Financing India's clean energy transition: Challenges and Opportunities

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Impacting sustainable development at scale with data, integrated analysis, and strategic outreach

TRANSFORMATIONS

- Low-carbon Economy
- Energy Transitions
- Power Markets
- Industrial Sustainability
- Sustainable Livelihoods

QUALITY OF LIFE

- Clean Air
- Sustainable Water
- Sustainable Food Systems
- Sustainable Cooling
- Sustainable Mobility

ENABLERS

- Sustainable Finance
- Technology Futures
- Circular Economy
- Climate Resilience
- International Cooperation

200+
Multidisciplinary team

320+
Peer-reviewed publications

160+
Instances of increased data transparency

460+
Roundtables & conferences

22
Indian states engaged

110+
Bilateral & multilateral initiatives promoted

SPECIAL INITIATIVES

- CEEW-CEF Centre for Energy Finance
- Powering Livelihoods
- Emerging Economies
- UP State Office

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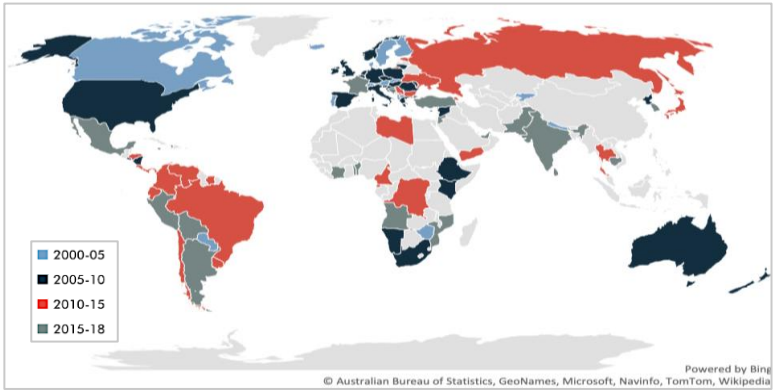
88% of all electricity demand will come from emerging markets

Maxims for energy (r)evolution

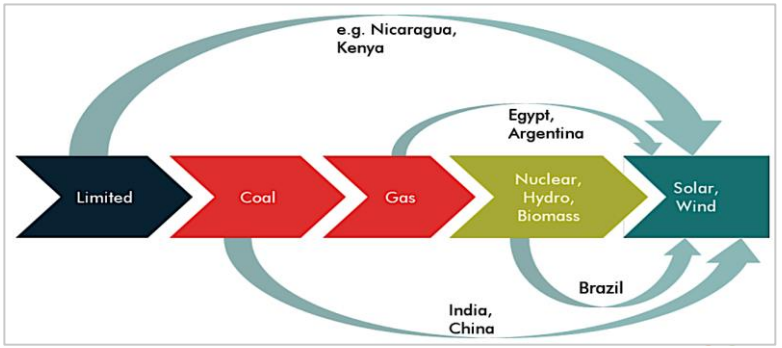
Energy security ≠ Energy independence	A **resilient supply chain will ensure energy security** for India, while enhancing synergies between India and other countries
Energy leapfrog ≠ Energy transition	Robust technology transfer will **allow India to leapfrog conventional bridge steps** (e.g., coal → natural gas → hydrogen for steelmaking)
Indigenisation ≠ Protectionism	**Foreign direct investment** coupled with **reduced trade barriers** will enable domestic industry growth and **expand global market access**

India's double leapfrog — **connecting nearly all households to electricity** and its **renewable energy rollout** — is one of the most revolutionary in scale

