

Energy Conversion

Jean Brainard, Ph.D.

Say Thanks to the Authors

Click <http://www.ck12.org/saythanks>

(No sign in required)



AUTHOR

Jean Brainard, Ph.D.

To access a customizable version of this book, as well as other interactive content, visit www.ck12.org

CK-12 Foundation is a non-profit organization with a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide. Using an open-source, collaborative, and web-based compilation model, CK-12 pioneers and promotes the creation and distribution of high-quality, adaptive online textbooks that can be mixed, modified and printed (i.e., the FlexBook® textbooks).

Copyright © 2016 CK-12 Foundation, www.ck12.org

The names “CK-12” and “CK12” and associated logos and the terms “**FlexBook®**” and “**FlexBook Platform®**” (collectively “CK-12 Marks”) are trademarks and service marks of CK-12 Foundation and are protected by federal, state, and international laws.

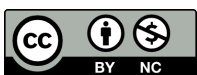
Any form of reproduction of this book in any format or medium, in whole or in sections must include the referral attribution link <http://www.ck12.org/saythanks> (placed in a visible location) in addition to the following terms.

Except as otherwise noted, all CK-12 Content (including CK-12 Curriculum Material) is made available to Users in accordance with the Creative Commons Attribution-Non-Commercial 3.0 Unported (CC BY-NC 3.0) License (<http://creativecommons.org/licenses/by-nc/3.0/>), as amended and updated by Creative Commons from time to time (the “CC License”), which is incorporated herein by this reference.

Complete terms can be found at <http://www.ck12.org/about/terms-of-use>.

Printed: October 17, 2016

flexbook
next generation textbooks



CHAPTER 1

Energy Conversion

- Define energy conversion.
- Give examples of energy changing from one form to another.
- Describe energy changes between kinetic and potential energy.



Sari and Daniel are spending a stormy Saturday afternoon with cartons of hot popcorn and a spellbinding movie. They are obviously too focused on the movie to wonder where all the energy comes from to power their weekend entertainment. They'll give it some thought halfway through the movie when the storm causes the power to go out!

Changing Energy

Watching movies, eating hot popcorn, and many other activities depend on electrical energy. Most electrical energy comes from the burning of fossil fuels, which contain stored chemical energy. When fossil fuels are burned, the chemical energy changes to thermal energy and the thermal energy is then used to generate electrical energy. These are all examples of energy conversion. **Energy conversion** is the process in which one kind of energy changes into another kind. When energy changes in this way, the energy isn't used up or lost. The same amount of energy exists after the conversion as before. Energy conversion obeys the law of conservation of energy, which states that energy cannot be created or destroyed.

How Energy Changes Form

Besides electrical, chemical, and thermal energy, some other forms of energy include mechanical and sound energy. Any of these forms of energy can change into any other form. Often, one form of energy changes into two or more different forms. For example, the popcorn machine below changes electrical energy to thermal energy. The thermal energy, in turn, changes to both mechanical energy and sound energy. You can read the **Figure 1.1** how these changes happen.

Energy Conversions in a Popcorn Machine



FIGURE 1.1

1. The popcorn machine changes electrical to thermal energy, which heats the popcorn. 2. The heat causes the popcorn to pop. You can see that the popping corn has mechanical energy (energy of movement). It overflows the pot and falls into the pile of popcorn at the bottom of the machine. 3. The popping corn also has energy. That's why it makes popping sounds.

Kinetic-Potential Energy Changes

Mechanical energy commonly changes between kinetic and potential energy. Kinetic energy is the energy of moving objects. Potential energy is energy that is stored in objects, typically because of their position or shape. Kinetic energy can be used to change the position or shape of an object, giving it potential energy. Potential energy gives the object the potential to move. If it does, the potential energy changes back to kinetic energy.

That's what happened to Sari. After she and Daniel left the theater, the storm cleared and they went for a swim. That's Sari in **Figure 1.2** coming down the water slide. When she was at the top of the slide, she had potential energy. Why? She had the potential to slide into the water because of the pull of gravity. As she moved down the slide, her potential energy changed to kinetic energy. By the time she reached the water, all the potential energy had changed to kinetic energy.

Q: How could Sari regain her potential energy?

A: Sari could climb up the steps to the top of the slide. It takes kinetic energy to climb the steps, and this energy would be stored in Sari as she climbed. By the time she got to the top of the slide, she would have the same amount of potential energy as before.



FIGURE 1.2

Q: Can you think of other fun examples of energy changing between kinetic and potential energy?

A: Playground equipment such as swings, slides, and trampolines involve these changes.

Summary

- Energy conversion is the process in which energy changes from one form or type to another. Energy is always conserved in energy conversions.
- Different forms of energy—such as electrical, chemical, and thermal energy—often change to other forms of energy.
- Mechanical energy commonly changes back and forth between kinetic and potential energy.

Review

1. Define energy conversion.
2. Relate energy conversion to the law of conservation of energy.
3. Describe an original example of energy changing from one form to two other forms.
4. Explain how energy changes back and forth between kinetic and potential energy when you jump on a trampoline. Include a sketch to help explain the energy conversions.

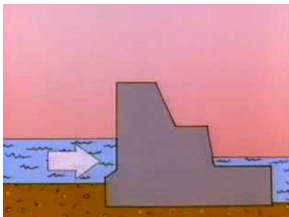
Resources



MEDIA

Click image to the left or use the URL below.

URL: <https://www.ck12.org/flx/render/embeddedobject/187326>



MEDIA

Click image to the left or use the URL below.

URL: <https://www.ck12.org/flx/render/embeddedobject/187373>

References

1. Frédéric BISSON. [Energy transfer to popcorn in a popcorn machine](#) . CC BY 2.0
2. Image copyright Poznyakov, 2014. [Water slides convert gravitational potential energy into kinetic energy](#) . Used under license from Shutterstock.com