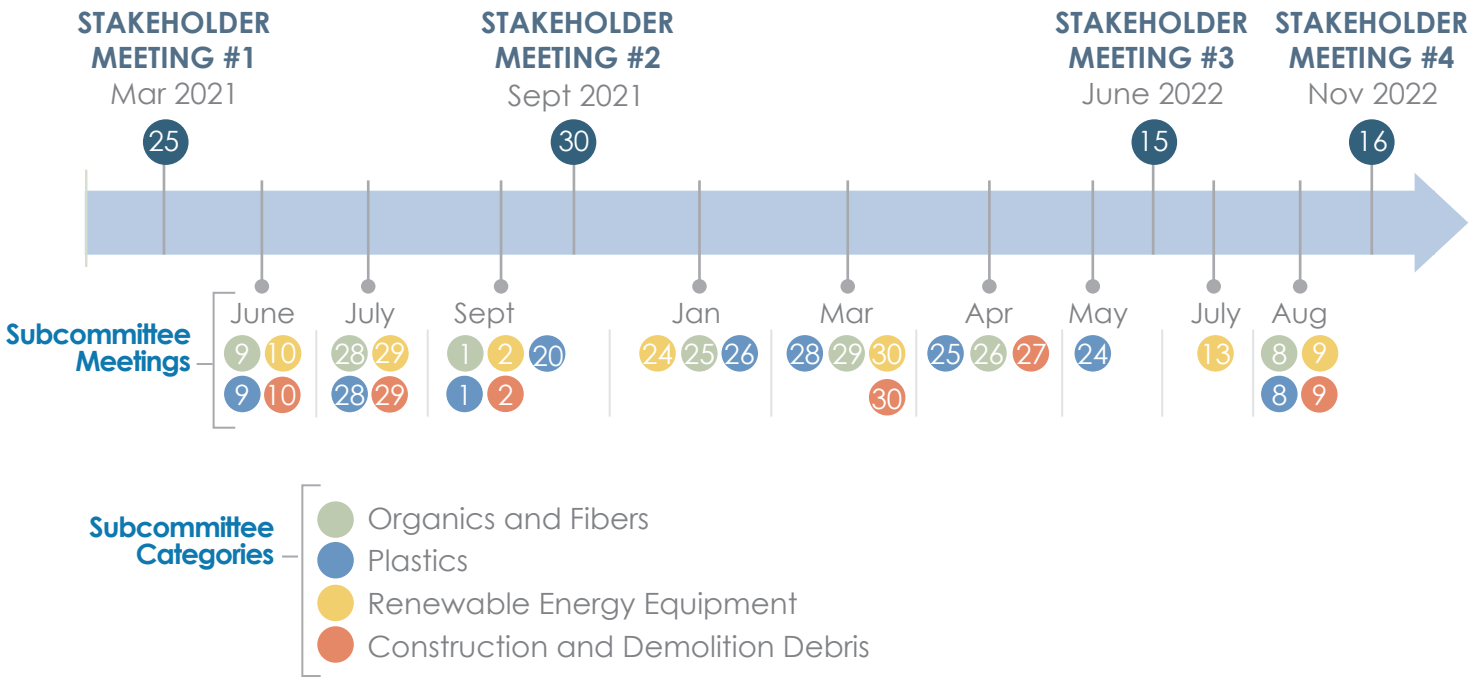
SUBCOMMITTEES

Description

Four subcommittees each assigned a specific material category of focus. Each subcommittee consisted of recruited industry experts, leaders, and knowledgeable and experienced professionals representing a variety of perspectives.

Role

Identify specific materials within the identified material categories; evaluate presented life cycle analyses; Identify potential strategies, actions, priorities, and implementation schedule; Select recommendations using modified consensus approach.



Prior to the first stakeholder meeting, criteria were established to help stakeholders select priority material categories. The criteria to identify the material categories included:

- Phase I recommendations;
- Build on what is already working in Iowa;
- Percent of disposed waste stream;
- Environmental benefits; and
- Implementation feasibility.

To help promote and encourage involvement in the process, the SCS Team worked with the DNR, various industry leaders, and a variety of trade associations to help identify and recruit potential individuals to attend stakeholder meetings. Beyond inviting identified individuals or organizations to participate, press releases and social media were used to inform Iowans about the stakeholder meetings. Notification methods included the DNR Facebook page, DNR's EcoNewsWire, and trade associations, such as the Iowa Society of Solid Waste Operations (ISOSWO), Iowa Recycling Association (IRA), and others.

The stakeholder group convened people with various industry perspectives, priorities, and assessments of Iowa's need for an SMM approach. While the stakeholder group was not a decision-making body for the project, the group provided crucial consultation and advice concerning Iowa's relevant resource management practices and potential needs, comprehensive review and discussion of proposed strategies and action items presented by the subcommittees, and provided direction for the subcommittee's in the development of their recommendations.

The SCS Team facilitated four stakeholder meetings. The format of these meetings was a series of presentations and open discussions. Meetings were promoted and open to the public to attend and provide their feedback. Participants could attend each session virtually and Stakeholder Meetings #3 and #4 also provided an in-person attendance option.

A description of each meeting is included below, and meeting summaries are available on the DNR's website.

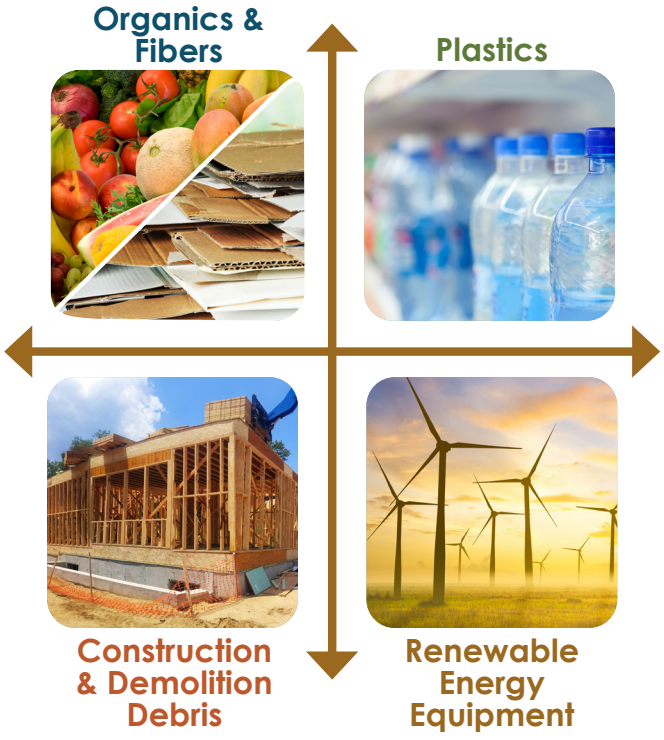
Stakeholder Meeting #1 – March 25, 2021

This meeting focused on educating participants on SMM, the efforts and results from Phase I of the project, and the selection of four primary material categories.

Four material categories were selected:

- Organics and Fibers
- Plastics
- Construction and Demolition Debris
- Renewable Energy Equipment

This meeting was attended by 60 participants representing a variety of industries, businesses, associations, municipalities, and waste and resource management facilities.



Stakeholder Meeting #2 – September 30, 2021

This meeting presented the subcommittee's results:

- Targeted materials; and
- Potential strategies for SMM implementation.

Stakeholders provided comments on and suggestions for modifications to the presented strategies and timelines that would help guide the subcommittees' next steps. This meeting was attended by 78 participants.

Stakeholder Meeting #3 – June 15, 2022

The meeting presented the strategies, action items and priorities developed by the subcommittees. The stakeholder's reviewed and discussed the presented information, suggested modifications to some of the items, and then voted on which actions should be considered priorities. This information was used to guide the subcommittees for developing final short, medium, and long-term strategies and actions. This meeting was attended by 62 participants (35 in-person and 27 online).

Stakeholder Meeting #4 – November 16, 2022

This meeting included a presentation and discussion of the final strategies, action items, and priorities for SMM implementation, and short-term strategy implementation plan that will move forward over the next several years. This meeting was attended by 58 participants (26 in-person and 32 online) representing a variety of entities and facilities.

Subcommittee Selection and Engagement

The work plan developed by the SCS Team established four subcommittees that would develop recommendations on specialized SMM topics, policy changes, priorities, and an implementation schedule.

The SCS Team worked with the DNR and a variety of industry leaders to identify and recruit individuals to serve as subcommittee members. The goal of subcommittee member recruitment was to establish representation of individuals and entities that are involved with the manufacture, distribution, generation, transportation, processing, regulation, and/or end-use of materials within the identified material category groups. Initially, the SCS Team worked to recruit 12 members for each subcommittee. However, throughout Phase II, additional subcommittee members were added as appropriate. Each subcommittee also had DNR representatives who served as subject matter experts and provided support to the subcommittees.

Prior to subcommittee meetings, members were provided an agenda and relevant research documents that would be reviewed/discussed during the meeting. Subcommittee meetings were facilitated by the SCS Team. The meeting formats included the SCS Team presenting information and then facilitating discussions. When a "vote" on items was necessary, a modified consensus format was used. In modified consensus, the subcommittee members agree upon a determination that all can support or at least "live with."

