National Conference

on

“Sustainable Energy Transition and Achieving Carbon Neutrality in the Power Sector”

MANAGING RISKS OF ENERGY TRANSITION & DECARBONIZATION IN INDIAN POWER SECTOR

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Energy Transition is a strategic compulsion, not a choice!

- Shift to low-carbon or RE sources to address climate change
- Ensure long-term energy security with strategic adoption of RE and DPGS*
- Decarbonization goals - Nationally determined contributions (NDCs)
- Foster innovations in energy sustainability
- Multi-faceted approach to energy transition
  - Incentives, Financing, Policies, Processes, Technology & Community
- Implement enterprise risk management (ERM) framework
  - Address complexities and challenges of energy transition
- Balance sustainability with energy security, affordability and growth

*DPGS: Distributed Power Grid Systems

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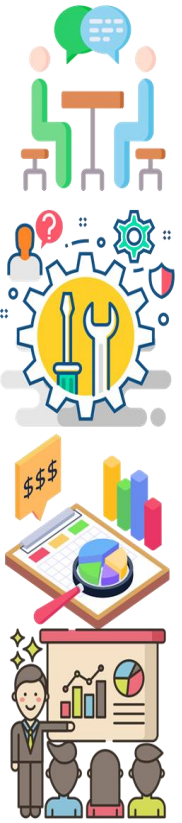
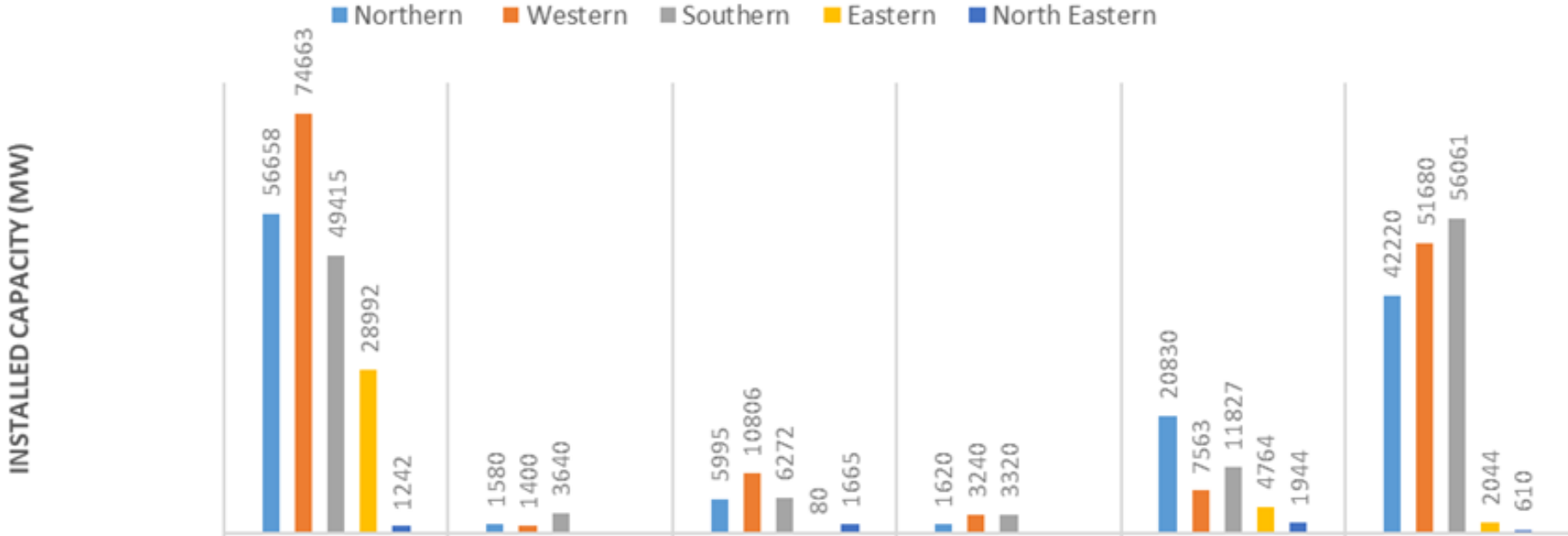
Region-wise Energy Mix (MW)



