## BASIC CONCEPTS ON RENEWABLE SOURCES & NON-RENEWABLE RESOURCES

## RESOURCES

According to Erich Zimmermann, a resource is a function or operation that a thing or substance can perform to achieve a specific goal, such as satisfying a want. Zimmermann believed that resources are not fixed things, but rather what humans use to serve their wants at a given time. He also believed that "resources are not, they become". In other words, what is considered a resource today may not be considered a resource tomorrow, and vice versa. Zimmermann also believed that only human appraisal can turn the "neutral stuff" of the earth into resources.

Most natural resources, such as coal and petroleum, were formed millions of years ago. Other resources, such as sunlight, were present even before the earth was formed. Regardless, we all depend on these resources in some way or another. These resources are termed natural resources and are very important for life on earth. Natural resources are classified into renewable resources and non-renewable resources

# RENEWABLE AND NON-RENEWABLE SOURCES

- Renewable Resources
- The resources which cannot be exhausted even after continuous utilisation are termed renewable resources. Examples of renewable resources are the sun, wind, and tidal energy.
- Non-renewable Resources
- The resources which cannot be immediately replaced once they are depleted are called non-renewable resources. Examples of non-renewable resources include fossil fuels, such as coal, petroleum, natural gas and rare minerals typically found in meteorites.

### USES OF RENEWABLE ENERGY

Here are some common ways to use it:

- Solar Power: Capturing sunlight with solar panels to generate electricity.
- Wind Power: Wind turbines are used to produce electricity.
- Biogas: Creating energy from gases produced by landfills and wastewater treatment plants.
- Geothermal Energy: Utilizing heat from below the Earth's surface for power and heating.
- Biomass Energy: Burning organic materials like wood and crop waste to produce energy.
- Hydroelectric Power: Generating electricity from the flow of water in rivers and dams.
- Wave and Tidal Power: Using the movement of ocean waves and tides to generate power.

## **BENEFITS OF NON-RENEWABLE ENERGY**

1. Cleaner Air and Water

No Harmful Emissions: Renewable energy sources like wind, solar, and hydropower don't produce air pollutants or greenhouse gases. This means cleaner air for us to breathe. As of 2024, renewables accounted for approximately 41.4% of India's total installed capacity, significantly reducing air pollution and improving public health

Reduced Water Pollution: Unlike fossil fuel power plants, renewable energy systems don't produce toxic waste or require large amounts of water for cooling, keeping our water sources clean.

#### 2. Sustainable and Endless

Never Runs Out: Renewable energy sources are naturally replenished. The sun will shine, the wind will blow, and rivers will flow regardless of how much we use them. In 2024, India's renewable energy capacity reached nearly 446.2 GW, with a substantial increase in solar and wind energy

Long-Term Availability: Unlike oil, coal, and gas, which are finite, renewable sources will always be available, ensuring a sustainable supply of energy for future generations.

- 4. Energy Independence and Security
- Local Resources: By using renewable resources available locally, communities can reduce their dependence on imported fuels, enhancing their energy security. India is working towards increasing its domestic renewable energy capacity to ensure greater energy independence.
- Resilient Infrastructure: Distributed renewable energy systems, like rooftop solar panels, make energy infrastructure more resilient to natural disasters and outages.

#### 5. Economic Growth and Job Creation

New Jobs: The renewable energy sector creates jobs in manufacturing, installation, maintenance, and research, boosting local economies. In India, the renewable energy sector is expected to create millions of jobs as it expands. In 2024, renewable energy projects are expected to attract investments worth approximately \$16.5 billion

#### ► 6. Environmental Protection

- Biodiversity Conservation: By reducing pollution and the need for resource extraction, renewable energy helps protect ecosystems and wildlife habitats.
- 7. Health Benefits
- Fewer Respiratory Issues: Reduced air pollution from renewable energy means fewer cases of asthma, bronchitis, and other respiratory diseases.
- Around 99 percent of people worldwide breathe air that is polluted and poses a health risk, according to the World Health Organisation (WHO), and more than 13 million people die from preventable environmental causes, such as air pollution, each year. Transitioning to renewable energy can mitigate these health risks.
- Overall Well-being: Cleaner environments lead to healthier communities, with lower healthcare costs and better quality of life

- 8. Technological Innovation
- Technological innovation is one of the key advantages of renewable energy technologies.
- Advancement in Technology: The push for renewable energy drives innovation and technological advancements, leading to more efficient and effective green energy solutions.
- 9. Flexibility and Scalability
- Small to Large Scale: Renewable energy systems can be scaled to fit different needs, from small home installations to large power plants.
- 10. Community Empowerment
- Local Projects: Communities can develop their own renewable energy projects, creating local ownership and benefits. For instance, in 2024, several Indian states like Gujarat and Rajasthan led the way in renewable energy capacity expansion

## UTILIZING RENEWABLE ENERGY ACROSS VARIOUS SECTORS

- Renewable energy can be utilized in various sectors to provide power and heat:
- I. Buildings: In residential and commercial buildings, renewable energy sources such as solar panels, wind turbines, and geothermal systems can be used to generate electricity and provide heating and cooling. Solar water heaters can supply hot water, while solar photovoltaic (PV) systems can power lighting, appliances, and other electrical needs.
- Industry: Renewable energy can be integrated into industrial processes through the use of biomass, solar thermal energy, and wind power. These sources can provide electricity for machinery and production lines, as well as heat for processes like drying, melting, and steam generation. Renewable energy can also help industries reduce their carbon footprint and meet sustainability goals.

