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| 30-45 mins | [“Bulbs, Wires, and Batteries”](https://docs.google.com/document/d/1GUUEhw8wSeZ6juUN1pEvg6YHIVCd8Zgpt7CbRDcQiUE/edit?usp=sharing)  Students will investigate a very basic circuit to determine that there must be a source of energy (in this case, chemical energy from the batter), a conductor to transfer energy (the wire), and a source of resistance/something to use the energy (the bulb). This is a HIGHLY simplified model of all electric services. | Items needed Per Group :  bulbs (3)  wires (2)  batteries (2) | n/a | n/a | [“Bulbs, Wires, and Batteries”](https://docs.google.com/document/d/1GUUEhw8wSeZ6juUN1pEvg6YHIVCd8Zgpt7CbRDcQiUE/edit?usp=sharing) | Allow students enough time to explore and think about these concepts. Ask students to consider how this is a model for electric services, brainstorm and ‘popcorn’ answers out. Record on chalkboard or whiteboard. Then show the video below. |
| 15 minutes | Video- [‘The Path of Electricity’](https://www.youtube.com/watch?v=d8kiulPl4ko)  The video provides a brief and interesting view at how electricity is generated from power plants and transferred over electric utilities to reach the consumer. | n/a | computer  projector | n/a | n/a | After the video is over, have a brief discussion about the major components of the electrical grid as it relates to the previous activity. What is the source? (fuel sources-- coal, oil, natural gas, solar, wind, etc) What are the wires? (the millions of miles of transmission and distribution lines)What is the ‘bulb’? (anything that uses power-- homes, businesses, industries) |
| 60-90 minutes | Traditional Energy Sources Foldable  This foldable allows students to research the various types of fossil fuels and allows them to also understand how they are formed, how they are obtained, how they are processed to become usable sources of fuel, pros/cons of use, and possible alternatives. The foldable organizes the material and makes it easy for students to compare how how the fuels are formed, obtained, and used. | [Foldable Instructions](https://docs.google.com/document/d/1cSx_L5puQENrlEbkHKZwWMOmWFn6d7_OviAOQUmrMps/edit?usp=sharing)  pen/pencil  computer | -computer/projector  -[Alternative Energy Powerpoint](https://drive.google.com/file/d/0Bzty_aq5TtofaVZxTGFMbVR4Nzg/view?usp=sharing)  -Optional: Document Projector | n/a | Traditional Energy Sources Foldable | Students will spend about 45-50 minutes working in small groups to research. Once they are done, request that each group share a designated portion of their foldable. For example: You might have one group compare and contrast acquisition techniques for the fossil fuels, or you might just have one group share information about coal. There is flexibility and some teacher discretion here due to to time and the level ofthe learner. |
| 15 minutes | [Solar and the NCEMC](https://www.youtube.com/watch?v=LpvDwkA165Q)  This video shows how solar electricity connects to existing electric utilities. It provides the students with a visual for understanding that available energy on ‘the grid’ is the same as available energy from solar panels. |  | computer/ projector | n/a | n/a | After the video is over, ask students to brainstorm and predict what types of challenges might be associated with solar panels. Some possible answers might be: cost, installation, land use, limitations, etc. |
| 60 minutes | Alternative Energy Jigsaw  This activity allows students to work in small groups (3-5) to become the ‘expert’ on a specific alternative energy topic and share their new information with classmates. | -[handout for Jigsaw](https://docs.google.com/document/d/1GaoeveKuG0DG7MEkXdhDpRC9l1GD0TPUheMJfJIBEyI/edit?usp=sharing)  -chart paper/markers  -[template for notes](https://docs.google.com/document/d/1x8UqxFwZapKNKTL4QJdQzGuSYDed4K7kxNPGRSWtQN8/edit?usp=sharing)  -computer | -computer/projector | n/a |  | Students can choose or be assigned their topic they are to research. Students will work in small groups on their contribution for approximately 45 minutes. The groups will visit each other to complete their notes. |
| 3-9 hours | Energy Expo Project  This project allows students to learn about an energy topic in depth and share their information with a group of peers, members of the community and teachers. | Computer  various models as available  (wind, solar)  poster board  paper/pens/markers  Rubric | [Project sign up sheet](https://docs.google.com/document/d/1bW9YCVMGHdtt7-JTTBRMwexzt6xUQWufeUiIuk3D1DA/edit?usp=sharing) | Varies- some outside time may be needed for testing/developing. Appropriate cautions should be taken. | [Energy Expo Project Rubric](http://blog.discoveryeducation.com/wp-content/uploads/2013/05/HS_Presentation_Rubric_for_PBL_FINAL2013_1.png)  \*\*This rubric is aligned to the Common Core standards and is from the Buck Institute\* | This is a student driven project. Students work in small groups to determine and area of research or a project to develop. The instructor, available time, and availability of materials will determine how ‘in-depth’ the project should be. It may range from students making presentation |
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