Peak or plateau demand for fossil fuel for electricity



Emerging market electricity leapfrog

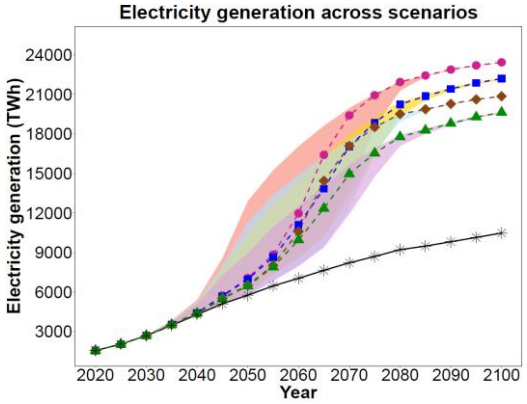


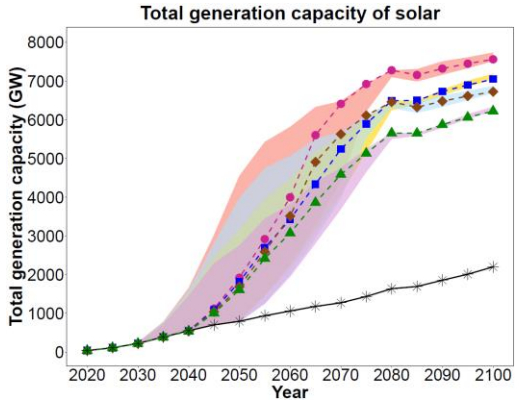
Source: Ghosh (2021); Bond and Ghosh et al. (2021)/ Reaching for the Sun: Emerging Market Leapfrog/ CEEW

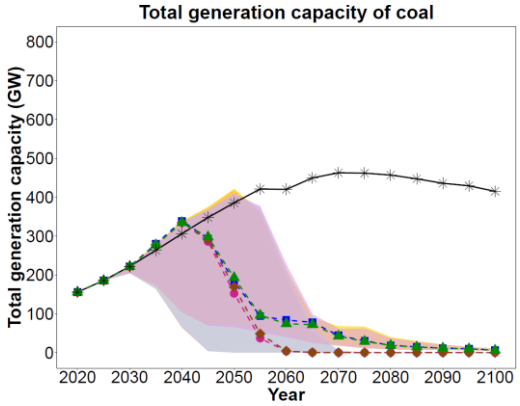
How transformational is net zero in India?

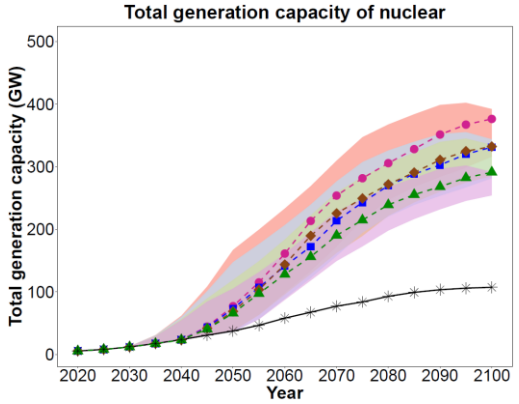
Source: Hitesh choudhary

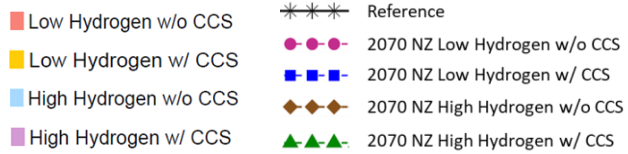
Transitions in the electricity sector are going to be massive











Source: Chaturvedi and Malyan (2021)/ Implications of a Net-Zero Target for India's Sectoral Energy Transitions and Climate Policy

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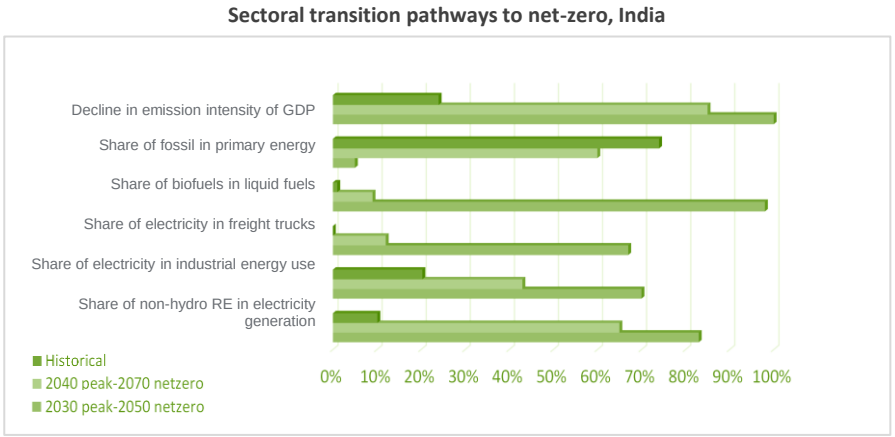
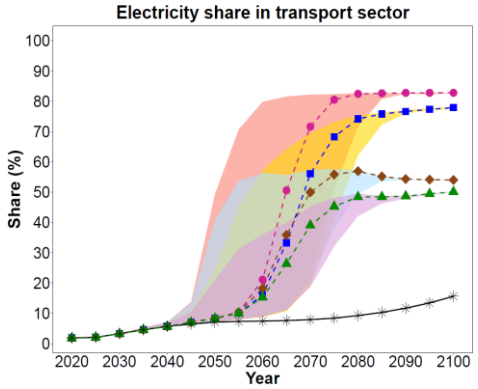
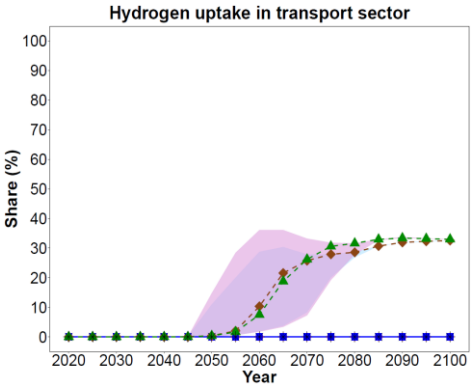
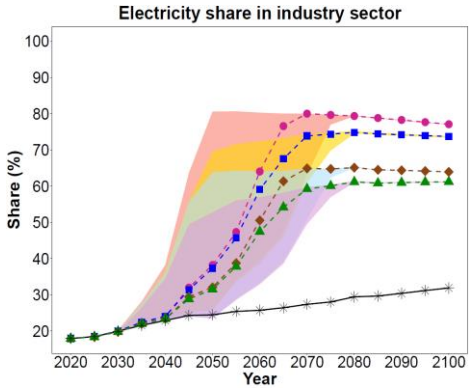
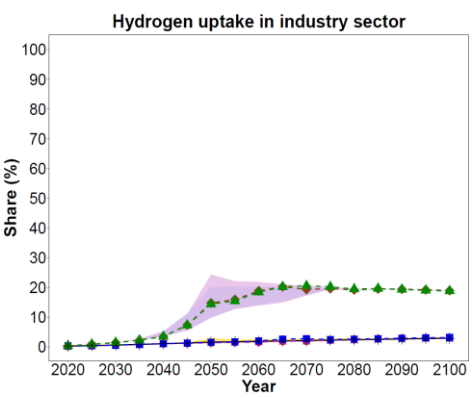
Transport, industrial and building sector will need to redefine their energy architectures

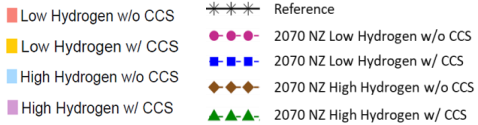












Source: Chaturvedi (2021); Chaturvedi and Malyan/ CEEW (2021)

