



VIDEO TOPIC SERIES ACTIVITY

ECO-FRIENDLY INFRASTRUCTURE

What's your preferred way to get around your city or town?

In this challenge, you and a partner will dive into the world of infrastructure as you design a whole new way to transport people within a community!

STEP 1: CONNECT

The different modes of transportation that are used around the world continue to evolve. Isn't it hard to believe that people have only owned cars for the past century?

Find a partner and discuss: How has transportation shifted and changed over the years to adopt to society's wants and needs?

STEP 2: INVESTIGATE

As the world combats global warming, energy-efficient transportation is a top need and want. Watch this [video](https://tinyurl.com/aerial-tram-video) (<https://tinyurl.com/aerial-tram-video>) highlighting a unique form of transportation: aerial tramways! As you watch, consider how aerial tramways could be built to maximize their energy efficiency.

STEP 3: DISCUSS

Read through the follow definitions of important energy principles:

- **Kinetic Energy:** Kinetic energy is the energy an object possesses due to its motion.
- **Potential Energy:** Potential energy is the stored energy an object has due to its position.
- **Energy Efficiency:** Energy efficiency refers to the ability of a system or process to perform a function using the least amount of energy possible.
- **Energy Conservation:** This principle states that the total energy in a closed system stays the same and can only change forms (such as from potential energy to kinetic energy). However, real-world factors like friction and air resistance can cause some energy loss, usually as heat or sound, which makes systems less than perfectly efficient.

With these principles in mind, how could a new tramway be built in order to be as energy efficient as possible?

IDEA STARTERS

Not sure how to make your tramway energy efficient?

Think about the design and shape of your tram cars, how to use terrain to your advantage, and/or how to maximize the energy used in braking!

STEP 4: MATERIALS

Now let's focus on designing the interior of your tramway car. You'll need:

- Device with internet access
- Smart phone and motion capture app like [Nawo Smart](#)
- Measuring tape
- Graph paper

STEP 5: THE CHALLENGE

With your partner, your challenge is to create a design for the interior of an aerial tramway car that gives people the impression they are flying, while taking *ergonomics* and *human factors* into account.

In a nutshell:

- *Ergonomics* is the science of designing things in a way that suits the body's natural posture and movements in order to maximize efficiency and comfort.
- *Human factors* involve understanding how people think, feel, and behave in order to make everything more user-friendly and intuitive.

Use an ergonomics motion capture app like [Nawo Smart](#) (which assesses ergonomical feasibility in real time), as well as your own simulations to assess what passenger position(s) would be best for a 30-minute aerial ride.

Then use the graph paper to sketch a to-scale model of the inside and outside of your tram! Include labels to indicate how the tram will be both energy-efficient and ergonomically sound, all while providing riders with an experience that gives people the impression they are flying!

STEP 6: SHARE

Once your designs are complete, create a short video that previews your community's new "in-development" tramway, including how it will be both energy- and passenger-friendly. Post your video with the hashtags #InnovationAtPlay and #FlyGreen to share with your community members.

NGSS STANDARDS

- HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.
- HS-PS3-3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form.

COMMON CORE ELA STANDARDS

- CCSS.ELA-LITERACY.CCRA.SL.4: Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience