2020 RECYCLING POSTER & VIDEO CONTEST
HELPFUL TIPS FOR TEACHERS
THEN, NOW & INTO THE FUTURE!

BACKGROUND

Past: Recycling has been a part of human history for centuries. During the American Revolution, Paul Revere recycled metal and it is very likely that the horse he rode to warn of the British invasion had recycled horseshoes! Families saved and reused their flour sacks to make new clothes during the depression, and World War II inspired a strong community response where Boy Scouts, schools, churches, organized paper, metal and rubber drives to support the war effort. Historically, many materials were reused or salvaged to get the most out of their lifespan – and it was easier and cheaper to do this than to obtain new raw materials, especially those that may have been scarce.

Present: Today, recycling has taken on yet other functions. Today's recycling industry has evolved over the past 200+ years to using sophisticated machinery to process and sort different valuable materials needed for manufacturing, providing economic opportunities and creating millions of jobs. Our ability to salvage and extract these commodities also reduces the amount of materials entering landfills, and helps the environment. Last year, the US recovered and processed approximately 130 tons of scrap metal, paper, plastics, electronics, textiles, glass and rubber, saving a lot of energy, reducing greenhouse house emissions, and saving natural resources. Recycling works!

Future: Throughout the course of the last 200 + years, recyclers have adapted, improved and created greater efficiencies when faced with changing times, increased environmental regulations and mechanisms to bring recycled materials into the manufacturing stream. Although technology has come a long way, there is still room for efficiency.
Plastic packaging still ends up in places we don't want. Broken glass can contaminate the recycling stream, and may end up right back in a landfill. Recycling systems in place require transportation and power to run. Most of this power will come from fossil fuels and contribute significantly to air and water pollution, including the human-made CO_2 that is released into the atmosphere. There remains confusion about what or how to recycle different materials, and this can often lead to people to the trash bin, instead of recycling. Whether a technical or educational solution, there is work to do! ***What will the future of recycling look like?***

WORKING WITH STUDENTS

Although all students K-12 can imagine and design a solution to a problem in recycling, the way in which students integrate the historical perspective, and apply the design process, may be very different. Here are some things to think about when working with the following grade levels:

Grades K-4

In the elementary grades, students can focus more on the innovation and design piece of the challenge. The research piece is optional. However, if you are interested in getting your students involved in research, there are some research models that can help like the Super 3 or Big 6. Humble ISD in TX has a helpful guide that walks teachers through these models, and there are plenty of other websites out there if so inspired to conduct a little bit of research on your own! If integrating a true research component is beyond what you are hoping to integrate with this project, the historical

perspective can be teacher directed to help students understand the story of how a process or technology has changed through time in the recycling industry. You might use videos or pictures as aids to help explain or encourage student dialogue and curiosity about the past. You might decide to have everyone in the class work on the same problem. You might also present a limited choice of problems for students to work on.

Student solutions should:

- ***Identify*** a specific problem or a related set of problems in recycling.
- ***Show or explain*** how people have tried to solve the problem in the past.*
- ***Imagine*** and design a new solution!

* To what extent students are able to include this aspect may vary.

Grades 5-12

Although the sophistication will vary along a continuum from grade 5 to 12, students in these grades can be encouraged to conduct research on their own. Students should use research to:

- identify the problem they wish to address.
- explore the history of the present-day solution - this could be a technology or a process.
- understand the problems or challenges that still exist.
- consider the lessons learned from the past - what kinds of solutions worked and why? What kinds of solutions didn't work and why? How can we apply this to a new solution?

For older grades and students who are ready for a challenge, they can also be encouraged to:

- identify the criteria and constraints of the solution.
- consider the potential impacts on society and the natural environment and how technological changes can have both intended and unintended effects. For example, the solution might solve one problem, but introduce another one. How does the solution account for some of these unintended effects (*growth mind-set*)?

Student solutions should:

- ***Identify*** a specific problem or a related set of problems in recycling.
- ***Describe*** how the technology, the process, or the recycling material has evolved over time. Do your research!
- ***Imagine*** and design a new solution and show how it integrates lessons learned from the past, whether failures or successes.