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What On Earth!™

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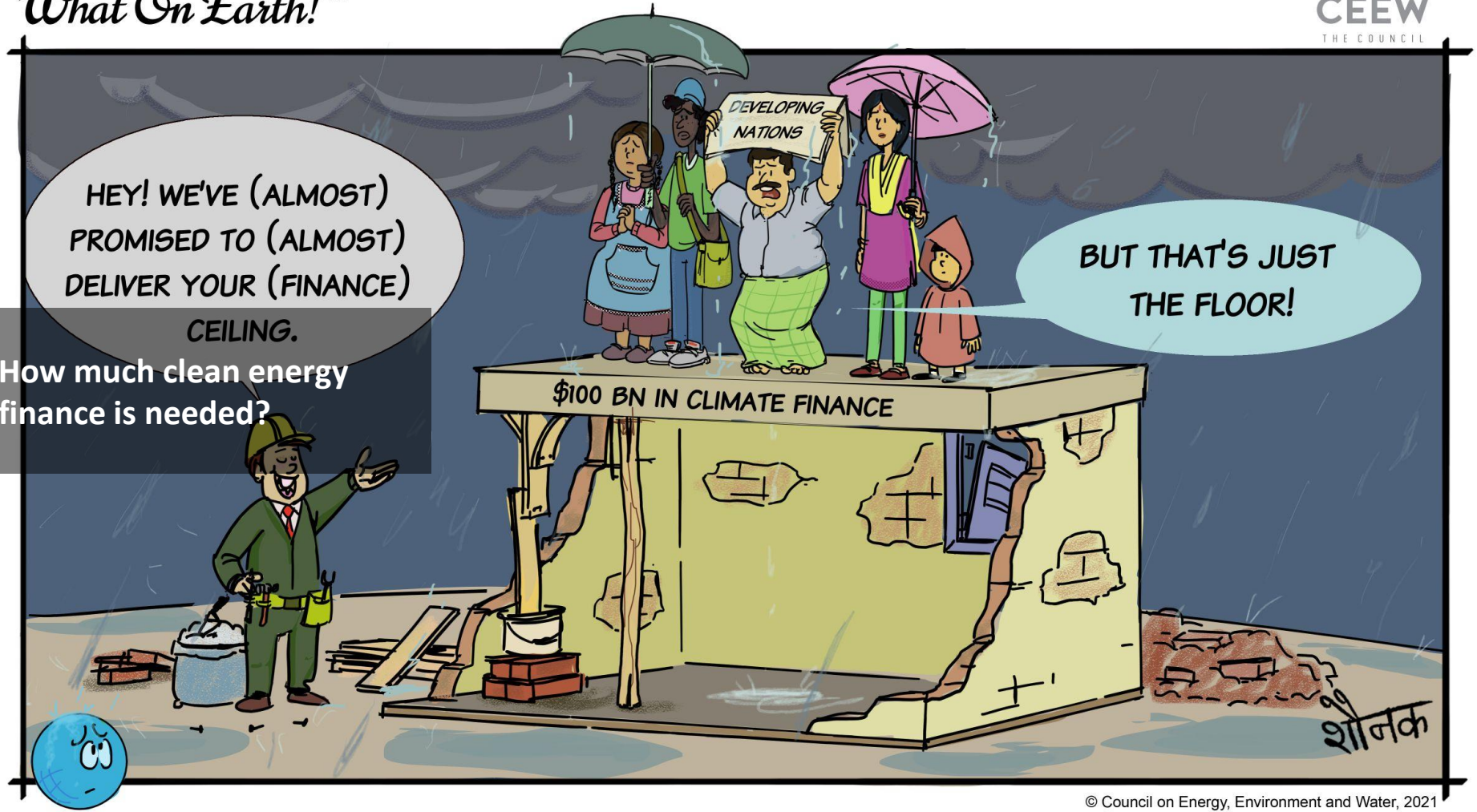

How much clean energy finance is needed?

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Emerging investment opportunity in India

Sector	Select indicators	Status in 2070[1] (unless stated otherwise)	Investment requirement[2] (USD bn)	Investment gap[2] (USD bn)	Investment support[2] (USD bn)
Power	**Coal**	Peak by 2040, ~0% by 2060	8,412	3,098	1,239
	Solar	5,630 GW			
	Wind	1,792 GW			
	Nuclear	225 GW			
Industry	**Coal**	Peak by 2040, ~0% by 2065	1,494	448	179
	Hydrogen	19% share in industrial energy use			
Mobility	**EVs** (% of car sales)	84%	198	-	-
	EVs (% of freight truck sales)	79%			
Total			**10,103**	**3,546**	**1,419**

USD 1.4 trillion in investment support till 2070 equates to an average annual value of USD 28 billion over the next 50 years, **varying from USD 8 billion annually in the first decade, to USD 42 billion annually in the fifth decade**

Note: Amounts in constant 2020 USD billion

Source: Pratap and Sindhu (2021)/ Investment Sizing India's 2070 Net-Zero Target /CEEW; Chaturvedi and Malyan (2021)

Solar and wind financing landscape in India

Leading solar and wind developers (cumulative installed capacity, up to June 2021) in India[1]

Solar PV	Capacity (MW)	Wind	Capacity (MW)
Adani	4,723	Greenko Energy Holdings	3,192
Acme Solar Holdings	2,900	ReNew Power	2,912
ReNew Power	2,688	Sembcorp	1,750
Greenko Energy Holdings	2,175	Mytrah	1,469
Azure Power	2,102	Tata Power	932
Tata Power	1,765	CLP	925
NLC	1,370	Continuum Energy	807
NTPC	1,140	Hero Future Energies	806
Avaada Power	900	Torrent Power	649
Hero Future Energies	794	Adani	647

Note: Anecdotally, much of the funding backing Indian developers at a corporate level (not SPV level) is sourced internationally (pension funds, sovereign wealth funds, private equity funds, other financial investors etc)

