

#8. Water and Energy

Summary: In this module you will learn about the water-energy nexus.

Goals: By the end of this module you will be able to describe sources of energy and their use in regions of the U.S. as well as greenhouse gas emissions from different energy sectors.

Required readings:

Chapters 1 – 4 in U.S. Department of Energy (DOE). 2014. The Water-Energy Nexus: Challenges and Opportunities - Overview and Summary. Available at:
<https://www.energy.gov/sites/prod/files/2014/07/f17/Water%20Energy%20Nexus%20Full%20Report%20July%202014.pdf>

Executive Summary: <https://www.ucsusa.org/resources/freshwater-use-us-power-plants#.VVJhcJNl8sx>

Supplemental Content (review in class or assign directly):

<https://www.learner.org/series/essential-lens-analyzing-photographs-across-the-curriculum/energy-capture-storage-and-transformation/> This resource has 34 photos with captions related to the topic of energy capture, storage and transformation.

Key Vocabulary: British Thermal Units, megawatt, Carbon Dioxide Equivalent, infrastructure, Withdrawl, Consumption, ppm, thermal discharge, renewable portfolio standard

Assessment Tools:

Energy Use Summary. <https://www.usofenergy.com/overview/> Summarize regional energy production and use information in a table. Include the following column headings at a minimum:

Region	Resources	Market	Infrastructure	Importer or Exporter	Major Source of Electricity
Hydro NW					
etc					

Discussion Questions (can be used in classroom or for on-line discussion board):

- https://www.ted.com/talks/fahad_al_attiya_a_country_with_no_water TED talk by Fahad Al Attiya (Food Security Expert) Qatar has large reserves of oil & natural gas, yet their short-term plan for water management and food security relies on renewable energy. Does that make sense? Why/why not?
- Which low carbon energy technologies are low water? Which are not?
- Are the aquatic impacts of thermal discharge “worth it”? Make your case.
- What are some of the ways in which water and energy are interconnected? Why is that important in relation to the climate crisis?
- Do you think conversion of all thermal plants in the U.S. to closed-loop technologies is a justifiable expense? Why or why not?
- Every energy production technology has adverse environmental impacts. What technology supplies the electricity at your college? What are some of the environmental impacts associated with that energy source?
- Does your state have a Renewable Portfolio Standard? What are some of the barriers associated with it? What incentives are in place to promote renewables?
- The DOE’s 2014 Report indicates that power plants in states with water used determined by Prior Appropriation Doctrines use less water per unit of electrical production than plants in states with Riparian Doctrine. Why?

Module 8 Lab Activity

Scripted Lab exercise on mapping GHG generation by sector in any location. The script is Instructor's copy. <https://archive.epa.gov/climatechange/kids/documents/mapping-emissions.pdf>