

Learning Objectives

Energy

Foundational Knowledge

- 1.1 | Understand the difference between renewable and nonrenewable energy resources.
- 1.2 | Demonstrate understanding of the different types of renewable energy technologies that are currently available, and how they are used to provide energy.
- 1.3 | Identify strengths and limitations associated with the different renewable energy technologies.
- 1.4 | Identify the current major uses of energy (i.e., in agriculture, manufacturing, transportation, residential, etc.).
- 1.5 | Distinguish between an energy source, a resource and a carrier.
- 1.6 | Differentiate between energy reserves and resource base.

Key ideas or concepts:

- 1.7 | Realize that the energy problem cannot be solved by technology alone and by only one technology.
- 1.8 | Realize that higher impact strategies are in shifting our collective relationship to energy.
- 1.9 | Know the general hierarchy of systemic intervention strategies that can improve or worsen the impacts of energy use (from low to high--material, efficient, formal and final causes).
- 1.10 | Realize that the consumption rate of renewable energy should be less than the regeneration rate in order for it to be sustainable.
- 1.11 | Understand that life cycle assessment and system thinking can be applied to better understand the impact of renewable energy and its applications.
- 1.12 | Realize that for sustainability of natural resources, our primary global energy resource profile must shift toward renewable resources.

Application

Critical thinking:

- 2.1 | Evaluate the advantages and disadvantages of renewable energy technologies in different contexts.
- 2.2 | Apply system thinking tools to assessing the potential value of different renewable energy contexts.

Creative thinking:

- 2.3 | Be able to create a list of potential appropriate renewable energy technologies that can be used in a particular situation, based on the situational factors.
- 2.4 | Strategize potential high-impact conceptual solutions to specific energy challenges.

Practical thinking:

- 2.5 | Be able to evaluate the environmental and social impacts of renewable and nonrenewable energy use.
- 2.6 | Evaluate the different ways to conserve energy in different contexts.
- 2.7 | Evaluate different energy technologies based on efficiency, impacts and other factors.

Skills:

Integration

- 3.1 | Recognize connections between population, water, and energy use and demand that can be explained by the IPAT equation.
- 3.2 | Relate the environmental, social, cultural, political, and economic issues and pressures on a region to anthropogenic energy consumption.
- 3.3 | Describe the potential role that renewable energy technologies can play in sustainability.

Human Dimension

- 4.1 | Understand their personal and professional role in energy conservation.
- 4.2 | Describe how their personal behavior around energy is interconnected to the quality of life for those in developing countries.
- 4.3 | Describe the perspective of the global population that lives in areas not equally served by global energy resources, and discuss the challenges experienced by people living in these areas.
- 4.4 | Understand the connection between human energy consumption and its relation to human behavior.
- 4.5 | Recognize that human rights apply to all people, regardless of their nation state.

Caring

- 5.1 | Become more interested in their capability to contribute to a more sustainable global future.
- 5.2 | Care about how their own actions and life style choices contribute to or diminish global sustainability.
- 5.3 | Feel that you, as an engineer, can help achieve more sustainable production and management of energy resources in your home, region, country, and globally.
- 5.4 | Care about populations that are not equally served by global energy resources.

Learning How to Learn

- 6.1 | Be able to find and access relevant library and Internet resources related to local and global issues associated with energy topics and issues.
- 6.2 | Diagnose what one needs to learn about global/local energy issues.
- 6.3 | Design and execute a plan for self-directed learning.

What impact do I want this module experience to have on students, that will still be there a year or more after the course is over?

