



ACTIVITY 9

Real-World Energy Decisions

READING

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ACTIVITY SUMMARY

Students read about two contrasting group decisions about renewable energy. In one case, the group decision-making process went well; in the other, it did not. The cases exemplify how real-world group decision-making takes into account the values of multiple stakeholders. Students analyze the case studies for shared or conflicting values between stakeholders and identify how conflict can be overcome through compromise.

ACTIVITY TYPE
READING

NUMBER OF
40-50 MINUTE
CLASS PERIODS
1-2

KEY CONCEPTS & PROCESS SKILLS

- 1 Values affect people's behaviors, opinions, and decisions. There can be disagreement within a community when people hold a variety of values.
- 2 Community decisions are more likely to be accepted if the values of all stakeholders, especially those who are underrepresented, are considered in the decision-making process.
- 3 When making a group decision where there are conflicting values, a compromise is sometimes necessary.

CONCEPTUAL
TOOLS



VOCABULARY DEVELOPMENT

compromise

when each side gives up something they want in order to reach an agreement

utility company

(assumed prior knowledge)

a business that provides services to customers, such as electricity, water, sewage services, and natural gas

TEACHER BACKGROUND INFORMATION

Causes of Disagreement in Group Decision-Making

Group decision-making can be challenging when people disagree about either the values, the facts, or both related to a decision. For example, one set of stakeholders may be against installing new wind turbines because they rank bird safety as the most important value to consider, while another group may support the decision because they value reduced greenhouse gas emissions as the most important value. In this case, these conflicting values could prevent agreement on a decision. An example of disagreement about the facts related to the values could be that the first group believes that wind turbines harm 10,000 birds a year, while the other group may think it is only 10 birds a year. In the case of facts, but not values, such disagreements can often be resolved by collecting more evidence.

Reaching a Group Decision

Researching information using credible sources and incorporating expert judgements can help groups reconcile disagreements over facts. Differences in values can sometimes be more difficult to address. Compromise is sometimes necessary to resolve conflicting values. By changing parts of the proposed decision, both parties in a disagreement may give up something to be able to agree on a decision. For example, both groups may agree on choosing a model of wind turbine that causes less harm to birds but does not reduce emissions as much as the other model. Successful group decisions often produce outcomes that are desirable by multiple stakeholders. This is most likely to happen when the values of various groups are considered throughout the decision-making process, including those that are underrepresented.

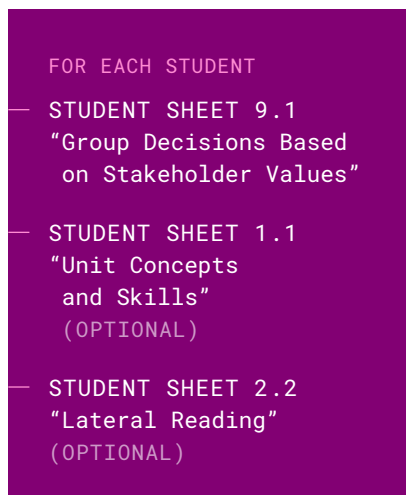
Hydroelectric Power

Hydroelectricity works on the science principle of transforming the gravitational potential energy of water into kinetic energy as it moves and then into electricity by a generator. Rivers and streams naturally flowing from a higher to a lower elevation are used to produce small amounts of electricity, while large hydroelectric plants require the construction of a large dam. Hoover Dam, a large dam on the Colorado River, created a waterfall of 122 meters (400 feet), which is more than twice as high as Niagara Falls. Hydroelectric power is a renewable resource because the water cycle continually supplies water to streams and rivers. Building hydroelectric dams also creates lakes and reservoirs that increase the

local water supply. This kind of power does not produce any pollution or waste outside of making the dam. Although building a dam is very expensive, once the dam is built, the cost of power is very low. The energy transformation of running water turning turbines is over 90%, which is the highest transformation efficiency of generation methods.

Dams do have significant negative environmental effects, such as a loss of fish and other aquatic species in the area when the natural environment is changed. Building a large dam floods the area upstream, in some cases drowning out forests and forcing whole towns to move away. Downstream, the amount and quality of water may also change because the dam will have changed the flow of the water.

MATERIALS & ADVANCE PREPARATION



FOR EACH STUDENT

- STUDENT SHEET 9.1
“Group Decisions Based on Stakeholder Values”
- STUDENT SHEET 1.1
“Unit Concepts and Skills”
(OPTIONAL)
- STUDENT SHEET 2.2
“Lateral Reading”
(OPTIONAL)

If students are going to conduct the Extension, review the task and choose one of the three research pathways, depending on the scaffolding needs of your students.

