#1 Renewable Energy Equipment

Subcommittee Meeting #1 Summary – Renewable Energy Equipment June 10, 2021 9AM-11AM

Subcommittee meeting #1 of the Renewable Energy Equipment Subcommittee (#1-REE) was convened virtually via Zoom on June 10, 2021 from 9AM-11 AM, CST. Committee membership and attendance for #1-REE is provided in Table 1.

Table 1. #1 REE Subcommittee Membership and Attendance

Name	Company	Attended 6/10/21
Jeff Maxted	Alliant Energy	Present
Jenny Coughlin	MidAmerican Energy Company	Present
Chaz Allen	Iowa Utility Association	Present
Joshua Syhlman	TPI Composites	Present
Rick Hurt	SCISWA	Present
Dan Nickey	Iowa Waste Reduction Center	Present
Shelene Codner	Region XII Council of Governments - Iowa Waste Exchange	Present
Shelly Peterson	IEDA	Present
Jerry Brown	Collins Aerospace	Present
Sally Buck	Valmont Industries, Inc., Coatings Division	Present
Steve Guyer	Iowa Environmental Council	Present
Kenneth Sulma	Iowa Utilities Board	Present
Dustin Miller	American Clean Power Association	Present
Theresa Stiner	DNR Internal SMM Team	Present
Laurie Rasmus	DNR Internal SMM Team	Present
Jeff Fiagle	DNR Internal SMM Team	Present
Tom Anderson	DNR Internal SMM Team	Present
Jennifer Wright	DNR Internal SMM Team	Present
Michelle Leonard	Consultant – SCS Engineers	Present
Christine Collier	Consultant – SCS Engineers	Present
Karen Luken	Sub-Consultant – EESI*	Present

* Economic Environmental Solutions International

A. Subcommittee #1-REE Summary

The meeting began with introductions of the Iowa Department of Natural Resources (DNR) staff and their role, the consulting team, and the Renewable Energy Equipment Subcommittee members. Subcommittee members and DNR representatives were present as noted in Table 1. The subcommittee meeting purpose and goals were then introduced, in addition to the decision making process to be utilized for these meetings. Modified consensus will be utilized for decisions to the extent possible, with members agreeing that although a decision may not be their personal highest choice, they can live with what has been selected. When this method fails, a vote will be taken with a quorum (majority of the

total members, not just those present) required. In order for a vote to pass, a majority of the members must vote in its favor.

Background on both sustainable materials management (SMM) and the results of Stakeholder Meeting #1 were then presented. Additional detail on information presented in the Subcommittee Meeting #1-REE meeting is provided in the agenda (Attachment A) and PowerPoint presentation (Attachment B). Initial research was completed on subcategories and materials resulting from Stakeholder Meeting #1. Results of this research were presented to the subcommittee prior to taking a brief break.

Subcommittee members shared their perspectives on issues, challenges, and opportunities in the area of renewable energy equipment.

WIND TURBINE BLADES

- There are an estimated 6,000 turbines - 18,000 blades in Iowa.
- Estimated that equivalent to be 150,000 tons or about 5% of total tonnage at Iowa landfills.
- Vestas (largest wind turbine manufacturer in the world) has announced a way to totally recycle wind turbine blades, including current ones as they move forward to better designs. Vestas recycles blades into an engineered fuel.
- Vestas is based out of EU where there are stricter requirements for reuse and recycling.
- Wind turbine manufacturers have methods for recycling blades but they are cost prohibitive to do so. Some have found that the recycling cost is double the landfill disposal cost.
- Wind power has been in Iowa for 25-30 years.
- There are financial/economic incentives to repower blades so end life of blades is not just tied to end of useful life.
- Most common method for recycling turbine blades today is co-processing – utilizing composite material ground into chunks to use as a fuel for producing concrete and using remaining fibers in concrete to strengthen the concrete.
- Some cement kilns in Iowa but blades are being shipped out of state for this processing.
- Turbine blades take too much space in landfills – there needs to be a better way.
- Pieces need to be small enough for landfills to handle.
- Iowa landfills that have chosen to accept wind turbine blades are not charging their gate rate to manage turbine blades as they are a special waste requiring special handling and consuming significant volumes of airspace.
- Of those Iowa landfills that have accepted turbine blades, most only accept turbine blades from within their service area.
- Warranty vs useful life important especially with utilities as ownership at end of life may change.

