

DZUP EskweKalikasan Module 9

# Renewable Sources of Energy







## KAYANG-KAYA! PODCAST

***Kayang-Kaya!*** is a 10-episode podcast in Filipino that follows the adventures of three senior high school students, Kali, Naya, and Alab, as they seek to understand and uncover issues confronting the environment. As an educational tool, the podcast serves to supplement classroom discussion using aural storytelling.

In ***Episode 9***, titled ***"Paano napapagana ang cellphone ng hangin at tubig?"***, Barangay Luntian recently experienced brownouts due to simultaneous maintenance activities conducted by the power distribution utility in their community. In school, Kali and Naya wonder about the possibility of powering up their gadgets with the use of natural resources, such as water and wind, due to the power failures. Their quest to find out answers leads to bigger questions about the energy sector confronting the climate crisis.



**Images of gadgets the youth commonly use today**

# How electricity is generated

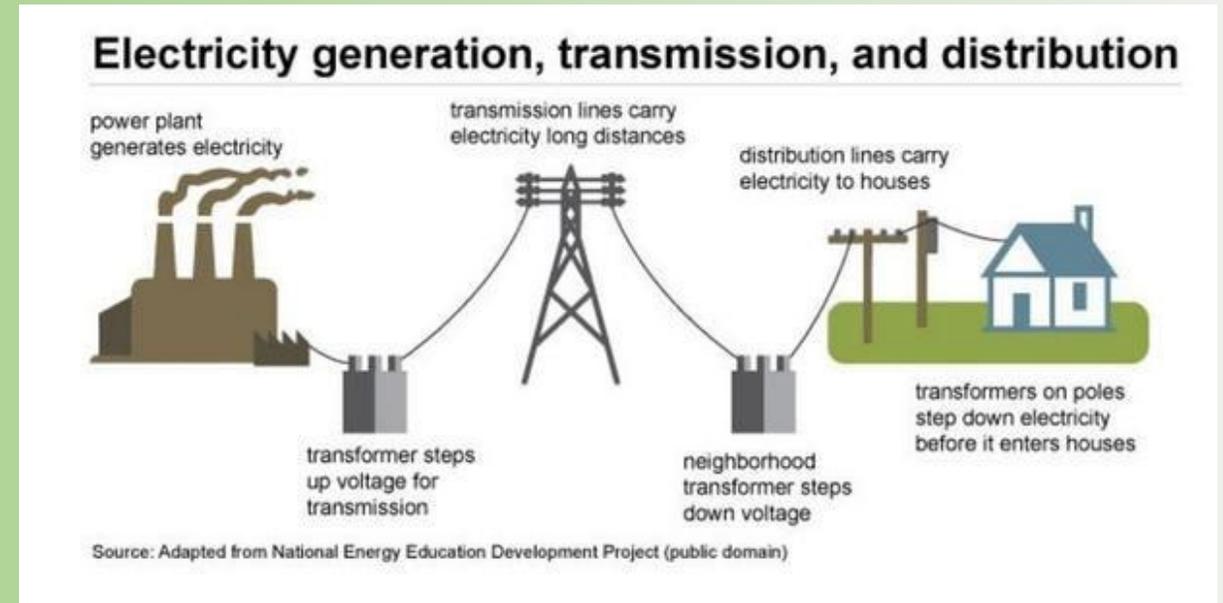
Power plants generate electricity with the use of various energy sources, such as coal, oil, and wind, among others. The energy is processed and turned into electricity, which then powers up our gadgets.

## Non-Renewable Energy

These are sources of energy that will eventually run out and take a long time to replenish. Since it typically takes millions of years to develop, these resources are finite.

## Renewable Energy

Often referred to as “clean energy,” they come from natural sources or processes that are constantly replenished quickly and dependably.



Source:

Electricity explained, How electricity is delivered to consumers [Online image]. (n.d.). eia.

<https://www.eia.gov/energyexplained/electricity/delivery-to-consumers.php>

Here's how electricity gets to your house. (n.d.). Alliant Energy Kids.

