

## ITEEA's Elementary STEM Council's 2nd Annual Global Design Challenge for Elementary STEM Students

In 2008, the U.S. National Academy of Engineering (NAE) identified 14 Grand Challenges for Engineering in the 21st Century. These Grand Challenges were designed to cause students and educators to think about solutions to the big challenges affecting all of our lives. Following ESC's first very successful Global Challenge for elementary-aged students in 2018-2019, we have a new problem for you to address in 2019-2020. *The Elementary STEM Journal* is sponsoring the 2nd Global Design Challenge for Elementary STEM (GDC) to provide students with a chance to solve a real problem, and show the world that everyone can help find solutions to these global challenges.

### The Process

Working with their teachers, elementary STEM students from around the world will work in small design teams to solve the GDC outlined below. As students attempt to solve the GDC, the elementary classroom teacher will document the process with a simple journal or portfolio that describes the problem-solving process, the products developed, results of product market testing, as well as the final product pitch presentations. Photos and videos of proposed solutions will be posted on the Elementary STEM Council's Facebook® site and ultimately, the team with the most elegant solution to the GDC will be provided an opportunity to present their solution during the International Technology and Engineering Educators Association Annual Conference in Baltimore, Maryland, on March 11-14, 2020. A story about the winning team will also be featured in *The Elementary STEM Journal*.

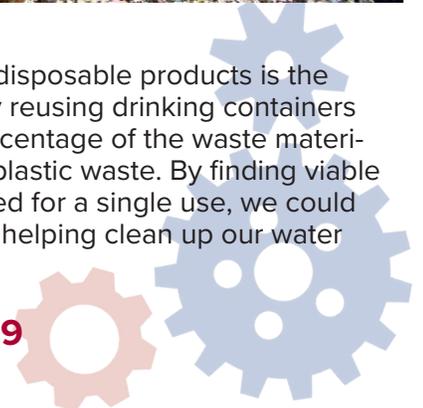
### The 2nd Global Design Challenge

One of the original Grand Challenges (NAE, 2008), called for engineers to provide clean water that could make a difference for millions of people around the world. Currently, one of the largest threats related to water is called the Great Pacific Garbage Patch. It is a collection of plastic and discarded trash floating in the Pacific Ocean. Just type the words "grand challenges" into your Internet browser for more information about these challenges or type "Pacific garbage patch" to learn more about the pollution problem. This Global Design Challenge calls on you and your team to develop a product that might help keep the water cleaner and reduce the amount of trash floating in the Pacific Ocean and other bodies of water.



Most conservationists agree that humans create too much waste and that actively reusing and reducing the number of single-use disposable products is the best way to reduce pollution problems. One way that people are responding is by reusing drinking containers rather than discarding plastic drinking containers after one single use. A large percentage of the waste materials currently floating in the Pacific Ocean and other bodies of water is single-use plastic waste. By finding viable and economically feasible secondary uses for plastic containers originally designed for a single use, we could substantially reduce the number of these items that end up in the water—thereby helping clean up our water sources.

**Application deadline: December 15, 2019**



### Challenge:

Can you work as a member of a small engineering design team to develop a prototype for a commercial product made primarily of recycled single-use disposable plastic products?

### Standards:

- STL #5: Students will develop an understanding of the effects of technology on the environment.
- NGSS 3-5-ETS1-1 Define a simple design problem reflecting a need or a want.

### Big Ideas:

- Technology can cause environmental problems—and solve them.
- Some new products are designed from recycled and reused products.
- The best new products are environmentally friendly and also provide a wanted or needed product for people.

### Parameters:

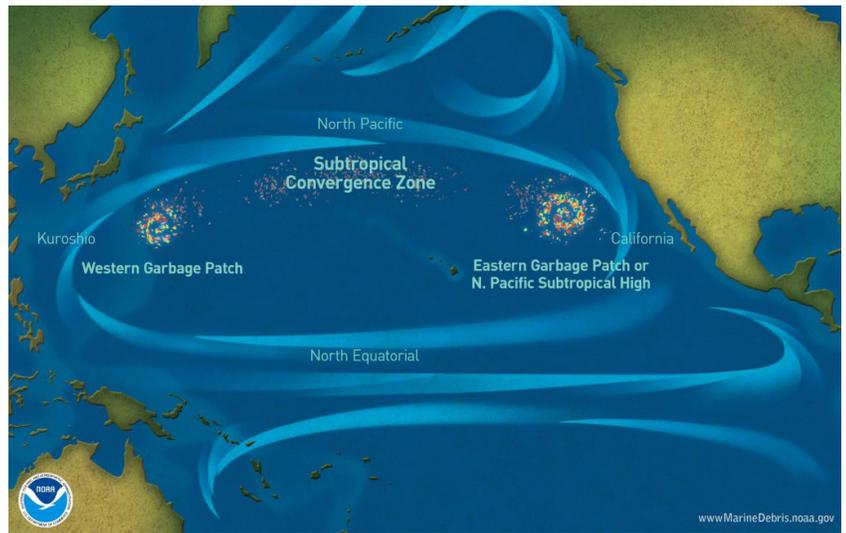
1. Develop a new product prototype, or innovate (make better) an existing product.
2. Use free, single-use, reused plastic as the primary source material for the prototype.
3. Make sure that the product does not require a common language—could be used anywhere.
4. Conduct a market test to determine whether people would purchase such a product if it were on the market, and how much they would pay.
5. Collect and share data related to your market research, amount of waste plastic that could be reused and removed from the ocean, describe how this would lead to cleaner water globally, and discuss the potential to generate revenue from sales of such a product.

### To the Teacher:

1. Encourage your students to use the engineering design loop and document this with a design journal and a final product pitch
2. Take lots of pictures throughout the design activity and a video of the pitch (3 minutes maximum)
3. Require the students to present and defend their product in a formal product pitch—an authentic audience would be ideal
4. Submit the results to Virginia Jones at [vjones@patrickhenry.edu](mailto:vjones@patrickhenry.edu) or Thomas Roberts at [otrober@bgsu.edu](mailto:otrober@bgsu.edu) no later than December 15, 2019.

### References

U.S. National Academy of Engineering. Grand Challenges. [www.engineeringchallenges.org/GrandChallenge-ScholarsProgram.aspx](http://www.engineeringchallenges.org/GrandChallenge-ScholarsProgram.aspx). Downloaded on April 10, 2019.



**Questions?** Email Michael Daugherty at [mkd03@uark.edu](mailto:mkd03@uark.edu) or Thomas Roberts at [otrober@bgsu.edu](mailto:otrober@bgsu.edu).