SOLAR PANELS

- Solar panels typically have a 25-year warranty, but their life is probably closer to 40 years.
- Two types of technology: thin film and crystalline type panels.
- Thin films panels rely on technology and metals that can be harmful to the environment.
- Crystalline panels do not have same elemental metals in panels – based on silicone structure so at most may have small amounts of lead from soldering.
- Movement to go away from use of lead in crystalline panels so panels will be lead free.

- Panasonic starting to make panels that meet European standards.
- Currently about 250 megawatts in Iowa, but utility scale is starting to take off.
- Almost 1,000 megawatts approved in northern Iowa, 690 megawatts (Duane Arnold Solar)in Linn County announced and application filed to the Iowa Utility Board (IUB), 100 megawatts by Cogin, Alliant announced 400 megawatt… others are out there too.
- Unless utility wants to upgrade, life will be 25-40 years life.
- Most consumers will have crystalline panels.
- 98% of all panels produced in the world are crystalline.
- Thin film until recently had much lower efficiency rate – 5-6% compared to 19-21% for crystalline.
- Thin films probably last 10-15 years at most due to how they're made.
- Choice between thin film and crystalline often comes down to cost in addition to efficiency.
- Thin film manufacturer in state – Power Film in Ames – typically more of defense industry but a source of information in Iowa.

BATTERIES

- Battery storage will become larger part on how energy is provided to customers in transition to cleaner energy.
- Battery storage needs to move forward as a material to be evaluated.
- Batteries are large on every front.

GENERAL

- IUB broad scope of what they look at – challenges are multi-faceted.
- IUB regulates and approves solar and wind turbine farms.
- Interested in what utilities and independent power producers are doing concerning the holistic picture of managing renewable energy equipment.
- What are the end uses? Is there a way to repurpose the materials? Have seen interesting solutions – shred to use turbine blades for insulation, wood that can be repurposed, reused in construction materials, concrete, struts for bridges… many interesting business solutions out there. IUB looking to see what is best for consumers and utilities and power producers.
- Utility scale to require IUB approval? Yes – solar, wind, and battery. Production facilities above 25 megawatt (wind) and solar and battery. Community solar or rooftop are between individual and power provider.
- Is there a requirement for utilities to put away money for end of life management funds? They have an open docket in regards to end of life management. Currently do not have anything in statute or rules for definitive plan of retirement. Doc IMU-2020-0001 with utility responses.
- Benchmarking strategies to close gap in cost between landfill and recycling is going to be key.
- Need to look at end of life conversations around all more efficient energy products – switching facilities to LED lights… still questions on how those are to be disposed.
- Have postponed some end of life from current equipment… leaving ballasts in place rather than taking them down.

- Economics have to work for end of life options.
- Designing products without good vision.
- Need to support having products that are designed and manufactured with the end life in mind, not just getting it to the market.
- Electronics are an issue as well.
- Transportation is a consideration.

B. Recommendations

Based on the discussion during the #1-REE meeting, the following materials have been recommended to be further evaluated for increased sustainability options:

- Wind turbine blades
- Solar panels
- Inverters
- Batteries

C. Research Request List

Through the discussions and in follow up discussions, various topics have been identified for further research. These are provided below, divided by responsibility.

Iowa Waste Reduction Center Topics:

- Batteries
  - How/where are they used for renewable energy?
  - Are they associated with wind turbines, solar farms, etc.?
  - How many are currently in use in Iowa and anticipated numbers for the future?
  - Are there different types of batteries to be considering?
  - How is battery end life currently managed?
- Inverters
  - How/where are they used for renewable energy?
  - Are they associated with wind turbines, solar farms, etc.?
  - How many are currently in use in Iowa and anticipated numbers for the future?
  - Are there different types of inverters to be considering?
  - How is converter end life currently managed?
- How are private vs utility solar panels, wind turbines, inverters, and batteries being managed in other states?
- What programs, policy and funding is in place in other states for batteries, inverters, wind turbine blades, and solar panels?
- Do other states have “financial assurance” for end of life renewable energy equipment?
- Environmental impacts of taking agricultural fields out of production for solar panel or wind turbine farms? Wind turbine impact on wild animals?

Research Topics to be Completed by Others

- Invite Vestas do presentation to the group on current status of recycling current wind turbine and changes in wind turbine blades being developed.
- Theresa Stiner to share contact information for kiln in Iowa using turbine blades; SCS contact for additional information
- Contact Power Film in Ames for additional information on film
- Utilities (MidAmerican and Alliant) have offered to present at the July meeting on their internal plans for management of wind turbine blades
- Open invite to other subcommittee members to present educational information on wind turbine blade, solar panels, inverters and/or batteries manufacturing and end of life management
- SCS to reach out to organizations for additional background information:
    - EPRI (Electric Power Research Institute)
    - American Clean Power Association
    - Iowa Utility Association
    - Solar Energy Industries Association

D. Other Notes

Other items of note from the #1-REE meeting are as follows:

- Steve Guyer, Iowa Environmental Council, accepted the role of Subcommittee Chair and will represent the Renewable Energy Equipment subcommittee at Stakeholder Meeting #2 in September.
- Next Renewable Energy Equipment subcommittee meeting dates and times are:
    - July 29, 2021, 9AM – 11 AM CST
    - September 2, 2021, 9AM – 11 AM CST
- Second Stakeholder Meeting will be held on September 30, 2021. Subcommittee members in addition to other interested parties are invited and encouraged to attend.

Attachments:

Attachment A: Agenda

Attachment B: PowerPoint Presentation

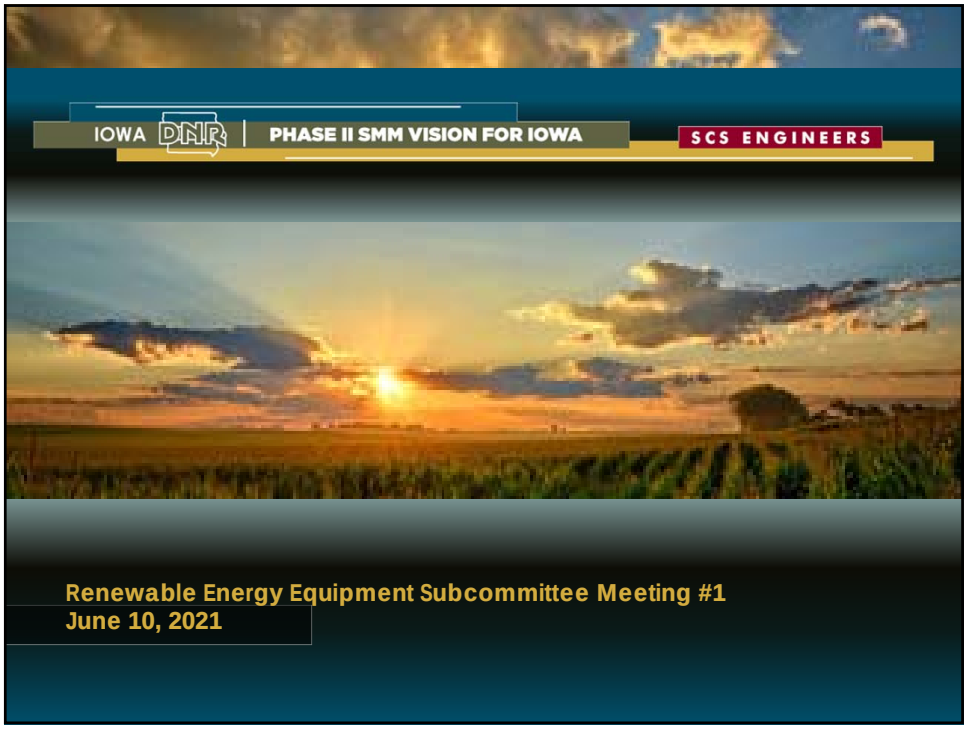
Attachment A
Agenda

Subcommittee Meetings #1

June 9-10, 2021

1. Introductions
    a. Project Team
    b. Subcommittee Members
2. Subcommittee Meetings Purpose and Goals
3. Decision Making Process
4. Background
    a. Sustainable Materials Management
    b. Stakeholder Meeting #1
5. Material Category Research Conducted to Date
6. Prioritizing Materials
7. Next Steps
    a. Selecting a spokesperson
    b. Future meetings dates and logistics

Attachment B
PowerPoint Presentation


IOWA DNR | PHASE II SMM VISION FOR IOWA
SCS ENGINEERS
Renewable Energy Equipment Subcommittee Meeting #1
June 10, 2021


WELCOME
IOWA DNR | PHASE II SMM VISION FOR IOWA
SCS ENGINEERS

Agenda

- **Introductions**
  - Project Team
  - Subcommittee Members
- **Subcommittee Meetings Purpose and Goals**
- **Decision Making Process**
- **Background**
  - Sustainable Materials Management
  - Stakeholder Meeting #1
- **Material Category Research Conducted to Date**
- **Prioritizing Materials**
- **Next Steps**
  - Selecting a spokesperson
  - Future meetings dates and logistics

Introductions

DNR

SCS ENGINEERS
www.scsengineers.com

Committee Introductions

- Name/Nickname
- Organization
- Your Experience with Renewable Energy Equipment

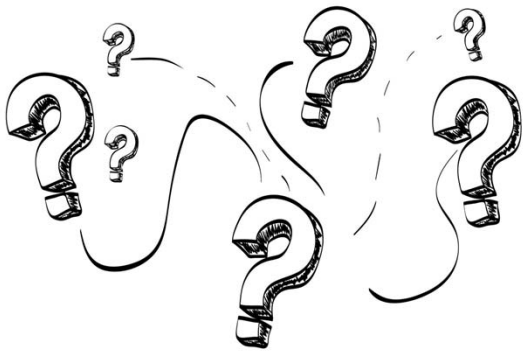
Expectations

- Share your expertise
- Ask a lot of questions
- Be open to new ideas and concepts
- Share information and solicit input from your co-workers, friends, and family
- Please keep participating

Communication Styles

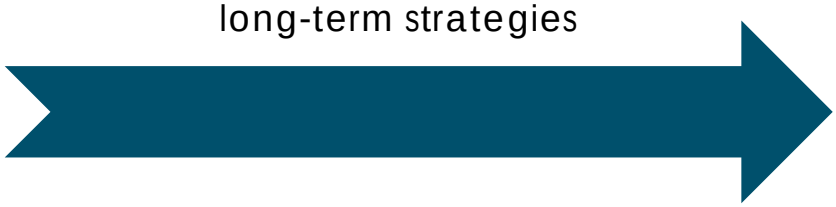
Director	Expresser
• Goal oriented • Tells it like it is • Makes decisions quickly • Always on the go • Speaks crisply • May be insensitive, intimidating	• People oriented • Animated, easily excited • Makes expressive gestures • Entertaining • Thinks out loud • Speaks rapidly • May be imprecise
Thinker	**Harmonizer**
• Task oriented • Makes lists • Does things "by the book" • Speaks deliberately • Believes there's a right way and a wrong way • May procrastinate	• Relationship oriented • Sensitive to others • Dedicated, loyal • Speaks softly • Avoids conflict • May over-commit

Communication Assessment



Goal

Establish a clear direction for implementing an SMM system with immediate, medium and long-term strategies