	Domestic (INR)	International (USD)
Institutional Debt (Banks + NBFC)	**Dominant Source** • Quantum challenging to determine • For reporting, RE is clubbed with others under "power sector"	**Recently Emerging** • USD 1.35bn project debt raised by Adani Green in March 2021 from 12 international banks
Debt Capital Markets (Bonds)	**Still Untapped** • Extremely credit quality conscious, even more so than international debt capital markets	**Fast Growing** • Many bond issuances of hundreds USD million • Typically to retire expensive INR institutional debt

Note: Geographic distribution of investors for international bond issuances varies on a case-by-case basis. For eg, for Hero Future's USD 363mn issuance in March 2021: Asia 58%, US 27%, Others 15%

Equity

~25% of capital deployed per SPV[1]

Debt

~75% of capital deployed per SPV[1]

RE Project Special Purpose Vehicle (SPV)

- Several hundred RE SPVs in India
- Aggregating 114.1 GW of installed RE[2]
- Representing a 28.2% share of India's generating capacity[2]

(1) Clean Energy Investment Trends 2021 (https://www.ceew.in/cef/solutions-factory/CEEW-CEF-clean-energy-investment-trends-2021.pdf)
(2) CEEW-CEF Q1 2022-23 Market Handbook (https://cef.ceew.in/solutions-factory/market-handbook)

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How do we re-structure our finances?

A blend of different pools of capital

1. **Financing for large scale renewables deployment** through innovative de-risking mechanisms that pool risks across countries to lower the cost of finance

2. **Transition finance for orderly decommissioning** of fossil fuel assets through transition bonds

3. **Financing for research and development for emerging technologies** through mechanisms such as pooling financial, human and technical resources

4. **Developing insurance mechanisms against climate shocks** that pool various kinds of climate risks and are capitalised through an allocation of Special Drawing Rights

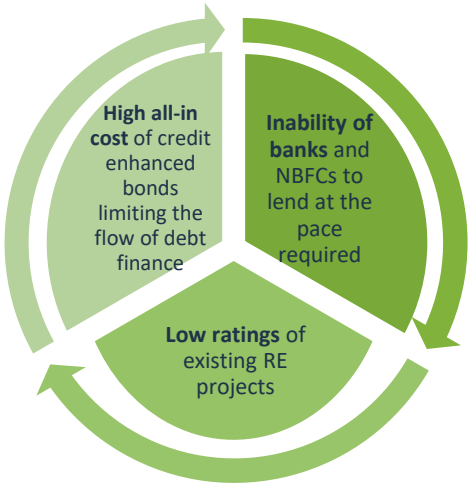
Finance beyond a negotiated maximum and a delivered minimum (1/3)

Scale

- India needs USD 2.5 trillion (2015-2030)
- 500 GW RE needs USD 200+ billion of capital investment
- USD 18 billion investment in RE in 2019
- 30% EVs is USD 206 billion sales opportunity (including USD 2.5 billion charging stations

Financial innovation from instruments

India's RE sector is caught in a three-way circularity



- **Establishing a subsidised credit enhancement facility** for domestic renewable energy bond issuances
- Investments mobilised by credit enhancement will lead to an additional 1 per cent of India's GDP

Source: Ghosh, Arunabha. 2021. *Inflexion Points: Break climate finance's 'maximum negotiated, minimum delivered' trap. Financial Express;*
Singh et al. (2020)/ RE-Financing India's Energy Transition/ CEEW

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Finance beyond a negotiated maximum and a delivered minimum (2/3)

Regulation
• Climate risk exposure • Green tagging • Tax incentives for green bonds • Matchmaking via accelerator programmes • Green securitisation • Standard-setting (Basel Committee on Banking Supervision; Network for Greening the Financial System)

Financial innovation from regulation

- **Lack of a common definition and disclosures** on green taxonomy prevents standardisation in the market, and interrupts international clean energy financing into domestic markets
- **Need to link and harmonise** international and domestic capital by adopting a granular, standardised sustainable green taxonomy
- Bring in greater transparency and credibility, and enable market participants to identify and assess sustainability-related risks and opportunities
- **Sebi's BRSR initiative relates to climate disclosure** and ensures that investors have access to standardised disclosures on ESG parameters.

