

P R O J E C T D E S I G N : O V E R V I E W

Name of Project: My Panels or Our Panels		Duration: 2 weeks
Subject/Course: Science	Teacher(s): Marlatt	Grade Level:7
Other subject areas to be included, if any: Math		

Significant Content (CCSS and/or others)	<p>MS-ESS3- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*</p> <p>MS-ESS3- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems</p> <p>MS-ETS1- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p>		
21st Century Competencies (to be taught and assessed) augment list with details	<p>Collaboration</p> <ul style="list-style-type: none"> • Students will collaborate with their group members. 	T & A	Creativity and Innovation
	<p>Communication</p> <ul style="list-style-type: none"> • Students will have to communicate their ideas in several ways. They will write them in the proposal, create some sort of presentation to display their ideas, and then reflect individually in writing. 	T & A	Other:
	<p>Critical Thinking</p> <ul style="list-style-type: none"> • Students will engage in critical thinking while they analyze the pros and cons of each idea and then synthesize these with what they research to create their reasoning for their proposal. 	E	

Project Summary / SCENARIO / TASK
(include student role, issue, problem or challenge, action taken, and purpose/beneficiary)

Entry paragraph

Energy generation is a huge issue in today's environment and society. Because of the effects of global climate change, the government has issued mandates for the nation to try to reduce our dependence on using fossil fuels (like coal) to create energy. Renewable energy is something that seems to be common knowledge. We all kind of know about the need to produce energy using renewable resources instead of fossil fuels. Right now in Tucson, two thirds of our energy production is made from coal and nuclear power. There are many reasons to change this. First, we are running out of coal and other fossil fuels, so by not changing our source of generating energy we will not have electricity in the near future. Also, the burning of coal, while depleting this nonrenewable resource, is also contributing CO2 (a greenhouse gas) to our atmosphere which can further contribute to climate change. There are new scrubbers used at power plants and low sodium coal that lessen this impact, but there is still an impact.

Paragraph 1

The good news is that we in Arizona have a very good resource for energy production, the sun. Solar energy is a clean energy that produces no waste products. It can be used to generate most energy that a typical house uses for a large portion of the year. There are many reasons to use this resource for all new energy production.

Paragraph 2

Many people feel that all new homes should be required to be built with solar panels. While it is a good resource, it is also expensive and that cost would fall to each individual family. Many people feel that instead of solar panels on each house, there should be what is called community solar arrays. This means that instead of a set of solar panels on each house, there would be a locally placed solar array or field of panels that all of the houses in that area can use energy from. Each family in that community or neighborhood would be responsible for a portion of the overall cost.

Statement

There are several pros and cons to having your own solar panels and also several for having a community solar garden. For the community solar fields: How will the community people make sure they can pull their energy needs (if you are sharing, is there going to always be enough for everyone when they need it?). And ow will the work of keeping the solar field clean, weed free, and running good be divided? For rooftop solar homes: Sometimes houses aren't facing a good direction to get a lot of energy out of rooftop solar panels. How will people who are required to put panels on their rooftops feel if they have a house that cant produce as much energy as their neighbor? There might not be one correct answer. With each option, there are several factors to consider in order to come up with a solution.

Pose a Problem

A construction company is building a new neighborhood down the street from our school. Should each of the 30 houses be required to have solar panels on them independently? Or should they create a community solar field?

Task

You and your team will be creating a proposal for the construction team. You will need some specialists. You will need an environmental specialist who makes sure that the environmental benefits of the solar energy, regardless of which option you decide on. You will also need a business expert that figures out which solution will be cheaper for each homeowner. You will need a project design coordinator that creates the presentation for the team, including the costs and benefits for your solution. Finally, you will need a project coordinator who assists all people with each aspect, obtains resources for members as needed and presents the final proposal. You will create a proposal (written on the provided format) and a presentation (however you think is appropriate). You can create a model of the solution, a powerpoint or prezi of your idea, or any other presentation method that you think is most effective. You will present to a construction manager, the utility department representative, and your class.

