

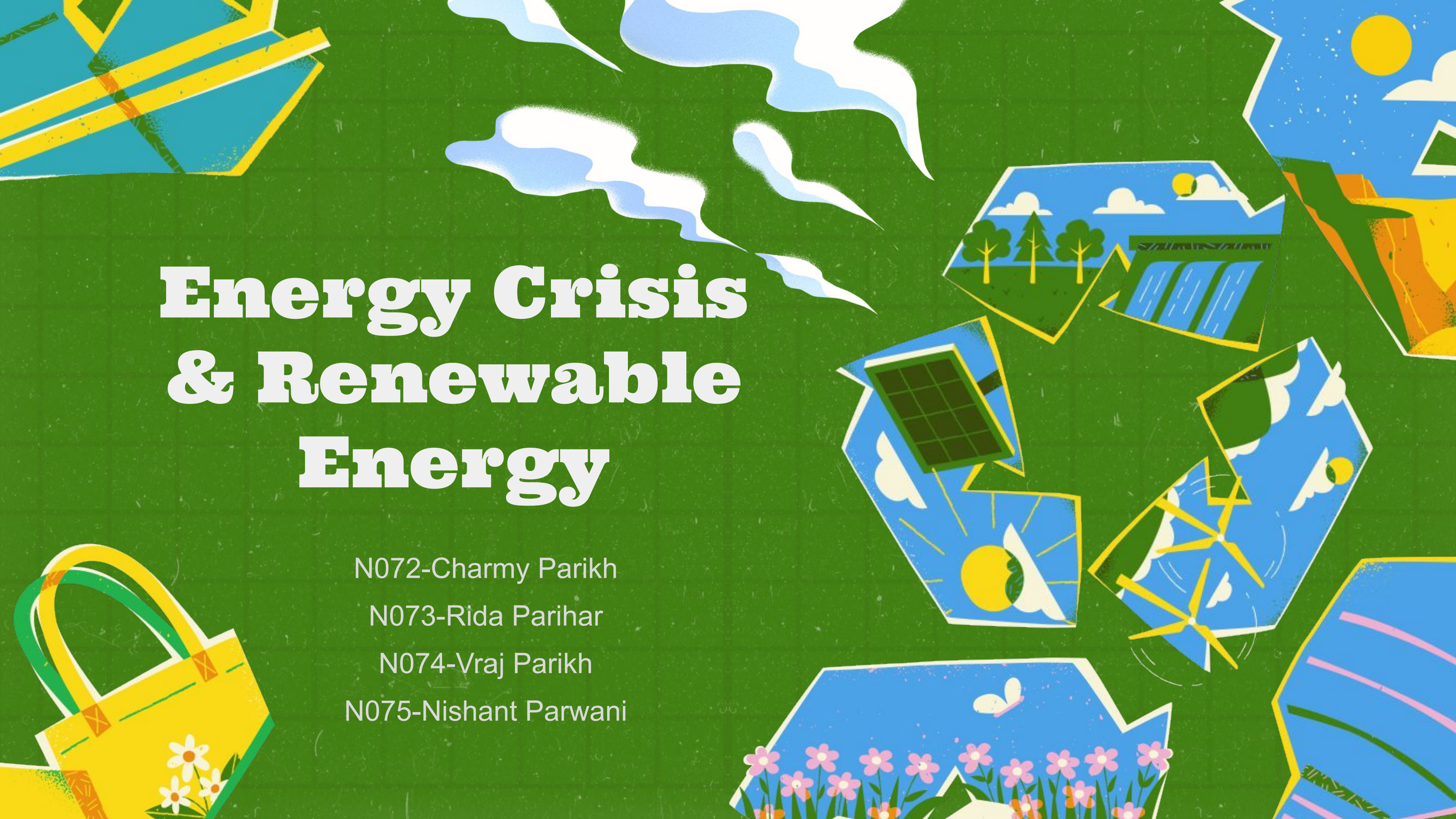
Energy Crisis & Renewable Energy

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Challenges



skyrocketing electricity
bills



oil shortages



power cuts

Understanding the Energy Crisis



Defining the Global Energy Crisis:

1

Definition of Energy Crisis

An energy crisis is characterized by a significant shortfall in the supply of energy resources, leading to increased prices and economic instability.

2

Significance to Modern Society

Energy is the lifeblood of modern society, powering industries, transportation, homes, and essential services, making its availability crucial.

3

Crisis Scope and Impact

The scope of an energy crisis can be global, regional, or national, impacting economies, societies, and environments on various scales.

Geopolitical Disruptions



Wars and Conflicts (Ukraine Example)

Conflicts, such as the 2022 Russian invasion of Ukraine, can disrupt energy supply, leading to price spikes and security concerns.

Political Instability in Oil-Producing Regions

Political instability in major oil-producing regions can curtail production and create uncertainty in global energy markets.