Following the subcommittee meetings, SCS prepared and provided a summary report of the meeting to the DNR and subcommittee members. These summaries serve as a documentation of presenting information, summary of discussions, and results of any surveys. Meeting summaries are available on the DNR's Sustainable Materials Management – Vision for Iowa webpage under the Documents & Resources heading for Organics and Fibers, Plastics, C&D Debris, and Renewable Energy Equipment .

During the first subcommittee meeting, each subcommittee elected a representative for their group. This individual was responsible for presenting subcommittee information during stakeholder meetings.

From June 2021 through August 2022, a total of 30 subcommittee meetings were convened. Detailed information on the subcommittee members and meetings are included in the following sections.

Organics and Fibers Subcommittee

The members of the Organics and Fibers Subcommittee are shown in Table 1.

Table 1. Organics and Fibers Subcommittee Members

Subcommitee Members		DNR Internal SMM Team
Aubrey Alvarez	Eat Greater Des Moines	Tom Anderson
Scott Amendt	GreenRU, LLC & Chamness Technology, Inc.	Reid Bermel
Satya Chennupati	DNR - Supervisor Wastewater Engineering Section	Laurie Rasmus
Christine Crow	Iowa Department of Education Consultant	Theresa Stiner
Joe Harms	Perishable Distributors of Iowa, LTD	Mike Sullivan
Aaron Holt	Iowa Restaurant Association	Ed Tormey
Christine Hradek	Nutrition Education Program Manager	Jennifer Reutzel Vaughn
Michelle Hurd	Iowa Grocery Industry Association	Jennifer Wright
Jennifer Jordan	City of Iowa City Landfill and Recycling Center	
Jon Koch	City of Muscatine	
Beth MacKenzie	University of Iowa	
Kathy Morris	Waste Commission of Scott County	
Kaveh Mostafavi	EcoCare Supplies and The Compost Ninja	
Karen Rodekamp	ISU Dining, Iowa State University	
Madeline Schmitt	Iowa Department of Transportation	
Alan Schumacher	Quincy Recycle Paper/Iowa Recycling Association	
Brian Sievers	Sievers Family Farm	
Doyle Smith	City of Cedar Falls	
Rich Stephens	Archer Daniels Midland Company	
Samuel Sturtz	Iowa Department of Transportation	
Jennifer Trent	Iowa Waste Reduction Center	
Brenda Windmuller	Iowa Department of Education Consultant	
Tim Woods	Woods Development, LLC	

Meetings for the Organics and Fibers Subcommittee

The meeting dates and general goals are summarized below. The magnitude and potential of organics and fibers programs was quickly determined, ranging from upstream to downstream, transportation, preconsumer and postconsumer, food recovery, composting, anaerobic digestion, etc. This led to the need for additional meetings and members for the subcommittee. Research presented during the subcommittee meetings is included in Appendix A.

2021

Jun 9

Subcommittee Purpose and Goals, **Material Category Research, Material Prioritization**

Jul 28

Presentation of Research and Guest Speakers

Topic - Existing Activities in Iowa, LCA's, End-of-Life Management Models

Sep 1

Guest Speaker, Potential SMM Strategy Discussion, Develop Objectives

2022

Jan 26

Focus on Upstream Management Strategies, Objectives Discussion

Mar 28

Development of Implementation Strategies to Meet Objectives – Short, Medium, & Long-Term

Development of Implementation Strategies

Apr 25

Finalize Short, Medium, and Long-Term Strategy Implementation for Stakeholder #3 Meeting

May 24

Complete Discussion from 4 | 25

Aug 8

Final Discussion on Short, Medium, and Long-Term Strategies Based on Stakeholder #3 Feedback; Discussion and Revision of Short-Term Strategy Implementation Plan

Sep 20

Continued Discussion from 9 | 1

Plastics Subcommittee

The members and affiliations of the Plastics Subcommittee are shown in Table 2.

Table 2. Plastics Subcommittee Members

Subcommittee Members	
Mick Barry	Mid America Recycling
Joe Bolick	Iowa Waste Reduction Center
Michele Boney	West Liberty Foods
Marcus Branstad	American Chemistry Council
Harlan Buxbaum	Dee Zee, Inc.
Halil Ceylan	Iowa State University – Institute for Transportation
Gabe Claypool	Des Moines Industrial
Nicole Crain	Iowa Association of Business and Industry
Jennifer Horner	That's Not Trash, LLC
Julie Ketchum	Waste Management
Merry Rankin	Iowa State University
Madeline Schmitt	Iowa Department of Transportation
Scott Vander Sluis	Van's Sanitation and Recycling
Bryce Stalcup	Waste Commission of Scott County
Samuel Sturtz	Iowa Department of Transportation
Sue Waters	Plastics Recycling of Iowa Falls, Inc.
Troy Willard	Can Shed LLC/ Iowa Recycling Association

DNR Internal SMM Team
Tom Anderson
Amie Davidson
Laurie Rasmus
Ed Tormey
Jennifer Reutzel Vaughn
Jennifer Wright

Meetings for the Plastics Subcommittee

The meeting dates and general goals are summarized below. Research presented during the Plastics subcommittee meetings is included in Appendix B.

2021

Jun 9

Subcommittee Purpose and Goals, Material Category Research, Material Prioritization

Jul 28

Presentation of Research and Guest Speakers

Topic - LCA's, Potential Strategies Presentation and Discussion

Sep 1

Guest Speaker, Potential SMM Strategy Discussion, Develop Objectives

Further LCA Presentation and Discussion, Upstream, Consumer, and End-of-Life Strategy Discussion

2022

Jan 25

Iowa Single Use Water Bottle LCA Presentation, Discussion on Bringing Advanced Recycling Technologies to Iowa

Mar 29

Development of Implementation Strategies to Meet Objectives – Short, Medium, & Long-Term

Revisit Revised Iowa Single Use Water Bottle LCA Parameters

Apr 26

Finalize Short, Medium, and Long-Term Strategy Implementation for Stakeholder #3 Meeting

May 24

Complete Discussion from 4 | 25 | 22

Aug 8

Final Discussion on Short, Medium, and Long-Term Strategies Based on Stakeholder #3 Feedback; Discussion and Revision of Short-Term Strategy Implementation Plan

Renewable Energy Equipment

Renewable Energy Equipment Subcommittee

The members and their affiliations of the Renewable Energy Equipment Subcommittee are shown in Table 3.

Table 3. Renewable Energy Equipment Subcommittee Members

Subcommittee Members	
Chaz Allen	Iowa Utility Association
Jerry Brown	Collins Aerospace
Sally Buck	Valmont Industries, Inc., Coatings Division
Shelene Codner	Region XII Council of Governments - Iowa Waste Exchange
Jenny Coughlin	Alliant Energy
Regi Goodale	Iowa Association of Electric Cooperatives
Jeff Gorrie	Iowa Association of Municipal Utilities
Steve Guyer	Iowa Environmental Council
Brad Hartkopf	Iowa Association of Business and Industry
Rick Hurt	South Central Iowa Solid Waste Agency
Adam Jablonski	MidAmerican Energy Company
Jeff Maxted	Alliant Energy
Dustin Miller	American Clean Power Association
Josh Mohr	MidAmerican Energy Company
Dan Nickey	Iowa Waste Reduction Center
Shelly Peterson	Iowa Economic Development Authority
Madeline Schmitt	Iowa Department of Transportation
Samuel Sturtz	Iowa Department of Transportation
Kenneth Sulma	Iowa Utilities Board
Joshua Syhlman	TPI Composites
Mary Wittry	Carroll County Solid Waste Management Commission

DNR Internal SMM Team
Tom Anderson
Jeff Fiagle
Laurie Rasmus
Theresa Stiner
Ed Tormey
Jennifer Wright

Meetings for the Renewable Energy Equipment subcommittee

The meeting dates and general goals are summarized below. Research presented during the Renewable Energy Equipment subcommittee meetings is included in Appendix C.

2021

Jun 10

Subcommittee Purpose and Goals, Material Category Research, Material Prioritization

Jul 29

Presentation of Research and Guest Speakers

Topic - LCA's, Potential Strategies Presentation and Discussion

Sep 2

Guest Speaker Presentation on Solar Panels, Discussion on Short, Medium, and Long-Term Strategies

2022

Mar 30

Extended Producer Responsibility, Discussion on Potential Strategies, and Refinement of Implementation Strategies.

Development of Implementation Strategies to Meet Objectives – Short, Medium, & Long-Term

Jul 13

Revisit Short, Medium, and Long-Term Strategies Proposed Based on Stakeholder #3 Feedback

Aug 9

Final Discussion on Short, Medium, and Long-Term Strategies Based on Stakeholder #3 Feedback; Discussion and Revision of Short-Term Strategy Implementation Plan

Construction & Demolition Debris

Construction and Demolition Debris Subcommittee

The membership and affiliations of the Construction and Demolition Debris Subcommittee are shown in Table 4.

