

3. Energy Resources

BVES-151: Environmental Studies

Unit 1: Fundamentals of Environmental Science and Ecology

Topic: Energy Resources

What are Energy Resources?

Energy resources are natural sources of energy used by humans for heating, electricity, transportation, and various other activities. They are broadly divided into two types:

- **Renewable Energy Resources**
- **Non-Renewable Energy Resources**

Renewable Energy Resources

Renewable energy resources are naturally replenished and never run out. They are environmentally friendly and sustainable.

1. Solar Energy

- **Source:** Sunlight captured by solar panels.
- **Uses:** Electricity, water heating, cooking, lighting.
- **Benefits:** Clean, abundant, reduces carbon emissions.
- **Challenges:** Initial setup cost, weather dependency.

2. Wind Energy

- **Source:** Wind turning turbine blades connected to generators.
- **Uses:** Electricity generation (wind farms).
- **Benefits:** Clean, renewable, no pollution.
- **Challenges:** Needs consistent wind; noise concerns.

3. Hydropower (Hydroelectric)

- **Source:** Flowing water (rivers, dams).
- **Uses:** Electricity generation.
- **Benefits:** Reliable, large-scale electricity, no emissions.
- **Challenges:** Ecological disruption, expensive dams.

4. Geothermal Energy

- **Source:** Heat from the Earth's core.
- **Uses:** Heating buildings, electricity generation.
- **Benefits:** Continuous, reliable, low emissions.
- **Challenges:** Limited to areas near tectonic activity; costly initial investment.

5. Biomass Energy

- **Source:** Organic matter (plants, animal waste).
- **Uses:** Cooking, heating, electricity, fuel.



- **Benefits:** Reduces waste, renewable, widely available.
- **Challenges:** Air pollution, deforestation if unmanaged.

□ Non-Renewable Energy Resources

These energy resources are finite—once used, they cannot be quickly replenished.

1. Coal

- **Source:** Fossilized plant material.
- **Uses:** Electricity generation, heating, industrial energy.
- **Benefits:** Abundant, low cost.
- **Challenges:** High pollution, carbon emissions, finite supply.

2. Petroleum (Oil)

- **Source:** Fossilized marine organisms.
- **Uses:** Transportation fuel (cars, planes), heating, plastic production.
- **Benefits:** High energy density, versatile.
- **Challenges:** Pollution, greenhouse gases, oil spills.

3. Natural Gas

- **Source:** Gas formed from decomposing organic matter underground.
- **Uses:** Heating, cooking, electricity generation, fuel.
- **Benefits:** Cleaner burning than coal/oil, reliable.
- **Challenges:** Methane leaks, carbon emissions, finite resource.

4. Nuclear Energy

- **Source:** Energy from nuclear reactions (uranium fission).
- **Uses:** Electricity generation.
- **Benefits:** High power output, no direct air pollution.
- **Challenges:** Radioactive waste, risk of accidents, expensive setup.

□ Importance of Sustainable Energy Use

Sustainable energy use means using energy in ways that do not harm the environment or exhaust resources:

- Protects environment from harmful emissions.
- Reduces dependency on limited resources.
- Supports long-term energy security.
- Improves public health by reducing pollution.

□ Ways to Use Energy Sustainably

Action	Impact
Switch off unused lights/appliances	Saves electricity and resources
Choose energy-efficient devices	Reduces energy consumption
Use renewable energy when possible	Cuts carbon emissions



Action

Impact

Encourage public transportation Lowers petroleum usage and pollution
Promote tree planting & green spaces Helps offset carbon emissions

☐ Renewable vs Non-Renewable: Quick Comparison

Aspect	Renewable	Non-Renewable
Availability	Unlimited	Limited
Environmental Impact	Minimal pollution	High pollution
Cost	Higher initial; lower long-term	Low initial; high environmental
Examples	Solar, wind, hydro, biomass	Coal, oil, natural gas, nuclear

☐ Quick Self-Check Questions

1. What is the main difference between renewable and non-renewable energy?
2. Give two examples each of renewable and non-renewable energy sources.
3. Why is sustainable energy use important?
4. Name three ways you can conserve energy in daily life.

☐ Key Takeaways

- Energy resources power our lives but impact the environment significantly.
- Renewable resources offer clean and lasting energy alternatives.
- Sustainable energy practices are crucial for protecting the environment and future generations.