Impact of Sanctions and Trade Disputes

Economic sanctions and trade disputes can restrict the flow of energy resources, affecting supply and demand.

Economic Drivers



Rapid economic growth in developing nations increases the demand for energy, straining existing supplies and infrastructure.



Speculation in energy markets and price volatility can amplify energy crises, leading to unpredictable price fluctuations.



Disruptions to the energy supply chain, whether due to pandemics or other factors, can result in shortages and price hikes.

Impacts of Energy crisis:



Environmental Factors:



Natural Disasters Affecting Energy Production :

Natural disasters, such as hurricanes and floods, can damage energy infrastructure, disrupting production and distribution.



Climate Change and Fossil Fuel Reliance:

Continued reliance on fossil fuels contributes to climate change, exacerbating environmental risks and necessitating a shift to renewables.



Increased Fossil Fuel Use During Crises:

During crises, increased fossil fuel use may occur, undermining long-term sustainability goals due to immediate demands outweighing environmental issues.

Economic Impacts:



Inflation Driven by Energy Costs:

High energy costs can fuel inflation, particularly through increased transportation and production expenses.



Industrial Impact on Energy-Intensive Sectors:

Energy-intensive industries face increased operating costs due to high energy prices, affecting their competitiveness.



Recession Risk:

Persistent high energy costs and inflation can contribute to an overall economic downturn and recession risks.

Social Ramifications:

Energy Poverty and Unequal Access:

Energy poverty arises from the lack of affordable access to energy, impacting living standards and opportunities.

Power Outages Affecting Daily Life:

Frequent power outages can disrupt daily life, impacting essential services, businesses, and overall quality of life.