Table 4. Construction and Demolition Debris Subcommittee Members

Subcommittee Members	
Mike Bahr	Turner Construction Company
Ashley Buss	Iowa Department of Transportation
Jamie Courtney	Iowa Home Crafters, Inc.
Kerry Dixon	Engie North America
Chaden Halfhill	Iowa Home Crafters, Inc.
Jay Iverson	Home Builders Association of Iowa
Cindy Kuhn	Habitat for Humanity Restore in QCA
Hal Morton	Retired
Tim Ruth	Home Builders Association of Iowa and IOWA CITY
Damion Sadd	Continental Cement Co.
Madeline Schmitt	Iowa Department of Transportation
Brian Seals	Waste Commission of Scott County
Seth Shannon	SCHEMMER
Becky Soglin	Johnson County Planning, Development and Sustainability
Les Stohs	Greater Des Moines Habitat for Humanity/Re-Store
Nick Wylie	J Pettiecord

DNR Internal SMM Team

Tom Anderson
Reid Bermel
Jeff Fiagle
Laurie Rasmus
Ed Tormey
Jennifer Wright

Meetings for the Construction and Debris Demolition subcommittee

The meeting dates and general purpose are summarized below. Research presented during the Construction and Demolition Debris subcommittee meetings is included in Appendix D.

2021

Jun 10

Subcommittee Purpose and Goals, Material Category Research, Material Prioritization

Jul 29

Presentation of Research and Guest Speakers

Topic - LCA's, Potential Strategies Presentation and Discussion

Sep 2

Discussion on Key Questions for Successful C&D Management and Programs, Discussion on Short, Medium, and Long-Term Strategies

2022

Jan 24

Presentation and Discussion on LCA's for Building Materials, Continued Discussion on Short, Medium, and Long-Term Strategies

Mar 30

Development of Implementation Strategies to Meet Objectives – Short, Medium, & Long-Term

Apr 27

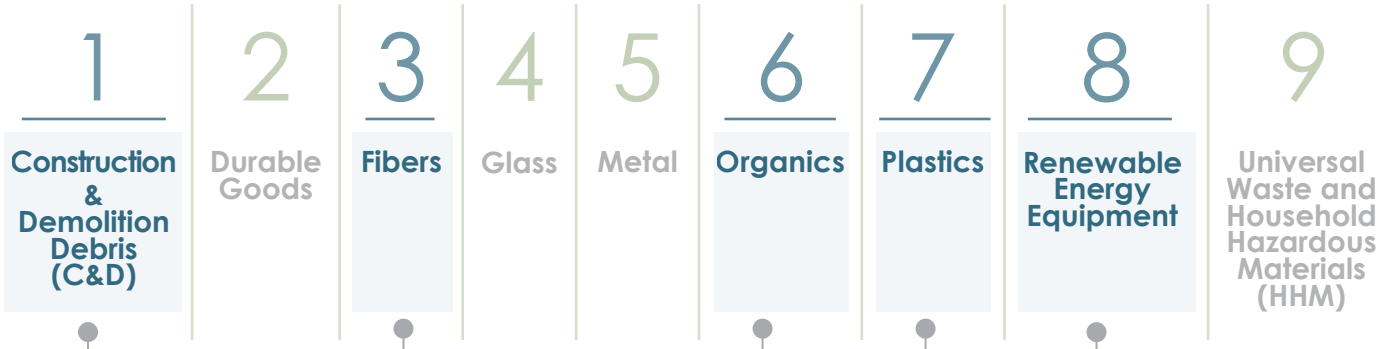
Finalize Short, Medium, and Long-Term Strategy Implementation for Stakeholder #3 Meeting

Aug 9

Final Discussion on Short, Medium, and Long-Term Strategies Based on Stakeholder #3 Feedback; Discussion and Revision of Short-Term Strategy Implementation Plan

MATERIAL CATEGORIES AND TYPES

In order to transition from a disposal based solid waste system to one based on sustainable materials management, it was determined the best approach would be to focus on specific materials in the waste stream. Specifically, how SMM focusses on these materials from the standpoint of material extraction, production, consumer use, and end-of-life management. Initially, a list of nine potential material categories were presented for prioritization, as shown below. Based on input from the stakeholders, **the following five materials were prioritized in four categories**:



Prioritization of the material categories used the following general guidelines:

- **Materials within the Material Category were recommended in Phase I of the SMM Visioning process**
- **Environmental benefit**
- **Percent of Material Category in the existing waste stream (based on the 2017 Statewide Waste Characterization Study)**
- **Feasibility for implementation**

Categories Description

Within each category are a number of materials that could be managed. In order to determine which materials to focus on, background information was presented to the subcommittees on the material types and prevalence in the Iowa wastestream.

Organics and Fibers

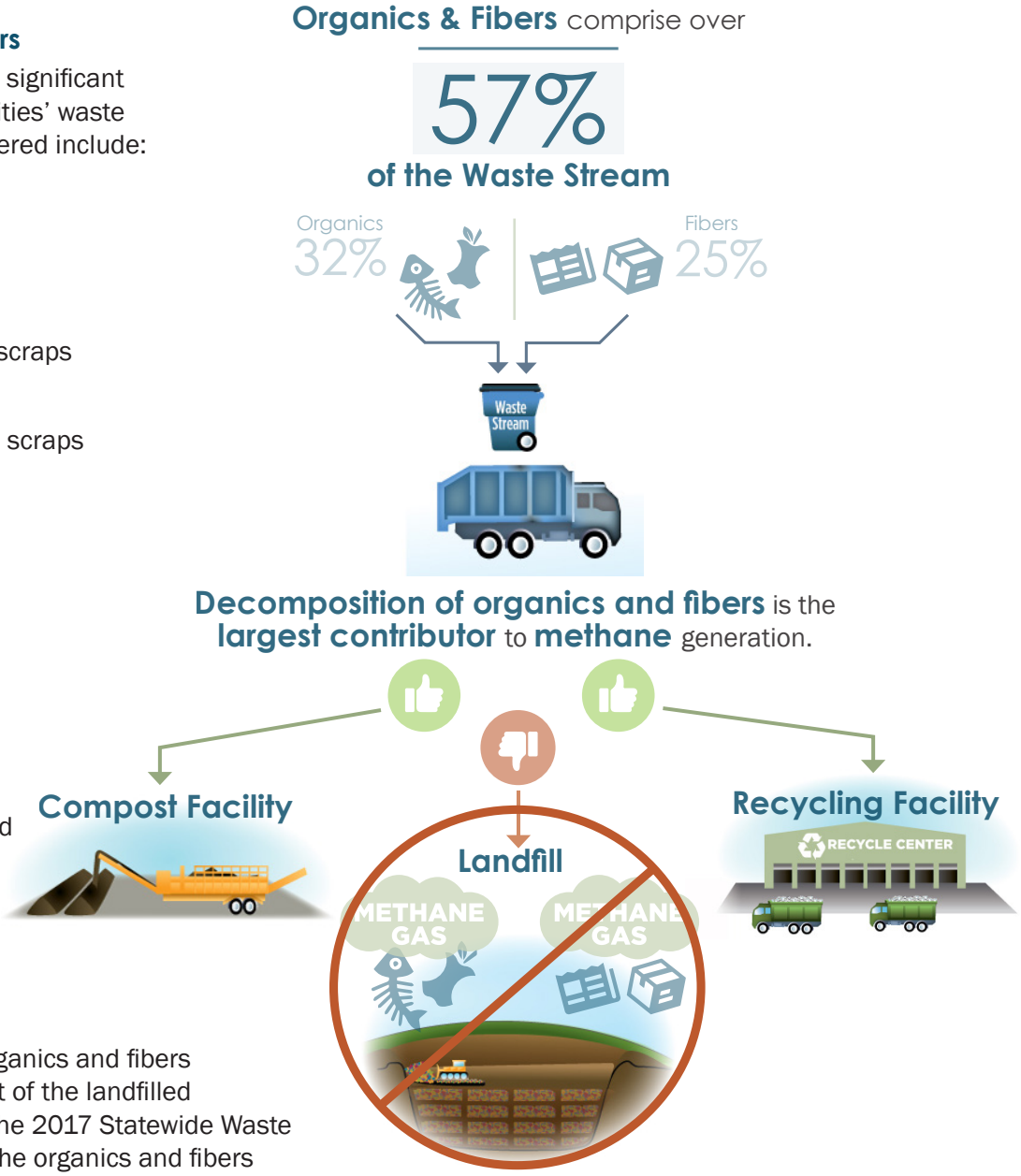
Organics and fibers are a significant portion of most communities' waste stream. Materials considered include:

Organics

1. Yard trimmings
2. Agricultural waste
3. Pre-consumer food scraps
4. Edible food
5. Post-consumer food scraps
6. Biosolids
7. Manure
8. Textiles