TEACHING NOTES

Suggestions for **discussion questions** are highlighted in gold.

Strategies for the **equitable inclusion of diverse students** are highlighted in pink.

GETTING STARTED (20 MIN)

1 Introduce the activity with a Walking Debate about an energy conflict.

- Begin the activity by presenting an imaginary energy conflict and conducting a Walking Debate. For more information on a Walking Debate, see Appendix 1: Literacy Strategies. Divide the class in half and tell each side to imagine that they live in an apartment building.
 - One half of the class represents those who rent an apartment in the building.
 - One half of the class represents those who own the apartment building.

The Owners Association plans to upgrade the building to be more energy efficient by adding solar panels to run a heat-pump system. After the renovations, it will reduce greenhouse gas emissions from the building by 30%. They expect that electricity bills will be about the same, but that renters will no longer need to pay a heating or air conditioning bill. To pay for all the upgrades, the building owners plan to increase the monthly rent for all renters by 20%. This would be the largest increase in the history of the building.

- Depending on your student population, you may consider changing the context of the situation and the corresponding questions to better connect to the life experiences of your students.
- With students, make a list of the facts and values from the scenario and record them on the board before conducting the Walking Debate.
- Begin the debate by asking, **Considering your role (renter or building owner), do you agree with the plan to reduce greenhouse gas emissions from the apartment building?** Identify one side of the classroom for those who agree and another for those who don't agree. Expect student arguments to include concerns related to the lack of affordability of the rent hike, the importance of reducing greenhouse gases because of climate change, and the possible outcomes that would result.
- When the debate is over, identify the conflict in the scenario and ask, **Do you think the disagreement between both sides is caused by differences in facts or values?** Accept all responses because the idea that conflicting values, not facts, tend to cause disagreements will be developed throughout this activity.
- Let students know that in this activity, they will be reading about some similar real-world energy conflicts by communities making energy-related group decisions.

PROCEDURE SUPPORT (35 MIN)

2 Students read about two real-world communities making energy-related group decisions.

- To support reading comprehension, students engage in the Read, Think, and Take Note strategy. Review student questions that are generated by the strategy.
- To help synthesize the information in the reading, have students work in pairs to complete a Directed Activity Related to Text (DART) on Student Sheet 9.1, “Group Decisions Based on Stakeholder Values.” For more information on a Directed Activity Related to Text (DART), see Appendix 1: Literacy Strategies. Students will need two copies of the student sheet, one for each case study. Sample student responses to Student Sheet 9.1 can be found at the end of this activity.
- For students who need more reading support, consider having students share the reading responsibilities within a group of four. One pair completes one of the case studies and shares the information with the other pair who has completed the other case study. Then the group of four works together to complete Student Sheet 9.1.

3 Discuss the main takeaways from the readings with students.

- Have a discussion about stakeholders related to the reading. First, review which stakeholders were similar in each scenario as identified on Student Sheet 9.1. Students may suggest the residents, politicians, government, and energy companies were present in both cases. Then ask, Which stakeholders in the energy situations are often underrepresented? Students may suggest Indigenous Peoples, those with little access to renewable technology due to money or education, and those not able to vote—such as people under 18, plants and animals, and the environment. Ask students to come up with ways that those stakeholders could have been a bigger part of the decision-making process. Accept all responses; students may circle back to some of the ideas from Activity 3 and suggest surveying them.
- Emphasize that the lack of success in Williamsport was not because the renewable project did not pass in the end. The community could have successfully made a group decision to turn down the renewable project. What made it unsuccessful was how the process broke down, the anger between stakeholders, and the ruined relationships between friends as a result of the group decision-making.

4 Lead a discussion about the role of compromise in group decision-making.

- Have students look at their completed Student Sheet 9.1 and compare the compromises made, or not, in each case. Students should have seen that in Uruguay, the group was able to successfully reach a compromise, whereas they were not in Williamsport. Ask, What made the compromise successful in Uruguay when compared to the attempt in Williamsport? Students should see that in Uruguay, there were concessions made by multiple parties. Both the government and the utility companies gave up something to make the plan acceptable to other stakeholders. This is

in contrast to Williamsport where one side made an offer that the other side rejected. This suggests that a successful compromise involves people from both sides considering one another's viewpoints carefully.

- If it comes up, clarify the difference between common values and shared values. Common values refer to those values that are most prevalent in the community and are the most popular for everyone. Shared values are values that are the same between two or more stakeholders. Shared values can be important in finding a compromise by bringing different stakeholders together to understand their common goals.
- Support students, particularly emerging multilingual learners, in sensemaking and language acquisition by adding a final word for the unit to the word wall. Record the word *compromise* and provide an example as needed.