<https://www.alliantenergykids.com/AllAboutEnergy/HowElectricityIsMade>

Non-Renewable Energy. (n.d.). Solar Schools. <https://www.solarschools.net/knowledge-bank/non-renewable-energy>

Renewable Energy. (n.d.). Solar Schools. <https://www.solarschools.net/knowledge-bank/renewable-energy>

Shinn, L. (2018, June 15). Renewable Energy: The Clean Facts. NDRC. <https://www.nrdc.org/stories/renewable-energy-clean-facts>

# Types of Non-renewable Energy Sources

## Fossil fuels

- **Coal** – It comes from the remains of plants that died hundreds of millions of years ago. It has the highest level of carbon of all fossil fuels.
- **Oil** – Also known as petroleum, it can be extracted and refined to make products such as gasoline, diesel, and jet fuel.
- **Natural Gas** – It is formed from the remains of tiny sea plants and animals that died millions of years ago. It is mainly composed of methane.

Source: Non-Renewable Energy. (n.d.). Solar Schools. <https://www.solarschools.net/knowledge-bank/non-renewable-energy>

# Types of Renewable Energy Sources

- **Wind Energy** – Wind turbines generate electricity for residential and commercial purposes. Large blades on wind turbines harness wind energy.
- **Solar Energy** – It comes from the sun. It's the primary source of energy for all living things on Earth and can also be converted into electricity through solar cells.
- **Hydropower** – It comes from the force of moving water. Hydropower plants use dams to capture water energy and convert it into electricity.

Source: Renewable Energy. (n.d.). Solar Schools. <https://www.solarschools.net/knowledge-bank/renewable-energy>

## Other Types of Non-renewable Energy Sources

### **Nuclear fuel, such as uranium**

Uranium is a naturally occurring element found within the earth's core. Its extraction is through mining. When it reaches critical mass, uranium begins to break down and release energy, which heats the water it is immersed in.

Source: Non-renewable energy. (n.d.). National Geographic. <https://www.nationalgeographic.org/encyclopedia/non-renewable-energy/>

## Other Types of Renewable Energy Sources

**Geothermal heat:** Geothermal is the heat trapped beneath the earth's crust. It is captured and produced using steam that comes from the heated water pumping below the surface.

**Ocean/Wave energy:** It can be thermal or mechanical. The former relies on warm water surface temperature, while the latter uses the ebbs and flows of the tides to generate energy.

**Hydrogen:** It is used for both fuel and electricity when separated from other elements.

**Biomass:** It is any organic matter that comes from recently living plants and organisms. It includes wood, crops, seaweed, and animal waste.

Source: Black, A. (2018, November). 7 Types of Renewable Energy: The Future of Energy. Just energy. <https://www.justenergy.com/blog/7-types-of-renewable-energy-the-future-of-energy/>



## Other Types of Renewable Energy Sources

# How much of this type of energy do we use?

**Fact:** “Coal continuously dominated the power mix in 2019 by increasing its share from 52.1% in 2018 to 54.6%.”

Source:  
2019 Power Situation Report. (n.d.). Department of Energy.  
[https://www.doe.gov.ph/sites/default/files/pdf/electric\\_power/2019-power-situation-report.pdf](https://www.doe.gov.ph/sites/default/files/pdf/electric_power/2019-power-situation-report.pdf)

