ANDRETTI FASTTRACK XPERIENCE | Official Partner

VIDEO 3:
Energy to Burn
EDUCATOR GUIDE

OVERVIEW

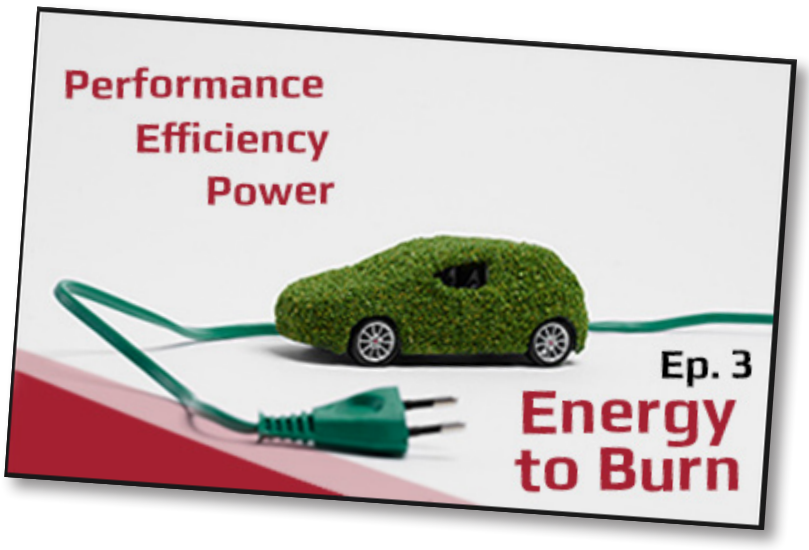
In this unit, we will introduce alternative fuel sources. What are some of the differences between gas and electric vehicles when considering efficiency, torque, and power? How do the performance needs of race cars and street cars influence the use of fuel sources?

Students will learn about the future of fuel sources for cars, with particular attention to the electric car. Students will explore the cost of power and how powering an electric engine is different from a gas engine.

In order to gain a better understanding, students will find the cost of power for common appliances in their own homes. Lastly, students will research various types of alternative energy sources and design an alternative fuel vehicle (AFV) which they will present and try to "sell" to their classmates.

Video 3: Energy to Burn

In this video, our subject matter experts will discuss the performance and efficiency of the electric car and the amount of power and torque generated in both race cars and street cars. Follow our students as they interact with subject matter experts to explore electric vehicles, alternative fuel sources and torque.



GETTING STARTED

Time: 40 minutes
Materials: Andretti FX video

Begin this lesson by watching the video about power and electric cars keeping in mind the following questions:

Is it possible to travel across the country in an Electric Vehicle? Why or why not?

Why can't you put solar panels on top of a vehicle to power the engine?

Why does an electric powered car have so much torque?

How does torque figure into a racecar driver's car performance?

How does a racecar engine differ from a street car engine in performance requirements?

How can electric cars be improved?

After watching the video, discuss some of the questions posed above. Also discuss the final challenge where students will research various types of alternative energy sources and design an alternative fuel vehicle (AFV) to present to their classmates.

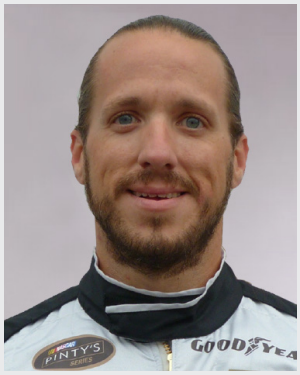
Let the students know that the next several lessons will further prepare them for the challenge and to start thinking about a solution.

REMOTE LEARNING TIP:

For remote classrooms and/or hybrids, utilize a whiteboard application to have students share their calculations with the class. Zoom breakout rooms will work well for team collaboration.

ELECTRIC / HYBRID VEHICLES MANAGER, PRODUCT QUALITY

Robert Scholer, of Kia North America discusses electric vehicles – their efficiency, how energy is regenerated rather than lost and also renewable fuel sources.



PROFESSIONAL RACE CAR DRIVER

As a professional race car driver and a member of the Andretti family of race car drivers, Adam Andretti discusses how the race car engines are designed for different performance than street cars. He talks about torque, horsepower and electric engines in race cars.

Lessons and Labs: Energy to Burn

After watching the video and discussing the questions, we have provided 3 Lessons covering power and energy transformations. These lessons and classroom labs will help the students learn and understand not only what happens in race cars but also in the world around us.

LESSON 1

Timing: 50 minute class period

The purpose of this lesson is for students to better understand and calculate the cost of electrical power. Most adults can relate to this cost when they open their monthly bill from the power company. Unfortunately, most students are unaware of this monthly charge and how it's calculated and more importantly the impact they can have in lowering this bill and helping the environment.

LESSON 2

Timing: 50-60 minute class period

This lesson will further review the concepts from Lesson 1, giving the students the opportunity to calculate the cost of several appliances used in their home for one month.

LESSON 3

Timing: 2 50-60 minute class period

Now that we've established the cost for electricity, this lesson has the students determine the cost of a trip in an electric car.

THE CHALLENGE

Design an Alternative Fuel Vehicle

We suggest doing this project in groups to allow for brainstorming and discussion as a team. It also allows students to showcase their skills (technology, math, art etc.) in the final product. Based on the research that students have done in lesson 3 and what they have learned from the video, teams will determine what they think is the best alternative fuel source and design a vehicle using that fuel source. They will give a 3 minute presentation/pitch illustrating why somebody should consider buying their exciting new vehicle.

The presentation can be in powerpoint, video, or other presentation format you determine and should include:

- The design features of the car – what will it look like. Include drawings/sketches of different views of the car (side, front, top)
- The fuel efficiency of the car. How much will it cost to drive it 200 miles and why?
- Its impact on the environment. How will it decrease carbon footprint? Will it use renewable fuel source(s)?
- The torque of the car. How quickly will it accelerate? Is it designed as a street car or a race car?
- The cost of the car, and monthly payments required for 60 months.

Presentation Rubric:	
Design of the car	10 pts
Fuel efficiency explanation	10 pts
Environmental impact explanation	10 pts
Torque explanation	5 pts
Cost of the car with monthly breakdown	5 pts
Sales pitch – did they sell it?	10 pts
Total Points	**50 pts**