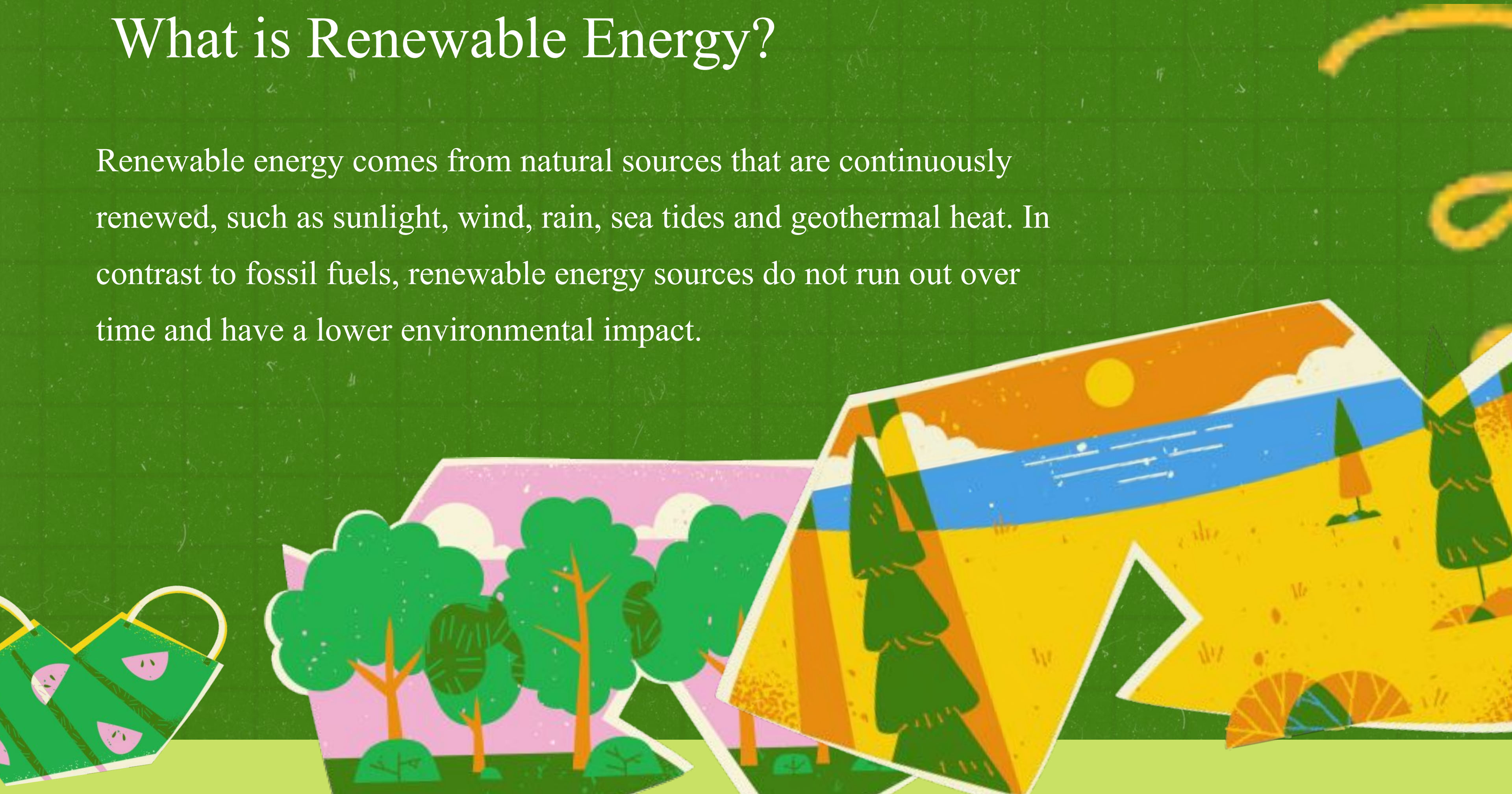


Potential for Social Unrest:

Prolonged energy crises and shortages can lead to social unrest and political instability as people struggle to cope with the consequences.

What is Renewable Energy?

Renewable energy comes from natural sources that are continuously renewed, such as sunlight, wind, rain, sea tides and geothermal heat. In contrast to fossil fuels, renewable energy sources do not run out over time and have a lower environmental impact.



Biomass Energy:

- Biomass energy is produced from organic materials such as wood, crops, and waste. It can be burned to produce heat or electricity, converted into biofuels for transportation, or processed into biogas for cooking or heating.



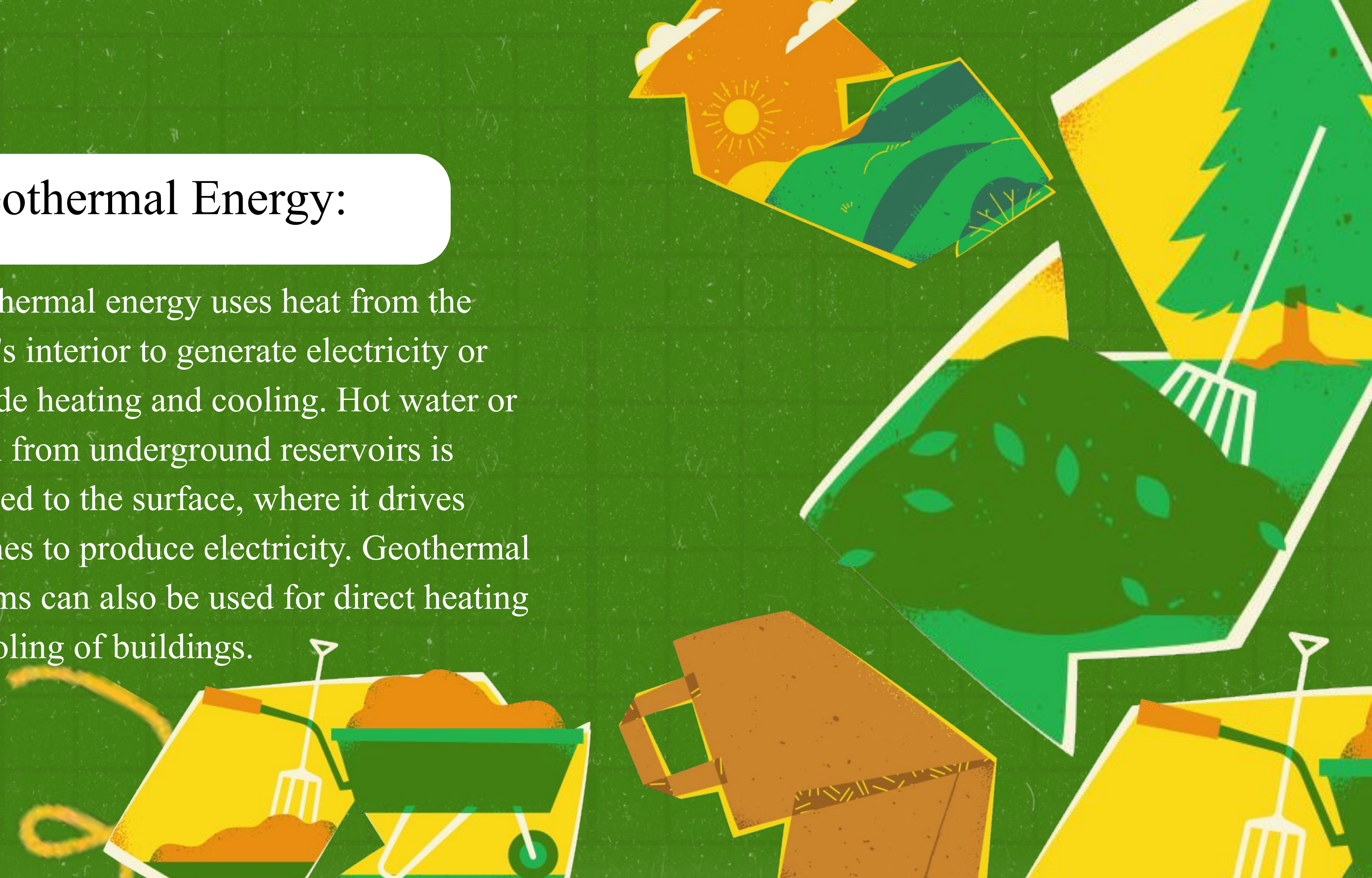
Wind Energy:

Wind energy is produced by converting wind movement into electricity using wind turbines. As wind passes through the blades of a turbine, it causes the blades to spin, which in turn drives an electrical generator to produce electricity. Wind farms can be located on land or in the ocean.



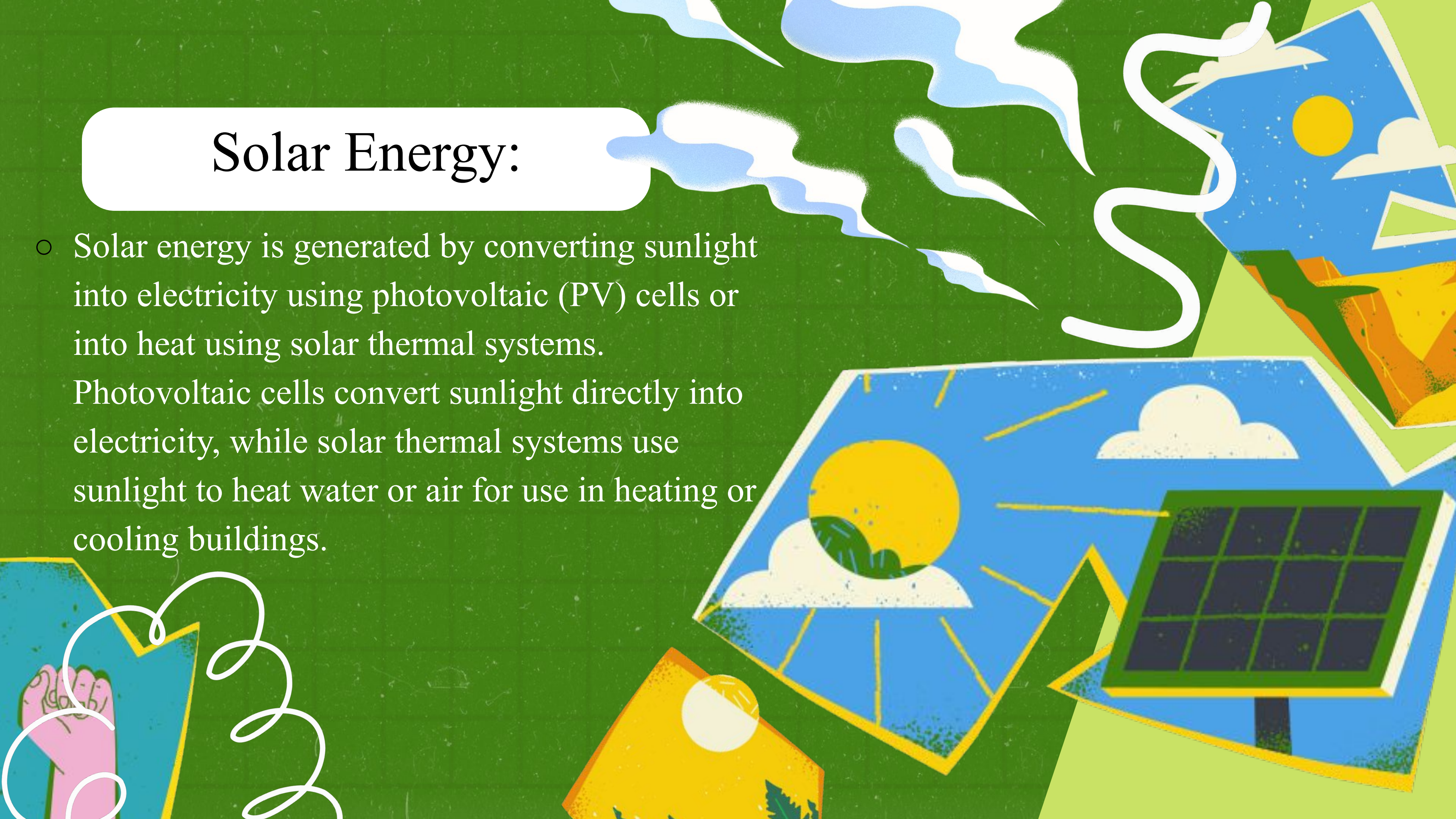
Geothermal Energy:

- Geothermal energy uses heat from the Earth's interior to generate electricity or provide heating and cooling. Hot water or steam from underground reservoirs is pumped to the surface, where it drives turbines to produce electricity. Geothermal systems can also be used for direct heating or cooling of buildings.