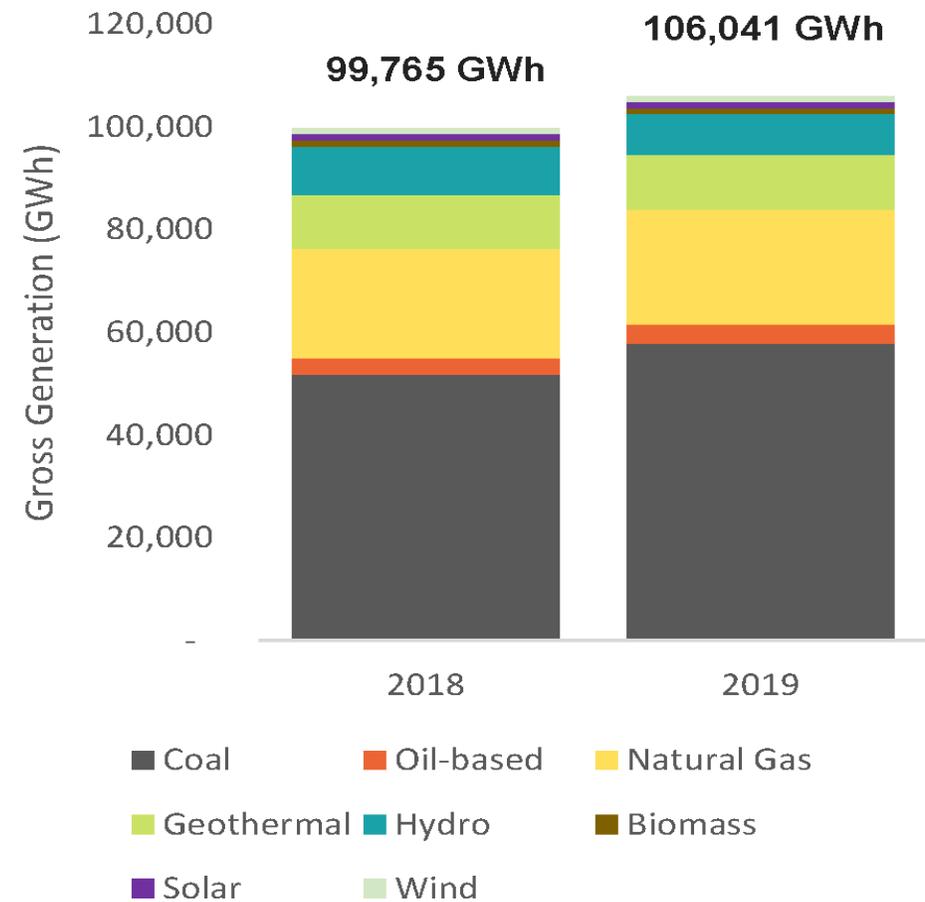


Figure 4. 2018 vs. 2019 Gross Generation, GWh

## Trivia (Did you know?)

Fossil fuels are typically found in specific parts of the world, making them more plentiful in some nations than others.

As a result, it makes the country reliant on fossil-rich countries. The Philippines imports 75 percent of its coal, mostly from Indonesia and Australia. (Insert map of Indonesia and Australia)

This is according to the Philippines-based Institute for Climate and Sustainable Cities (ICSC).

Sources:

Renewable Energy: The Clean Facts. (n.d.). NRDC. <https://www.nrdc.org/stories/renewable-energy-clean-facts>

Torralba, A. (2018, May 18). Coal-reliant Philippines struggle to power up clean energy. Reuters. <https://www.reuters.com/article/us-philippines-coal-renewables/coal-reliant-philippines-struggles-to-power-up-clean-energy-idUSKCN1J1DL>

# Renewable Energy Use in the Philippines

As of 2018, the percentage of renewable energy use in the Philippines is about 25 percent.

Based on a data released by the Department of Energy in 2018, the distribution per energy source is as follows.

Source:  
PES-STRAED. (2018, August 20). HOW RELIANT IS THE PHILIPPINES ON RENEWABLE ENERGY? Department of Science and Technology. <http://dost.gov.ph/knowledge-resources/news/56-infographics/infographics-2018/1487-how-reliant-is-the-philippines-on-renewable-energy.html>

<b>Geothermal</b>	<b>44.3%</b>
<b>Hydropower</b>	<b>41.5%</b>
<b>Solar</b>	<b>5.2%</b>
<b>Wind</b>	<b>4.7%</b>
<b>Biomass</b>	<b>4.4%</b>

# Renewable Energy Use in the Philippines

The distribution of energy per region is as follows.

Source:  
PES-STRAED. (2018, August 20). HOW RELIANT IS THE PHILIPPINES ON RENEWABLE ENERGY? Department of Science and Technology. <http://dost.gov.ph/knowledge-resources/news/56-infographics/infographics-2018/1487-how-reliant-is-the-philippines-on-renewable-energy.html>



**Luzon - 50%**

**Visayas - 30%**

**Mindanao - 20%**

## Renewable Energy Use in the Philippines

Per area:

**Hydroelectric power plants** are located in Pangasinan, Benguet, Laguna, Isabela, Bulacan, Nueva Ecija, Ilocos Sur, Bohol, Lanao del Sur, Lanao del Norte, Bukidnon, Davao del Sur, and Misamis Oriental (Solenergy Systems Incorporated, n.d.).

## Renewable Energy Use in the Philippines

**Geothermal plants** are located in Laguna, Sorsogon, Albay, Batangas, Negros Occidental, Leyte, and North Cotabato (Solenergy Systems Incorporated, n.d.).

