

FINANCING GLOBAL ENERGY TRANSITION



The global shift towards sustainable energy has reached a critical juncture. While the period 2010-2021 saw remarkable cost reductions for solar and wind power technologies, scaling up technologies like green hydrogen, energy storage, and offshore wind is imperative for the next stage of the energy transition. However, access to funding in many emerging and low-income economies is not sufficient, and often too costly to accelerate the energy transition at the necessary rate. This underscores the critical role of affordable finance in ensuring the success of this transition as well as in meeting global climate goals.

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I. What do we understand by Energy transition?

- It refers to the global **energy sector's shift from fossil-based systems of energy** production and consumption-including oil, natural gas and coal- **to renewable energy sources** like wind and solar, as well as lithium-ion batteries.
- The primary goal of energy transition is **to reduce**

carbon emissions and promote sustainability. It is therefore **a crucial enabler of sustainable development and climate resilience.**

- Global energy transition **demands a substantial infusion of financial resources** to drive innovation, infrastructure development, and global climate action.

I.I. What factors underscore the necessity of a global shift in energy sources and systems?

The need for energy transition to sustainable sources arises from several pressing challenges and imperatives that humanity faces today. These include:

- **Climate Change Mitigation:** Transitioning to low-carbon energy sources is essential to limit global warming to safe levels and mitigate its adverse effects.
- **Global Commitments:** Energy sector accounts for approximately 65% of total global GHG emissions. These need to be reduced dramatically, and eventually eliminated, to meet the goals of the Paris Agreement to limit the global temperature rise to within 1.5°C.
- **Energy Security:** Transitioning to domestic and renewable energy sources enhances energy security by reducing dependence on fossil fuel imports.
- **Depletion of Non-Renewable Resources:** Transitioning to renewable energy sources, which are essentially inexhaustible, helps mitigate resource depletion concerns.
- **Hedge against fossil fuel price volatility:** Renewables, once installed, provide multi-decadal

energy independence and, thus, minimise the effect of instability of international energy markets.

➤ **Need for energy transition in India:**

- Sector-wise, **electricity generation is a major contributor in India's Greenhouse Gases (GHG) emissions** (contributing around 34 % in total emissions in 2019).
- In order to fulfil its **Nationally determined contributions (NDCs) and Panchamrita Pledge**, such as- achieving 50% energy from non-fossil fuel resources by 2030, net-zero emissions by 2070, etc.
- To reduce its **dependency on energy imports** to overcome issues related to **energy supply chain volatilities.**
- Spending on more efficient appliances, electric and fuel cell vehicles, building retrofits and energy-efficient construction **provide further employment opportunities.**

Box I.I. 'Just' Energy Transition

Just Energy Transition **puts people at the centre** of the energy transition. **International Labour Organization (ILO) defines Just Energy Transition** as "Greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind".

- Just Energy Transition **seeks to strike a balance between environmental goals and social equity** by ensuring that vulnerable and disadvantaged communities are not disproportionately affected by the changes.

Figure 1.1. Global Energy Transition Trends

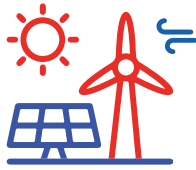
Globally



Renewables make up around **30%** of electricity generation.



300 GW of renewables were added in 2022 accounting for 83% of new capacity.



88% and 68% cost reductions for solar PV and onshore wind respectively.

USD 1.3 trillion investments across all energy transition technologies in 2022 (a record high).



Targeted share of renewables in the global energy mix - **77%** by 2050 (1000 GW).



Financing targets- **USD 150 trillion**, approx. 4.4 trillion annually.

Source: World Energy Transition Outlook 2023 (IRENA)

Case in India



Renewables made up around **20%** of electricity generation, 180 GW of installed capacity.



Targeted share of renewables in the energy mix- **50%** by 2030, 500 GW of installed capacity.









Financing targets: **USD 28 billion** will be required annually from 2022 to 2029.



1.2. What are the available technological avenues for energy transition?

Technological avenues for energy transition encompass a range of innovations and solutions for balancing intermittency and increasing the efficiency of renewable power systems.

Table 1.1. Technological avenues that support energy transition

	Energy conservation and efficiency solutions	These include upgrades, retrofits, repairs and replacements of end-use appliances and other circular economy practices .
	Renewable energy technologies	These include Solar Photovoltaic (PV) Panels, Wind Turbines, Hydroelectric Power, Biomass Energy and Geothermal Energy .
	Electricity storage technologies	These include battery technologies like lithium-ion batteries, Redox-flow batteries (RFBs), Liquid metal batteries etc.
	Development of Hydrogen	This include grey, blue and green hydrogen to decarbonize economic sectors which are hard to electrify, such as cement, steel, long-haul transport etc.
	Carbon Capture, Utilization, and Storage (CCUS) technologies	This includes Direct Air Capture (DAC) i.e. Capturing CO ₂ directly from the air and Bioenergy with carbon capture and storage (BECCS) i.e. Capturing CO ₂ from the combustion of plant-based biofuels.
	Digital technologies	This includes Smart grids and Smart meters , that can help integrate higher shares of renewables and better match supply and demand.

2. What are the barriers to financing the transition towards renewable energy in Developing and Emerging economies?

Developing and emerging economies **account for two-thirds of the world's population** and therefore play a major role in achieving the global energy transition targets. However, these countries **account for only one-fifth of investment in clean energy**. Major barriers in access to finance in these countries are:

- **High Capital Cost:**
 - **High upfront capital** required for solar or wind farms, acts as a barrier for many investors.
 - **High risk perception** due to factors like political instability, regulatory uncertainties, etc. This **increases the Risk Premium** (additional cost of capital that investors may demand to compensate for perceived or actual risk).
 - **Lack of transparency on the actual cost** make it harder for investors to price risk and for policy makers to act.
 - **High inflation and rising interest rates**, depresses rates of return, making investments in general less attractive.
- **Disparities across countries and technologies:** Renewable energy investment remains concentrated in a limited number of countries and are focused on only a few technologies.
 - For instance, Africa accounted for only 1% of additional capacity in 2022. And 95% investments were channelled toward solar PV and wind power (IRENA).
- **Over reliance on public sources of finance** and limited affordability and access to private capital.
 - 75% of global investment in renewables from 2013 to 2020 came from the private sector, but in technologies with the least associated risks like solar PV (IRENA).
 - Technologies like geothermal and hydropower relies primarily on public finance.
- **Global Uncertainties: COVID-19 and Ensuing price spikes** amid Russia's- Ukraine war have drained developing economies of their financial resources and shifted focus to maintaining secure and stable energy supply.
- **Lack of supportive policy and regulatory environment:** Fossil Fuel subsidies, lengthy procedures for licensing and land acquisition, restrictions on FDI, currency risks, and weaknesses in local banking and capital markets are the major issues.
- **Other challenges** like **Dependency on fossil fuel** as primary source of energy, **rising debt levels** in most low- and middle-income countries (LICs and MICs) and **Weak institutional capacities**.

2.1. What are the major challenges of financing energy transition in India?

These challenges are intricately associated with the structure of the industry and investment character for the industry:

- **Institutional and Policy-level Complicacies:** Energy is a concurrent subject. This somehow creates a degree of uncertainty with regard to decision making power.
 - ▷ This also **creates market segmentation within the country**, and India is not often considered as a single market by investors.
- **Short Tenures and High Costs of Debt Financing:**
 - ▷ High (often variable) interest rates, short debt tenures, and lack of non-recourse debt make India an expensive destination for investment.
- **Risks and Uncertainties: Policy and regulatory risks, technology-related risks, off-taker risks, and foreign-exchange risks** are associated with renewable energy sector financing, given the nascent phase of renewable energy development in the country.

3. What are the leading initiatives in place to support the funding of the energy transition?

3.1. Major initiatives at global level to finance energy transition

- **Paris Agreement:** It encourages financial flows from developed to developing countries towards low-carbon and climate-resilient development.
- **Climate Investment Funds (CIFs):** The only multilateral climate fund to work exclusively with multilateral development banks (MDBs) to provide financing for climate-related projects in developing countries. They include the **Clean Technology Fund (CTF)** and the **Scaling-Up Renewable Energy Program (SREP)**.
- **Green Climate Fund (GCF):** GCF is a financial mechanism under the UNFCCC that provides funding to developing countries to support their efforts in reducing greenhouse gas emissions and adapting to climate change.
- **Mission Innovation (MI):** A global initiative involving 24 countries and the European Union, to accelerate clean energy innovation by increasing public and private investments in research and development.
- **Global Energy Efficiency and Renewable Energy Fund (GEEREF) by the European Investment Bank Group.** It is an innovative Fund-of-Funds catalysing private sector capital into clean energy projects in developing countries and economies in transition.
- **Kyoto Protocol:** Introduced **carbon credits**, expressed in **tons of carbon dioxide equivalent**, which can be traded across borders, and the revenue realized by sale of carbon credits is generally termed as **carbon finance**.

3.2. Major initiatives by India to finance energy transition

- **Establishment of a renewable energy focussed Non-Bank Finance Corporation in 1987** by the Ministry of New and Renewable Energy.
 - ▷ These bonds **also attract private sector investment**, thereby reducing the cost of capital for green projects.
- **Role of Indian Renewable Energy Development Agency (IREDA):**
 - ▷ **Providing Soft Loans** through various modes, such as direct lending and lending through various financial intermediaries.
 - ▷ **Promoting emerging technologies** such as battery energy storage systems, green hydrogen electrolyzers, etc. **through innovative financing policies.**
- **Sovereign Green Bonds:** The green bond proceeds are earmarked for **financing public sector projects** that will help reduce the **carbon intensity of the Indian economy.**
 - ▷ **National Clean Energy Fund (NCEF): Operational since 2011-12** to invest in **entrepreneurial ventures and research** in the field of clean energy technologies.
 - ▷ It helps in mobilizing funds through a cess on coal of INR 400 per ton known as Clean Environment Cess ("**polluter pays**" principle).
 - ▷ **Recognition of Priority Sector Lending (PSL):** RBI has categorized the renewable energy sector as a priority sector lending in April 2015.

- ▶ Government is now also **considering to include Electric Vehicle sector in PSL.**
- ▶ **Other major steps taken by the Government:**
 - ▶ **Permitting Foreign Direct Investment (FDI) up to 100 %** under the automatic route for renewable energy projects.
 - ▶ **Waiver of Inter State Transmission System (ISTS) charges** for inter-state sale of solar and wind power for projects to be commissioned by 30th June 2025.
 - ▶ Launch of **Green Term Ahead Market** to facilitate sale of renewable energy power through exchanges.
 - ▶ **Incentive schemes for production of green hydrogen** and electrolyzers under the National Green Hydrogen Mission.

Table 3.1. Worldwide success stories for potential energy transition

India	As a result of the government’s commitment and the above initiatives, India has emerged as most attractive destination for renewable energy investment (ranked third on the Renewable Energy Attractive Index in 2021) and possesses the fourth-largest solar and wind power base globally , experiencing rapid growth. <ul style="list-style-type: none"> ▶ The key drivers behind this progress include improved technological maturity, continued innovation in technologies and business models, enhanced system integration and operational performance, increased manufacturing and assembling capacities, reduced labour costs and reduced operation and maintenance costs.
Indonesia	Green Sukuk Market Development : It is an innovative financial instrument under which 100% of the proceeds exclusively go to finance or refinance green projects that contribute to mitigating and adapting of climate change.
Argentina	RenovAr Programme: It opened a space for private sector investment and innovation, helping Argentina meet its renewable energy goals while leveraging private capital and avoiding public debt.

4. What more needs to be done to secure low cost funding for the energy transition in developing and emerging economies?

Responsibility for **fostering a strong enabling environment** at all levels to propel the energy transition **lies squarely with governments.** Government leadership on energy transitions is translated into **a supportive regulatory environment,** and instruments to minimize risks, which can deliver outcomes including **energy security, energy affordability, and jobs. This entails:**

- ▶ **Synergy between public and private sector: The role of the public sector** including **multilateral development banks (MDBs) is crucial** in mitigating project risk and **unlocking low-cost private sector capital** for the energy transition.
 - ▶ **Blended finance approach helps** combines public and private sector funds to support sustainable energy projects.
- ▶ **Targeted and scaled-up public contributions:** Public funding is needed to invest in basic energy infrastructure, as well as to drive deployment in less mature technologies (especially in end uses such as heating and transport, or synthetic fuel production) and in areas where private investors seldom venture.
- ▶ **Effective innovation frameworks** across four dimensions – enabling technologies, business models, market design and system operation- are crucial components in accelerating the deployment of new and critical energy transition technologies, reducing financing cost premiums and attracting investments.
 - ▶ **General business-friendly measures:** These include tax policy (such as not withholding taxes on profits, and no VAT on clean power sales), allowing foreign direct investment (FDI), improved permitting processes, and foreign currency/ability to repatriate profits.
 - ▶ **Mapping the drivers of cost of capital differences** between countries and technologies to understand the reasons for these differences.
 - ▶ **Policy incentives:** Countries should provide a range of policy incentives **such as certification standards** for the purchase of green hydrogen, to facilitate the development and deployment of the next set of critical technologies for the energy transition.

▶ **Learning from past experiences: Countries should build upon the lessons learnt from the success of solar PV and onshore wind** to accelerate the potential scale-up of these critical technologies in their own country-specific context.

Box 4.1. In Conversation! Concept of blended finance

Vinay

Hey Vini, have you heard about this concept of blended finance to support sustainable energy projects? It's been making headlines lately.

Vini

Yes, I have read that it's an approach that combines public and private sector funds to support sustainable energy transition. But how does it actually work?

Vinay

So, sustainable energy projects often require significant upfront investments, and they might not always offer immediate returns. Public funds can help de-risk these investments, making them more attractive to private investors.

Vini

Oh, I see. So, it's like a partnership between governments and businesses?

Vinay

Exactly. Governments or international organizations provide concessional finance or guarantees, reducing the financial risk for private investors. This, in turn, encourages more private capital to flow into clean energy projects.

Vini

That sounds like a win-win. Is India utilising this approach?

Vinay

Yes, India collaborated with international organizations like the World Bank and the International Finance Corporation (IFC) to attract private sector investments into developing solar power.

Vini

I hope more developing countries get on board with this for a greener and more sustainable future.

5. Conclusion

There is a growing recognition among **governments, businesses and people** alike of the need for urgent action to accelerate the **energy transition towards a net-zero future**. Despite the immense significance, gaps still remain between the current deployment of energy transition technologies and the levels needed to achieve the goal of the Paris Agreement. The financial factor acts as a major barrier and a holistic policy framework is needed to ensure the emerging technologies for the energy transition scale down their cost curve supported by new innovations.

TOPIC AT A GLANCE

Financing Global Energy Transition

Global energy transition refers to the global energy sector's shift from fossil-based systems of energy to renewable energy sources in order to reduce carbon emissions and promote sustainability. This requires a substantial infusion of financial resources.

Share of renewables in the global energy mix		Investments in energy transition technologies	
Present- 30%	Target - 77% by 2050.	Present - USD 1.3 trillion	Target - USD 150 trillion, approx. 4.4 trillion annually by 2050.

Developing and emerging economies play a major role in achieving the global energy transition targets.



Barriers to financing the energy transition

- High Capital Cost as a result of high risk perception, high inflation and rising interest rates.
- Investment remains concentrated in a few countries and low risk technologies like solar PV.
- Over reliance on public sources of finance.
- Global Uncertainties like COVID-19 and price spikes amid Russia's- Ukraine war.
- Lack of supportive policy and regulatory environment like Fossil Fuel subsidies.
- Other challenges like Dependency on fossil fuel, rising debt levels of countries.
- Major challenges in India include Policy-level Complicacies, High Costs of Debt Financing.



Leading initiatives to support the funding of the energy transition

Global

- Paris Agreement encourages financial flows from developed to developing countries.
- Climate Investment Funds (CIFs) provide project financing in developing countries.
- Green Climate Fund (GCF) under the UNFCCC provides funding to developing countries for climate change mitigation and adaption efforts.
- Mission Innovation(MI) to encourage public and private investments in R&D.
- Global Energy Efficiency and Renewable Energy Fund (GEEREF) by the European Investment Bank Group for catalysing private sector capital.
- Kyoto Protocol introduced carbon credits.

Initiatives by India

- Renewable-energy-focussed non-bank finance corporation under Ministry of New and Renewable Energy.
- Soft loans and Innovative financing policies by IREDA.
- Sovereign Green Bonds that attract private sector investment for green projects.
- National Clean Energy Fund (NCEF) for research in clean energy technologies.
- Categorising renewable energy sector under Priority Sector Lending (PSL).
- Other major steps such as up to 100% FDI for renewable energy projects, Incentive schemes for production of green hydrogen under the National Green Hydrogen Mission etc.



Way forward to secure low cost funding for global energy transition

- Enhancing synergy between public and private sector through Blended financing approach.
- Targeted and scaled-up public investments in less mature technologies.
- Effective innovation frameworks to reduce financing cost premiums and attracting investments.
- Business-friendly tax policy, FDI policy, improved permitting processes, etc.
- Mapping the drivers of cost of capital differences between countries and technologies.
- Policy incentives such as certification standards for green hydrogen.
- Building upon the learnings from the success of solar PV and onshore wind.

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2 AIR
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UMA HARATHI N

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3 AIR
GAMINI SINGLA



4 AIR
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6 AIR
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7 AIR
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8 AIR
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HEAD OFFICE
Apsara Arcade, 1/8-B,
1st Floor, Near Gate-6,
Karol Bagh Metro
Station, Delhi

MUKHERJEE NAGAR CENTRE
Plot No. 857, Ground Floor,
Mukherjee Nagar, Opposite
Punjab & Sindh Bank,
Mukherjee Nagar, Delhi

FOR DETAILED ENQUIRY
Please Call:
+91 8468022022,
+91 9019066066



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SHUBHAM KUMAR
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ENQUIRY@VISIONIAS.IN /VISION_IAS WWW.VISIONIAS.IN /C/VISIONIASDELHI VISION_IAS /VISIONIAS_UPSC

