Innovation and Entrepreneurship for the Digital Economy

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Innovating Green Economy: Problems and Solutions for Sustainable Development and Poverty Alleviation

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Presentation Outline

Introduction

- The current level of global economic growth is not something that can continue without facing challenges in the future.

- Various terms have been established to describe efforts aimed at improving environmental performance.

- Whether it is green technology, green economy or green growth, all these terms imply to focus on utilizing environmentally sustainable renewable energy sources (Shahzad *et al*., 2022).

Henan Province GDP Per Capita (1994-2020)

Natural Degradation (as measured by wastewater, waste gas, and SO_2) in Henan Province from 1994-2020
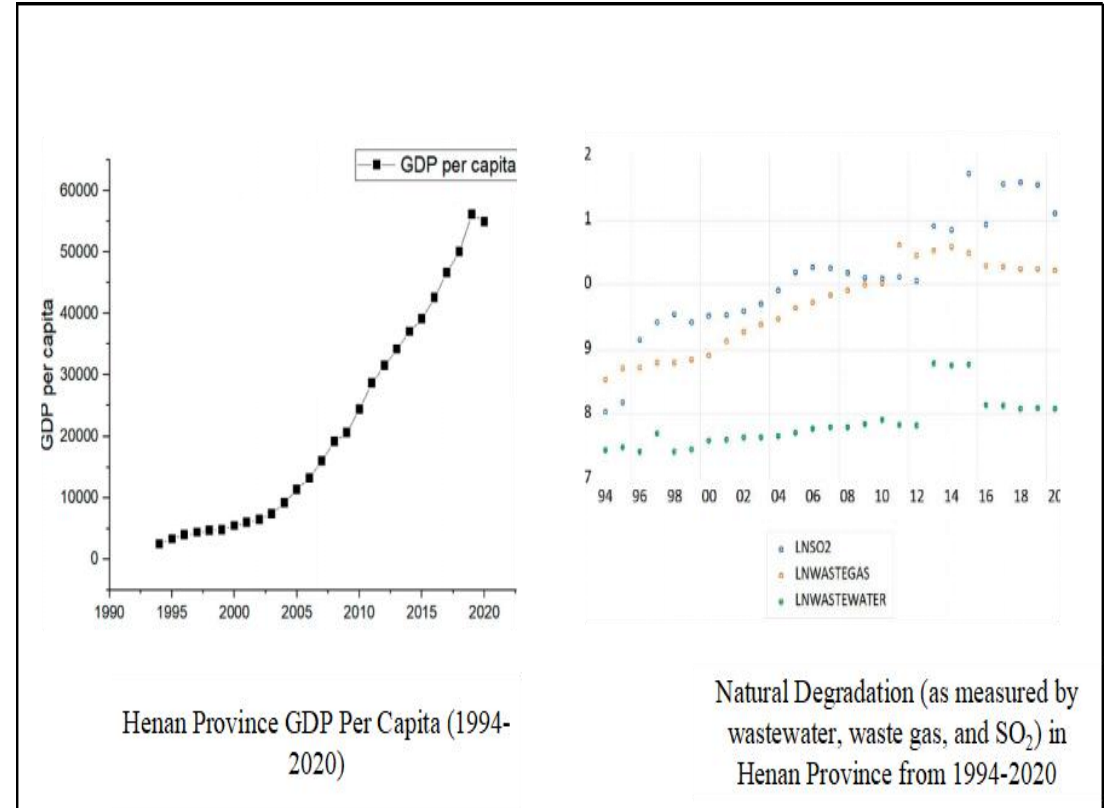
Main Objective

Explore and analyze the potential of innovative green economy solutions as a means to achieve sustainable development and alleviate poverty.