## Renewable Energy Use in the Philippines

**Solar farms** can be found in Cavite, Pampanga, Ilocos Norte, and Cagayan de Oro (Solenergy Systems Incorporated, n.d.).

## Renewable Energy Use in the Philippines

**Wind power plants** are located in Ilocos Norte, Rizal, Guimaras, and Aklan (Solenergy Systems Incorporated, n.d.).

## Renewable Energy Use in the Philippines

**Biomass power plants** are found in Isabela, Nueva Ecija, Rizal, Laguna, Isabela, and Metro Manila.

Source: Renewable energy spots in the Philippines. (n.d.). Solarenergy Systems Inc. <https://solenergy.com.ph/renewable-energy-spots-philippines/>

# Advantages and Disadvantages of Non-Renewable Energy

## Advantages

- consistent
- always available
- easy and inexpensive to extract and store
- high in energy release
- easily stored, piped, and shipped anywhere in the world

## Disadvantages

- produces greenhouse gases that contribute to climate change
- climate change resulting to extreme weather events, shifting wild population and habitats, rising seas, etc.
- mining works damage the environment
- takes a long time to replenish
- rising costs (especially that the price of fuel fluctuates)
- high dependence on fuel-rich countries

# Advantages and Disadvantages of Renewable Energy

## Advantages

- abundant
- accessible
- safe
- clean
- environment-friendly
- no greenhouse gases emission
- less dependence on fuel imports
- lower energy bills
- expansion of energy access in developing countries

## Disadvantages

- storage capabilities
- not available 24/7
- geographic limitations
- location specific (for example, wind power is only applicable in some areas)
- costly, as technology still needs development
- requires massive amount of space (i.e., wind and solar farms)

Sources for slides 18-19:

Greenpeace. (n.d.). *Green is Gold*. <https://storage.googleapis.com/planet4-philippines-stateless/2019/05/b7d41fd1-green-is-gold-how-renewable-energy-can-save-us-money-and-generate-jobs-03.pdf>

Shinn, L. (2018, June 15). *Renewable Energy: The Clean Facts*. NRDC. <https://www.nrdc.org/stories/renewable-energy-clean-facts>

Non-renewable energy. (n.d.). *National Geographic*. <https://www.nationalgeographic.org/encyclopedia/non-renewable-energy/>

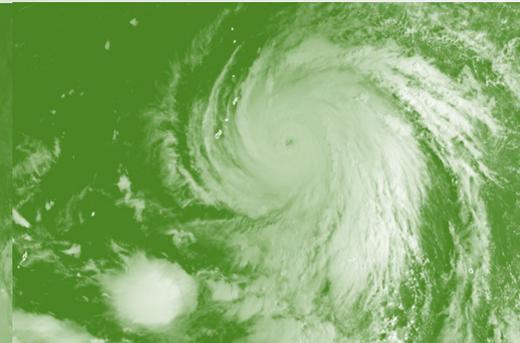


# Key Concepts

## Climate crisis is a reality.

- Burning fossil fuels, like coal, oil, and natural gas is harmful to the environment. They release carbon dioxide in the earth's atmosphere, contributing to the greenhouse effect.
- Greenhouse gases trap heat and make the planet warmer, which could lead to potentially catastrophic changes in the Earth's climate.

Source: Climate 101. (n.d.). The Climate Reality Project. <https://www.climaterealityproject.org/climate-101>



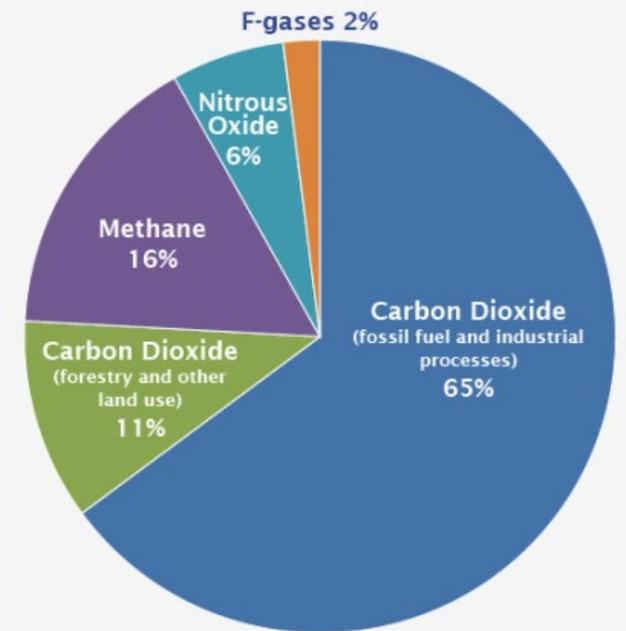


# Key Concepts

Over the past ten years, **the energy sector has remained the largest contributor to greenhouse emissions**, representing the biggest percentage of global emissions in 2013.

