

SCRAP TIRES, A WASTE MATERIAL NO LONGER

4th-9th Grade Discussion Guide

Developed by: Joseph Kanke

SCIENCE CATEGORIES

Environmental & Ecosystem Science

TIMEFRAME

3-5 lessons

MATERIALS

Articles embedded within the lesson plan

KEYWORDS

Monofill, Waste Material, Sustainability, Part 169, Steel In-gots, AstroTurf, Tire-Derived Fuel, BTU

OBJECTIVES

Students will be able to:

- Define waste material and assign items to the definition
- Provide examples of reusing scrap tires and create a new potential use
- Produce an infographic
- Write a product proposal

SUMMARY

In this lesson students will explore the term waste material; paying particular attention to scrap tires using a Red Robin activity. Students will further delve into this topic by creating infographics portraying the benefits of reusing scrap tires. Following the research and creation of infographics, students will post their finished projects and engage in a gallery walk.

Then, students will work in small groups to develop a written project proposal exploring a new and creative way to use scrap tires. To conclude the lesson cycle, students will partake in the A- Z Summary activity to consider something they have learned through their investigation.

BACKGROUND INFORMATION

This episode reconsiders how we evaluate what is considered a waste material; focusing specifically on scrap tires. In the United States we dispose of about one tire per person, per year. This adds up to about 300 million tires. Historically tires were dropped into landfills. Many were also dumped illegally in places like fields, ditches and rivers. This illegal dumping is not only an eye sore, but can also be detrimental to health.

Detroit, also known as Motor City, has been working to solve the problem of tire disposal since 1991. Since Detroit is central to car manufacturing, they also have more tires than other places and many of these tires were dumped in urban settings such as abandoned building lots and backyards. To combat this growing problem Michigan enacted Part 169 to clean up the tires. To date the program has removed 35 million tires. Their goal is to shift the perspective of tires as a waste to seeing them as reusable and recyclable.



While scrap tires are an issue across the entire country, how each state handles them is different. In Colorado, for example, many tires are collected in large monofills; the tires can then be processed and turned into beneficial products. Many states offer incentives, rebates and grants to recycle and utilize scrap tires. In Michigan tires are shredded and made into a road paving substance. Some other examples of use for recycled tires include mulch, paving and artificial turf.

In Colorado, tires are mostly made into Tire Derived Fuel (TDF). This is an alternative to burning fossil fuels and produces 25% more energy than coal. The TDF is used in the process of creating cement which requires a large investment of energy in the form of heat.

VOCABULARY

MONOFILL: a landfill that only accepts one specific material.

WASTE MATERIAL: material that is rejected as worthless or useless.

SUSTAINABILITY: a mindset or practice that balances the environment, economic and social needs of the present, without compromising future needs.

PART 169: The rules and regulations in Michigan's Natural Resources and Environmental Protection Act that specifically address scrap tires.

STEEL INGOTS: a piece of steel that has been formed into a particular shape to make it easier for transportation and storage. Steel ingots are made by melting the metal and then reforming the shape in a mold.

ASTROTURF: an artificial grass surface, used for athletic fields.

TIRE DERIVED FUEL (TDF): a fuel derived from scrap tires of all kinds. This may include whole tires or tires processed into uniform, flowable pieces that satisfy the specifications of the end-user. Scrap tires are used as fuel either shredded or whole depending on the type of combustion unit.

BTU: a unit of heat; it is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

LEARNING PROCEDURE

Red Robin Activity:

Instructor states, "Today we are going to explore a few questions: What is waste material? Are scrap tires a waste material? What creative ways can we reuse or recycle scrap tires? In order to further discuss these questions, we will need to all have a common definition for Waste Material. Our working definition for Waste Material is: a material that is rejected as worthless or useless."

Explain to students that they will be engaging in an activity known as Round Robin. First instruct students to consider the definition of waste material and write a list of as many waste materials as they can. Once the five minutes are done, ask a student to share one item from their list. The instructor should keep a running list on the board or chart paper. Tell students that if they already have this item on their list to check it off. If the item is new, they should add it to their list. Do this either until everyone's list is exhausted or for a set amount of time. Then pose the question:

Given our definition of waste material, does anyone disagree with any of the items on our list? If so, why?

ACTIVITY 1:

For this activity the instructor will explain that students will be creating an infographic which speaks to the benefits of reusing scrap tires. Begin this lesson by explaining what infographics are and where they originated. If you have access, this [four minute clip](#) does a great job. You may also want to share this infographic titled: [Environmental Benefits of Recycled Rubber](#).

The instructor should create or co-create a rubric to help guide the expectations of the assignment. Some categories to consider for the rubric include design, content, graphics and mechanics. Students may choose to create their infographic using technology or hand to paper.

Students may choose to go broadly and include a variety of benefits in reusing scrap tires or they may choose to highlight one specific way that tires are reused.

Following the creation of the infographics, invite students to post them around the room for a gallery walk. Inform students that as they view the other groups' infographics they should find one new piece of information they learned and be prepared to share it with the class.

ACTIVITY 2:

The instructor states, "In the video, we saw that creativity is a critical component of problem solving. Today, you will be working in small groups and getting creative - thinking of ways to reuse, repurpose or recycle scrap tires."

Explain to students that they will be working in groups of three to consider a new use for scrap tires. Once the team has had a chance to collectively determine their new and creative use, they will write a project proposal. This may be the first time that students have been exposed to this type of text. Provide a brief summary of the components of the text:



The 6 Steps To Writing a Project Proposal

Step 1: Write the Executive Summary....a relatively shorter section designed to give investors and stakeholders a brief overview of the most important information about the project. It should summarize what's coming and also persuade the reader to continue reading.

Step 2: Explain the Project Background. ...

Step 3: Present a Solution. ...

Step 4: Define the Project Deliverables. ...

Step 5: Request Your Needed Resources. ...

Step 6: State Your Conclusion.

In order to complete this assignment, groups may want to access a variety of resources. They can find useful information to inform their design from the [Tire Derived Aggregate Poster](#) as well as an example of creative use at the [2015 Midway Office Complex](#). Students may also benefit from seeing a [sample project proposal](#). Please note the sample contains sections not required for this assignment.

CONCLUSION:

The instructor states, "Scrap tires provide raw materials that are useful in various construction, landscaping, engineering and industrial applications."

A-Z Topic Summary

Have a stack of index cards with a letter of the alphabet on each card (exclude x, z). Ask students to draw a card from the deck and write a sentence that connects to the lesson. Their sentence must begin with a word that begins with the letter they drew from the deck. As students pass their cards forward, shuffle and choose several to read aloud.

Extending the Lesson (Options for extended/additional activities and lessons)

Example:

Do a newscast featuring a company that has found a creative way to reuse scrap tires.

Create a flowchart demonstrating the life of a tire from its inception to reuse as another product.

Create a single frame cartoon that uses a minimum of 4 colors. The caption should have a maximum of 2 lines. Beneath your cartoon, identify the science concept being shown. Then provide a paragraph explaining how the cartoon depicts or addresses the concept you identified.

Write and perform a skit about scrap tires.