Sub-Objectives

1. Assess recent advances in renewable energy technologies and their potential contribution to the green economy.

2. Compare and contrast global green economy innovation initiatives with local sustainability initiatives.

3. Identify growth opportunities in the green economy and propose solutions to environmental and economic challenges.

4. Analyse successful case studies of green economy innovation and extract best practices for implementation.

Figure 1: Patterns of economic growth as one the source of environmental degradation

Continued

- Green Growth emphasises increase in investment and promoting innovation to support sustainable development and create new economic opportunities.

- A green economy is low in carbon,

use of resources efficiently, and is socially inclusive.

TRANSITIONING TO A GREEN ECONOMY

Material Intensity of Asia and the Pacific measured in Domestic Material Consumption per dollar.

Latest Advances in Renewable Energy

Exploring the latest advances in renewable energy is critical to identifying innovative solutions that can accelerate the transition to a green economy.

Solar Innovation:

Perovskite solar cell: it is new type of solar cell that uses perovskite structural materials to convert sunlight into electrical energy.

Tandem solar cells : These cells combine two or more different types of solar cells with complementary absorption wavelengths to achieve higher total efficiency compared to single-junction cells it works by stacking cells with different band gap and it can convert a wider range of sunlight into electricity more efficiently.
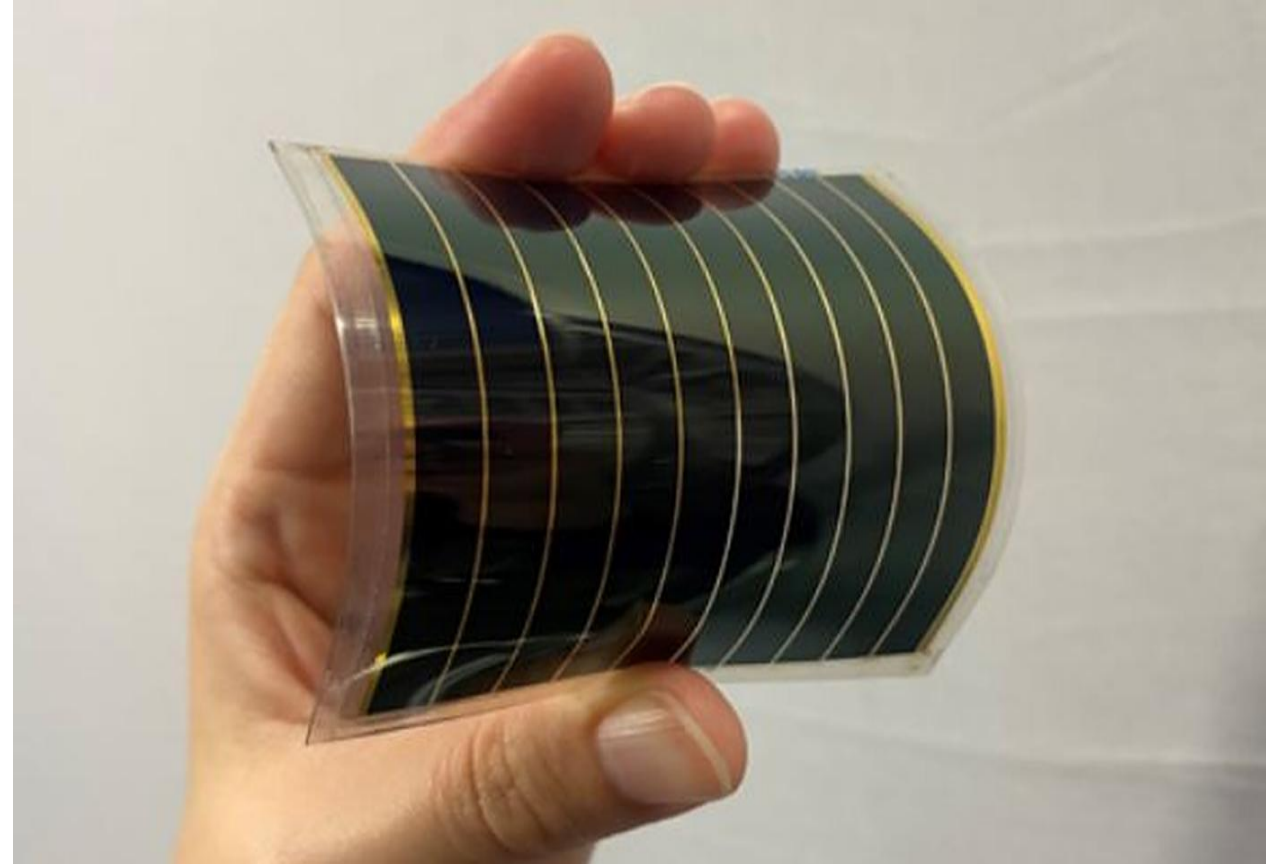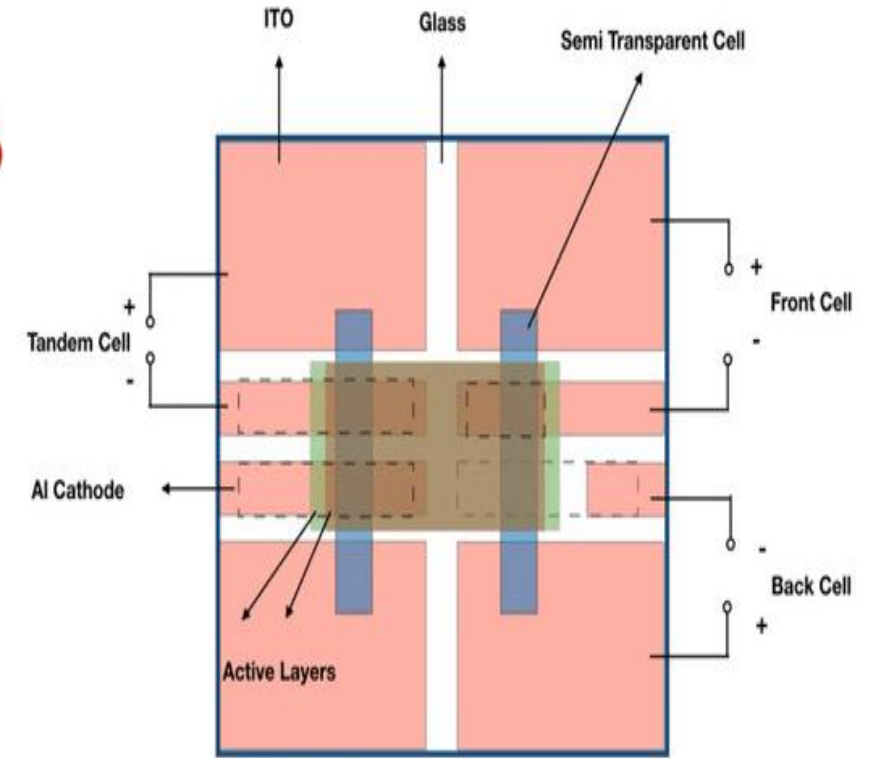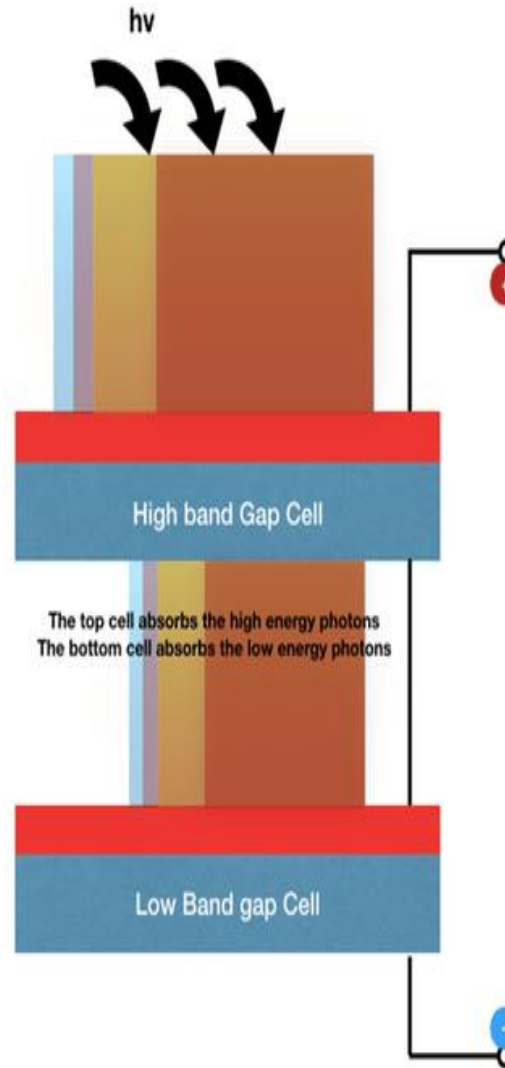