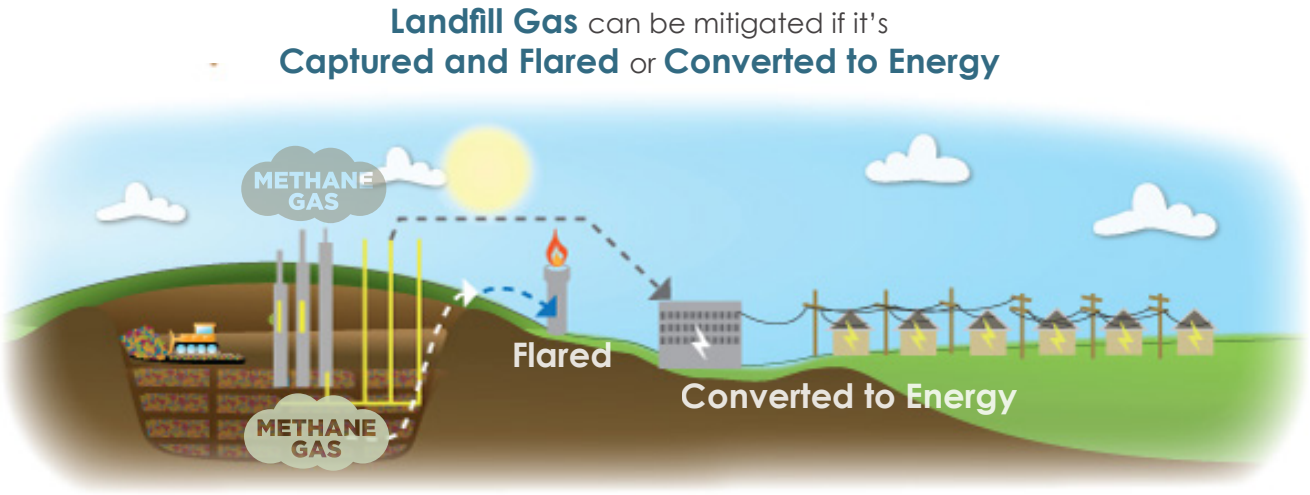
Fibers

1. Office Paper
2. Newspaper
3. Magazines
4. Corrugated Cardboard
5. Packaging
6. Fiberboard
7. Junk mail



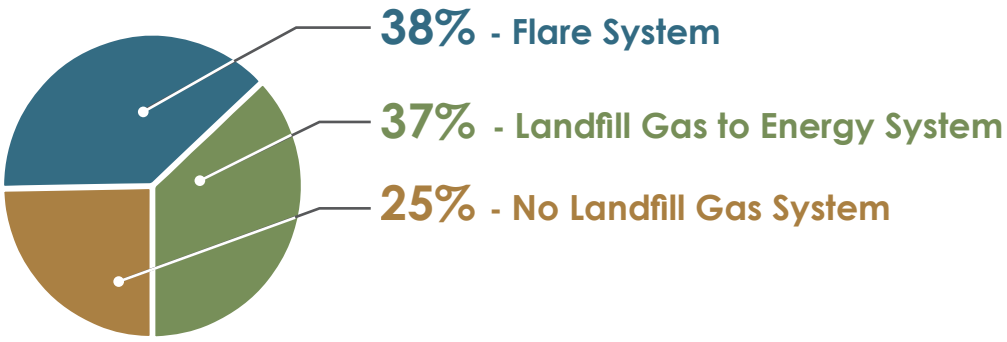
On a state-wide basis, organics and fibers comprise over 57 percent of the landfilled waste stream based on the 2017 Statewide Waste Characterization Study. The organics and fibers subcommittee decided to focus on organics, which comprise approximately 32 percent of the disposed waste stream.

Organics and Fibers are both carbon-based, which means they will eventually decompose. The United States (U.S.) Environmental Protection Agency (EPA) has identified landfills as the single largest source of methane emissions in the U.S., and the decomposition of organics and fibers is the largest contributor to the methane being generated. If paper is recycled and organics composted, they don't end up in the waste stream, headed for a landfill where the wastes will degrade and generate methane.



Landfills in Iowa include facilities with no LFG systems, with LFG flares, and LFG-to-energy. Figure 1 shows the percent of municipal solid waste disposed in each type of landfill.

Figure 1. Percent of Municipal Solid Waste Disposed in Each type of Landfill



Plastics

Plastics are ubiquitous in modern society, and have become an environmental priority as they enter waterways, are littered on roads and highways, and are primarily made from petroleum, a non-renewable resource.

A product resin type often influences its applicability to material reduction, reuse, substitution, recycling, and end-of-life management practices. The types of plastic resins and their respective resin numbers include:

1. Polyethylene
2. High-density polyethylene
3. Polyvinyl chloride
4. Low density polyethylene
5. Polypropylene
6. Polystyrene
7. Other (BPA, polycarbonate, etc.)

Some resins are more readily recycled, such as numbers 1, 2, 4 and 5, while others, including 3, 6 and 7 have traditionally been more difficult to recycle. Products made from plastics includes a vast array of packaging, beverage containers, and single-use items, such as food service ware and bags. In the 2017 Iowa Statewide Waste Characterization Study, plastics were found to comprise approximately 18 percent of the waste disposed in landfills by weight.

Plastics comprise approximately

18%

of the Waste Stream

Wind turbine blades can be as long as **197 feet**, are made of cross-linked polymers that **cannot be melted down and recycled, and do not compact in landfills.**

Renewable Energy Equipment

The REE waste from wind and solar energy is relatively new and is not a significant component of the Iowa waste stream. However, experts forecast hundreds of thousands of tons of used wind turbine blades, utility scale batteries, and solar modules will need to be disposed of or recycled in the next decade—and millions of tons by 2050.

The size of **wind turbine blades** is significant. A single blade for a modern onshore turbine is as long as 60 meters (197 feet), according to the manufacturer LM Wind Power, and blades are getting longer. While some wind turbine components, including the tower, gearbox, and generator can be recycled, the blades present a challenge. They are typically made from a composite of glass fiber and epoxy or another thermoset resin. The cross-linked polymers cannot be melted down and recycled, in contrast to thermoplastics such as polypropylene.

The replacement of wind turbine blades has already generated wind turbine blade waste for disposal in Iowa landfills. Without pre-processing, the blades are unwieldy and do not compact, consuming valuable landfill airspace. Some companies have worked to find management solutions including alternate uses and grinding processes.

With respect to **solar panels**, it likely will be decades before the modules deployed in the largest utility installations reach the end of their lives, but the timeline is difficult to determine. Most solar panels contain a layer of crystalline silicon semiconductor sandwiched between glass sheets and tough polymer films, all in a frame made of aluminum. The surface of the semiconductor is embedded with trace amounts of silver used as a conducting material, as well as lead and tin solder. The quality of the silicon recovered is not high enough for reuse as a photovoltaic material but is suitable to be used in specialty aluminum and steel alloys

Battery storage - generally lithium-ion batteries- are essential to speeding up the replacement of fossil fuels with renewable energy. Battery storage systems will play an increasingly pivotal role between green energy supplies and responding to electricity demands. Battery storage, or battery energy storage systems (BESS), are devices that enable energy from renewables, like solar and wind, to be stored and then released when customers need power most.

The need for storage has increased dramatically with the expanded use of renewable sources. Solar and wind energy, which depend on sunlight and weather conditions, deliver intermittent power, at times that do not always coincide with consumption in the case of photovoltaic (PV) solar panels (inactive during peak consumption in the evening).

While **lithium-ion batteries** are currently the most popular option to store renewable energy, zinc batteries are making their case for being a lower cost option. However, lab experiments currently show they can't recharge over and over for decades. If a longer lasting rechargeable zinc battery becomes available, it will likely become the number one option for renewable energy storage.

Construction and Demolition Debris

Materials generated from construction and demolition activities vary greatly, and are comprised of a variety of types of natural resources, including wood, minerals, and silicates. **Some C&D materials can be reused and recycled**, such as untreated wood, glass, bricks, rock and concrete, while **others can be more problematic**, such as treated wood and composite shingles. In the 2017 Iowa Statewide Waste Characterization, C&D debris was found to comprise five percent of the disposed waste stream. It is speculated this percentage is most likely greater, as the study did not include samples from roll off boxes which typically contain C&D debris. It is important to note that **C&D debris typically consists of large pieces, which consume landfill capacity because of its volume**.

Some C&D materials can be reused and recycled

- Untreated wood
- Glass
- Bricks
- Rock
- Concrete

- Composite materials
- Treated wood

MATERIAL SELECTION

Following the discussions on the types of materials included in each category, the subcommittees selected the top material types to develop policies, programs and facility strategies in the context of SMM.

Organics and Fibers

This category contains 15 material types, with some sub-material types. Based on the established criteria, the subcommittee selected these materials types:

Edible Food

Edible food is food intended for people to eat, including food not sold because of appearance, age, freshness, grade, surplus, etc. Edible food includes, but is not limited to, prepared foods, packaged foods and produce.

Pre-Consumer Food Waste

Waste produced in the manufacture of a product, food storage (such as grocery stores) or food preparation (such as kitchens). In general, raw material food that is never seen by the consumer.

Compostable/Digestible Paper, Food and Yard Waste

Materials that can degrade into compost –a soil amendment; and processed into biogas.

Plastics

The plastics material category included a number of plastic products that were discussed for further analysis and consideration. During the plastics subcommittee meeting, reoccurring points of discussion included strategies for improving education and outreach efforts concerning the use, reuse, and recycling of plastics; litter reduction; the need for a unified message throughout the state; the importance of local end markets; and focusing on plastics that have viable reuse options, and on single use water bottles.

Based on the discussions, the following plastic types were recommended for further evaluation for increased sustainability options:

Single-Use Water Bottles

Single-use plastics are goods that are made primarily from fossil fuel–based chemicals (petrochemicals) and are meant to be disposed of right after use—often, in mere minutes.

Film/Plastic Bags

Plastic bags are made out of "film," or thin flexible sheets of plastic. Plastic film is typically defined as any plastic less than 10 mil thick. The majority of plastic films are made from polyethylene resin and are recyclable if the material is clean and dry and facilities are able to process it.

Polystyrene

Closed-cell extruded polystyrene, Expanded Polystyrene Foam (EPS). It's resin is #6, it is non-biodegradable and has limited recyclability.