List of possible materials and commodities students might research include:

Electronics	Plastics	Ferrous metals
Glass	Rubber	Textiles
Paper	Nonferrous metals	

Examples of some current challenges in recycling today:

Important Note! The following are just a few ideas to help generate some starting points. Students should be encouraged to let their research lead the way to finding other issues and challenges, and to locate other useful websites. Not all the websites listed below appear in the student help-sheet. Teachers should feel free to share these websites out as may be helpful.

Paper - contamination (heavy ink, grease from food, staples, paperclips . . . etc).

Possible websites:

- Video: How it's Made - Recycling Paper- https://www.youtube.com/watch?v=2c8YxMb0tlk
- Video: The Paper Recycling Process - https://www.youtube.com/watch?v=jAqVxsEgWIM
- Article: Everything You Need to Know About Paper Recycling: https://earth911.com/business-policy/business/paper-recycling-details-basics/
- Supporting ISRI lesson teachers can do with their students in grades 5-12: *Keep it Clean!* https://www.isri.org/docs/default-source/jason-learning/paper-recycling--keep-it-clean.pdf?sfvrsn=2&sfvrsn=2

Glass - broken glass can contaminate the recycling stream and/or may be difficult to recover (must also be sorted by color)

Possible websites:

- Article - The Scrap Recycling Industry - Glass - https://www.isri.org/recycling-commodities/recycled-glass
- Article - Why Glass Recycling in the US is broken - https://cen.acs.org/materials/inorganic-chemistry/glass-recycling-US-broken/97/i6
- Article - Glass Recycling Facts - http://www.gpi.org/recycling/glass-recycling-facts#targetText=Glass%20is%20100%25%20recyclable%20and,for%20furnace%2Dready%20recycled%20glass.
- Video - Glass Bottles - How Are They Recycled? - :https://www.youtube.com/watch?v=fi_4tQEP1ec

Electronics - challenges of recycling items that contain toxins (lead , mercury, cadmium)

Possible websites:

- Weblinks to articles - EWaste Problem Overview - http://www.electronicstakeback.com/resources/problem-overview/
- Article - Green Chemistry vs. Toxic Techology - http://www.electronicstakeback.com/toxics-in-electronics/
- Article - How to Solve America's Growing EWaste Problem - https://planetgreenrecycle.com/fundraising/e-waste-problem
- Article - How Kids Can Solve the EWaste Problem - http://www.electronicstakeback.com/how-to-recycle-electronics/resources-for-kids/
- Article/video: The Scrap Recycling Industry - Electronics - https://www.isri.org/recycling-commodities/electronics-scrap
- Video: How Computers and Electronics are Recycled - https://www.youtube.com/watch?v=Iw4g6H7alvo

Other challenges include:

- Proper labeling of recycling materials
- General confusion as to what and how to recycle
- Plastics get into our waterways rather than into the recycling stream.
- General efficiency (in any commodity) to maximize yields and support a robust industry and economy while helping the planet.

General Supporting Websites:

General background on commodities: https://www.isri.org/recycling-commodities

Article: The History of Recycling: https://www.buschsystems.com/resource-center/page/a-brief-timeline-of-the-history-of-recycling

Article: A Brief History of Household Recycling: https://www.citylab.com/city-makers-connections/recycling/

Other Links:

Helpful Tips for Students - Getting Started (For grades 5-12) (link)
Recycling Activities Collection - www.jason.org/recycling

Connecting to Standards

View Standards

Whether supporting students outside of school time or integrating the contest as an in-school project, there are strong connections to history, science, and engineering not to mention lots of opportunities for students to practice reading, writing, and communication skills. Depending on what educators want students to focus on, there are many different standards that can be addressed. Follow this link for a list of possible science standards. It is important to keep in mind that this is not a full list, and that it would be impossible to cover all the standards listed. Educators can choose which one(s) to explicitly address when integrating this project into class time.