Driving Question /s (essential questions)	<p>What solar energy option is the best to use to supply power in a newly developed neighborhood?</p> <p>How many solar panels does a typical 3 bedroom house require to obtain enough energy?</p> <p>What is the impact to the environment of using solar panels to generate energy?</p>	
Entry Event	<p>The students will be shown a google earth image of an area near our school where they will build houses. They will also be shown a report from the EPA about coal power plants and the push towards solar energy. They will be shown a resource about the amount of solar energy available to Arizona http://www.nrel.gov/gis/solar.html . Finally, they will be shown some videos of solar energy : http://energy.gov/energysaver/articles/small-solar-electric-systems of solar panels on houses and in a more community sharing setting. I will give them the summary starter and then we will set up an assignment sheet so that students know what they are supposed to do and what information they will need.</p>	
Products	<p>Individual:</p> <ul style="list-style-type: none"> • Notes about their portion of the task: costs/setups of panels in either situation, environmental issues • Reflections about their task 	<p>Specific content and competencies to be assessed:</p> <ul style="list-style-type: none"> • Description of which option is the best and the support for that from investigation • Ability to work as a team and reflect on their teams progress towards the task.
	<p>Team:</p> <ul style="list-style-type: none"> • Presentation to audience 	<p>Specific content and competencies to be assessed:</p> <ul style="list-style-type: none"> • Written proposal – for ability to describe their position and support with evidence. • Actual presentation – for description of the solution, how they came to it, and why it is the best option. • Media based presentation – for ability to convey their ideas and show their research.
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Public Audience (Experts, audiences, or product users students will engage with during/at end of project)	<p>The audience will be their classmates, some administrators, a representative from Tucson Electric Power’s renewables department (via web), and a construction specialist (in the works – hopefully someone with experience in solar panel installation/issues).</p>	
Resources Needed	<p>On-site people, facilities: Computer lab -1/2 days for research and presentation creation</p>	
	<p>Equipment: Computer Lab</p>	

	<p>Materials:</p> <p>Websites:</p> <p>Background for project</p> <p>http://www.eia.gov/state/analysis.cfm?sid=AZ</p> <p>http://www.epa.gov/cleanenergy/energy-and-you/affect/coal.html</p> <p>http://www.recgroup.com/en/aboutsolar/Solar-animation/</p> <p>Rooftop solar information</p> <p>http://www.sunrun.com/solar-lease/cost-of-solar/</p> <p>Community Solar Gardens</p> <p>http://www.solargardens.org/</p> <p>http://www.cleanenergyresourceteams.org/solargardens</p> <p>http://mysunshare.com/</p> <p>Advantages/Disadvantages of solar power</p> <p>https://vimeo.com/78369159</p> <p>http://cleantechnica.com/2013/10/08/advantages-disadvantages-solar-power/</p> <p>http://www.solarworld-usa.com/solar-for-home/advantages-of-solar-energy</p> <p>http://www.dummies.com/how-to/content/the-benefits-of-solar-powering-your-home.html</p> <p>http://homeguides.sfgate.com/advantages-disadvantages-solar-powered-homes-79587.html</p> <p>http://homeguides.sfgate.com/pros-cons-solarpowered-home-systems-79724.html</p> <p>http://www.tc.umn.edu/~dama0023/solar.html</p>
	Community Resources: Solar panel examples

Reflection Methods (Individual, Team, and/or Whole Class)	Journal/Learning Log	X	Focus Group	
	<ul style="list-style-type: none"> The students will use their journals to reflect on their own ideas as well as to reflect after the board meeting as to which of the class' ideas they thought was the best. 			
	Whole-Class Discussion	X	Fishbowl Discussion	
	<ul style="list-style-type: none"> We will have a whole class discussion at the end about which idea we thought was the best and why. 			
	Survey		Other:	

Notes:

PROJECT DESIGN: STUDENT LEARNING GUIDE

Project: My Panels or Our Panels

Driving Question: What solar energy option is the best to use to supply power in a newly developed neighborhood?

How many solar panels does a typical 3 bedroom house require to obtain enough energy?

What is the impact to the environment of using solar panels to generate energy?

Final Product(s) Presentations, Performances, Products and/or Services	Learning Outcomes/Targets content & 21st century competencies needed by students to successfully complete products	Checkpoints/Formative Assessments to check for learning and ensure students are on track	Instructional Strategies for All Learners provided by teacher, other staff, experts; includes scaffolds, materials, lessons aligned to learning outcomes and formative assessments
(individual and team) <u>Individual</u> <ul style="list-style-type: none"> Journal writing Note taking <u>Team</u> <ul style="list-style-type: none"> Proposal Presentation 	MS-ETS1- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem	Group check ins. Sample evaluation	Questioning strategies about a good design review. Then grading rubric review Modeling – samples
	MS-ESS3- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Reviewing journal entries	Websites Class discussion
	MS-ESS3- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems	Group check ins Proposal rough draft Journal writing	Modeling – argument samples Class discussion