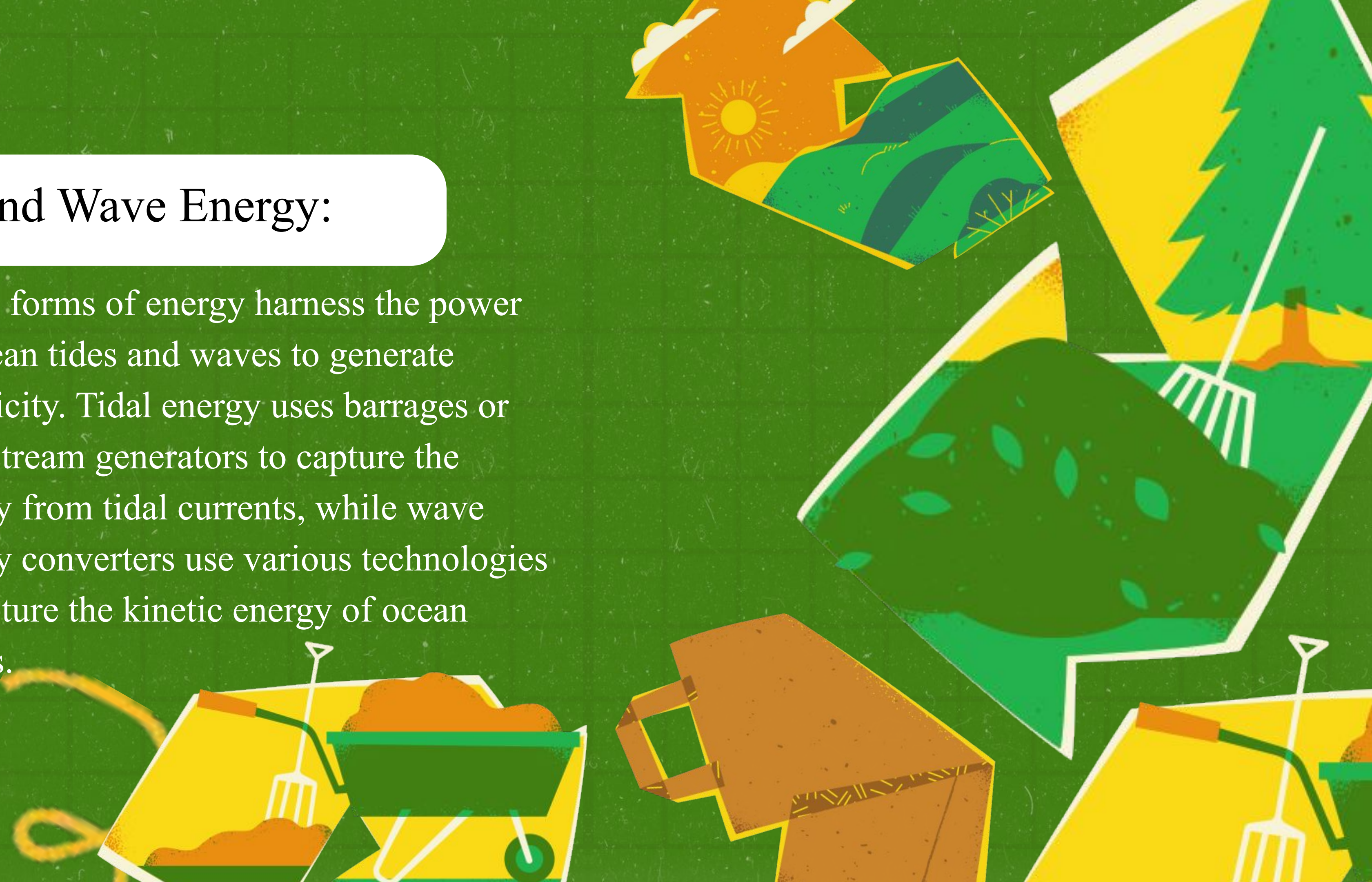
Solar Energy:

- Solar energy is generated by converting sunlight into electricity using photovoltaic (PV) cells or into heat using solar thermal systems. Photovoltaic cells convert sunlight directly into electricity, while solar thermal systems use sunlight to heat water or air for use in heating or cooling buildings.