INDIA'S REGION-WISE ENERGY MIX OF TOTAL INSTALLED CAPACITY (MW), AS ON AUG 2024



	Coal	Lignite	Gas	Nuclear	Hydro	Renewables
Northern	56658	1580	5995	1620	20830	42220
Western	74663	1400	10806	3240	7563	51680
Southern	49415	3640	6272	3320	11827	56061
Eastern	28992	0	80	0	4764	2044
North Eastern	1242	0	1665	0	1944	610

NOTE: RENEWABLES INCLUDE SOLAR, WIND, SMALL HYDRO, BIOMASS/ COGEN & WASTE-TO-ENERGY

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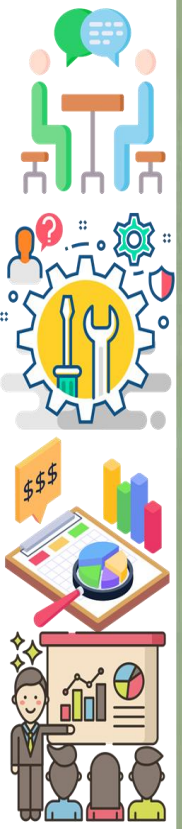
India’s roadmap to Energy Transition



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- Meeting 50% of electricity demand from RE by 2030
- Reducing 45% of carbon emissions by 2030 from 2005 level
- Reducing 1B tonnes of total carbon emissions by 2030
- Install Fossil-free & RE capacity of 500 GW by 2030
- Achieve net-zero emissions by 2070

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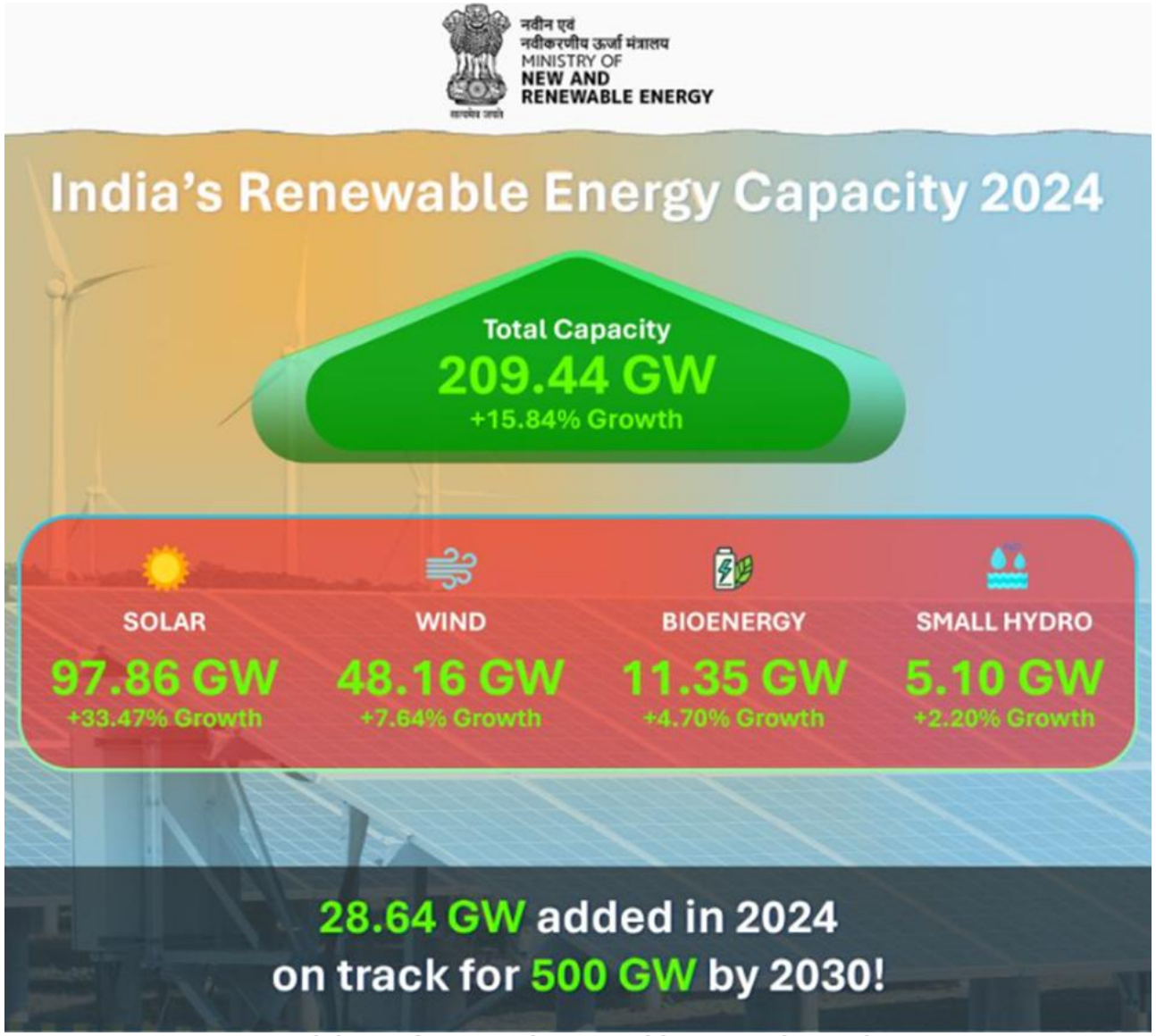
India’s Renewable Energy Capacity