Process

Select specific material types within each category

Define specific strategies
- Legislation
- Policies
- Programs
- Infrastructure
- Funding mechanism

Identify implementation timeline, responsible party, and performance metrics

Decision-Making Options

- Absolute Consensus
- Consultative Decision Making
- Modified Consensus
- Voting

Administrative

- A quorum is the majority of members
- A quorum is required to conduct a vote
- Only subcommittee members can vote
- All motions will require a second and a vote of the subcommittee

- We will convene two more times before the next Stakeholder meeting
  - July 29
  - September 2
- Subcommittee will elect a chair
  - Represents the subcommittee at Stakeholder meetings

Phase I

- Occurred between November 2018 and October 2019
- Included:
  - Initial strategy meeting
  - Planning meetings
  - Benchmarking study
  - Vision for Iowa Think-Tank
  - Surveys
  - Focus groups
  - Think Tank Report
  - SMM Vision Report

What is SMM?

"Sustainable materials management is an approach to using and reusing materials most productively throughout their entire life cycles"

It represents a change in how our society thinks about the use of natural resources and environmental protection

Source: USEPA

What Isn't SMM?

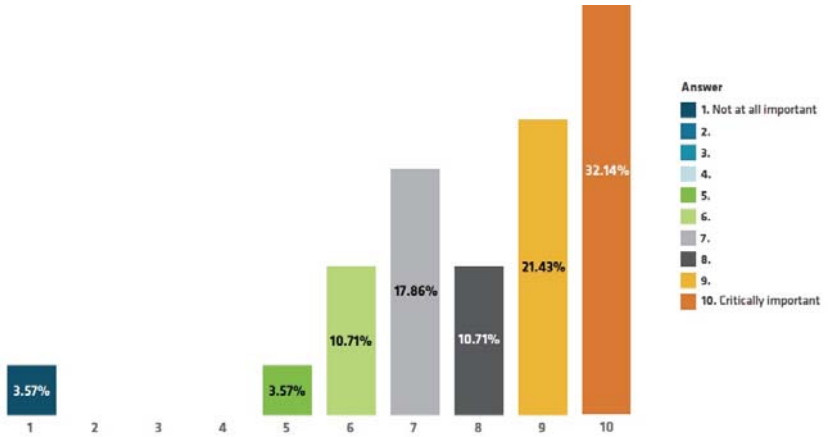
- Product Bans without LCA on alternative products
- Landfill diversion requirements without:
  - Strategies to reduce generation
  - Sufficient infrastructure and funding to collect and process
  - Assessment of impact on greenhouse gas emissions; especially at landfills with landfill gas to energy systems
  - Assessing the impact of GHG emissions from transporting recyclables across country/world
  - Viable off-take markets

SMM Need

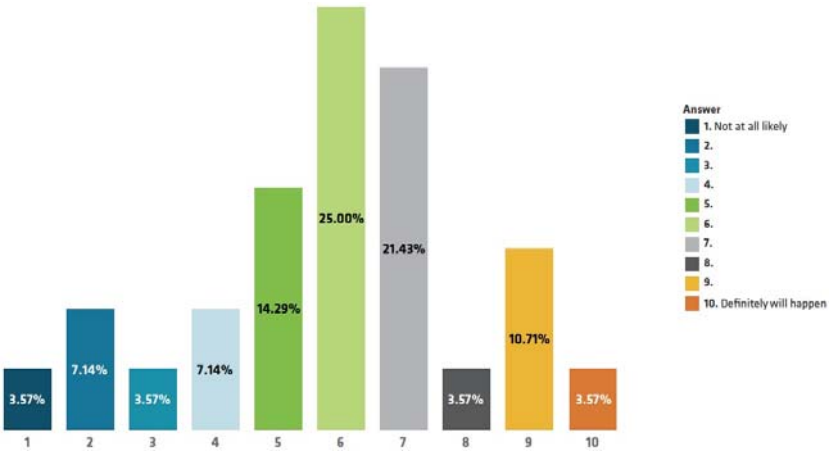
Global raw material use rose during the 20th century at about twice the rate of population growth