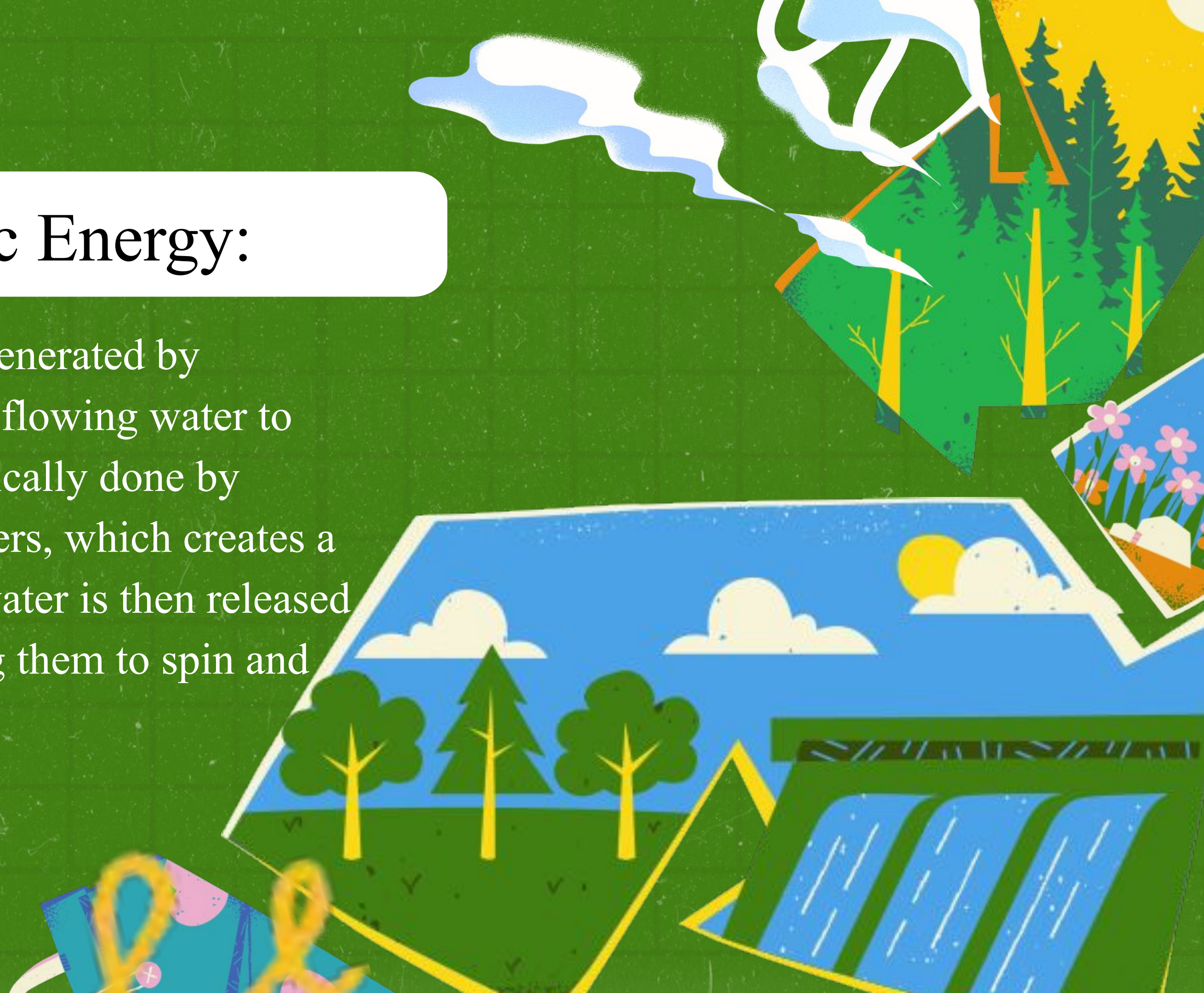
Tidal and Wave Energy:

- These forms of energy harness the power of ocean tides and waves to generate electricity. Tidal energy uses barrages or tidal stream generators to capture the energy from tidal currents, while wave energy converters use various technologies to capture the kinetic energy of ocean waves.



Hydroelectric Energy:

- Hydroelectric power is generated by harnessing the energy of flowing water to turn turbines. This is typically done by building dams across rivers, which creates a reservoir of water. The water is then released through turbines, causing them to spin and generate electricity.



Type of Renewable Energy	Advantages	Disadvantages
Solar Energy	Widely accessible, reduces greenhouse gas emissions, energy independence, low maintenance.	High upfront costs, intermittent energy source, requires large space for installation.
Wind Energy	Abundant resource, creates jobs, low greenhouse gas emissions, scalable.	Intermittent energy source, noise pollution, visual impact.
Hydroelectric Energy	Constant energy supply, low operational costs, scalable.	Geographic limitations, high upfront costs, potential environmental impacts on ecosystems.
Geothermal Energy	Reliable and constant energy source, low greenhouse gas emissions.	Limited geographic availability, high upfront costs, potential for induced seismicity.
Biomass Energy	Reduces waste, can be used for heating and electricity, <u>creates jobs</u> .	Can have air pollution issues, requires large land areas for feedstock.
Tidal and Wave Energy	Predictable and reliable energy source, low greenhouse gas emissions.	High upfront costs, limited geographic availability, still in early development stages.