Renewable Energy Equipment

The REE subcommittee decided to focus on utility-scale solar PV panels and wind turbines due to the number in Iowa that will be decommissioned over the next decades, the impact on landfill capacity and lack of recycling opportunities in the state. The subcommittee felt there is infrastructure in Iowa to recover utility-scale storage batteries, and decided not to focus on this material at this time.

Utility-Scale Solar PV Panels

There are two types of Solar PV Panel technology: thin film and crystalline type panels. Thin films panels rely on technology and metals that when not handled properly, can be harmful to the environment. Crystalline panels do not have the same elemental metals as panels – they are based on silicone structure and have only small amounts of lead from soldering. The industry is moving away from use of lead in crystalline panels so panels will be lead free.

Wind Turbine Blades

Wind turbine blades are primarily made of composite materials (i.e., glass and carbon composites) but also incorporate other metals, polymers, and electronic components. When these materials can be removed from the primary composite materials, they are generally easily recyclable. However, the composite material that the blades are made of has proven challenging to recycle.

Construction and Demolition Debris

Similar to the other material categories, C&D debris includes a vast number of products and materials. Some of the reoccurring themes in the discussions on C&D debris included the following:

- **Need for emphasis on building reuse**
- **Identification of financial incentives for reuse and deconstruction**
- **Costs for deconstruction vs. traditional demolition**
- **Building codes, practices and specifications that present barriers to use of deconstructed or salvaged building materials**
- **Need for, and lack of, markets for C&D debris**
- **Lessons learned from existing and previous efforts to reuse and recycle C&D materials**

Based on the discussion during the C&D subcommittee meeting, the following materials were recommended to be further evaluated for increased sustainability options:

Interior Building Components

Drywall, Carpet, Manufactured Lumber, Ceiling Tiles, and Metals.

Roofing Materials (Non-Shingle) And Roof Shingles

Composite asphalt shingles, Clay or concrete tile, Wood shingles, Slate, Metal and Ethylene Propylene Diene Monomer (EDPM) rubber.

Drywall, Plaster, Gypsum Board

Flat panel made of gypsum plaster sandwiched in between two sheets of thick paper. Gypsum is a mined mineral made up of hydrous calcium sulphate. Also known as sheetrock or wallboard.

Treated Wood And Untreated Wood

Treated lumber is infused with chemicals to resist deterioration. Untreated wood is all natural.

STRATEGIES

Strategies and implementation schedules were developed over the course of the project that would enable the state to transition to an SMM system. This transition requires change and buy in from a large number of stakeholders – essentially those who live in or do business in Iowa. In order to develop a plan to move forward, strategies were identified for implementation in short, medium, and long term time frames. The goal of this approach was to allow a common sense, systematic approach to enable the efficient use of DNR and State of Iowa resources. Each subcommittee discussed in detail the potential strategies for development and implementation. The discussions and outcomes of these subcommittee engagements are detailed in the following sections.

ORGANICS AND FIBERS

Following selection of the material types, the Subcommittee members shared their perspectives on **challenges and opportunities** associated with developing and implementing strategies for edible food, pre-consumer spoiled food, and post consumer compostable organics. Following are comments made by subcomittee members during discussion on selected materials.

1 Waste Reduction/Recovery

- Need to educate consumers on waste reduction methods, edible food donation liability, and existing edible food recovery activities and resources.
- There is confusion regarding the labeling of products with Best When Bought By, Use By, etc., which results in food discards. Standardization of labels is essential.
- There is a lack of infrastructure, funding, legislation/mandates for edible food recovery.
- Use of meal forecasting software on campuses and hospitals significantly decreases pre-consumer food waste.

2 Collection and Infrastructure

- Compost infrastructure is severely lacking. There is none in the western part of the state.
- Need to understand existing digester capacity and availability.
- Only 25 percent of grocers and convenience stores participate in food recovery programs due to lack of reliable collection and transportation.
- Businesses need to be educated regarding the cost for transportation of edible and compostable organics to ensure reliable collection.
- Existing collection barriers include yard waste that is only collected over 9-10 months.
- Difficult to regulate collection or final disposition of commercial organics.
- Collection programs and education need to be consistent in local communities and amongst Iowa colleges/universities.
- Need to encourage businesses to divert organics from landfills.
- Compostable packaging ends up in the food waste composting containers because the packaging is labeled “compostable”.
- Food waste collection is impacted by the processing method, this needs to be established as part of the program.
- Reliable and safe food transportation needs to be well established to increase food recovery from convenience stores.

3 Funding

- Lack of edible food collection and distribution infrastructure puts funding burden on non-profits
- Need to share responsibilities between public, private and non-profit organizations.
- Iowa DNR has offered grants for food banks and food pantries. What is the potential to expand these programs?

Reoccurring points throughout the discussion included determining the best and highest use of food wastes [source reduction, feeding humans, feeding animals, industrial uses, composting, anaerobic digestion (AD), landfill] and working cohesively throughout the state and organizations to determine the best use of different food wastes. Reducing food waste in the first place should be a goal but there will regardless always be waste to manage so having the infrastructure, funding, and programs in place to do so is key.

Upstream Strategies

Upstream activities that can generate food waste include:

- Harvest
- Product Distribution
- Product Management
- Product Utilization

The organics subcommittee dedicated a meeting in January 2022, to discussing upstream food waste generation and developing waste reduction strategies. ReFED was the source for many of these strategies, which included:

- **Avoid over-production**, then harvest as much as possible. For wild-caught products, source only what is needed.
- **Package and distribute surplus**, off-grade, near-expiration, or imperfect produce to certain retailers or consumers.
- **Work with Iowa schools** to adjust purchasing specifications to allow for imperfect produce.
- **Collect leftover product** from fields after the initial commercial harvest.
- Implement processes to **only reject partial loads** of produce.
- **Maximize freshness** and selling time by harnessing the power of technology to create smart systems to efficiently move products.
- **Align purchases with sales** as closely as possible, and when surplus arises, finding secondary outlets to accommodate it.
- Build out systems and processes for **optimal on-site handling**.
- Improved intelligence around demand planning through systems or incorporating historical data in future decisions, often using machine learning to aid in **better forecasting and fulfillment**.
- Provide technology-enabled **tracking of food loss and waste to highlight opportunities for reduction**.
- Develop applications that **alert consumers to markdowns** or excess food at retailers or restaurants.
- Establish **dynamic pricing** to help retailers automate and comprehensively update markdowns, optimizing price points to sell more product.
- **Minimize on-hand inventory**.
- **Decreased minimum order** quantity.
- Design facilities, operations, and menus to u**se as much of each product as possible**.

When it comes to **food waste prevention**, **designing and planning menus is one of the most effective** (and controllable) measures possible. A study by Cornell University Food and Brand Lab says, on average, diners will leave 17% of their meals uneaten, and 55% of edible leftovers are left at the restaurant. This represents an opportunity to influence food waste prevention through service style and menu design. By creating menus with food waste prevention in mind -- in effect reducing the number of ingredients and re-purposing some of the foods an operation is planning to throw away -- food service operations can increase their bottom lines. As an example, a pasta dish can be served as a full size or half size. Limited offers or promotions can also reduce over ordering or under use of an item.

- Rethink the concept of "waste" by **turning surplus** and byproducts into food products through **upcycling**
- Support **active and intelligent packaging research**
- Provide **technical assistance** to Iowa food manufacturing businesses to reduce food waste
- **Sell pre-measured** ingredients to cook specific meals.
- Conduct **advocacy campaigns** to **raise awareness** and educate consumers about ways to **prevent food waste**.

Consumer Strategies

The organics subcommittee focused on reshaping consumer habits and strengthening food rescue during the discussions on preliminary strategies to reduce consumer food waste. These strategies included:

- **Create smaller size options** for menu items to reduce over portioning and plate waste.
- **Sell pre-measured ingredients** to cook specific meals.
- Conduct **advocacy campaigns** to raise awareness and educate consumers about ways to prevent food waste.:
- **Standardize food label** dates to two phases (quality and safety).
- **Optimize food packaging size** and design to ensure complete consumption by consumer by reducing spoilage.
- Develop **education campaigns** focused to reduce plate waste on buffets.
- **Change K-12 lunch programs**.

STRATEGIES

Just 3 percent of surplus food ends up being donated, with the greatest portion coming from grocery retail. Distribution and logistical challenges contribute to these low percentages of food being donated. The organics subcommittee identified these preliminary strategies to address these challenges:

- **Educate donor organizations** on the cost associated with transporting food from the point of generation to the point of distribution.
- **Increase the amount of storage** and handling capacity for donated food.
- Create a system where **donors and rescue organizations can communicate**.
- Establish a **vetting system for food donors.**
- **Educate businesses** on the potential costs and avoided disposal costs **of food donation and collection**.
- **Increase** donation **storage and handling capacity**.
- Adopt **edible food recovery** legislation.

Examples of State regulations to address food waste include:

End of Life Strategies

- Survey/Inventory composting and AD facilities to **establish a baseline**.
- **Increase** the compost and AD **infrastructure**.
- **Inventory food waste reduction/recovery** legislation in other states/assess viability in Iowa.
- **Provide funds** and design regulations to facilitate **innovative processing** technologies.
- **Create organic waste sheds**.
- Feed **food scraps to livestock**.
- **Target communities with no landfill gas systems**.
- Establish **compost standards**.

