

BY THE NUMBERS may advance the following

ENERGY LITERACY PRINCIPLES AND CONCEPTS

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

1.1 Energy is a quantity that is transferred from system to system.

1.4 Energy available to do useful work decreases as it is transferred from system to system.

1.5 Energy comes in different forms and can be divided into categories.

1.6 Chemical and nuclear reactions involve transfer and transformation of energy.

1.7 Many different units are used to quantify energy.

1.8 Power is a measure of energy transfer rate.

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

2.2 Sunlight, gravitational potential, decay of radioactive isotopes, and rotation of the Earth are the major sources of energy driving physical processes on Earth.

2.3 Earth's weather and climate are mostly driven by energy from the Sun.

2.6 Greenhouse gases affect energy flow through the Earth system.

2.7 The effects of changes in Earth's energy system are often not immediately apparent.

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

3.1 The Sun is the major source of energy for organisms and the ecosystems of which they are a part.

3.6 Humans are part of Earth's ecosystems and influence energy flow through these systems.

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

4.1 Humans transfer and transform energy from the environment into forms useful for human endeavors.

4.2 Human use of energy is subject to limits and constraints.

4.3 Fossil and biofuels are organic matter that contain energy captured from sunlight.

4.4 Humans transport energy from place to place.

4.5 Humans generate electricity in multiple ways.

4.6 Humans intentionally store energy for later use in a number of different ways.

4.7 Different sources of energy and the different ways energy can be transformed, transported, and stored each have different benefits and drawbacks.

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

5.3 Energy decisions can be made using a systems-based approach.

5.4 Energy decisions are influenced by economic factors.

5.5 Energy decisions are influenced by political factors.

5.6 Energy decisions are influenced by environmental factors.

5.7 Energy decisions are influenced by social factors.

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

6.2 One way to manage energy resources is through conservation.

6.3 Human demand for energy is increasing.

6.4 Earth has limited energy resources.

6.5 Social and technological innovation affects the amount of energy used by human society.

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

6.8 Amount of energy used can be calculated and monitored.

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

7.1 Economic security is impacted by energy choices.

7.2 National security is impacted by energy choices.

7.3 Environmental quality is impacted by energy choices.

7.4 Increasing demand for and limited supplies of fossil fuels affects quality of life.

7.5 Access to energy resources affects quality of life.