

BECC Conference
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U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
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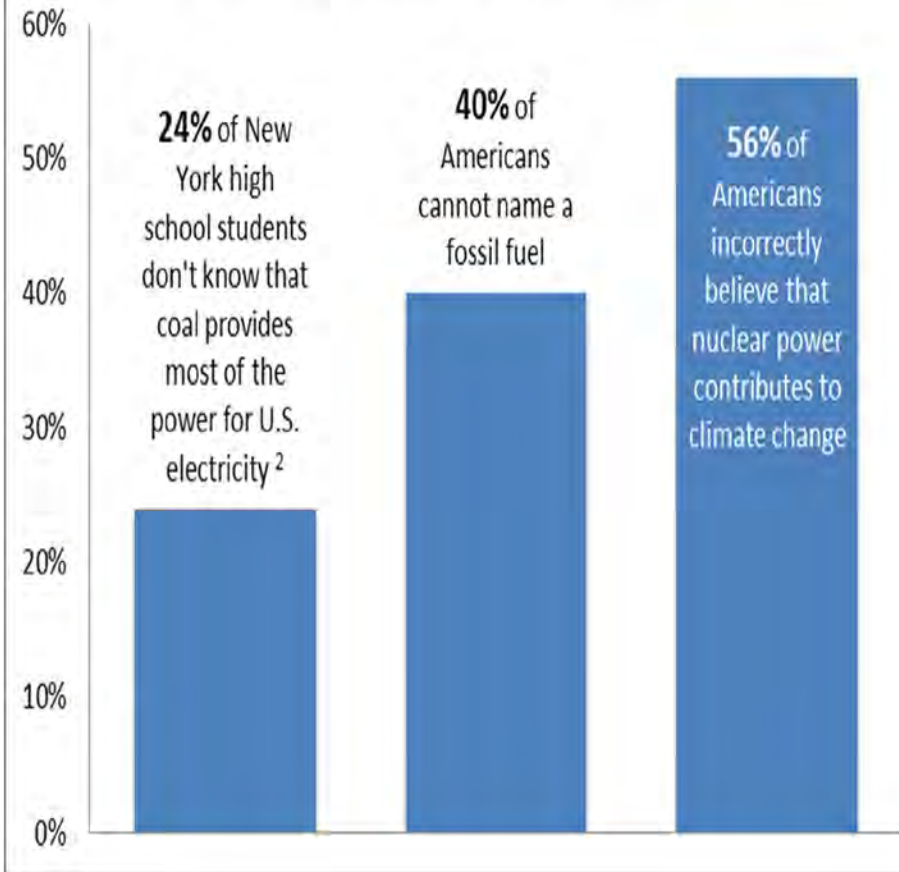


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State of Energy Literacy in America

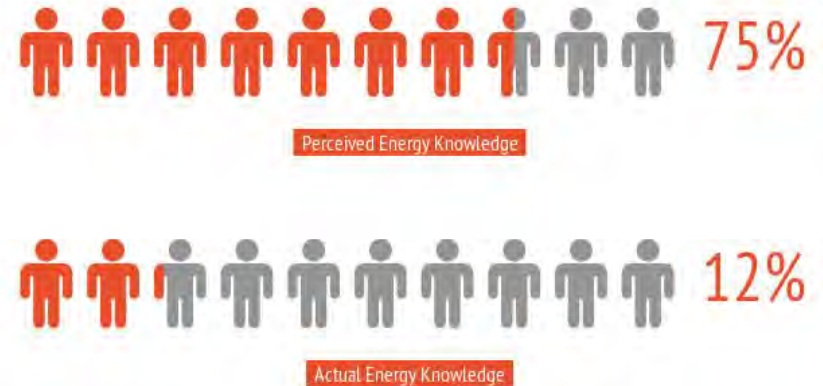
Energy Literacy in America¹



¹ DeWaters, J.E., & Powers, S.E. (2011). Energy literacy of secondary students in New York State (USA): A measure of knowledge, affect, and behavior. *Energy Policy*, 39(3), 1699-1710.

² Bittle, S., Rochkind, J., & Ott, A. (2009). The energy learning curve. Public agenda. As cited in DeWaters & Powers, 2011, page 1699.