Solutions and Recommendations



Prioritizing Renewable Energy

Accelerate the transition to renewable energy sources to reduce dependence on fossil fuels and mitigate climate change effects.



Enhancing Energy Efficiency

Implement and promote energy-efficient practices across all sectors to minimize energy consumption and reduce waste.



Promoting International Cooperation

Foster international cooperation to address shared energy challenges and facilitate the exchange of knowledge and resources.

Future Outlook

Sustainable Energy Transition

Advance the sustainable energy transition through integrated policies, technological innovations, and collaborative efforts.



Long-Term Energy Security

Focus on achieving long-term energy security through diversified and resilient energy systems that can withstand disruptions.

Mitigating Global Energy Crisis

Proactively address the underlying causes of energy crises to prevent future disruptions and ensure a stable energy supply for all.

Global Impact

1) Environmental impact:-

Reduction in Greenhouse Gas Emissions.

Renewable energy prevented about 2.1 billion tons of CO₂ emissions in 2022 alone.

Eco-friendly innovations (floating solar, offshore wind.)

Reduction in habitat destruction.

2) Economic Impact:-

Less reliance on imported oil & gas.

Have low operating costs compared to fossil fuels.

More stable & self-sufficient economies.

42 million jobs expected by 2050

Over 13 million jobs in renewable energy



3) Social Impact:-

Better Public Health

Solar microgrids & wind power **electrify remote villages**

Energy Access for Developing Regions

Community-owned wind and solar projects provide local economic benefits and reduce reliance on large corporations.

Decentralized renewable energy solutions (off-grid solar, microgrids, and wind turbines) bring electricity to rural and remote areas.



4) Political and Geopolitical Impact:-

Reduce competition over fossil fuel resources.

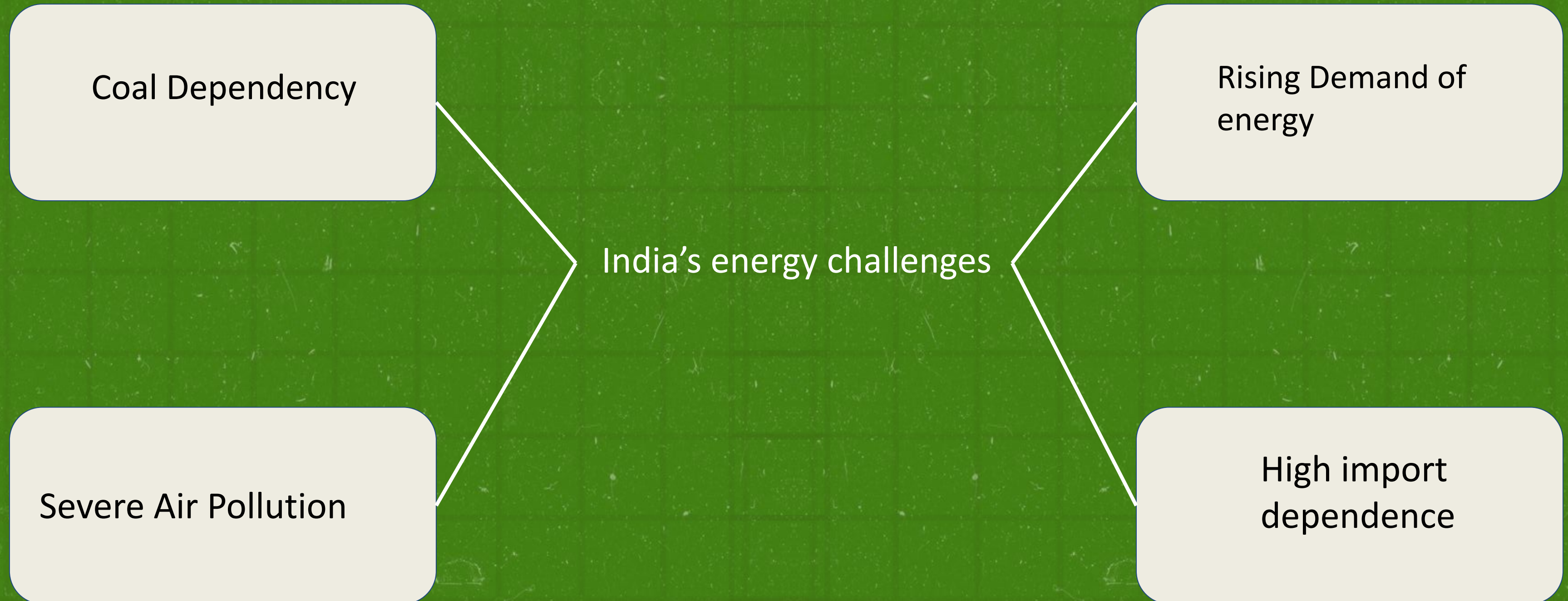
Agreements like the Paris Agreement push countries to transition toward 100% renewable energy.