Figure 1: Perovskite solar cell

Latest Advances in Renewable Energy and Key Players and Their Contributions

- **Organic photovoltaics:** uses organic molecules (carbon) to convert sunlight into electricity and the materials are known for being lightweight, flexible and potentially cheaper to manufacture than traditional silicon-based solar cells.

- **Wind power development**

Advances in wind power technology have transformed the efficiency and scalability of wind farms around the world.

Innovations such as **floating wind turbines** and **vertical axis wind turbines** are pushing the boundaries of wind power and driving progress toward a low-carbon future.

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High band Gap Cell

The top cell absorbs the high energy photons
The bottom cell absorbs the low energy photons

Low Band gap Cell

ITO

Glass

Semi Transparent Cell

Tandem Cell

Al Cathode

Active Layers

Front Cell

Back Cell

Advances in Green Technology

In recent years, green economy energy storage technology has advanced significantly, offering possibilities for effectively storing renewable energy and improving grid stability.

- Advanced lithium-ion batteries- Lithium-ion battery technology is predicted to advance until 2024, with an emphasis on increasing energy density, safety, and cycle life.

Solid-state electrolytes, silicon anodes, and novel cathode materials are being investigated to improve the performance of lithium-ion batteries.
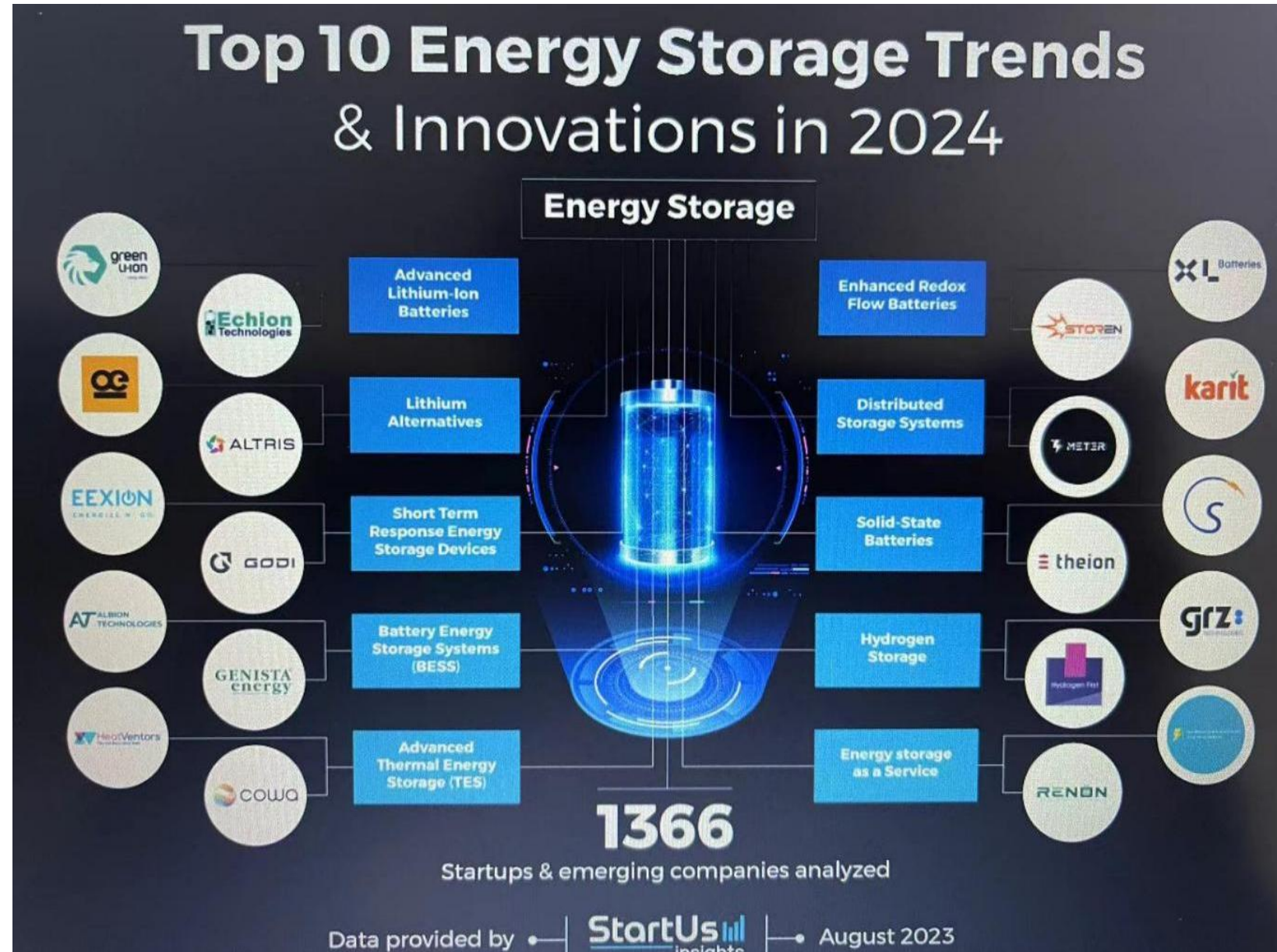
Advances in Green Technology

- **Advances in Electronic Vehicles (EVs)**

- **Autonomous driving:** Self-driving technologies are becoming more common in electric vehicles, boosting road safety, convenience, and efficiency. Advanced driver assistance systems (ADAS) and autonomous driving features continue to advance, opening the road for completely driverless electric vehicles in the future

- **Battery technology**: Electric vehicles benefit from developments in battery technology, such as increased energy density, faster charging, longer service life, and reduced pricing. Solid-state batteries and silicon anodes are among the advances that improve electric vehicle performance and range.