- Define **compostable versus biodegradable**.
- Consider a food scraps **disposal ban**.
- Provide **organic waste collection** to all residents and businesses.
- **State policy to procure recycled organic waste products** (i.e., compost, renewable gas, etc.).

Plastics

PLASTICS

The SCS Team led participants through a discussion regarding the **challenges in Iowa regarding plastics.** These include:

1 Data

- Iowa does not have comprehensive or readily available data about what plastics are being recycled, manufactured, or being used in Iowa. Therefore, it is hard to measure the environmental impact of plastics in Iowa.

2 Education and Research

- The available plastic waste data in Iowa focuses primarily on litter impacts.

3 Regulations

- While Iowa has robust collection initiatives supported by the Iowa Bottle Bill, this regulation does not include several other containers. Iowa also recently passed regulations that established pre-emptions concerning banning the use of materials (i.e., plastic bags).

Strategies were identified that work to address plastic waste through up-stream practices (i.e., production and manufacturing), consumer-based practices (i.e., change consumer behaviors), and end-of life practices (i.e., disposal alternatives). The identified strategies for each practice along with a brief description, are listed below.

Upstream Strategies

Upstream activities that can generate plastic waste include:

- Design products for recycling or composting - Manufacturers consider how the product can more easily be recycled and/or composted.
- Eliminate problematic and unnecessary packaging - standard packaging and containers with a focus on selecting packaging that is reusable, refillable, repurposable.
- Require post-consumer recycled content for packaging - Creates markets for recycled plastics and is part of closed loop economy. Examples include the following:

Maine was the first state to enact an EPR bill for paper and packaging waste. The bill requires producers to finance stewardship organizations and bear more responsibility for the packaging they put into the market. The bill covers most packaging materials and contains exemptions for paint and beverage containers, small businesses, and low-volume packaging producers.

Oregon's EPR bill establishes a program for plastic packaging, paper, and food service ware. The bill requires producers to join producer responsibility organizations (PROs) that will charge annual membership fees based on the environmental impacts of the producer's products. The state will establish a collection list to standardize recycled items across the state and funding will go toward upgrading facilities to meet new performance standards.

California's Plastic Pollution Prevention and Packaging Producer Responsibility Act covers certain single-use packaging and plastic food service ware. On or after January 1, 2032, producers of these materials must ensure they are recyclable or compostable and meet specified recycling rates. All businesses associated with the sale, distribution, or importation of these materials must join a PRO.

STRATEGIES

Consumer Strategies

The plastic subcommittee focused on reshaping consumer habits during the discussions on preliminary strategies to reduce plastic waste. These strategies included:

- **Standard for customer opt-in for food service packaging** and accessories - Require restaurants to ask consumers if they want utensils placed in their takeout products rather than just including them.
- **Encourage reusables for dine-in** - Allow customers to bring personal containers for leftovers and eliminates single use items for dine-in experience (plates, cups, cutlery).
- **Encourage reuse/refill for take-out and delivery** - The City of Boulder, Colorado has set a goal of recycling, composting, and reusing 85% of its waste by 2025, and to have reusable takeout containers available in 50% of Boulder restaurants by 2025. As part of this zero-waste commitment, Boulder teamed up with a company called Repeater to offer reusable takeout containers as a sustainable alternative.
- **Develop reuse and refill pilots and funding sources** - A program in California visits businesses and provides funding to encourage them to participate in these programs. Funding includes infrastructure to be able to wash dishes and cups to help eliminate single-use food service ware.
- **Provide education and awareness campaigns for refill, reuse, and repurpose** - Identify best methods to educate the public and use these to change consumer behavior. Identify barriers that prevent consumers from participating in existing programs.
- **Implement to-go container and cup charges** Establish fees that discourage activities that use/create this waste.
- **Implement a plastic bag fee** - Establish fees that discourage activities that use/create this waste.

End of Life Strategies

- Provide **education and awareness** campaigns on contamination **in recycling**.
- Provide education and awareness **on littering**.
- **Collect data on final destinations** of materials/ recycling facilities.
- Support development and adoption of **reusable packaging systems**.
- Incorporate all **non-carbonated containers into Bottle Bill** or **implement other methods** to **reduce the environmental impact** of single use beverage containers.

RENEWABLE ENERGY EQUIPMENT

At the initial meeting, the subcommittee decided to focus on wind turbines and solar PV panels. The reason the subcommittee did not initially target utility-scale storage batteries is due to the potential to recover their components through traditional electronic recycling programs.

As previously discussed, wind turbines and solar PV are an emerging waste stream and significant generation will most likely not occur for at least a decade. Therefore, the REE subcommittee met on seven occasions to understand potential estimates on the amount of REE that could be generated in Iowa, the need for end-of-life management of REE, and the status of technologies and policies for recovering REE.

At the 4th meeting, the REE subcommittee began discussing strategies for end-of-life management. This committee suggested “incentives versus government mandates’ and support of renewable energy in Iowa be guiding principles when considering strategies. The subcommittee categorized strategies by 1) support renewable energy in Iowa and 2) facilitate end-of-life management for REE. The subcommittee discussed the following strategies:

Support Renewable Energy in Iowa

1 **Review County ordinances and determine if they should be standardized. Discussion included:**

- Whether counties might feel like government is taking away their local control
- The Iowa Environmental Council is reviewing all 99 county ordinances to see where they stand on wind energy. Counties are also reviewing their ordinances as projects are announced.

2 **Promote the Benefits of Renewable Energy**

- It was suggested the DNR would support the promotion of renewable energy and that Iowa Economic Development Authority would be the lead agency.
- It was acknowledged that there is some citizen concern about locating wind and solar parks, and the Iowa legislature considers siting bills on an annual basis.

3 **Consider Re-Establishing and Expanding the Renewable Energy Tax Credit**

- This strategy was suspended because it is under consideration at the federal level, and Iowa may support federal tax credit legislation.

Facilitate End-of-Life Management of REE

1 **Encourage Research on Recycling of Renewable Energy Materials**

- The Iowa Energy Center Board provided financial support to those that are conducting this type of research, but the funding for this research has sunset.
- There should be communication with the manufacturers of REE. They know the materials going into the production and likely know best how to manage the materials at the end of the products useful life.
- Identify end of life projects that have been funded by the IEDA.

2 **Encourage Policies to Solve End of Life Challenges**

3 **Encourage Solutions that Drive Businesses and Solutions to Iowa**

- Work with IEDA.

4 **Begin Developing Extended Producer Responsibility (EPR) Policies**

5 **Survey of Installers on Types of Waste – Residential or Business and Current Disposal**

Construction & Demolition Debris

CONSTRUCTION AND DEMOLITION DEBRIS

Strategies that could be considered to encourage reduction of C&D waste generation and to divert the material from being landfilled range from education, to policies, to programs and facilities.

Contruction and Demolition Debris Strategies

1 **Education and Outreach**

- Educating consumers that there are alternative product options for their projects that may have a better impact on the environment than traditional products can help encourage their use. Education concerning the prevention of waste generation strategies (i.e., deconstruction, donating durable goods, sustainable design/materials, etc.) can also be effective in reducing C&D waste.

2 **Diversion Specifications and Requirements**

- Government agency projects can help develop markets for products with recycled content by mandating its use in their internal or external projects. Government agencies can also establish regulations which specify that products sold within their state must contain certain percentages of recycled content.

3 **Market Development**

- Requiring use of products that contain minimum recycled contents can help present viable markets for these materials which would support manufacturers of these products.
- Government agencies can establish recycling market development zones which provide incentives (i.e., low interest loans, technical assistance, permitting and zoning assistance, etc.) for manufacturers that process materials to locate and operate in their jurisdiction

4 **Facility Development and Certification**

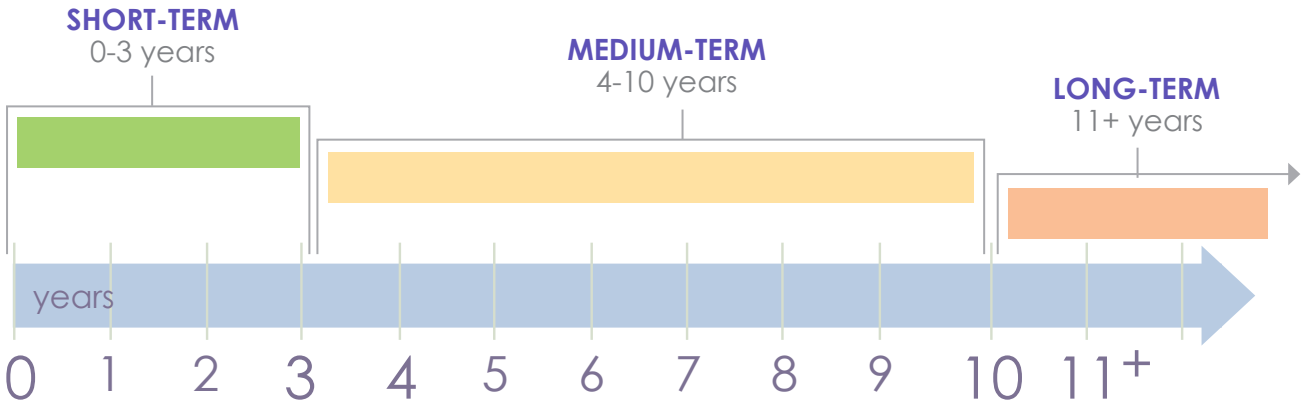
- Supporting the development of C&D processing facilities and establishing a third party certification institute to verify compliance can help support this market and give credibility to the work that contractors are doing to divert C&D from disposal.

