

Overview of ESS Solar Energy/Fluid Circulation Unit

Content Focus	Duration	Instructional Outcomes
Introduction to House Design Project <i>Students will be presented with RFP and Project Scoring Tool.</i>	2 Days	<ul style="list-style-type: none"> Students will learn to specify criteria and constraints for the design of the project. Students will learn that homes in different parts of the world will have varying temperatures, precipitation, wind, severe weather threats, and be close to different geographical conditions. They will use the information collected to design their home.
		House Design Project Connection: Students will identify the challenges of designing a home in different parts of the world while also incorporating a green design.
Unequal Heating <i>Earth's surface and atmosphere influence the amount of solar energy reaching the Earth and how it is redistributed from regions of surplus to deficit.</i>	13 Days	<ul style="list-style-type: none"> Students will describe how energy and matter transfer affect Earth's systems Atmospheric circulation (heat transfer systems conduction/convection/radiation, phase change, latent heat, pressure gradients, general global circulation, Coriolis effect) Students will explain how global conditions are affected when natural and human-induced changes alter the transfer of energy and matter Climate type and distribution (temperature and precipitation)
		House Design Project Connection: In order for students to design their project, students must know how sun/earth relationships influence the amount of daylight in their part of the world and the duration of seasonal patterns. They must also understand how heat is transferred to create global and local winds. Both of these may lead students to incorporate the use of solar and wind energy.
Fluid Circulation <i>The atmosphere and oceans are both three-dimensional fluids that have measurable physical properties.</i>	8 Days	<ul style="list-style-type: none"> Students will describe how energy and matter transfer affect Earth's systems Oceanic circulation (density differences, daily and seasonal land/sea breezes, Coriolis effect) Atmospheric circulation (heat transfer systems conduction/convection/radiation, phase change, latent heat, pressure gradients, general global circulation, Coriolis effect) Students will explain how global conditions are affected when natural and human-induced changes alter the transfer of energy and matter. El Nino and La Nina
		House Design Project Connection: Students will investigate the water cycle, pressure systems and weather patterns influenced by El Nino and La Nina and continue to modify their house design. They may also consider using hydropower.
Severe Weather <i>Atmospheric and hydrospheric conditions are associated with the formation and development of severe weather.</i>	6 Days	<ul style="list-style-type: none"> Students will describe how energy and matter transfer affect Earth's systems
		House Design Project Connection: Students will investigate different types of severe weather and determine if their house location will be impacted. This could lead to significant changes in their structural design.
House Design Project <i>Continuation of house project development and evaluation.</i>	9 Days	<ul style="list-style-type: none"> Students will learn that design is a creative planning process that leads to useful systems and that design usually requires taking constraints into account.
		House Design Project Connection: Students will apply the knowledge they have gained throughout the entire unit sequence to construction their house project in small collaborative groups.