The U.S. Energy Literacy Gap³



"Only 12% of the U.S. adult population is considered energy literate"
America's Low Energy IQ 2002

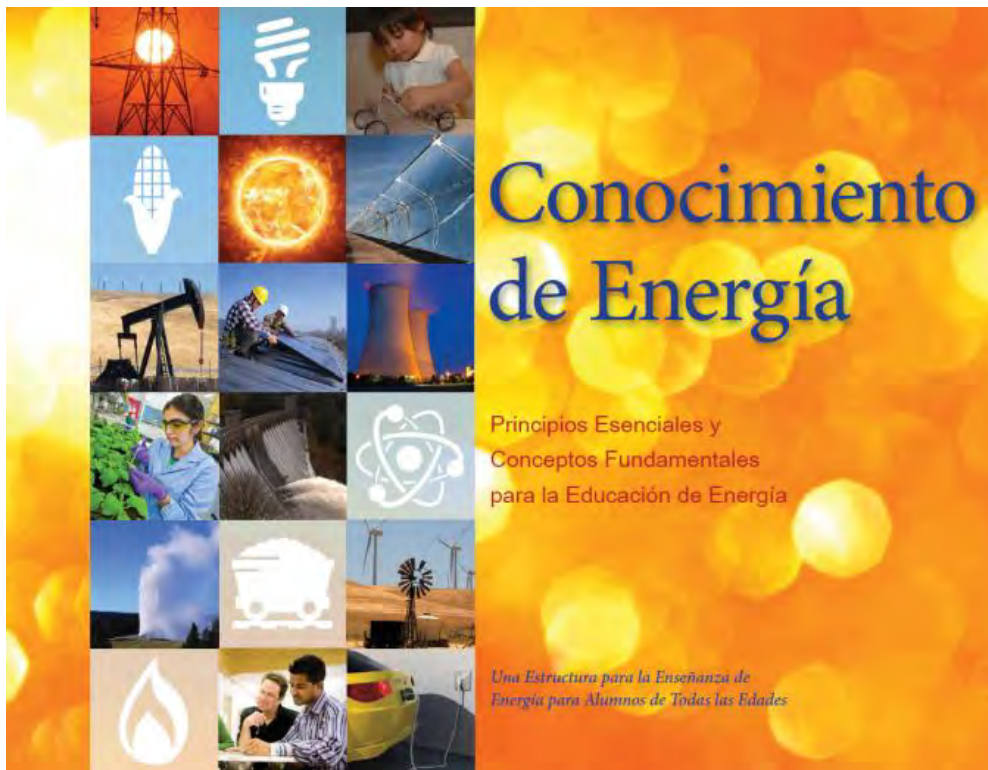
Consistently across studies and as a whole, the public wants to save energy and are sympathetic to energy concerns, but they lack the knowledge to act.

Energy Literacy Framework for Educators

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A Framework for Energy Education for Learners of All Ages

www.energy.gov/eere/energy/literacy



- 1** Energy is a physical quantity that follows precise natural laws. 
- 2** Physical processes on Earth are the result of energy flow through the Earth system. 
- 3** Biological processes depend on energy flow through the Earth system. 
- 4** Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination. 
- 5** Energy decisions are influenced by economic, political, environmental, and social factors. 
- 6** The amount of energy used by human society depends on many factors. 
- 7** The quality of life of individuals and societies is affected by energy choices. 



Energy Literacy – A holistic interdisciplinary approach to Energy

Natural Sciences

- Physics
- Chemistry
- Earth Science
- Biology

1 Energy is a physical quantity that follows precise natural laws.



2 Physical processes on Earth are the result of energy flow through the Earth system.



3 Biological processes depend on energy flow through the Earth system.



Engineering/ Technology

4 Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.



Social Sciences

- Civics
- Economics
- Psychology

5 Energy decisions are influenced by economic, political, environmental, and social factors.



6 The amount of energy used by human society depends on many factors.



7 The quality of life of individuals and societies is affected by energy choices.



Concepts underlying Principle 6

Essential Principle 6:

6 The amount of energy used by human society depends on many factors.



6.1 Conservation of energy has two very different meanings. There is the physical law of conservation of energy. This law says that the total amount of energy in the universe is constant. Conserving energy is also commonly used to mean the decreased use of societal energy resources. When speaking of people conserving energy, this second meaning is always intended.

6.2 One way to manage energy resources is through conservation. Conservation includes reducing wasteful energy use, using energy for a given purpose more

efficiently, making strategic choices as to sources of energy, and reducing energy use altogether.

6.3 Human demand for energy is increasing. Population growth, industrialization, and socioeconomic development result in increased demand for energy. Societies have choices with regard to how they respond to this increase. Each of these choices has consequences.

6.4 Earth has limited energy resources. Increasing human energy consumption places

stress on the natural processes that renew some energy resources and it depletes those that cannot be renewed.