PRIORITIZATION

As we look to make decisions about potential SMM strategies, we need to assess what we think we can control in the future, and what are things that we can do right away. Change can be difficult and we want to understand the change and the positive impacts that those changes will have. Some important decision making considerations include:

- Implementation Approach
- Legislation/Policies
- Infrastructure
- Funding Needs and Sources

The SCS Team led participants through a process in which strategies were refined and prioritized for potential implementation within the immediate (0-3 years), medium (4-10 years), or long-term (11+ years). The results of multiple subcommittee meetings and discussions have led to the prioritization of the strategies. Consideration of needs, opportunities, and challenges in regards to funding, staffing, and overall objectives help to further define and prioritize the strategies. The final short, medium, and long term strategies are included in this section, and reflect the consensus of the groups that contributed to their design and development.



SHORT-TERM
0-3 years

ORGANICS AND FIBERS

- Provide stores and restaurants documentation on how to reduce food waste.
- Meet with entities such as Iowa State University and EPA to find gaps and reassess how to expand programs already in play in Iowa.
- Institute advocacy campaigns to create food waste awareness.
- Promote food labeling policies if national legislation is passed.
- Evaluate how other states gather information on local food recovery infrastructure.
- Increase storage donation handling and capacity.
- Educate business on the costs associated with food donation collection and awareness of options for food recovery organizations.
- Determine what information wastewater treatment plants currently submit to DNR related to accepting food/organics.
- Evaluate if a rule/code is required to obtain necessary information from wastewater treatment plants related to accepting food/organics.
- Include people from the wastewater world in this conversation.
- Institutionalize Iowa co-digestion successes/challenges.
- Inventory compost facilities and digesters for information on types and quantities of materials accepted, processing methods, and capacity.
- Analyze food waste reduction strategies in other states/nationally.
- Research what other states require for government organic-content procurement.
- Estimate what it would cost to divert organics from landfills to Iowa composting facilities and digesters.
- Create a Food Recovery Master Plan.

PLASTICS

- Conduct education and awareness campaigns on littering, recycling contamination, and Extended Producer Responsibility (EPR).
- Identify problematic packaging and options for recycling and composting.
- Research opportunities for Post Consumer Recycled (PCR) content purchasing for state and local agencies.
- Monitor EPR policy framework for packaging in other states.
- Inventory recycling methods and facilities throughout the state.
- Develop reuse and refill pilots and funding.
- Review and revise existing state definitions, standards, and labeling for biodegradable, compostable, and recyclable.
- Research Health & Safety Codes regarding reusable containers.
- Support research on methods to transform plastics into new products, fuels, etc.
- Incentivize development of facilities that manufacture new products using recycled plastics.

RENEWABLE ENERGY EQUIPMENT

- Monitor technologies for managing (production and end-of-life) wind turbine blades and solar panels that are available and under development worldwide.
- Monitor other states' and national legislation for solar PV and wind turbine end-of-life management.
- Continue/expand the subcommittee work to consider legislation for end-of-life management of renewable energy equipment.
- Collaborate with counties, non-governmental organizations (NGO's), generators, manufacturers and state agencies (affected stakeholders) to review policies and procedures regarding end-of-life management for REE.

CONSTRUCTION AND DEMOLITION DEBRIS

- Conduct studies and evaluate data on C&D materials in Iowa; prioritize materials.
- Implement policies and programs for reduction, recovery, reuse and recycling.
- Review and update local building policies, programs, and codes to implement Sustainable Construction and Demolition practices.
- Research and identify barriers and incentivize development of C&D processing facilities.
- Research potential markets for C&D materials.

MEDIUM-TERM
4- 10 years

ORGANICS AND FIBERS

- Find investors to utilize food remaining in post-harvest collection.
- Encourage schools to purchase imperfect foods.
- Educate industry on other options such as compost and AD rather than relying on landfill disposal.
- Work with K-12 institutions in conjunction with the United States Department of Agriculture (USDA) standards/expectations to create smaller size menu options, particularly for younger grade levels.
- Inventory what agencies are managing educational and institutional food waste.
- Institute advocacy campaigns to create awareness about food waste recovery facilities.
- Assess if Iowa needs legislation for food labeling.
- Implement food waste recovery plan.
- Begin creating multi-county organic waste sheds.
- Require the State to procure organic-content products.
- Develop regulations that define compostable and biodegradable.

- Establish compost standards.
- Create a robust compost/AD facility data base.

PLASTICS

- Develop and implement policies to reduce single-use food service ware in public spaces.
- Develop and adopt incentives to use alternatives to single-use plastic bags.
- Require post-consumer recycled content purchasing for government agencies and policies that encourage environmental preferable purchases.
- Incorporate all non-carbonated beverage containers into Bottle Bill or implement other methods to reduce the environmental impact of single use beverage containers.
- Reconsider Ban on Bans.
- Develop and implement EPR for plastic packaging.

RENEWABLE ENERGY EQUIPMENT

- Coordinate workshop(s) of national and international renewable energy equipment recycling technology providers to share information, policies and procedures.
- Begin working with the Iowa Economic Development Authority to identify opportunities for REE recyclers to locate in Iowa.
- Develop end-of-life management policies/legislation/ordinances for local or statewide consideration.
- Incentivize the use of REE that has the greatest potential for recovery at end of life.

CONSTRUCTION AND DEMOLITION DEBRIS

- Educate building community on deconstruction principals, practices, facilities and services.
- Review and update building policies, programs, and codes to prioritize building reuse and incentivize material reuse.
- Adopt builder/contractor certification program (National program standards).
- Adopt recycling certification institute methods.

LONG-TERM
11+ years

ORGANICS AND FIBERS

- Adopt food recovery legislation.
- Provide food waste collection to all residents.
- Adopt food waste to livestock regulations.

PLASTICS

- Conduct public opinion survey regarding incentives, fees, and bans.
- Develop and adopt policy to ban single-use plastic bags.
- Develop and adopt PCR content requirements for packaging.
- Establish producer registry and reporting for packaging.

RENEWABLE ENERGY EQUIPMENT

- Potentially adopt and implement end-of-life policies/legislation/facilities/programs at local or state level.

CONSTRUCTION AND DEMOLITION DEBRIS

- Identify, evaluate, and implement incentives for purchasing deconstructed materials.

SHORT-TERM IMPLEMENTATION PLAN

Once the short, medium, and long-term strategies were developed, focus was shifted to identifying the implementation requirements for the short-term strategies. The SCS Team prepared and reviewed with the DNR a short-term implementation plan for the four material categories. This plan was discussed and reviewed in subcommittee meetings in August 2022. A key factor of this process was working towards actionable goals that will move Iowa closer to a SMM model. The short-term implementation plan will establish the next steps in the vision and transition to SMM in Iowa.

ORGANICS AND FIBERS

1 ASSESS ORGANICS PROCESSING CAPACITY IN IOWA

Inventory Existing Compost Facilities

Action Steps:

- **Research** how other states inventory compost facilities
  - Does the state or local government gather the data?
  - Is reporting mandatory?
  - How frequently is data gathered?
  - Is the survey process codified?
- **Work with DNR** to identify contacts of any compost facilities and municipal programs within Iowa.
- **Design a survey** that **assesses**:
  - Types and quantities of organics accepted;
  - Material specifications;
  - Tipping/processing fees;
  - Service area;
  - Local capacity for organics collection;
  - If methane recovery is occurring at landfills;
  - Daily and annual processing capacity;
  - Existing processing methods;

- Ability/plans for expansion (quantities/material types); and
- Current and future material marketing plans.

- **Work with the Iowa Composting Council to test and ultimately promote the survey.**
- **Assess service gap areas**
  - Target service gap areas for technical and financial support.

Evaluate the potential to expand the co-digestion of food scraps and biosolids

Action Steps:

- **Create an inventory of entities in Iowa** including municipalities, agricultural operations, and/or industry that are currently co-digesting organics.
- **Meet with entities** to ascertain**:**
  - What is/is not working
  - Costs associated with co-digestion, such as depackaging equipment
  - Energy production
  - How are food scraps delivered
  - Specifications for food scraps
  - Competition for feedstock (interstate facilities)
  - Current throughput of facilities
  - Potential for expansion
- **Interview other wastewater treatment plants** to assess interest in co-digestion.
- **Discuss with DNR** wastewater permitting section design, permitting, and construction challenges/considerations.
- **Map areas of Iowa** that have the **potential for co-digestion** based on these criteria:
  - Amount of capacity available
  - Food scrap specifications
  - When capacity could come online
  - Use 2022 Iowa Statewide Waste Characterization data to estimate the quantity of food scraps in the region
  - Identify large generators of food scraps that align with food scrap specifications
- **Work with legal counsel** to assess the potential to use funding from the National Infrastructure Law to retrofit Iowa wastewater treatment plants to co-digest food scraps.
- **Research other potential funding sources** for infrastructure and program expansion.
- Based on the results of **previous tasks**, convene a **work group** to progress co-digestion in Iowa.