For every 1 percent increase in gross domestic product, raw material use has risen by 0.4 percent

Visioning Results- SMM Importance



Visioning Results- Feasibility

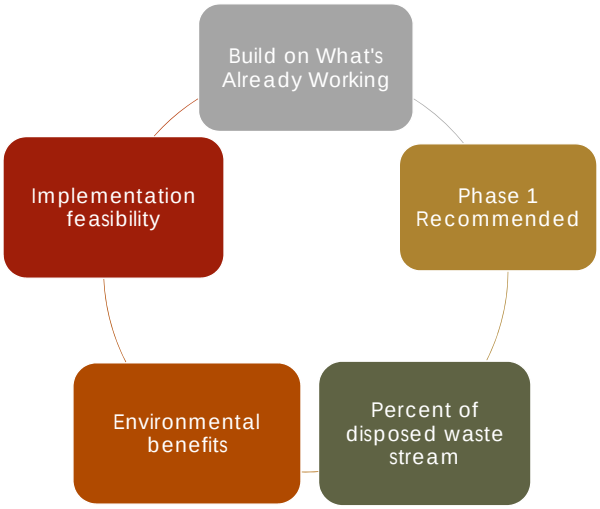


Phase II

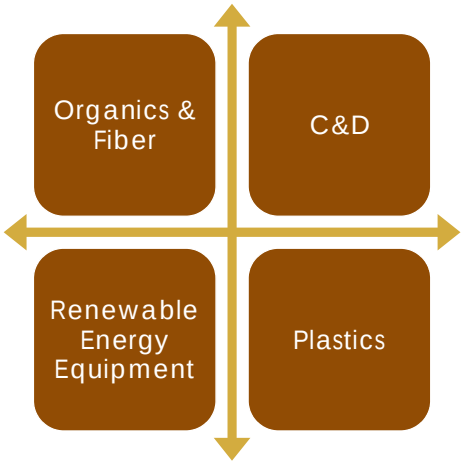
- Began in late 2020
- Will end in 2022
- Contents
  - Stakeholder Workshops
  - Subcommittee Work Sessions
- First Stakeholder Workshop held on 3-25-21
- Approximately 50 Participated via Zoom
  - Business, waste industry, education, municipalities, consulting, and state government

Stakeholders Reviewed Material Categories for Iowa SMM

Criteria for Category Selection



Material Categories Selected



Category Material Types

Renewable Energy Equipment

- Wind Turbine Blades
- Solar Panels
- Wire
- Batteries

Research

Phase I Benchmarking

State	Sustainable Materials Planning Document	Material Life Cycle Analysis	Recycling Market Development	Food Waste Management	Sustainable Materials Stakeholder (SMM) Education	Container Deposit Laws	Materials Stewardship
Minnesota	√	√	√	√	√		√
Vermont	√	√	√	√	√	√	√
Maine	√	√		√	√	√	√
Oregon	√	√	√	√	√	√	√
Tennessee	√			√	√		

Phase I Benchmarking Conclusions

Many statewide SMM programs linked to waste reduction and diversion goals

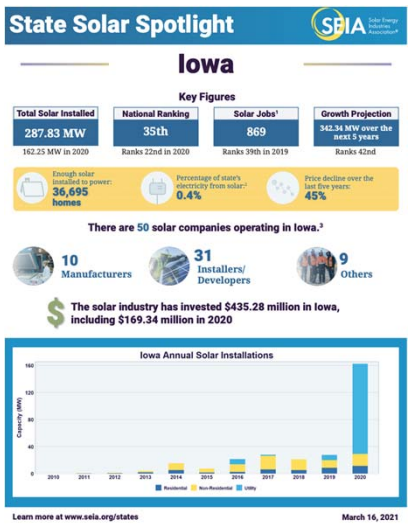
State funding mechanisms not likely sustainable in the long-term

States transitioning to SMM system prioritize increased organics diversion and fostering materials stewardship