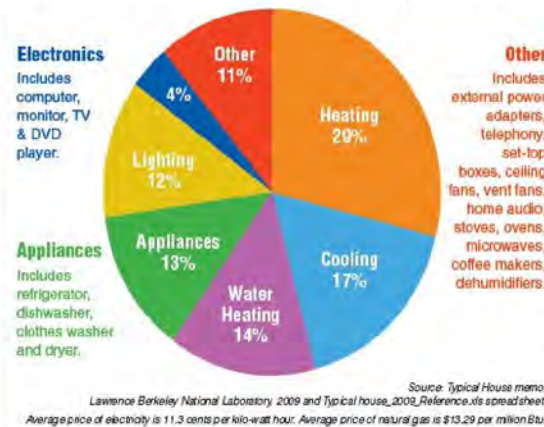
individuals and society can take to conserve energy. These actions might come in the form of changes in behavior or in changes to the design of technology and infrastructure. Some of these actions have more impact than others.

6.7 Products and services carry with them embedded energy. The energy needed for the entire lifecycle of a product or service is called the "embedded" or "embodied" energy. An accounting of the embedded energy in a product or service, along with knowledge of the source(s) of the energy, is essential when calculating the amount of energy used and in assessing impacts and consequences.

6.8 Amount of energy used can be calculated and monitored. An individual, organization, or government can monitor, measure, and control energy use in many ways. Understanding utility costs, knowing where consumer goods and food come from, and understanding energy efficiency as it relates to home, work, and transportation are essential to this process.

Where Does My Money Go?

Annual Energy Bill for a typical U.S. Single Family Home is approximately \$2,200.



6.5 Social and technological innovation affects the amount of energy used by human society. The amount of energy society uses per capita or in total can be decreased. Decreases can happen as a result of technological or social innovation and change. Decreased use of energy does not necessarily equate to decreased quality of life. In many cases it will be associated with increased quality of life in the form of increased economic and national security, reduced environmental risks, and monetary savings.

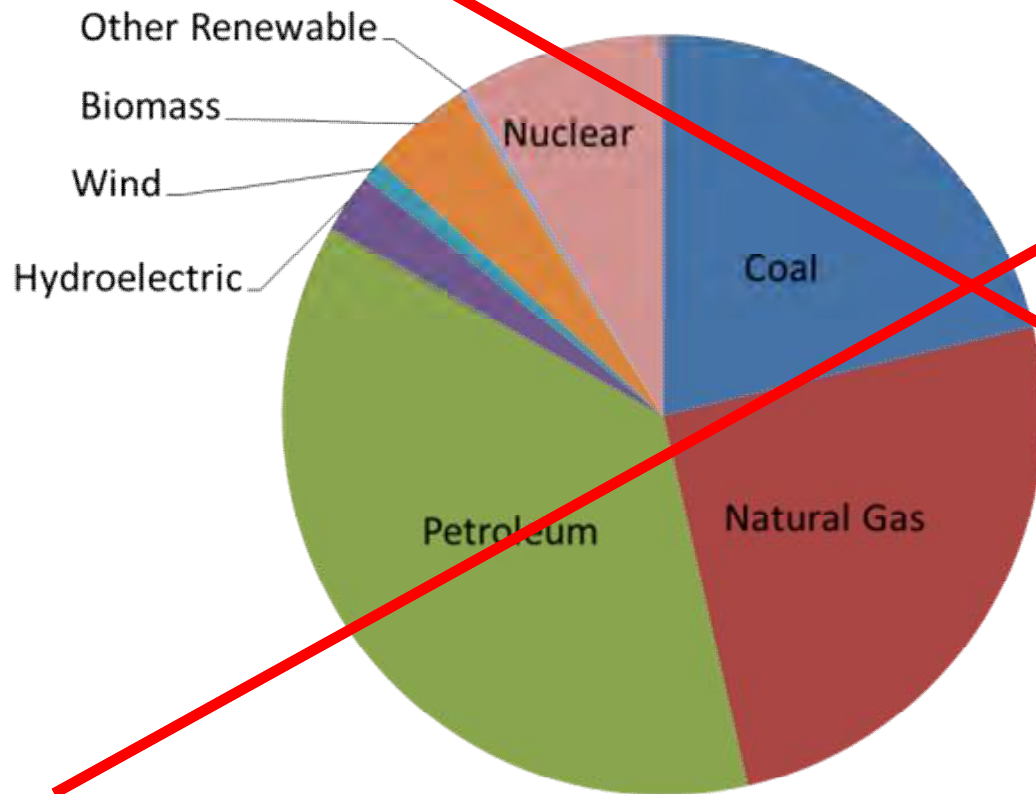
6.6 Behavior and design affect the amount of energy used by human society. There are actions

The Energy Star program is run jointly by the U.S. Department of Energy and the Environmental Protection Agency. The Energy Star logo designates products as highly energy efficient.