2 PRESENT THE CURRENT AND FUTURE ORGANICS INFRASTRUCTURE

Prepare a Statewide Organics Management Plan

Action Steps:

- **Determine contents/outline of the plan**
- **Prepare plan sections**
- **Circulate draft plan to key stakeholders for review and comment**
- **Finalize draft plan**

3 INCREASE AWARENESS OF FOOD WASTE

Expand existing food waste awareness campaigns with an Iowa based message

Action Steps:

- **Research effective national and state food waste campaigns** available for entities to use. Information to summarize could include:
  - Content
  - Target audiences
  - Costs
  - Results
- **Identify project partners** to champion an Iowa-specific campaign.
- **Work with a marketing firm** to design Iowa-specific campaigns.
- **Pilot campaign** to assess results. May include:
  - Conduct pre-campaign market research on food waste awareness/concern
  - Communicate with food waste generators to understand current initiatives to reduce food waste
  - Implement campaign(s)
  - Measure campaign results on reducing food waste
- **Modify campaign(s) if needed and launch statewide.**

PLASTICS

1 INVENTORY RECYCLING METHODS AND FACILITIES IN IOWA

Conduct a study of existing recycling methods, materials and facilities

Action Steps:

- **Update the facility list and map** developed for the 2017 Iowa DNR Hub and Spoke study, utilizing solid waste planning areas to confirm recyclers present in their areas.
- **Convene a work group** to assist with design of survey questions. Questions will include but not be limited to:
  - Location of facility
  - Service area of facility
  - Objective of facility (single stream vs dual/multiple, consolidation and transport, sort and market, etc.)
  - Materials accepted at the facility to include detail on:
    - Plastics
    - Glass
    - Paper
    - Metal
  - Equipment within facility (for example level of equipment, robotics, AI, etc.)
  - Capacity of facility, current utilization level, plans to expand
  - End user of materials
- **Identify best method** for administering survey
- **Test the survey** on the work group members' facilities

- **Promote** the need for the survey/data
- **Conduct study and analyze data.** Update on annual or other regular basis.

Establish reporting system for recyclable materials

Action Steps:

- **Research how and how often** other states obtain recycling data.
- **Develop methodology for recyclers to report on regular basis** the types and quantities of materials collected and processed in Iowa. Include information on how much material is brought into Iowa to process and how much processed material is recycled in Iowa.
- **Request recyclers to report on an annual basis** the types and quantities of materials managed.
- **Evaluate data received under voluntary system** to determine next steps.

2 REVIEW EXISTING REGULATIONS

Review existing state definitions, standards, and labeling for biodegradable, compostable, and recyclable terminology

Action Steps:

- **Conduct a comprehensive review** of state policies, codes, and regulations for definitions and references to terminology related to recycling, composting, and materials management. Maintain awareness of unintended consequences with affecting other existing codes.
- **Review other states' definitions** for options/input.
- **Identify need for revisions/updates** or new definitions.
- **Develop proposed standard definitions** for consideration and adoption.

3 CONDUCT PUBLIC OPINION SURVEY

Determine which relevant/representative policies and programs have produced tangible, desired results in other states

Action Steps:

- **Identify states to conduct research** on relevant/representative policies and programs.
- **Contact states and gather data** for use in designing survey. Consider what has already worked or not in other locations.

Conduct public opinion survey regarding policies, such as Extended Producer Responsibility (EPR), incentives, fees and bans and programs previously determined to produce tangible results

Action Steps:

- **Seek input from survey specialists to determine survey methodology.**
- **Develop survey questions.**
- **Identify stakeholders to survey.**
- **Identify distribution method for survey.**
- **Implement survey.**
- **Review and analyze survey results.**

4 PLASTIC PACKAGING

Identify problematic packaging and options for recycling and composting and use this information to reduce littering, recycling contamination, and design education campaigns

Action Steps:

- **Review available studies to understand how to assess plastic packaging sold and purchased in Iowa.**
- **Review waste characterization data to identify types and quantities of plastic packaging disposed in Iowa.**
- **Review consumer sales data regarding plastic packaging sold in Iowa.**
- **Establish baseline of plastic packaging issues as they relate to littering and recycling contamination in Iowa.**

Use study data to identify the types of materials to be targeted for education campaigns addressing littering, recycling contamination, and potential policies

Action Steps:

- **Assess existing education resources to identify enhancements and/or need for new content.**
- **Prepare scope of work for development of new outreach campaigns.**
- **Develop new outreach campaigns using internal or external resources.**
- **Identify preferred methods for delivering campaigns**
- **Implement new campaigns.**
- **Evaluate effectiveness/impact of outreach campaigns.**

RENEWABLE ENERGY EQUIPMENT

1 TECHNOLOGY

Monitor the Status and Production and End-of-Life REE Recycling Technologies

Action Steps:

- **Identify potential Iowa partner organizations** and possibly leverage their resources.
- **Create a repository of REE technology developers**, research organizations, and funding sources.
- **Notify those entities** of the Iowa SMM project and begin assembling information on their technologies and research.
- **Share information with key stakeholders** and obtain feedback on feasibility to implement in Iowa.
  - Update research and outreach quarterly.

2 LEGISLATION, POLICIES AND PROCEDURES

Leverage Local Expertise.

Action Steps:

- **Continue/expand the subcommittee work** to consider legislation for end-of-life management of renewable energy equipment.

- **Collaborate with counties, NGO's, generators, manufacturers and state agencies** (affected stakeholders) to review policies and procedures regarding end-of-life management for REE.

Learn from Others

Action Steps:

- **Monitor other states' and national (including international) legislation and policies** for solar PV and wind turbine production and end-of-life management.
- **Become active in REE trade associations** such as the American Council on Renewable Energy (ACORE), the American Clean Power Association, the European Renewable Energy Council, and European Renewable Energies Federation (EREF).

CONSTRUCTION AND DEMOLITION DEBRIS

1 C&D MATERIAL EVALUATION

Conduct studies and evaluate data on C&D materials generation, disposal and diversion in Iowa

Action Steps:

- **Include C&D materials in future Iowa Statewide Material Characterization studies as was done in 2022.**

Prioritize material types for reduction, recovery, reuse and recycling.

Action Steps:

- **Utilize Iowa Statewide Material Characterization study data** and additional research/LCAs to understand costs, and benefits of various policies and programs.

Implement policies and programs for reduction, recovery, reuse and recycling.

Action Steps:

- **Implement policies and programs for reduction, recovery, reuse, and/or recycling.** Monitor activities' outcomes and modify as necessary.

2 C&D PROCESSING FACILITIES AND MARKETS

Research and identify barriers to developing C&D processing facilities, including required throughput and potential markets for C&D materials.

Action Steps:

- **Gather data** on previous and existing C&D material processing operations/facility development issues in Iowa, including environmental, economic, feedstock, end market and social aspects.

Research opportunities to develop C&D material processing operations/facilities

Action Steps:

- **Gather and analyze data** on existing building codes, policies, programs and permitting, and existing facilities/ operations. Analyze material generation and determine throughput of successful facilities and criteria for success.

Conduct facility study

Action Steps:

- **Use materials generation data and existing facility data to identify building cycles** and material variation where C&D materials processing facilities/operations are presently located and where they are needed. Include evaluation of building cycles and material variation in study.

Market Study

Action Steps:

- **Conduct market analysis of C&D materials.**

3 EXISTING SUSTAINABLE CONSTRUCTION AND DEMOLITION POLICIES AND PRACTICES

Review Iowa and other states and local building policies, programs, and codes for Sustainable Construction and Demolition practices

Action Steps:

- **Review Iowa state and local building policies,** programs, and codes Sustainable Construction and Demolition practices.
- **Review similar state and local building policies,** programs, and codes for Sustainable Construction and Demolition practices.
- **Summarize existing active Sustainable Construction and Demolition practices** and which have tangible positive outcomes both within Iowa and in similar states.

Evaluate existing Sustainable Construction and Demolition projects in Iowa

Action Steps:

- **Collaborate with Iowa USGBC and construction industry** to gather information on the existing Sustainable Construction and Demolition practices found in public and private sectors.

Update building programs, incentives, policies and codes, if possible, to establish consistent statewide Sustainable Construction and Demolition practices

Action Steps:

- **Work with agencies and building industry** to develop templates and guidance for these Sustainable Construction and Demolition practices and make available to agencies.

NEXT STEPS

NEXT STEPS

The process of transitioning to a SMM system is not a small feat. It will require use of available resources that are restricted in scope and availability. DNR staff is working to develop the detailed path forward on the execution of the short-term implementation plan. Considerations include:

- Determination of the entity best suited to complete each task;
- Continued stakeholder and subcommittee input;
- Personnel resources available to complete in a timely manner;
- Knowledge and past experience; and
- Associated costs.

It is important to understand this document is a living guideline to how to proceed forward. Changes in legislature, new products or technologies, availability of grant funding, and other factors can directly impact the strategies. It is also important to acknowledge ongoing implementation of existing programs, as well as other initiatives that have similar and related goals that will impact, or be impacted by, the transition to SMM. The process will be fluid and dynamic, and will require the dedication and commitment of all involved to reach the overall goal of a system that shifts from managing material based on tonnage to using materials in the most productive way with an emphasis on using less, using resources more efficiently throughout their life and reducing environmental impacts throughout the material life cycle.