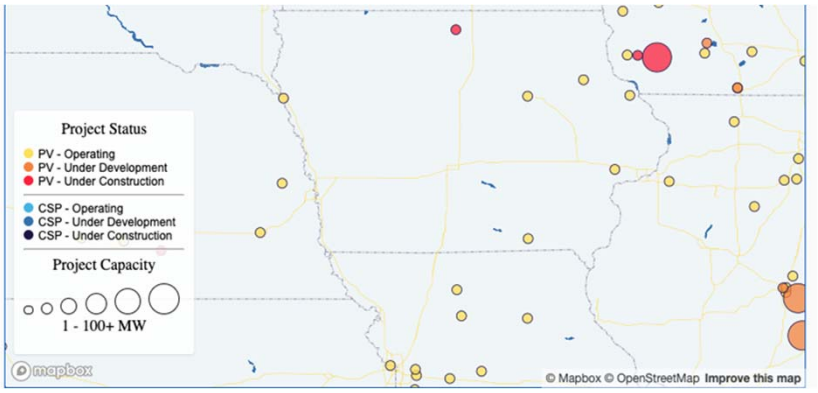
Phase II Research

- Iowa products and producers
- Existing LCA's
- State-driven extended producer responsibility
- Campaigns to change consumer behavior

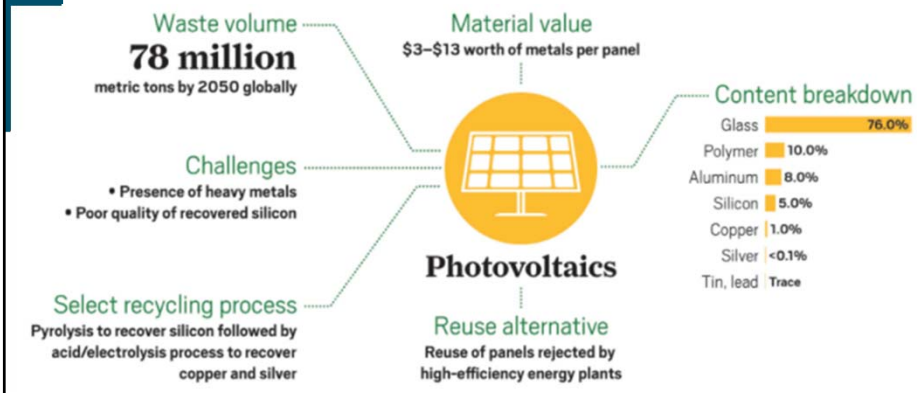
Background - Solar



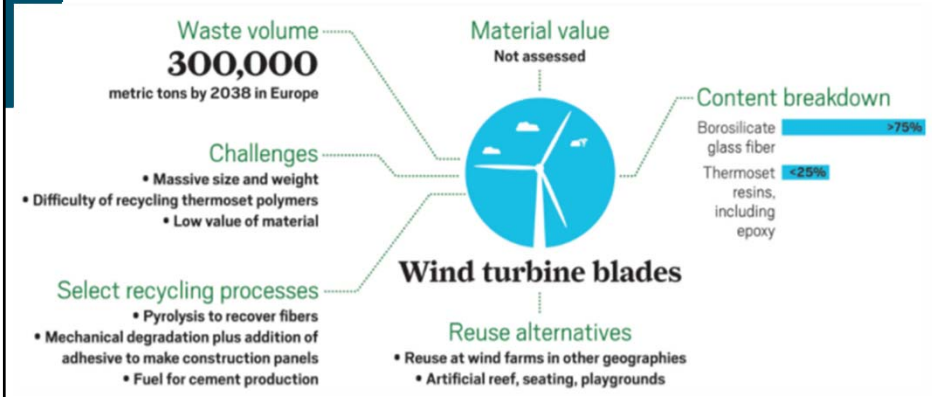
Background- Solar



Background- Solar



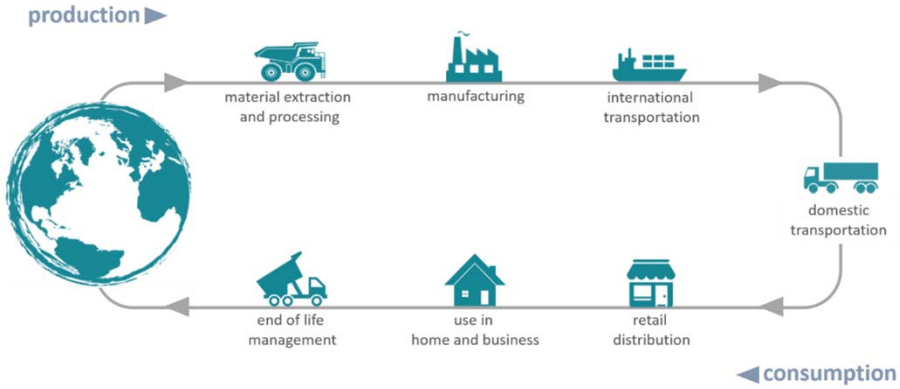
Background- Wind



Background- Wind