SYNTHESIS OF IDEAS (20 MIN)

5 Have students reflect on how the reading informs the situation in Vanwick.

- Ask, **How do the real-world situations in the readings relate to the situation in Vanwick?** Students may see parallels between Vanwick and Williamsport, Ohio, because they are the same size communities and because solar farms are being considered as part of the Vanwick energy plan. The case study in Uruguay showed that group decision-making can happen, even in complicated situations such as energy generation. This implies that Vanwick can make a change for a better future. The readings also showed that successful group decisions need good leadership, persistence, and a commitment to invest in stakeholders' values.
- Apply the lessons learned in the activity to the global energy situation. Ask, **How does the reading inform the global energy situation?** Students should recognize that the Uruguay case study provides a perspective on the global community. Uruguay, albeit a small country, offers a model to the world of an energy system that is self-reliant and low emissions. Their experience shows other countries that they, too, can engage in group decision-making in a way that can accomplish global energy goals.
- Remind students that in Activity 8, they made a land-use decision from the perspective of a stakeholder. In this activity, they investigated some similar group decisions. In the next activity, they will combine what they learned when they will make a group decision.

6 Have students consider the scenario from the beginning of the activity.

- Revisit the scenario from the Getting Started section about the renters and owners of a building. Brainstorm with students some ideas about how the scenario could be resolved with a compromise. Responses will vary but expect students to propose ways to compromise such as staging the renovation over time to spread out the cost or getting the money elsewhere to keep rents affordable.

- You may wish to revisit Student Sheet 1.1, “Unit Concepts and Skills,” to help students formally organize the ideas introduced in the unit so far. Students can add the headings “Decision Analysis” and “Group Decision-Making” into the organizer and add examples from their classroom experiences in Activities 7–9. This is the last time students will revisit this sheet so, when completed, it should reflect the majority of the unit content. See the end of Activity 1 in the Teacher’s Edition for a sample student response.
- To conclude the activity, evaluate if your students are able to answer the Guiding Question, **What can support successful group decision-making?** Use this as a chance to revisit and summarize the key concepts and process skills of the activity in preparation for the final activity.

EXTENSION (90 MIN)

7 Use the Extension as an opportunity for advanced learning.

- Have students investigate the energy situations in other countries. Students are often interested in learning about other countries and their energy situations. Of importance is how the decision-making process can be different in these countries compared to their own country. Some countries to suggest are:
 - Australia
 - China
 - Nigeria
 - Pakistan
 - Saudi Arabia
 - United Kingdom
 - USA
- Depending on the scaffolding needs of your students, you may want to provide more curated or less curated resources for students. You may also want to provide students with Student Sheet 2.2, “Lateral Reading,” from Activity 2 as a guide to exploring websites.

SAMPLE STUDENT RESPONSES

BUILD UNDERSTANDING

- ① For each of the two communities you studied, which values were conflicting? Explain why it made it more difficult to agree on a decision.

a Williamsport, Ohio

Many residents in Williamsport did not want to change the views of the countryside and wanted to keep it as farmland. Some also had worries that the solar panels would lower home prices and be a danger to the health of the environment, people, and animals. This prevented agreement between a small group of farmers who valued more income by leasing their land and the mayor and electrical union who valued more money and jobs from the solar farm being built.

b Uruguay

The government liked the plan because they valued not having to buy energy from other countries. A lot of residents on the coast also liked it because they valued lower emissions. But many people opposed it because of worries about how much it would raise the cost of electricity if the companies owned the utility. The private companies were also worried that it would cost them too much money to build all the wind turbines at the very beginning if they couldn't make money by owning the electrical grid.

- ② Which of the two communities—Williamsport or Uruguay—had a more successful group decision-making process? Describe why.

Answers may vary. One sample response follows.

I think Uruguay had a more successful decision-making process because the people who had a large influence on the decision (such as the president, private companies, and other government officials) were more open to the viewpoints of others and were more willing to compromise. The solar company in Williamsport offered a few ideas to compromise, such as walls to hide the view and help with the noise, but they did not really address the other side's values enough to really change most people's minds. In Williamsport, some people did not use verified facts about the safety of solar panels and seemed to make judgements based only on what they valued. Some people ended up really unhappy in the town afterward. In Uruguay, I feel like the different stakeholders listened to each other more and were more willing to compromise.

- ③ Stakeholders can fail to reach a decision because of disagreement over values, claims of fact, or both. Describe an example from the first reading in which different stakeholders disagreed about a claim of fact.

Some of the residents in Williamsport thought that the solar panels would leak dangerous cadmium that could harm plants and animals and people. But one of the farmers said he did research that showed that the levels of the element are too low to cause any health or environmental problems. Also, the company had agreed to clean up the solar panels after the lease, so it was not a fact that should have mattered.