Governments offer subsidies, tax incentives, and feed-in tariffs to accelerate the shift to renewables.

Countries with abundant sunlight and wind gain strategic advantages in energy markets.



Case Study:- India's Renewable Energy Revolution



— **Government Initiatives:**

National Solar Mission (2010)

Energy Transition Initiatives (2021)

Solar Park Scheme

Rooftop Solar Programme Phase II

National Green Hydrogen Mission



Achievements:-

1) Solar power:-

Fifth-largest installed solar capacity in the world.

The Bhadla Solar Park (Rajasthan) is the world's largest solar farm, generating 2.25 GW of electricity.

2) Wind Energy Expansion:-

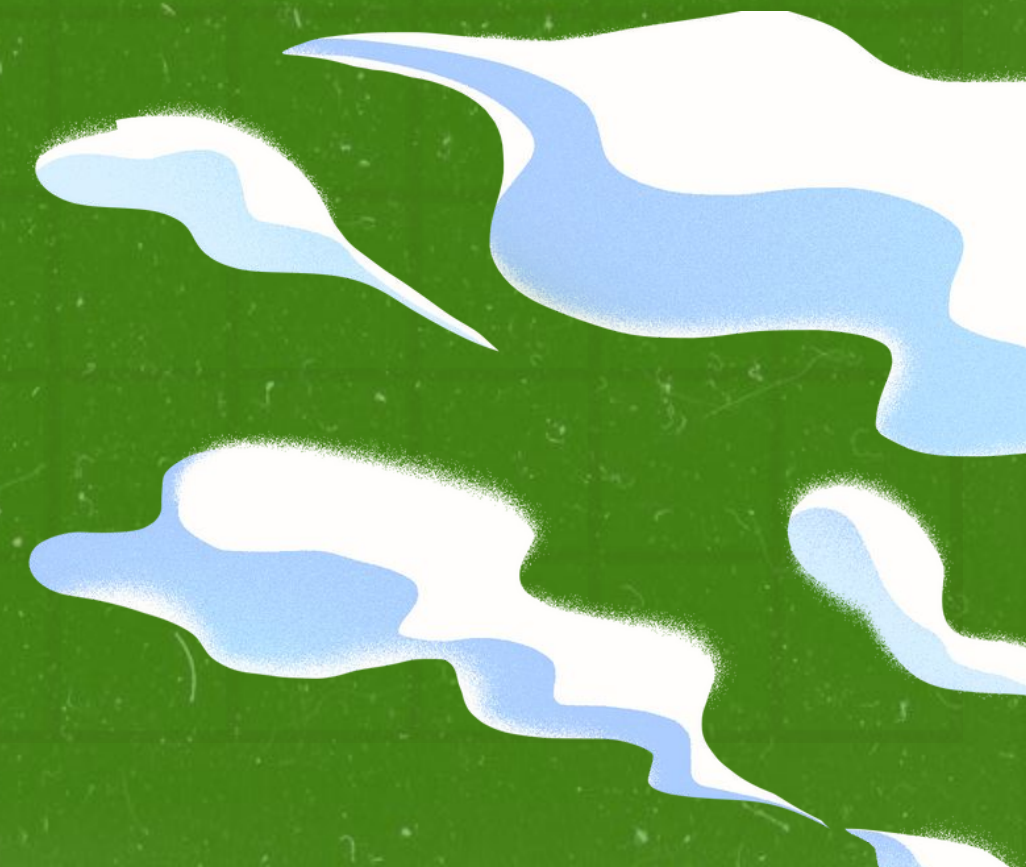
Fourth-largest wind power capacity worldwide.

Muppandal Wind Farm in Tamil Nadu generates 1.5 GW of wind power.

3) Hydropower and Biomass Energy:-

Hydropower contributes 13% of India's electricity.

States like Himachal Pradesh and Uttarakhand rely heavily on hydroelectric projects.



- 4) **Job Creation** – Over **1 million** jobs in solar & wind sectors
- 5) **Manufacturing Hub** – India emerging as a **solar panel producer**
- 6) **Rural Electrification** – *Saubhagya Scheme (2017)* powered **28 million** rural homes.
- 7) **Air Pollution Reduction** – Prevents **1 million** deaths yearly
- 8) Renewables have cut carbon emissions by 250 million tons per year and reduced respiratory diseases.





Conclusion

By harnessing renewable energy sources, we can reduce our impact on the environment, encourage sustainable development, and create a cleaner, healthier planet for future generations.

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Thank you