

Subjects
Geography, Social Sciences, Maths
Total time
60 mins
Age range
11-14 years

Photo source: Melanie Dreyse/iaif

Decoding Global Goal 7: Ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All

“Technology can solve all the problems we are facing.”

William Kamkwamba, self-taught windmill constructor in Malawi

Learning Outcomes

- Students will learn to distinguish between renewable and non-renewable sources of energy as well as primary and secondary sources of energy
- Students will identify the Global Goals which benefit from the provision of access to modern energy
- Students will recognize the difference between access to electricity and access to clean cooking/heating facilities and identify which regions of the world are most affected
- Students will identify the main issues related to access to energy and learn about the range of solutions available to address these

- Students will compare the ecological footprint of various nations over time

Preparation

- Read through the lesson plan and the tips thoroughly

Materials

- Print handouts: 1 – 6
- Access to the internet/computers/tablets for students

Acknowledgements

With special thanks to **Pia Løvengreen Alessi**, WAME Project Coordinator

Note to Educators:

Energy is a global commodity and hence energy prices are determined globally. If the development level of a country and the average income of the population is low while the global price of energy is high, then people will not be able to afford access to energy. Thus, an essential condition of affordability is raising income levels (and hence purchasing power) and controlling the impacts that impersonal economic forces operating at global levels have on the costs that people face on an everyday basis.

Affordability of energy is meaningless, if energy provision is unreliable. In many parts of the developing world, energy sources are often scarce and their supply intermittent.

Today, approximately 14% of the world's population still lacks access to electricity, and a larger share suffers from persistent power failures paralyzing entire cities for hours on end. Massive nationwide blackouts are unfortunately common in many developing countries paralyzing transportation and communication systems and the overall productivity.

Note on language terms for educators:

AFFORDABLE: The price that a family has to pay for the provision of energy services has to be reasonable in relation to their monthly/annual income.

RELIABLE: Reliability refers to the quality and quantity of the energy service that must be met by the provider.

SUSTAINABLE: Refers to the consumption of energy that does not have negative effects on the environment in the short and long-term. Using wood for fuel is sustainable if a tree is planted for every tree that is chopped, but it is not sustainable if it leads to desertification.

MODERN: Modern energy refers to an energy form that is useful to contemporary life and here electricity is essential. It also refers to modern technologies that are as energy efficient and clean as possible.

CLEAN COOKING FACILITIES: Are considered safer, more efficient and more environmentally sustainable than the traditional facilities that make use of solid biomass (such as a three-stone fire). This refers primarily to improved solid biomass cookstoves, biogas systems, liquefied petroleum gas stoves, ethanol and solar stoves.

MODERN ENERGY ACCESS: Access to modern energy services includes household access to a minimum level of electricity; household access to safer and more sustainable cooking and heating fuels and stoves than traditional biomass stoves; access that enables productive economic activity; and access to public services.

Step 1: Different Types of Energy

5
mins

Begin by asking students *what different types of energy do you use at home or in your local community? What do you think might be used at school to generate electricity for heating, cooling and cooking?*

Take suggestions and write them on the board. Ask students to quickly differentiate those between renewable or non-renewable energy sources.

Tip: Do a sorting activity between renewable and non-renewable energy sources and primary and secondary sources. Where useful use **Appendices 1 and 2**

Step 2: Decoding Global Goal 7

15
mins

Ask students to identify which Global Goal they think they will be learning about today.

Goal 7 Affordable and Clean Energy

Activity 1: Explain to students that there are some key language terms that students need to understand for today's learning. Split the class into groups and ask them to define the following concepts.

AFFORDABLE:
RELIABLE:
SUSTAINABLE:
MODERN:

Activity 2: Share the Decoding SDG 7 video <https://www.youtube.com/watch?v=eBnDz7HljT0> and/or the inspiring story of William Kamkwamba (a condensed edit of his life story is in Appendix 3).

https://www.ted.com/talks/william_kamkwamba_how_i_harnessed_the_wind/discussion

Ask the class to discuss the extent to which the provision of electricity and clean cooking impacts the other Global Goals? Remind students to think about social, economic, health, gender and environmental issues.

In groups ask students to answer or discuss the following questions:

1. Identify the Global Goals that are facilitated by having access to clean cooking and fuel
2. Why might clean cooking be getting less political attention than access to electricity?
3. How might lack of access to electricity and clean cooking affect a family living in a refugee camp?
4. Does lack of access to electricity and clean cooking have the same effect on women and men? What about children?

Ask groups to come back together and discuss as a class.

Step 3: Exploring the Issue

15
mins

Divide the class in groups and direct them to this page: <https://www.iea.org/energyaccess/database/>

Ask students to:

1. Compare the rural electrification rate and the national electrification rate in the Democratic Republic of the Congo, India and Bolivia. Discuss the differences in the three countries and present your conclusions to the class
2. Compare the population without access to electricity and the population without access to clean cooking in the Democratic Republic of the Congo, India and Bolivia. Discuss the differences in the three countries and present your conclusions to the class

Tip: It may be important to take some time to define and discuss the meaning of: power outages (blackouts), greenhouse gases, energy efficient technologies, combustion ...