Related Links

<https://cdphe.colorado.gov/wastetires>

<https://www.tdamfg.com/>

<https://www.firststatetire.com/>

<https://www.recycledrubberfacts.org/environmental/>

<https://www.epa.gov/sustainability>

<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

<https://www.sustain.ucla.edu/what-is-sustainability/>

<https://www.michigan.gov/egle/about/groups/scrap-tire-advisory-committee>

The following National Common Core Standards can be met teaching;

SCRAP TIRES, A WASTE MATERIAL NO LONGER

COMMON CORE STANDARDS: 4TH GRADE

CCSS.ELA-LITERACY.RI.4.1	Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
CCSS.ELA-LITERACY.RI.4.2	Determine the main idea of a text and explain how it is supported by key details; summarize the text. 4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. 4.7.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
CCSS.ELA-LITERACY.RI.4.9	Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.
CCSS.ELA-LITERACY.W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
CCSS.ELA-LITERACY.W.4.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.) 4.7.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.
CCSS.ELA-LITERACY.SL.4.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.4.1.A	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
CCSS.ELA-LITERACY.SL.4.1.B	Follow agreed-upon rules for discussions and carry out assigned roles.
CCSS.ELA-LITERACY.SL.4.1.C	Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
CCSS.ELA-LITERACY.SL.4.1.D	Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
CCSS.ELA-LITERACY.SL.4.2	Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
CCSS.ELA-LITERACY.SL.4.5	Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.



5TH GRADE

- CCSS.ELA-LITERACY.RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- CCSS.ELA-LITERACY.RI.5.2** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.5.7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- CCSS.ELA-LITERACY.RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
- CCSS.ELA-LITERACY.W.5.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- CCSS.ELA-LITERACY.W.5.4** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. 5.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- CCSS.ELA-LITERACY.SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- CCSS.ELA-LITERACY.SL.5.1.A** Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- CCSS.ELA-LITERACY.SL.5.1.B** Follow agreed-upon rules for discussions and carry out assigned roles.
- CCSS.ELA-LITERACY.SL.5.1.C** Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- CCSS.ELA-LITERACY.SL.5.1.D** Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
- CCSS.ELA-LITERACY.SL.5.2** Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- CCSS.ELA-LITERACY.SL.5.5** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

6TH GRADE

- CCSS.ELA-LITERACY.RI.6.1** Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- CCSS.ELA-LITERACY.RI.6.2** Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.6.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- CCSS.ELA-LITERACY.RI.6.7** Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- CCSS.ELA-LITERACY.W.6.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.



CCSS.ELA-LITERACY.W.6.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS.ELA-LITERACY.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.6.1.A	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
CCSS.ELA-LITERACY.SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
CCSS.ELA-LITERACY.SL.6.1.C	Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
CCSS.ELA-LITERACY.SL.6.1.D	Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
CCSS.ELA-LITERACY.SL.6.5	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

7TH GRADE

CCSS.ELA-LITERACY.RI.7.1	Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
CCSS.ELA-LITERACY.RI.7.2	Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text.7.3. Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).
CCSS.ELA-LITERACY.W.7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.7.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS.ELA-LITERACY.SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.7.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
CCSS.ELA-LITERACY.SL.7.1.B	Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.
CCSS.ELA-LITERACY.SL.7.1.C	Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
CCSS.ELA-LITERACY.SL.7.1.D	Acknowledge new information expressed by others and, when warranted, modify their own views.
CCSS.ELA-LITERACY.SL.7.5	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

8TH GRADE

- CCSS.ELA-LITERACY.RI.8.1** Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- CCSS.ELA-LITERACY.RI.8.2** Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.8.3. Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).
- CCSS.ELA-LITERACY.W.8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- CCSS.ELA-LITERACY.W.8.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-LITERACY.SL.8.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- CCSS.ELA-LITERACY.SL.8.1.A** Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- CCSS.ELA-LITERACY.SL.8.1.B** Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
- CCSS.ELA-LITERACY.SL.8.1.C** Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
- CCSS.ELA-LITERACY.SL.8.1.D** Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
- CCSS.ELA-LITERACY.SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

9TH-10TH GRADE

- CCSS.ELA-LITERACY.RI.9-10.1** Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- CCSS.ELA-LITERACY.RI.9-10.2** Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
- CCSS.ELA-LITERACY.W.9-10.2** Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- CCSS.ELA-LITERACY.W.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-LITERACY.SL.9-10.1** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
- CCSS.ELA-LITERACY.SL.9-10.1.A** Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.