Source: Ghosh, Arunabha. 2021. *Inflexion Points: Break climate finance's 'maximum negotiated, minimum delivered' trap. Financial Express*; Economic Times. 2021. Sebi comes out with disclosure requirements under BRSR. *Economic Times.*

Finance beyond a negotiated maximum and a delivered minimum (3/3)

Risk

- De-risking utility-scale renewables against non-project risks
- Credit enhancement for DRE for small businesses
- Risk guarantees for R&D

Financial innovation from institutions

- **Make India a hub** for sustainable clean energy finance for emerging markets
- **Pilot Global Clean Investment Risk Mitigation Mechanism (GCI-RMM**) to ease access to non-project risk management tools and reduce transaction costs, particularly in emerging markets

Source: Ghosh, Arunabha. 2021. *Inflexion Points: Break climate finance's 'maximum negotiated, minimum delivered' trap. Financial Express;* Ghosh and Harihar (2021)/ Coordinating Global Risk Mitigation for Exponential Climate Finance/ CEEW

Thank you

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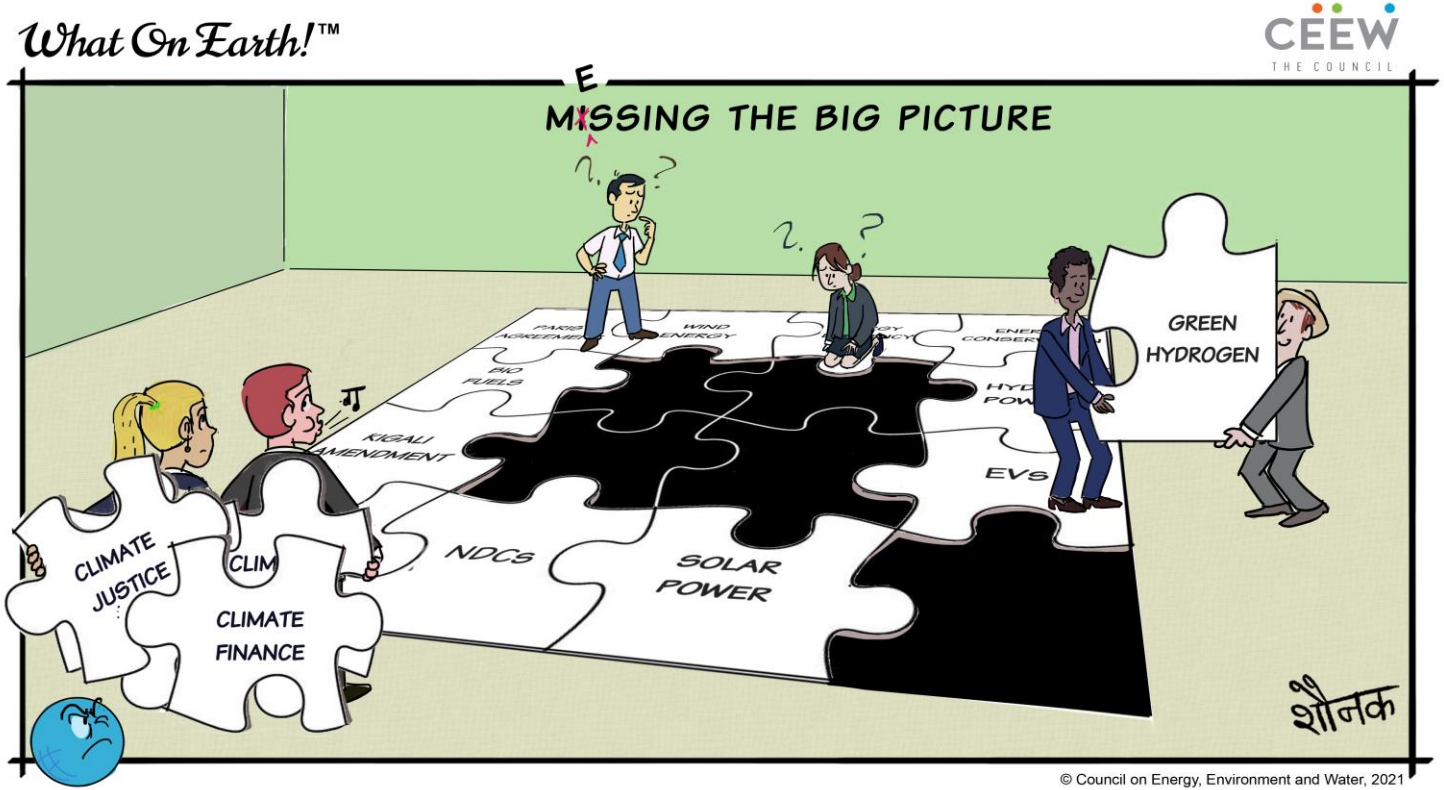

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