Step 4: Ecological Footprints

15
mins

Ask students if they have ever heard the term *Ecological Footprint*? *What might it mean?*

(If students are unsure of meaning, you may want to watch this video:
https://www.youtube.com/watch?time_continue=58&v=jgbY79Opn34)

Next, ask students to go to this website: <http://data.footprintnetwork.org/#> In groups get them to:

1. Find the ecological footprint per person in your country. Compare today's footprint to the footprint in 1980 and in 2000, discuss the changes.
2. Compare today's footprint of your country with today's footprint of countries from three different continents. Try to determine why the footprint is higher in some countries compared to others.

Step 5: Conclusion and Call to Action!

10
mins

Ask students to discuss in groups: *"Who can contribute to achieving Global Goal 7?"*

Suggested responses: We can all improve our energy consumption by installing more efficient technologies (consume less for the same result), more sustainable technologies (reduce the negative impact on the environment, for instance by using renewable energy in place of fossil energy) and developing better habits. Responsibility for meeting the Global Goal 7 lies in the hands of everyone and with all spheres of society: Governments must install the right policies and rules, the energy companies must implement the latest technologies to achieve the best possible outcome and must make it available at affordable prices, NGOs must help the most vulnerable, media must address the untold stories and everyone must try to become responsible consumers. You can take immediate action in your home by reducing your consumption, you can also identify innovative solutions that can be implemented in your school and involve your friends and teachers and finally you can adopt more sustainable travel habits (walk, bike, public transport).

To finish, ask students: *Consider your own ecological footprint, what changes could you make to improve it?*

Suggested ideas could include: Using LED light bulbs, smart power strips as well as energy efficient household appliances.

Share your lesson with us:

Send photos of your learning to lesson@project-everyone.org and info@wame2015.org **Tweet us** @TheWorldsLesson and @wame_2015, **Facebook** @TheWorldsLargestLesson, **Instagram** @theworldslesson!

If you would like to have more resources for Global Goal 7 head to <http://www.wame2015.org/>

And don't forget to add yourselves to our interactive global map!

<https://worldslargestlesson.globalgoals.org/map/index.html>

Activity 1 Civil Action to Promote More Sustainable Habits

For students living in a situation **where 100% access to energy has been achieved** they should identify where improvements (energy saving, energy efficiency, energy sustainability) can be made in the students home or the school buildings. The steps to be taken include:

1. Survey the types and amount of energy used in a given place (home, school or public building)
2. Identify ways to conserve energy in that place
3. Prepare a written report summarizing the observations and proposing the improvements you have identified
4. Present your report to your parents/headmaster/mayor explaining how you think they can introduce more sustainable energy consumption and possibly also save money

For students living in a situation **where 100% access to energy has not yet been achieved** they should identify where improvements to access can be achieved in the local community (public buildings including schools and health centers, private home owners, commercial use, industry). The steps to be taken include:











1. Review the national and local energy mix, quantifying the % of the population that does not have access to electricity and clean cooking facilities
2. Identify the national and local plans for providing access to energy (electricity and clean cooking) including identifying any shortfalls regarding meeting the SDG 7 by 2030 and proposing what needs to be done to address these shortfalls
3. Prepare a written report summarizing the observations and proposing the improvements you have identified
4. Write a letter to the local authority or local utility asking them to take part in the shared responsibility for meeting SDG 7 and highlighting the conclusions of your report and asking them to improve the situation


