



RENEWABLE ENERGY

Powering the Future, Sustainably

A Lesson in Environmental Science



2 Why Renewable Energy Matters

As the world's energy needs grow, where that energy comes from shapes our climate, our economies, and our future.



Climate & Environment

Renewable sources produce little to no greenhouse gas emissions during operation, helping slow climate change.



Economic Growth

Renewable energy is one of the fastest-growing industries, creating jobs in manufacturing, construction, and maintenance.



Energy Security

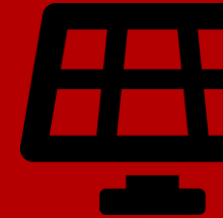
Sun, wind, and water are local and inexhaustible, reducing dependence on imported fuels.

3 What Is Renewable Energy?

“Renewable energy comes from natural sources that replenish faster than we use them — like sunlight, wind, and flowing water.”

— A working definition used by environmental scientists

- Unlike fossil fuels, renewable sources are not depleted when we use them.
- Most renewable sources produce electricity with little to no direct emissions.
- They can be harnessed almost anywhere sun, wind, or water is available.



Clean by Design

From rooftop solar panels to river dams, renewable technologies convert natural forces directly into usable electricity.

4 Types of Renewable Energy



Solar

Captures sunlight using panels to generate electricity or heat.



Wind

Turbines convert moving air into rotational, then electrical, energy.



Hydropower

Flowing or falling water spins turbines to produce electricity.



Geothermal

Taps heat stored beneath Earth's surface for power and heating.



Biomass

Organic material like crops or waste is converted into energy.



Tidal & Ocean

Harnesses the motion of tides and waves along coastlines.

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How Solar Panels Work



1. Sunlight Arrives

Photons from the sun strike the surface of a solar panel.



2. Cells Absorb Light

Photovoltaic cells convert sunlight directly into electric current.



3. Current Is Converted

An inverter turns the direct current into usable alternating current.



4. Power Is Used

Electricity flows into homes, businesses, or the grid, or is stored in batteries.

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How Wind Turbines Work



1. Wind Blows

Moving air flows across large turbine blades.



2. Blades Spin

The force of the wind rotates the blades around a central hub.



3. Generator Spins

The rotating shaft turns a generator inside the turbine housing.



4. Electricity Flows

Generated electricity travels through cables into the power grid.

7 Hydropower, Geothermal & Biomass



Hydropower

The largest single source of renewable electricity worldwide. Dams and river systems use flowing water to spin turbines, and pumped-storage plants can even store energy for later use.



Geothermal

Wells tap into heat stored deep underground to generate steady, round-the-clock electricity or to heat buildings directly, with minimal land disturbance.



Biomass

Organic matter such as crop waste, wood, or manure is burned or converted into fuel, recycling carbon that plants recently absorbed from the air.



PART TWO

Benefits & Challenges

Weighing the advantages of renewable energy against what stands in its way.

9 Benefits of Renewable Energy



Environmental Protection

Little to no greenhouse gas emissions during operation means cleaner air and a more stable climate.



Economic Opportunity

Renewable industries create jobs in installation, manufacturing, and maintenance around the world.



Energy Independence

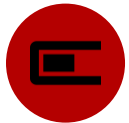
Local sun, wind, and water reduce reliance on imported and price-volatile fuels.

10 Challenges to Overcome



Intermittency

The sun doesn't always shine and the wind doesn't always blow, so output can vary.



Energy Storage

Storing extra power for cloudy or calm days still needs cheaper, larger-scale batteries.



Upfront Cost & Land Use

Building large solar or wind farms requires significant land and initial investment.

11 Renewables vs. Fossil Fuels



Renewable Sources

- Naturally replenished and effectively inexhaustible.
- Little to no emissions once built and running.
- Output can vary with weather, time of day, or season.



Fossil Fuels

- Coal, oil, and gas exist in limited underground supplies.
- Burning them releases greenhouse gases and air pollutants.
- Can generate steady power on demand, day or night.

12 Global Renewable Energy Facts

~30%

of the world's electricity now comes
from renewable sources

No. 1

Hydropower is the single largest
renewable electricity source

~1 Hour

of sunlight reaching Earth could power
the world for a year

**Fastest-
Growing**

Solar and wind are the fastest-growing
electricity sources today

Renewable capacity keeps expanding worldwide as solar and wind costs continue to fall, making clean power more accessible every year.

13 What Can You Do?



Use Energy Efficiently

Switch to efficient appliances and LED lighting to lower overall demand.



Consider Renewable Options

Look into rooftop solar or a green energy plan from your utility provider.



Support Clean Policy

Encourage schools, workplaces, and local leaders to invest in renewable energy.



Powering a Sustainable Future

Every kilowatt from the sun, wind, or water is a step toward a cleaner, more resilient world.

Thank You

