

Methane to Music

Lesson 6: Energy Justice and Renewable Fuels



Lesson Logistics

[Watch Teacher-Author Walkthrough Video of this Lesson](#)

[Watch Teacher-Author Walkthrough of Hands-On Mudwatts activity](#)

Handouts & Reference Links

- Teacher Resource: [Teaching Tolerance](#)
- Mudwatt [Student Investigation Sheet](#)
- [Mudwatt Activity Sheet: Measuring Voltage and Current of a MudWatt](#)
- Video: [Algae powered building](#)
- [Equity and Social Justice in Accessing Renewable Energy Graphic Organizer](#)
- [Equity and Social Justice Topics](#)
- [Equity and Social Justice Exit Ticket](#)

Required Materials, Equipment, & Supplies for 45 Students

- [Mudwatt classroom kits](#), 2 cups of dirt per kit

Detailed Description

Lesson 6: Energy justice and renewable fuels

Students will list the different ways that people in their community live and decide if all types of homes have the same access to renewable energy. Then, in small groups students will fill out a graphic organizer with information from a teacher-provided resource on a specific way renewable energy is being made accessible to all, whether this resource exists for people in our community and action steps to make it happen. Each group will then make a poster to present to the class.

Lesson Preparation

- Working with a partner students will be learning about a specific way that renewable energy can be made accessible to all using a teacher-provided resource. These will then be shared with the rest of the class in the form of a mini-poster or google slides. There is then an exit ticket at the end of day 3 where students summarize one way to make renewable energy more accessible in their community.
- Make copies of [MudWatt Activity Sheet](#)
- Have copies of the Equity and Social Justice in Accessing Renewable Energy Graphic Organizer printed and ready to hand out one per group. Also have printed copies of the different Teacher-Provided Topics ready. One Topic per group. Depending on class size you might have several groups working on the same topic

Lesson Progression

Day 1: Equity and Social Justice with Renewable Energy

- (15 min) In a whole class discussion ask the students to share their thoughts on the following questions. (Summarize responses on whiteboard) "What are the different types of renewable energy?"
 - For each type of renewable energy students list ask, "How does an individual, at their home get energy from that source?" After you have gone through all the different forms of renewable energy follow up with, "What are the different types of homes that people in this community live in?" (Students should list single homes, rentals, apartment complexes, trailers/RV's, motels/hotels, other).
 - Finally, ask, "Can all people in this community, regardless of their home type access renewable energy if they want to?" "What are some of the barriers?"
- (40) Hand out the teacher topics on different ways that renewable energy can be made accessible, on topic per group. Have students work in groups of 2 and fill out the Equity and Social Justice in Accessing Renewable Energy Graphic Organizer. Students will need to read the teacher provided topic and fill out the graphic organizer. Collect the graphic organizers at the end of the class period for use during day 2 of the lesson

Day 2: Exploring sustainable energy solutions: MudWatts

- (10 min) In their notebooks have students summarize what they read yesterday in 7 quick facts. Students will then share facts with partners and groups.
- (20 min) Watch short [MudWatt](#) video and introduce the MudWatt kits. Have students set up individual MudWatt kits with soil and record

observations. Have students brainstorm possible variables may increase the energy output created by the microbes over time.

- [Talk moves for Student Discourse:](#)
 - i. What factors can you change to affect the voltage and current in your fuel cell?
 - ii. Since we expect the number of microbes to increase over time, what evidence can we look for to indicate the effectiveness of a particular variable on the energy output of the fuel cell?
- While students are building and investigating with their kits, the teacher should roam to ask questions to prompt students towards being able to answer the discussion questions at the end of class. Students should explicitly reference ideas to isolate independent variables and measure against a class control. If you have time, students can investigate their predictions in their fuel cells and complete the [MudWatt investigation](#) activities.
- (5 min) In their groups, have students discuss and record their chosen variable to add to their fuel cell and set up their data table to monitor for voltage and current over the following week.
- (15 min) Lead discussion on the sustainability and accessibility of this type of clean energy. Ask students if they think that biologically produced energy like this could power a building or home, and provide evidence to support their arguments. Show [Algae powered building](#) video as another example of biologically produced clean energy.
- Continue to monitor MudWatts fuel cells to determine how different variables affected the voltage and current of the system.

Day 3: Exploring solutions to accessibility

- (5 min) Summarize the different forms of renewable energy and types of “homes” in our community from day 1. Explain that each group received a topic on a way that renewable energy access can be made more accessible. Today, you will be summarizing your findings in a poster or google slides and sharing them with the class.
- (30 min) Students use the poster requirements document to create a poster or google slides that they will share with the rest of the class in an informal 1-minute mini-presentation.
- (15 min) One group at a time students present their posters to the class and share their findings.
- (5 min) Exit ticket. On the sheet of paper provided evaluate the different ways that renewable energy can be made more accessible. Select one of the topics that you or your classmates presented and explain why this is the solution that should be implemented first in your community.