

Do I Have to Pay My Power Bill? A Personal Finance Look into Solar Power



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OBJECTIVES

Grade 12, Economics/Personal Finance

Students will be able to compare various power choices for their home by creating a proposal on the given template that compares 3 options including:

- On grid system
- Off grid System
- Do nothing approach by investing the money into an interest bearing account
- Return On Investment (ROI) analysis for each system - student created for differentiation

OVERVIEW

Micro Economics/Personal finance – Students will determine the required size of a solar power system to power their individual family home (Off Grid vs On Grid).

1. The learner will (TLW) collect information regarding current family household power usage (1 Month's electric bill)
2. TLW physically connect a basic off-grid system, and use it to charge a cell phone
3. TLW use an online solar power calculator to determine the size of system to provide all power needs
4. TLW estimate the cost of the power system
5. TLW determine ROI for the system – including 30% tax credit
6. TLW summarize all the information into a proposal that is graded by the instructor



ENGINEERING CONNECTIONS

Define: The students will define the problem of energy supply and demand, and calculate individual power demand

Develop Solutions: The students will brainstorm a myriad of solutions for providing power to each of their individual homes. They will examine several solutions for using solar panels, either on-grid, off-grid, or a hybrid system. They will have an opportunity to connect a basic off-grid system for a hands-on activity.

Optimize: The students will determine the best solution for each individual circumstance

REFERENCES

SoarFlicks]. (2016, February 1). Solar Home Basics : On Grid vs Off Grid Solar Panels [Video file]. Retrieved from <https://www.youtube.com/watch?v=2l29gKFkr-M>

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[ExploringAlternatives]. (2015, August 25). Off Grid Solar Power - How To Calculate your Solar needs [Video file]. Retrieved from <https://www.youtube.com/watch?v=4eXB4vF8mKk>

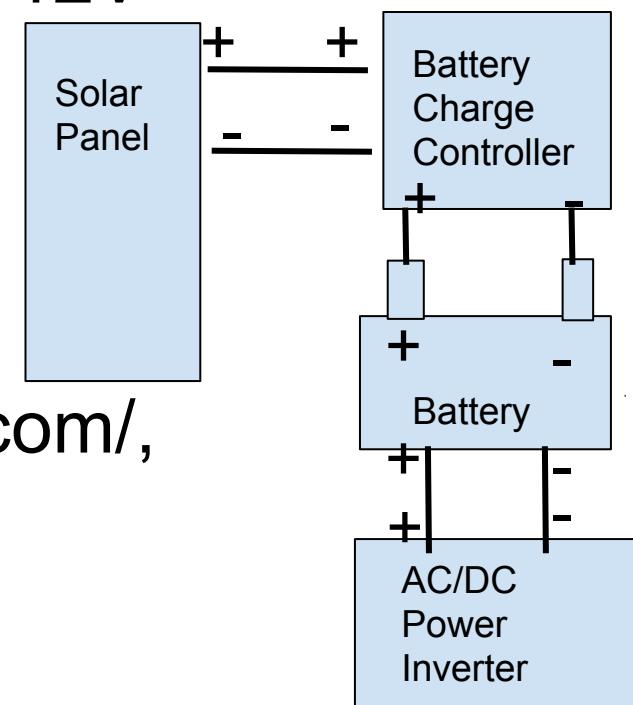
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Solar Sizing Calculator | Solar Cable Gauge Calculator | Battery Interconnect Calculator - Renogy Solar. (n.d.). Retrieved June 18, 2018, from <https://www.renogy.com/calculators>

Carbon footprint calculator. (May 2018). Retrieved June 18, 2018, from <https://www.nature.org/greenliving/carboncalculator/index.htm>

MATERIALS

- Basic Solar Power System Demonstration: (12V Solar panel, battery charge controller, 12V battery, 100W inverter, meter)
- Computers with Projector
- 3 Solar Video (Listed in Procedures)
- Solar Power Kits Available Online at:
The Inverter Store: <https://theinverterstore.com/>, Renogy, Amazon, etc.



PROCEDURES

Open Lesson: A short discussion and calculation of individual carbon footprint, using a carbon footprint calculator.

Main Question: “Do I have to pay for power?” - followed with In-Class discussion (3-5 min)

1. The teacher will discuss various forms of energy and the students will then brainstorm for alternatives in each of their own situations.
2. The teacher then explains a basic solar power system using the videos: (On Grid vs Off grid, ~5 m), (Basic How to hook up Solar Panels, ~3m)
3. The teacher will now demonstrate the referenced Off grid system above. Small groups of students will come to the front of the classroom and physically connect a small solar power system including solar panels, battery charge controller, battery, and inverter. They will carry the system to a window and observe a cell phone charge. (The rest of the students will begin to develop the pros/cons of earlier alternatives.)
4. The students will determine the maximum and minimum power requirements to power their individual homes using the chart on their electric bills. **END DAY 1**
5. The students will watch a video about power sizing requirements and move on to the Renogy solar sizing calculator (Off Grid Solar Power, ~9m)
6. Once the size has been determined (On/Off grid options), the students will research components and compare costs to build the system at their homes.
7. The students will now calculate the ROI (Return On Investment) for their chosen systems, including the government 30% tax credit, and use a financial investment calculator to investigate the “Do Nothing” option.
8. Finally, the students will report their findings in the provide project template.
*** Students will write a set of observational notes to be turned in with the proposal. The highest level learner will discover more ways to power than simply on/off grid. The low level students can have modifications for time constraints, but this lesson is designed for all levels of learners to be successful.

LESSON OUTCOMES

The students will gain an understanding of alternative energy sources, and will develop a working knowledge of a basic solar power system. The student will also need to reflect on questions as they relate to personal finance, and impacts of alternative energy on socio-economically disadvantaged individuals.