- ④ How are the real-world situations in the readings similar to:

a the energy situation in Vanwick?

There are a lot of similarities between Vanwick and Williamsport because they are the same size community. They both considered solar farms as part of their energy plans. The conflicts over the size of the solar panels and their locations were also the same issues that came up in Vanwick.

b the energy situation around the world?

The Uruguay case study is an international situation, so it provides a little perspective on the global community. It is a small country, but it is a good model for the world about how to create a self-reliant system with low emissions. Uruguay's experience shows other countries that it can be done.

- ⑤ In the Uruguay case, part of the success of the decision-making process included addressing the values of those who were previously underrepresented. Think about decisions in your school or community. Who are other stakeholders that may be underrepresented when group decisions are being made?

Responses will vary. One sample response follows.

Students who have to travel a long distance to our school are underrepresented because they are not able to stay after school and contribute to the school council clubs. When the school administration makes decisions, they talk to students in the clubs, and those clubs don't have any members who live across town. The bus leaves right after school, and the late bus is unreliable. So those students' values are not well represented when students get to make decisions with the administrators.

CONNECTIONS TO EVERYDAY LIFE

- ⑥ **Think about a time you disagreed about what to do with someone at school or at home. It could have been a friend or someone related to you. How did you cope with this conflict between the values of pleasing the other person and your own values? Describe the situation and how a compromise might have resolved it (or did resolve it).**

My parents wanted me to finish my homework, but I wanted to go out with my friends to a movie. They valued me finishing my schoolwork to learn and help me in the future, but I was feeling stressed out and really wanted to have some fun. I got angry, but I think a compromise could have been reached if they agreed to let me do my homework with my friends. I would have gotten to spend time with friends and get my work done at the same time.

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Community: _____

What was the energy problem and the group decision that needed to be made?

Reading Notes

WHO WERE THE STAKEHOLDERS?	WHAT VALUES WERE MOST IMPORTANT TO THEM?

Describe any compromises made to address the values of the stakeholders and the community's final decision.

Community: The town of Williamsport, Ohio

What was the energy problem and the group decision that needed to be made?

Many utility companies want to reduce emissions and lower costs by switching to more energy production by wind and solar. Generating electricity from solar panels or wind turbines can be cheaper than using coal or natural gas and help the state reach lower emission goals. The town of Williamsport, Ohio, needed to decide if a company called EDF Renewables would be allowed to build a new solar farm there.

Reading Notes

WHO WERE THE STAKEHOLDERS?	WHAT VALUES WERE MOST IMPORTANT TO THEM?
the solar company and the utility company	lower costs to generate electricity, lower carbon dioxide emissions, making money for their companies
farmers who want to lease their land to the solar company	a stable source of money from leasing
the mayor and other members of the community	more money and jobs for the town by taxing the solar company
the city of Columbus and the state of Ohio	lower emissions for their climate-change goals of switching to more electricity from renewables
other farmers and community members	unchanged views and use of their countryside for farming, home values, health of animals and people

Describe any compromises made to address the values of the stakeholders and the community's final decision.

The solar company offered to put up fences to hide some of the solar panels and work with farmers to prevent underground pipes from being broken. But in the end, most of the residents decided that they did not want the solar farm to be built in their town.

Community: The nation of Uruguay

What was the energy problem and the group decision that needed to be made?

Uruguay was not getting enough electricity from its hydroelectric dam and had to start buying energy from other countries. Electricity was getting expensive and was unreliable. Uruguay needed to decide on a new energy plan that would build wind turbines all around the country to generate electricity.

Reading Notes

WHO WERE THE STAKEHOLDERS?	WHAT VALUES WERE MOST IMPORTANT TO THEM?
<i>residents who live on the coast</i>	<i>lower greenhouse gas emissions to deal with climate change and prevent flooding of where they live</i>
<i>members of government</i>	<i>not having to depend on other countries for energy, lower costs of energy, a more stable source of energy</i>
<i>labor unions</i>	<i>reliable electricity, job stability</i>
<i>residents who had been previously overcharged for electricity</i>	<i>cost of electricity if the companies owned the energy grid</i>
<i>private companies</i>	<i>cost to build the wind turbines at the beginning of the plan</i>

Describe any compromises made to address the values of the stakeholders and the community's final decision.

The government offered to train the electrical workers and upgrade the hydroelectric dam to help the labor union agree to the energy plan. They also changed the plan so the electrical grid would be owned by the government, and the private companies would generate the electricity instead. The companies only agreed to this after the government agreed to buy all the energy for the next 20 years. In the end, the nation adopted the energy plan.