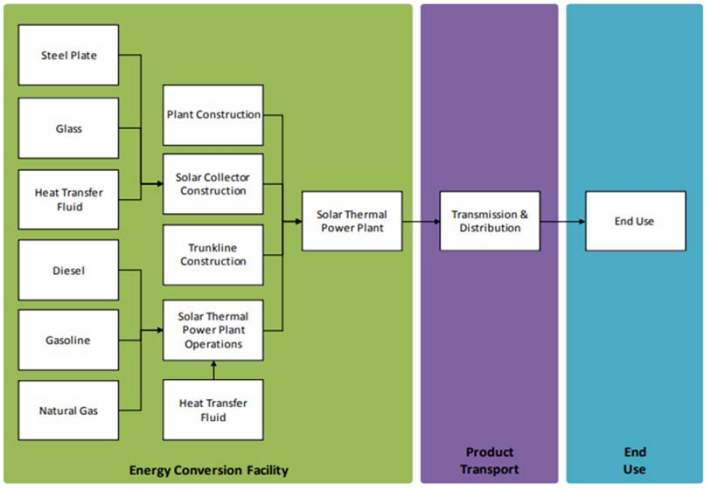
There are currently 4,173 turbines in Iowa. This information is based upon the U.S. Wind Turbine Database

Life Cycle Assessment

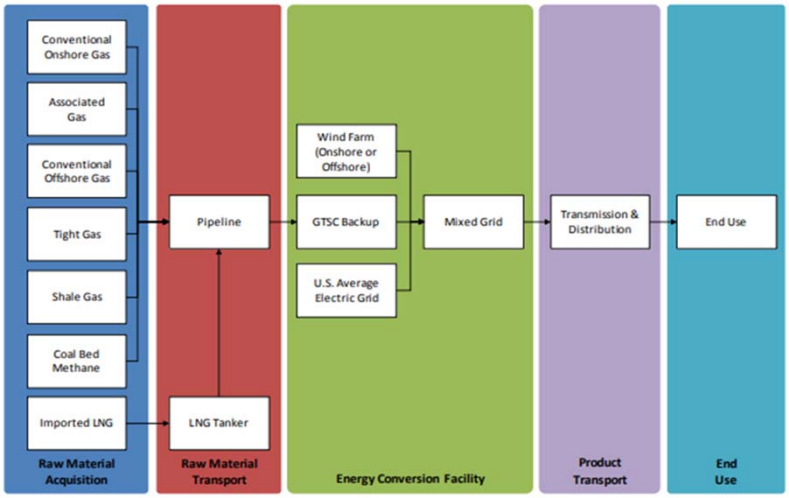


35

LCA-Solar



LCA-Wind



BREAK (10 Minutes)

Discussion

Your perspective on renewable energy equipment

- Challenges
- Opportunities
- Material types to add?

Prioritization Mapping

41