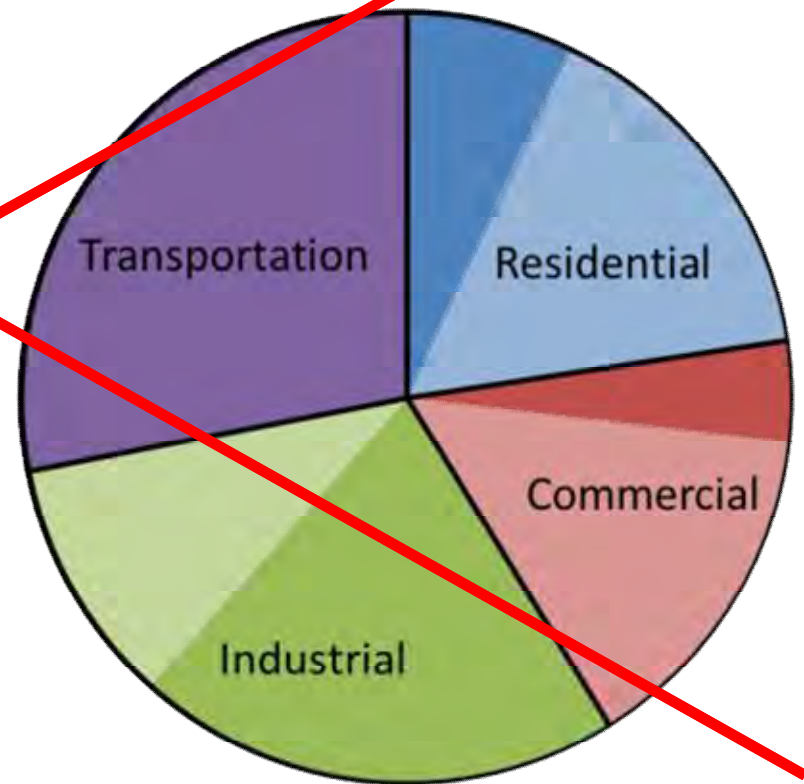


Energy Use in the United States

Total Primary Energy Use by Source



Primary Energy Use by Sector



Total Energy Use = 98 quadrillion Btu

(In left chart, lighter shade is energy for electricity used in that sector)

How much **energy** do you use?

See how much **energy** someone like you used in 2012.

SELECT STATE

MINNESOTA



1 5 8 , 3 0 0 , 0 0 0 B T U

That's like the energy in:



Minnesota

U.S. Average

33,265 burritos

2,039 burritos **above**
the U.S. Average.



Minnesota

U.S. Average

175,806 sticks of dynamite

10,773 sticks **above**
the U.S. Average.



Minnesota

U.S. Average

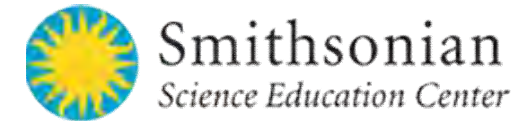
16,374 lbs. of coal

1,004 lbs. of coal **above**
the U.S. Average.

Others Implementing Energy Literacy Principles

Just to name a few:

- National Energy Education Development (NEED) Project
- CLEAN Collection and Community
- PBS
- National Oceanic & Atmospheric Administration
- Department of Housing and Urban Development
- Environmental Protection Agency
- Next Generation Science Standards K-12
- Association of Science & Technology Centers (ASTC)
- Northwest Advanced Renewables Alliance (NARA)
- National Geographic Education
- Discovery Education
- American Geosciences Institute
- iBook on Renewable Energy by Ecodads
- YWCA – EMPOwERgirlz youth mentoring
- Will Steger Foundation – Energy Institute for teachers
- Smithsonian – Teacher Energy Institute for teachers
- Paleontological Research Institution
- McCall Outdoor Science School Field Campus
- TED-Ed
- 100Kin10
- AP Energy Course (in discussion)



- Dissemination is key
 - Focus is on building partnerships to leverage distribution channels
 - Association of Science and Technologies Centers (ASTC)
 - Interagency partners
 - DOD interest is on saving lives by saving energy via culture change
 - Department of Education: teaching math through energy
 - NOAA: climate and energy literacy
 - HUD/ED: focus on low income to use energy wisely and understand career pathways
 - DOD/VA: outreach to vets/transitioning service members
- Measuring Impact not easy
 - Intentionally open source and usable by anyone, so hard to track use
 - Hoping to use Green Button data (enables individuals to see continuous home energy use data)

The Energy Literacy Scaffold

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The Energy Literacy Framework is not prescriptive, it is a scaffold intended for energy curriculum developers and instructors.



- The principles are meant to be broad categories representing big ideas.
- Each fundamental concept under the principles is intended to be unpacked and applied as appropriate for the learning audience and setting.
- The concepts are not intended to be addressed in isolation. A given lesson on energy will most often connect to many of the concepts.

Ideas and Feedback welcome

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Energy Literacy Framework: Energy.gov/EERE/EnergyLiteracy

Note: now available in Spanish
<http://www.energy.gov/eere/energia>