- 3. Agriculture: In agriculture, renewable energy sources can be used to power irrigation systems, greenhouses, and farm equipment. Solar energy can be utilized for drying crops and powering livestock operations, while biogas from organic waste can provide heat and electricity for farms.
- 4. Transport: The transportation sector can benefit from renewable energy through the use of biofuels, electric vehicles (EVs), and hydrogen fuel cells. Biofuels, derived from organic materials, can replace conventional fossil fuels in internal combustion engines. EVs can be charged using electricity generated from renewable sources like solar and wind, reducing emissions and reliance on fossil fuels. Hydrogen fuel cells, powered by renewable hydrogen, can provide a clean and efficient alternative for transportation.

## ADVANTAGES OF NONRENEWABLE RESOURCES

- Potential for Profitability: Investing in non-renewable resources such as oil, natural gas, and minerals can be highly profitable due to their scarcity. They also may be profitable because they play a role in various industries worldwide.
- Potential for Stability and Predictability: Non-renewable resources can offer a level of stability and predictability that can be attractive to investors. For example, consider how engrained oil and gas are in our society.

Continual Global Demand: Another advantage of investing in nonrenewable resources lies in their global presence. For instance, some public companies may only cater to clients in the United States. Meanwhile, nonrenewable resources may be sourced from emerging markets and used around the world. For investors not wanting to lock into certain specific economies, nonrenewable resources could be an international investment that spans geographic borders. OPEC expects an increase in production from the United States, Canada, and Brazil, for example.

## LIMITATIONS OF NONRENEWABLE ENERGY

- There are also some downsides to keep in mind when considering investing in nonrenewable energy:
- Environmental and Social Impact: One significant disadvantage of investing in nonrenewable resources is their detrimental environmental and social impacts. Extraction and processing of these resources can lead to deforestation, habitat destruction, water pollution, and greenhouse gas emissions. Political stances aside, these activities may contribute to climate change and can harm local communities' health and livelihoods. Investors must balance financial implications with potential non-financial outcomes.
- Volatility and Price Uncertainty: In the advantages section above, we talked about stability as an advantage. Unfortunately, nonrenewables may also come with high levels of volatility and uncertainty. Nonrenewable resources can be subject to significant price volatility due to geopolitical tensions, changes in global supply, technological advancements, and regulatory shifts. For instance, though we discussed growth in the section prior, the International Energy Agency still notes that the growth rate is slowing.

- Growing Costs: When investors think of nonrenewable energy, they may think about higher revenue due to the limited supply of a good. However, as that resource has a smaller and smaller supply that can be extracted from Earth, extraction costs may exponentially increase. This may mean the net margin of nonrenewable energy may fluctuate or even diminish if it becomes too difficult to affordably extract that resource. In addition, legislation like amendments to the Fluid Mineral Leases and Leasing Process rule increase leasing costs.
- Technological Advancements: We touched on this in a bullet above, but investing in nonrenewable resources raises concerns about long-term sustainability due to changes in technology. As society considers alternative ways of doing things and comes up with more modern solutions that rely on renewable energy sources, nonrenewable energy faces long-term obsolescence in favor of more efficient solutions.

## ENVIRONMENTAL IMPACT OF NON-RENEWABLE ENERGY

- Greenhouse Gas Emissions: Burning non-renewable energy sources, particularly fossil fuels, releases significant amounts of carbon dioxide and other greenhouse gases into the atmosphere.
- Air Pollution: Non-renewable energy production and consumption result in the emission of air pollutants leading to poor air quality and adverse health effects.
- Water Pollution : The extraction and utilisation of non-renewable energy resources through coal mining leads to water pollution. Spills, leaks, and improper waste disposal can contaminate water sources.
- Land Degradation: Extracting non-renewable resources involves land disturbance, deforestation, and soil erosion.

### CONSERVATION OF NON-RENEWABLE ENERGY

- Here are several reasons why there is a need to conserve non-renewable energy:
- Finite Resource: Non-renewable energy sources are limited in supply and will eventually run out. By conserving these resources, we can prolong their availability for future generations.
- Environmental Impact: Non-renewable energy production and consumption have significant ecological consequences. By conserving non-renewable energy, we can reduce these negative impacts.
- Climate Change Mitigation: Non-renewable energy sources are significant contributors to greenhouse gas emissions.. Conserving non-renewable energy is crucial in mitigating climate change.
- In summary, conserving non-renewable energy is essential to ensure long-term resource availability, minimise environmental impacts and mitigate climate change.