Activity 2 The Lumen Project

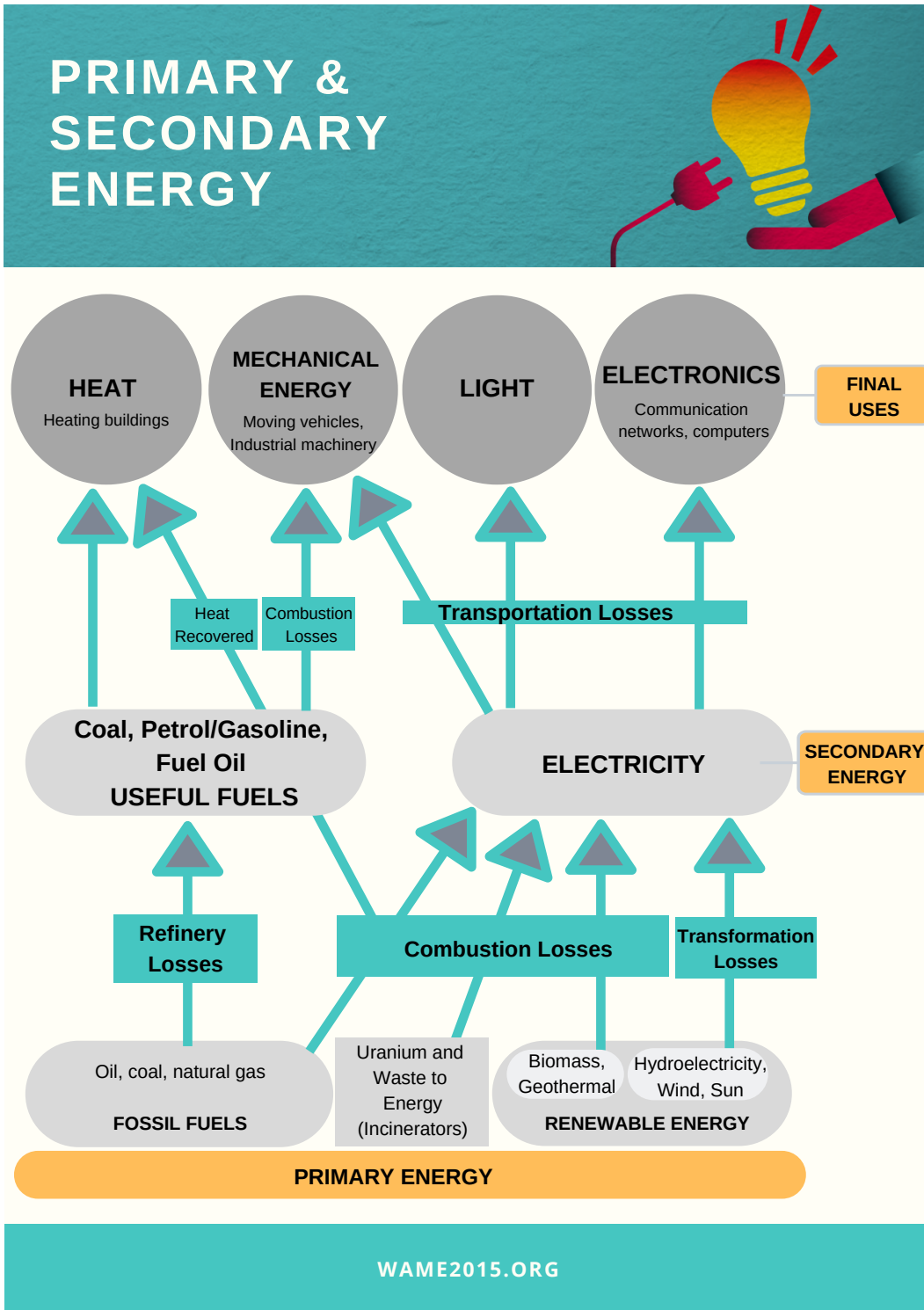
For class-room fun download the lumen version of Minecraft and let the students learn while playing:
<http://www.innoenergy.com/education/lumen/>

The Lumen project aims to teach students the fundamental concepts of energy with a focus on electricity. In the module, all the electrical components that are used act exactly the same as they would in the real world. This allows the students to experiment with electrical power in a safe and fun environment. They can construct electrical circuits which are stable, easy to use and can be developed further.

This is demonstrated, for example, by connecting solar panels and generators to light bulbs that light up if everything is done correctly. Voltage and ampere meters also show the voltage and the actual current being fed into the light bulbs from generator and solar panels. This shows that a solar panel produces less electricity than a generator, which means that more solar panels will have to be connected before the bulb lights up. The game can be used both in the classroom and at home, either playing yourself at your own pace or online with worldwide competition.

RENEWABLE SOURCES			NON-RENEWABLE SOURCES	
 Solar	 Biomass	 Wind	 Nuclear	 Natural Gas
 Hydro	 Wave	 Geothermal	 Coal	 Oil

 **WAME**
World Access to Modern Energy



A primary source of energy is one that occurs naturally. Fossil fuels (coal, oil and gas), and renewable fuels (biofuels, wind, waves, solar radiation) as well as nuclear fuels and waste for incineration are all primary sources of energy.

A secondary source of energy is one that is made using a primary resource. Electricity is secondary resource, and can be generated by a number of different primary sources, with or without combustion. It is important and largely used because it can provide a variety of energy services, moving elevators or surgical bistouries, charging mobile phones and computers, illuminating homes and streets, cooking meals. For cooking and heating we can use both primary and secondary energy.

Appendix 3: William and the Windmill



William Kamkwamba was born in a family of relative poverty in Malawi that relied primarily on farming to survive. At fourteen he was forced to drop out of school when famine struck Malawi and his parents were no longer able to pay the tuition fees. In a desperate attempt to retain his education, William began to frequently visit the village library.

It was there that William discovered his true love for electronics and where the pictures in the book *“Using Energy”* of windmills inspired him to build his own. Hoping to provide a steady source of water for his family’s farm, he gathered materials wherever he could find them. Using a bicycle wheel, plastic pipe and other bits and pieces, William succeeded in building a working windmill and providing energy for four light bulbs and two radios. The achievement of young William gained international attention and granted him the financial support to eventually build a second windmill that served to irrigate the farm.

THE GLOBAL GOALS

For Sustainable Development