Source: Ministry of New and Renewable Energy (MNRE), Jan 2025

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Balancing stakeholders and conflicts in Energy Transition

Govt. and Intl. organizations	• Policies, energy security and climate goals.
Companies	• Profitability, competitiveness, sustainability, reliability and compliances.
Investors	• Financial returns, ESG compliance and risk management.
Consumers	• Affordability, reliability and sustainability.
Environment groups, NGOs	• Climate justice and ecosystem protection.
Labour Unions	• Job security, fair transition.
Technologists	• Innovation, scalability, and market adoption.
Regulators	• Market balance, safety, and compliance.
Communities	• Local benefits, environmental protection, and economic development.
Academia	• Research, innovation, and policy guidance.
Media	• Public awareness and accountability.

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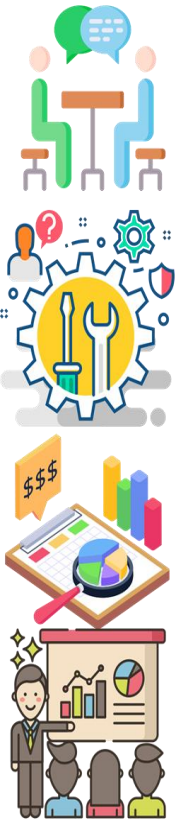
Classification of Energy Transition risks



Economic and Financial risks: Significant upfront investment, uncertain RoI, market risks e.g. demand volatility, supply chain, cost escalations

Policy and Regulatory risks: Changing regulations, unclear policies, implementation delays, subsidies on fossil fuels, entry barriers on new technologies

Social and Environmental risks: Job risks due to phasing out of fossil fuels, green energy skills shortage, mining of materials for RE can impact environment, energy inequity, community backlash

Technological risks: Energy burden on Data Centres, RE intermittency, technology obsolescence, cybersecurity threats, technology replacement costs

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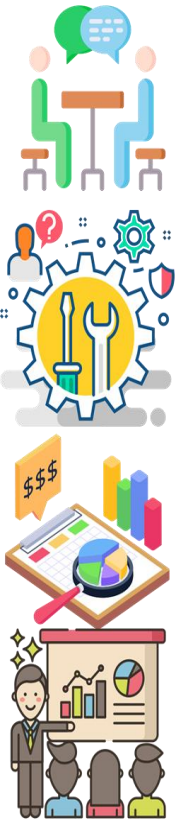
Indian Power Sector Energy Transition & Decarbonization challenges



