3-5 YEARS IN PROJECT

Energy

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Understanding Energy

- Construct a scientific explanation of the transformations between potential and kinetic energy
- Analyze the properties and compare sources of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy
- Differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability
- Understand how energy is used in agriculture and gain an understanding of how it affects your work
- Learn to read an electric meter and discover what a kilowatt-hour can provide
- Take the knowledge from above to interpret your family electric bill
- Explore the differences between series and parallel circuits
- Learn about different types of switches and their applications
- Learn and practice proper techniques for creating simple soldered circuits and their components
- Investigate energy laws, policies, regulations, etc. Create your own thoughts on how these laws, policies, and regulations will change over the next 5 to 10 years

Conservation of Energy and Energy Transfer

- Research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes
- Conduct an investigation to demonstrate the way that heat (thermal energy) moves among objects through radiation, conduction, or convection
- Diagram convection patterns that flow due to uneven heating of the earth
- Describe how stored energy can be converted into another form for practical use
- Gather evidence to justify that oceanic convection currents are caused by the sun's transfer of heat energy and differences in salt concentration leading to global water movement
- The need for conserving natural resources is important knowledge. Identify different energy conservation practices and apply one within your home. Calculate the savings for your family if able to do so
- Operating electric appliances has a cost associated with its use. Calculate your family's cost to run various appliances

Relationship Between Energy and Forces and Fields

- Use evidence to explain the cause-and-effect relationship between the speed of an object and the energy of an object
- Make observations and conduct experiments to provide evidence that friction produces heat and reduces or increases the motion of an object (example static)

Energy in Chemical Processes and Everyday Life

- Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem
- Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways
- Predict and explain how human life and the natural world would be different without current technologies related to energy
- Develop a model to generate data for ongoing testing and modification of an electromagnet, a generator, and a motor such that an optimal design can be achieved
- Research what eight states utilize TVA and what are the other sources of energy for other states
- Research careers related to energy (patent/proprietor of owning energy, physicists, electrician, careers with military, shop captains, salesman, engineering, drilling, etc.)

Influence of Engineering, Technology, and Science on Society and the Natural World

- Design, build, and test objects that use renewable energy (such as a solar oven, solar car, or a wind powered boat)
- Organize a club field trip to your local power plant or energy cooperative