- **Fast charging infrastructure:** The establishment of fast charging infrastructure is critical to reducing range anxiety and boosting the ease of electric car ownership. Investments in ultra-fast chargers, high-power charging networks, and wireless charging technology are speeding up the adoption of electric vehicles.
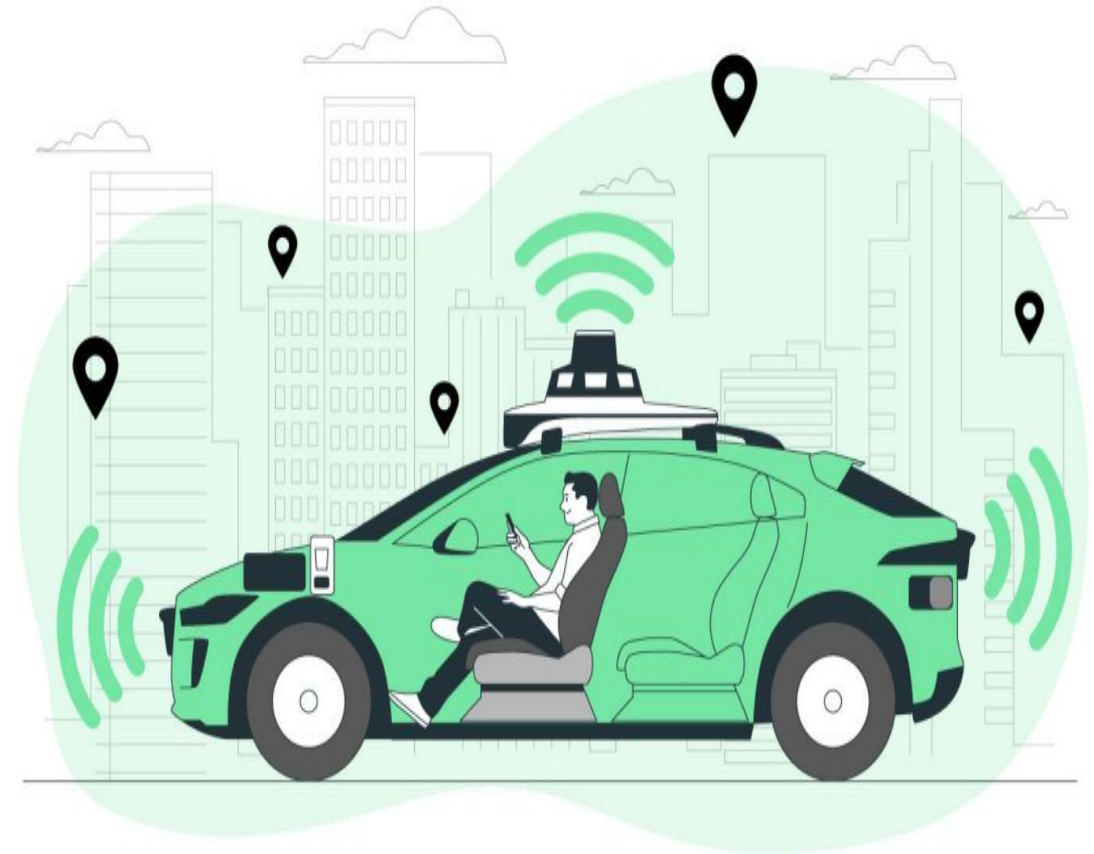
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Figure : Self Driving Vehicles

Advances in Green Technology

Advances in Sustainable Agriculture :

IoT in agriculture:
 refers to a network of physical objects, automobiles, appliances, and other items equipped with sensors, software, and connection that allows them to communicate and share data via the internet.

Geographical Information Systems (GIS) in Agriculture:
  GIS in agriculture uses technology such as drones and satellites to determine crop position and kind, fertilisation level, soil status, and other data.

AI/ML and Data Science for Agriculture Technology:
Farmers who use AI/ML and data science technology find it easier to forecast crops. 3D laser scanning and spectral imaging/spectral analysis, for example, can assist farmers in forecasting weather patterns and optimising the use of irrigation, fertilisation, and pest management resources.

Collaborations Among Government, Industry And Academia

- Collaboration among government, industry, and academia is crucial for expanding renewable energy, encouraging green innovation, and supporting sustainable development.

- Government involvement is critical to provide regulatory frameworks, incentives and financing opportunities to support renewable energy projects, green innovation initiatives and the Sustainable Development Goals.

- Industry engagement is crucial to driving commercialization, adoption and scale of renewable energy technologies and green innovation.

- Collaborative research projects, joint ventures and technology transfer programs enable academia to bridge the gap between theory and practice, accelerating the translation of research breakthroughs into real-world applications.

Figure 4. Collaborations Among Government, Industry And Academia

Global Vs. Local Initiatives

International Efforts for a Green Economy:

Landmark Agreements:

Financial Institutions:Green Climate Fund (GCF):International Organizations:UN Environment Programme (UNEP):

International Renewable Energy Agency (IRENA):

Regional Initiatives:

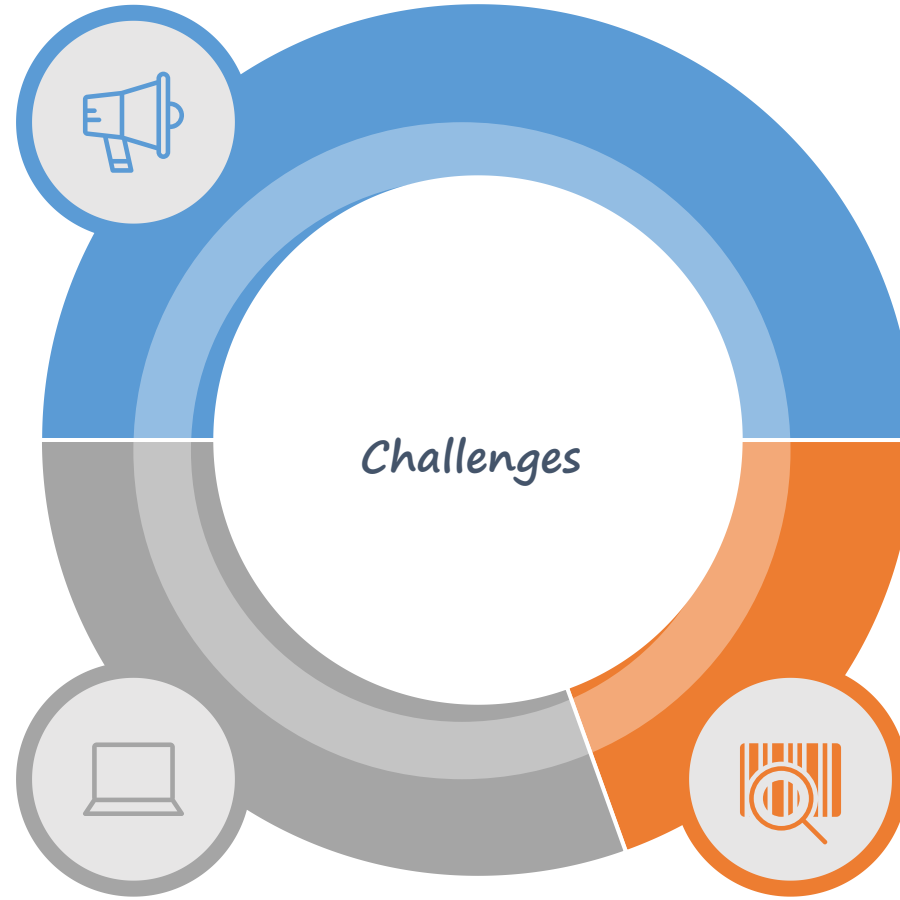The Belt and Road Initiative The European Union's Green Deal:

Challenges for Innovating Green Economy

Recommendations

- **Awareness Campaign**: Raise public and business awareness

- . **International cooperation:** collaborate on global efforts to combat climate change and promote sustainable development.

- **Invest in Green R&D**: Increase funding for research and development of next-generation renewable energy technologies, energy storage solutions, and sustainable materials.

- **Implement Carbon Pricing:** Introduce carbon pricing mechanisms like carbon taxes or cap-and-trade systems to incentivize businesses and industries to reduce emissions.

- **Streamline Green Permits:** Simplify permitting processes for renewable energy projects and green infrastructure development to reduce red tape and expedite implementation.

- **Invest in Public Transportation:** Develop and expand clean and efficient public transportation systems to reduce reliance on private vehicles and air pollution.

- **Support Green Finance:** Issue green bonds and create a policy framework that attracts private investments in sustainable projects.

THANK YOU