



## Start Your Engines!

This module is designed for Scouts BSA to help you explore how technology affects your life each day.

1. Choose A or B or C and complete ALL the requirements.
  - A. Watch about three hours total of technology-related shows or documentaries that involve transportation or transportation technology. Then do the following:
    - (1) Make a list of at least two questions or ideas from the show(s) you watched.
    - (2) Discuss two of the questions or ideas with your counselor.

***Some examples include—but are not limited to—shows found on PBS (“NOVA”), Discovery Channel, Science Channel, National Geographic Channel, and TED Talks (online videos). You may choose to watch a live performance or movie at a science museum instead of watching a media production. You may watch online productions with your counselor’s approval and under your parent’s or guardian’s supervision.***

- B. Read (about three hours total) about transportation or transportation technology. Then do the following:
    - (1) Make a list of at least two questions or ideas from each article.
    - (2) Discuss two of the questions or ideas with your counselor.

***Examples of magazines include—but are not limited to—Odyssey, Popular Mechanics, Popular Science, Science Illustrated, Discover, Air & Space, Aviation Week, Astronomy, Science News, Natural History, Robot, Servo, and Scientific American.***

- C. Do a combination of reading and watching (about three hours total). Then do the following:
    - (1) Make a list of at least two questions or ideas from each article or show.
    - (2) Discuss two of the questions or ideas with your counselor.
2. Complete ONE merit badge from the following list. (Choose one that you have not already used toward another Nova award.) After completion, discuss with your counselor how the merit badge you earned uses technology.

Automotive Maintenance	Electricity	Nuclear Science
Aviation	Energy	Railroading
Canoeing	Farm Mechanics	Small-Boat Sailing
Cycling	Kayaking	Space Exploration
Drafting	Motorboating	Truck Transportation

3. Do ALL the following.
  - A. Using the requirements from the above list of merit badges:
    - (1) Tell your counselor the energy source(s) used in these merit badges.
    - (2) Discuss the pros and cons of each energy source with your counselor.
  - B. Make a list of sources of energy that may be possible to use in transportation.
  - C. With your counselor:
    - (1) Discuss alternative sources of energy.
    - (2) Discuss the pros and cons of using alternative energy sources.
  
4. Design and build a working model vehicle (not from a kit).
  - A. Make drawings and specifications of your model vehicle before you begin to build.
  - B. Include one of the following energy sources to power your vehicle (do not use gasoline or other combustible fuel source): solar power, wind power, or battery power.
  - C. Test your model. Then answer the following questions:
    - (1) How well did it perform?
    - (2) Did it move as well as you thought it would?
    - (3) Did you encounter problems? How can these problems be corrected?
  - D. Discuss with your counselor:
    - (1) Any difficulties you encountered in designing and building your model
    - (2) Why you chose a particular energy source
    - (3) Whether your model met your specifications
    - (4) How you would modify your design to make it better
  
5. Discuss with your counselor how technology affects your everyday life.

## Start Your Engines! Counselor's notes

3A: Using the requirements from the above list of merit badges:

(1) Tell your counselor the energy source(s) used in these merit badges.

- **Automotive Maintenance—Gasoline, diesel fuel, electric, blended gasoline, biodiesel, hybrid**
- **Aviation—Aviation fuel and kerosene**
- **Canoeing—Human power**
- **Cycling—Human power**
- **Drafting—Human power, electricity**
- **Electricity—Electromagnetism, chemical**
- **Energy—Biomass digesters, cogeneration, fossil fuel power, fuel cells, geothermal power, nuclear power, solar power, tidal energy, wave energy, ocean thermal energy, wind**
- **Farm Mechanics—Diesel fuel**
- **Kayaking – Human power**
- **Motorboating—Gasoline, diesel fuel, blended gasoline, biodiesel**
- **Nuclear Science—Nuclear energy**
- **Railroading—Diesel fuel**
- **Small-Boat Sailing—Wind**
- **Space Exploration—Most common solid: ammonium perchlorate mixed with powdered aluminum**
  - **Liquids for first-stage rockets—RP-1**
  - **Liquids for second-stage rockets—Liquid hydrogen, liquid oxygen**
- **Truck Transportation—Diesel fuel**

(2) Discuss the pros and cons of each energy source with your counselor.

### *Helpful Links*

*The following links are places to start.*

*“Diesel Reborn”: Edmunds.com*

*Website:* <https://www.edmunds.com/fuel-economy/diesel-reborn.html>

*“Aviation Jet Fuel Information”: CSGNetwork.com*

*Website:* <http://www.csgnetwork.com/jetfuel.html>

- A. Make a list of sources of energy that may be possible to use in transportation. (See the list earlier in this section.)
- B. With your counselor:
  - (1) Discuss alternative sources of energy.
  - (2) Discuss the pros and cons of using alternative energy sources.

## Helpful Links

The following links are places to start when researching alternative fuels. It is not an exhaustive list. You can also search “Air Force alternative fuels” using your favorite search engine. Be sure you have your parent’s or guardian’s permission to use the Internet.

“Alternative& Advanced Vehicles”: U.S. Department of Energy

**Website:** [https://afdc.energy.gov/fuels/electricity\\_benefits.html](https://afdc.energy.gov/fuels/electricity_benefits.html)

**Energy Sources and Uses: U.S. Department of Energy, Energy Information Administration:**  
<https://www.eia.gov/>

“Alternative Fuels”: U.S. Department of Energy

**Website:** <https://www.fueleconomy.gov/feg/current.shtml>

“Alternative Fuel”: *Popular Mechanics*

**Website:** <https://www.popularmechanics.com/cars/hybrid-electric/>

**Nuclear Power: U.S. Department of Energy, Energy Information Administration:**

<https://www.eia.gov/energyexplained/nuclear/>