Source: Greenhouse Gas Emissions. (n.d.). EPA.  
<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

Global Greenhouse Gas Emissions by Gas



## Argumentative Question

Is it important for the Philippines to shift to renewable sources of energy? Can the Philippines shift to renewable energy sources? If yes, why? If no, why not?

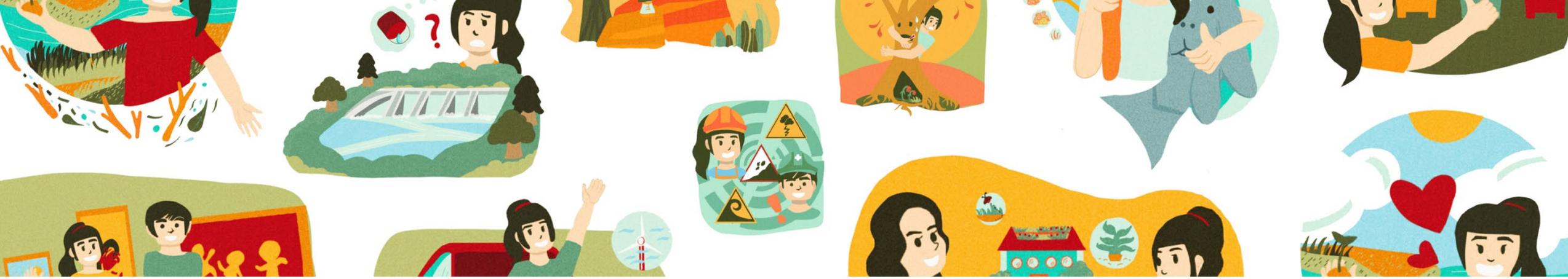
## Quotable Quote

*"The climate crisis has already been solved. We already have the facts and solutions. All we have to do is to wake up and change."*

Greta Thunberg



Photo: Anders Hellberg (used under Creative Commons CC BY-SA 4.0 License)



You may listen to this podcast episode at [dzup.org/eskwekalikasan](https://dzup.org/eskwekalikasan).  
Catch all ten episodes of *Kayang-kaya!* Podcast at [dzup.org](https://dzup.org).

**Episode 1:** Ano ang carbon footprint?

**Episode 2:** Kakaunti na lang ba talaga ang mga isda natin sa Pilipinas?

**Episode 3:** Ano ang kahalagahan ng pagtanim ng punò sa tao at sa kapaligiran?

**Episode 4:** Ano ang epekto ng “fast fashion” sa ating kalikasan?

**Episode 5:** Bakit kayâ summer na pero bumabagyo pa rin sa barangay namin?

**Episode 6:** Mapupunô ba ng basura ang barangay namin?

**Episode 7:** Bakit walang lumalabas na tubig sa gripo?

**Episode 8:** Paano maghahanda ang buong barangay laban sa disaster?

**Episode 9:** Paano napapagana ang cellphone ng hangin at tubig?

**Episode 10:** Bakit kailangang lumahok ang kabataan sa environmental movement?

If you'd like to know more about the renewable sources of energy, you may listen to the radio episodes of DZUP EskweKalikasan's Module 9. **Renewable Sources of Energy:**

**Radio Episode 1. Renewable and Non-renewable Energy Resources**

Guest: Gerry Arances

**Radio Episode 2. Renewable Energy in the Philippines**

Guest: Pedro Maniego Maniego

**Radio Episode 3. Where Does Our Electricity Come From?**

Guest: Gabriel Marco M. Manalac

**Radio Episode 4. Issues in Renewable Energy Sources**

Guest: Pete Montallana

**Radio Episode 5. Philippine Government Policies on Renewable Energy**

Guests: Marissa P. Cerezo and Pedro Maniego Maniego