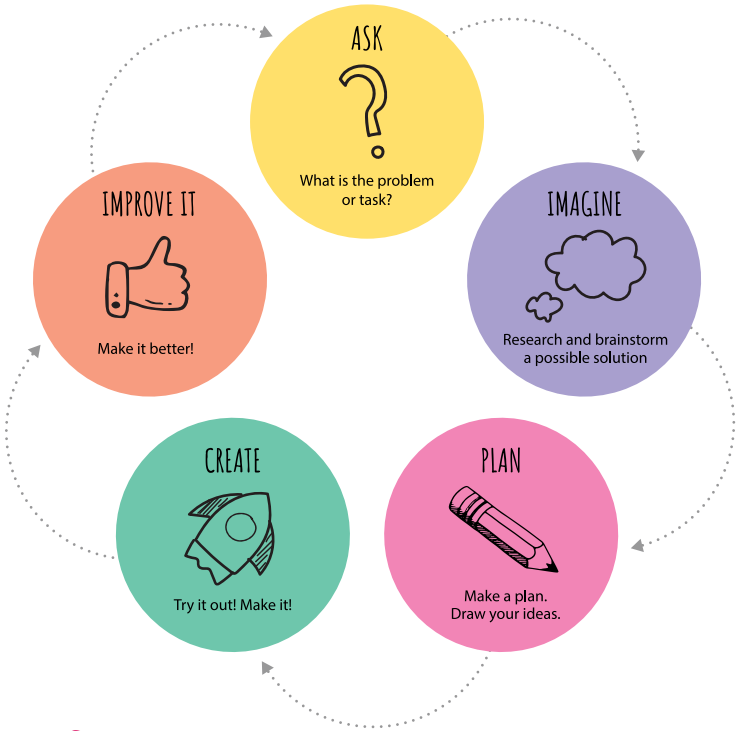
# Challenge # 1 Energy Conservation & Pollution

**Essential Question: How can we use energy to help reduce air pollution?**

**The City of Fresno needs your help!** There are many different vehicles that are used in Fresno and within the Central Valley that are contributing to our poor quality. There are boats that are used in our many surrounding lakes (Millerton, Shaver, Pine Flat, Huntington). There are airplanes that regularly fly in and out of our local airports. (Fresno Yosemite International, Fresno Chandler, Sierra Sky Park). There are many trucks that drive up and down highways 41 and 99 ranging from small pickup trucks to large diesel trucks delivering cargo. Lastly, we rely heavily on agriculture in Fresno and in the Central Valley. Farms have a variety of heavy farm equipment and tractors that also contribute to air pollution.

**Provided Resources**

**Student Submissions**




## Challenge:

**Design a vehicle that will reduce air pollution in the Central Valley.**

## Directions:

**Use the engineering design process to help find a solution to your problem!**

**Here's how to read the chart on the next page:**
Each column has a header representing a phase in the engineering design process. You will work across and then down through your four weeks. Start with the first column on the left and do everything in the corresponding column. Let's get to work!

## Criteria for Success

**(1st - 3rd)**

1. Submit a drawing of your vehicle idea
2. Submit a written or drawn list of items/features for your new vehicle design
3. Create your design using materials found around your home (see list of example items)
4. Present your ideas on how your vehicle is better for the air quality than the current vehicle being used.


| Week 1<br>October 12th–16th | Week 2<br>October 19th–23rd | Week 3<br>October 26th–30th | Week 4<br>November 2nd–6th | |
|---|---|---|---|---|
| **Ask**<br>(Problem or task) | **Imagine**<br>(Research and brainstorm a possible solution) | **Plan**<br>(Make a plan.<br>Draw your ideas.) | **Create**<br>(Make a prototype) | **Present** |
| • Can you help create a vehicle replacement that is better for our air?<br><br>• Your challenge is to choose one of the many vehicles listed that you would see in the City of Fresno (old truck, tractor, airplane, boat, diesel truck), or you can choose another vehicle that was not mentioned. You need to redesign the vehicle that you chose to have features that might make it more energy efficient. It must also use an energy source to power the vehicle that reduces air pollution. To successfully complete the challenge you must include:<br><br>  • A drawing of the vehicle that you chose (label parts)<br><br>  • A presentation of why you chose the vehicle that you did, and how it is going to conserve energy and create less air pollution than the current model.<br><br>• (Background: pollution, energy, human impact, cars and how they contribute to pollution, ideas for cleaner vehicle (types of engines), fuel types, etc. | • With an adult, or group of peers, create a list (written or drawn) of items that you think your new vehicle design should have so that it reduces air pollution.<br><br>*(Adult can write list as student shares ideas, if necessary)*<br><br>• Open-ended questions and modeling might help get ideas started<br><br>• *Students have the option of choosing the resource they would like to use to create and submit their list, such as: Word, PowerPoint, Flip Grid, pencil & paper image, Google Slides, etc.)*<br><br>• Student must a submit written, digital, or drawn list | • Make a drawing of what you would like your new vehicle to look like.<br><br>*(Students can make one drawing, or make multiple and choose their favorite)*<br><br>• Allow students to draw at their level of development; affirm with positivity; no judgment!<br><br>• *Students have the option of choosing the resource they would like to use to create and submit their drawing, such as: Microsoft Paint, pencil & paper image, Google Draw, etc.)*<br><br>• Resource of what sketches look like or blueprint drawings | • Using materials from around your home (cardboard, plastic bottles, aluminum cans, styrofoam, wood, paper clips, rubber bands, binder clips, pencils, etc.) create a prototype vehicle according to the drawing that you chose from your plan.<br><br>• Students may still utilize blocks and Legos for their prototype if that is developmentally appropriate.<br><br>• Students must submit their prototype in a viewable form: a picture/ video/flipgrid/etc.<br><br>*(this can be combined with the presentation)* | **(optional) Improve it!**<br><br>• After School Program or classroom: (virtual gallery walk to share prototypes; students can then modify their prototype based on ideas/feedback from others)<br><br>**Present**<br><br>• Students will present their final prototype to an adult/peer explaining why they chose the vehicle that they did, and the features on their vehicle that make it better for the air than that current vehicle's design.<br><br>• Resource for speaking/ presentation checklist<br><br>**Student Submissions** |