Energy Demand and Supply	• Fossil fuels accounts for 54% in India, while clean energy (Nuclear, Hydro, RE) accounts for 46%. Investments needed to strengthen grid infra to connect new RE systems and create transfer capacity.
Financial & Institutional barriers	• India's market in RE, energy storage and low-carbon technologies will be over USD $80 billion by 2030. Institutional and policy support needed to access low cost, long-term financing.
Policy and Regulatory Issues	• Subsidy policy should balance energy transition and equity, ensuring affordable energy, offset job losses in fossil-fuel sector by creating alternatives e.g. reskilling of workers in clean energy.
Technology & Infrastructure	• Ageing infrastructure and technology upgrades, clean energy capacity expansion, indigenization, capital investments in smart grids, metering, energy storage and EVs.

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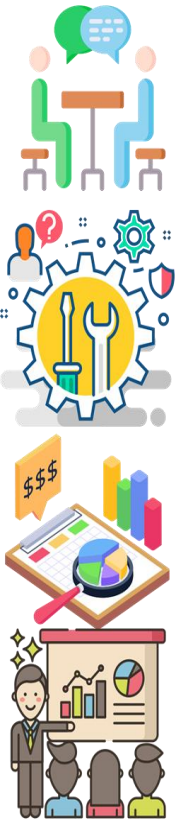
Clean Energy Transition with Hydrogen, Biofuels, and EVs



Financial incentives to promote the adoption of hydrogen, biofuels, and electric vehicles:

- **National Hydrogen Mission**: Promoting the production and use of green hydrogen
- **National Policy on Biofuels**: Increasing the use of biofuels in the energy mix
- **FAME Scheme**: Incentives for Faster Adoption and Manufacturing of Hybrid and Electric Vehicles

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Sustainability solutions for power, heat and transport

1. **Green Hydrogen**:
    - Key to drive energy transition in transport, industry and power generation
    - Annual target of 5 Million MT of green H_2 requires 135 GW of RE capacity to power the electrolyzers
    - Policy initiatives, mass production of electrolyzers and affordable RE can bring down the cost of green H_2
    - National Green Hydrogen Mission is aiming to make India a global hub for production, use and export of green H_2
2. **Biofuels**:
    - India targeting 20% bioethanol blending with petrol by 2025
    - India aims to intensify use of biofuels in energy and transport
    - Biomass such as agricultural wastes, forest residues and urban bio-wastes can be turned into low-cost, low-carbon fuels, using biomass gasification, anaerobic digestion and bioethanol production
3. **Electric Vehicles (EVs):**
    - Fossil-fuel dependent transport sector accounts for 37% of global CO2 emissions
    - Critical materials (e.g. Li, Co and Ni) for EV batteries have supply and environment concerns
    - EV charging infrastructure, with aggregating platform to connect EV owners to charging stations
    - High-speed EV chargers, powered by RE, offering commercial charging services even in remote/ rural areas

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Enterprise Risk Management (ERM) framework to manage transition risks

Risk Identification: Identify risks across various areas – operational, financial, reputational, legal, and environmental.

Risk Assessment: Quantify likelihood and impact to help prioritize the risks. Regulatory changes, stranded fossil fuel assets and environmental risks rank high in terms of financial impact.

Risk Mitigation strategies:

- **Stakeholder Engagement**: Structured dialogue with stakeholders to align interests, negotiate solutions, and build collaboration.
- **Diversification**: Diversify energy portfolios and invest in hybrid mix of renewables.
- **Scenario planning**: Model different transition scenarios for risk mitigation.
- **Equity**: Incorporate policies to ensure social justice and protect vulnerable communities.
- **Sustainability and ESG metrics**: Incorporate environmental, social, and governance criteria.

Monitoring and Reporting: Monitoring of risks and mitigation strategies such as tracking of emissions and social impact of transitions (e.g. job losses, community displacement).

Adapting to Regulatory Changes: Stay agile and adapt to changes in regulatory environments.

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Thank you!

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