

Energy Security with Decarbonization Symposium 2023

Energy Security and Path to Carbon Neutrality in the Coal Value Chain

Organized by Japan Carbon Frontier Organization (JCOAL)

Co-Organized by Japan Organization for Metals and Energy Security (JOGMEC)

Energy Security and Path for Decarbonisation in India

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India



Contents

- Energy Security in India : The Backdrop
- Energy Sector Imperatives and Initiatives
- Total Primary Energy Supply and Coal Supply Scenario & Initiatives
- Coal Sector Reforms and Initiatives
- India's Commitment to Climate Action, Achievement and Outlook

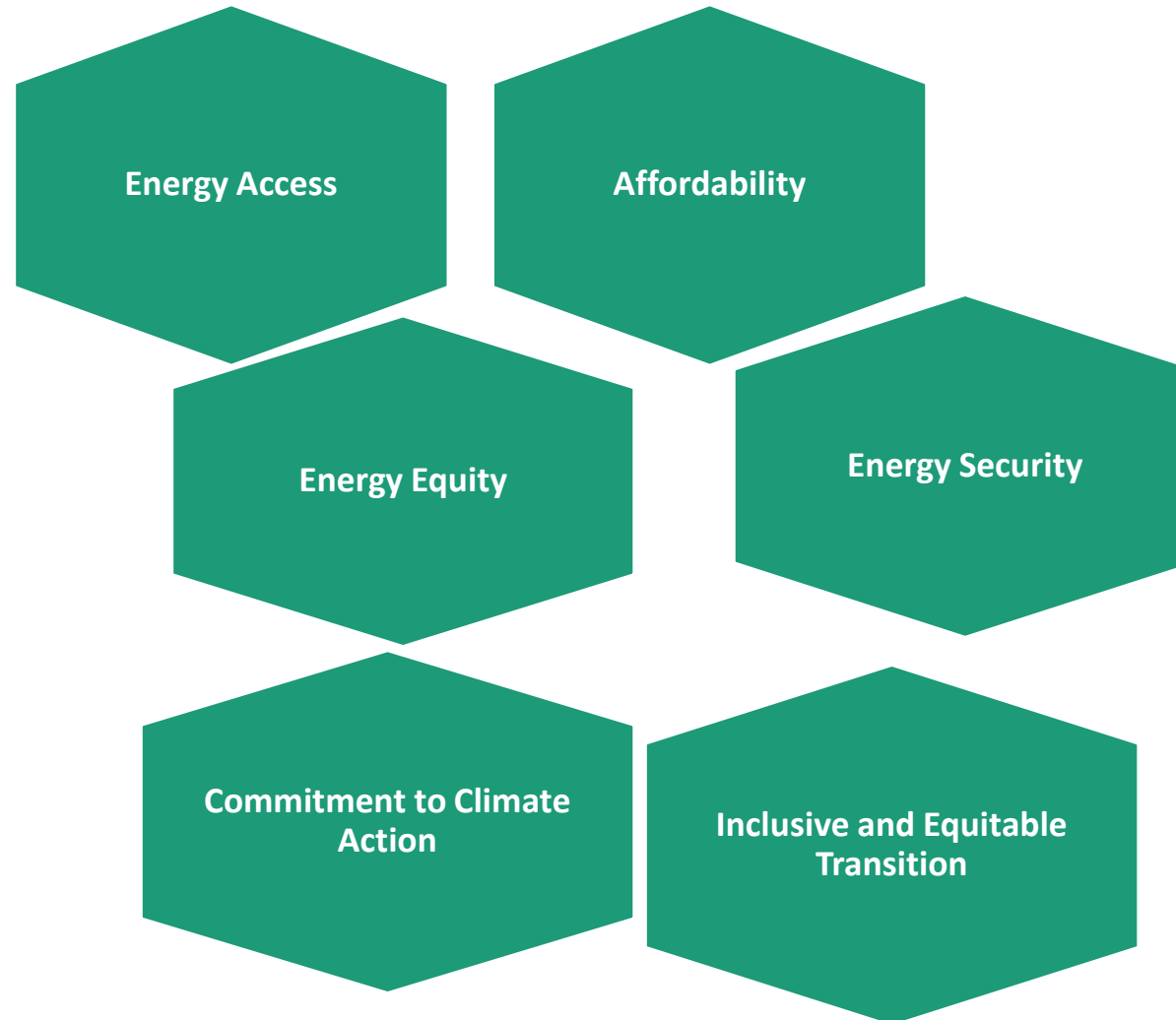
Energy Security in India : The backdrop



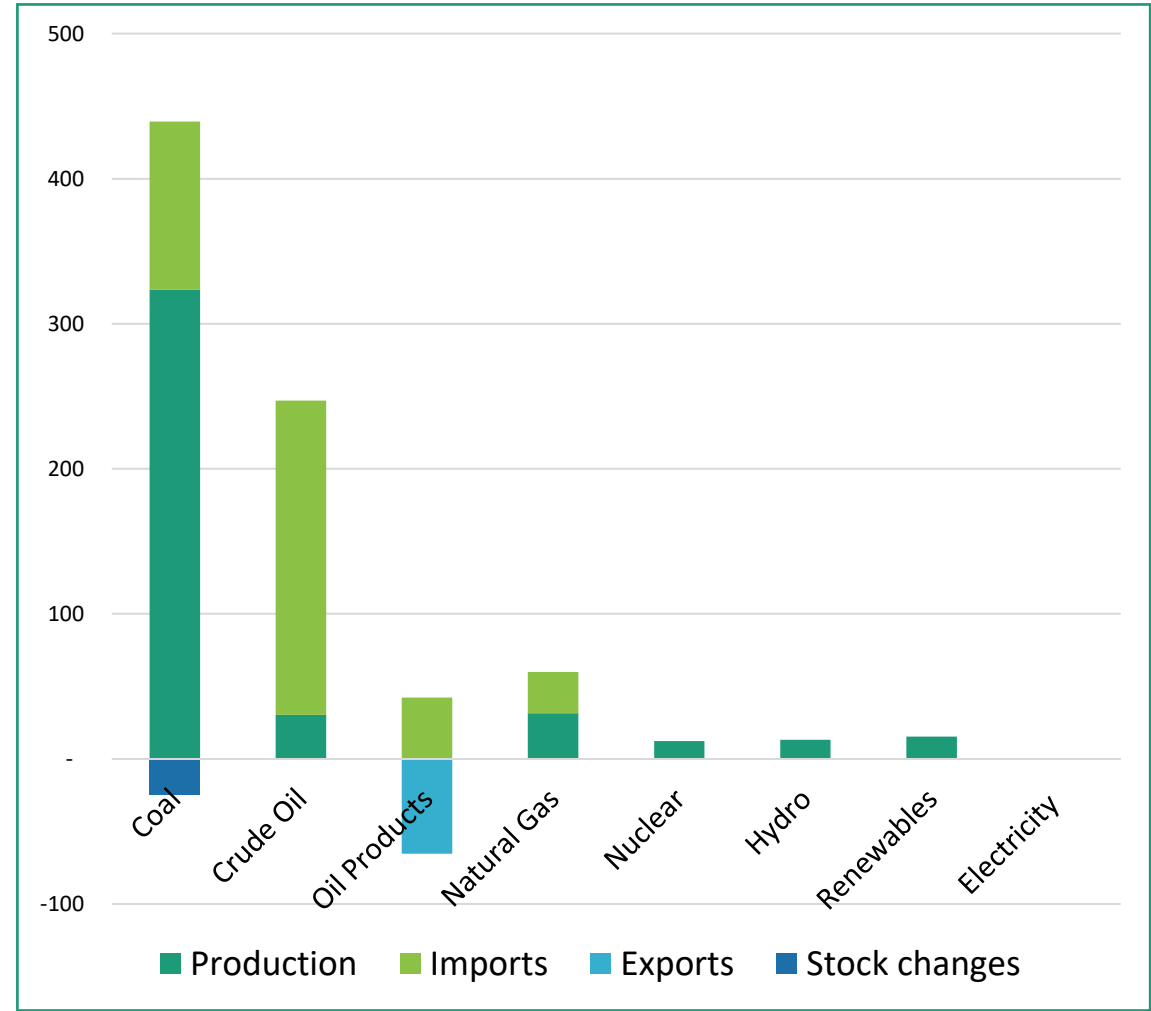
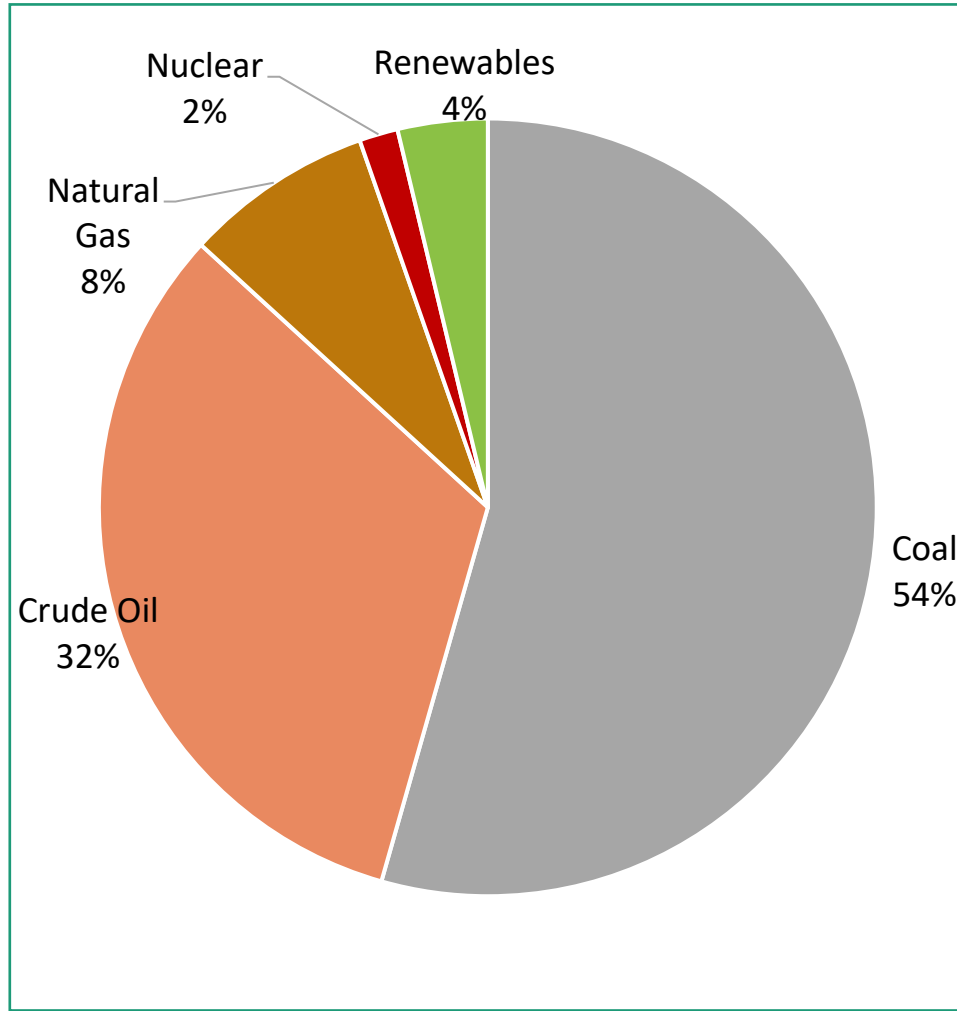
- Largest democracy in the world
- Home to one-sixth world's population
- A developing and growing economy
- Growing energy and electricity consumption : ~ 5% p.a.
- Per-capita energy and electricity consumption ~one-third of world average
- Human Development Index (HDI): despite an increase of ~ 50% in last 20 years, the country still ranks in the medium HD category
- Variety of energy sources; significantly developed: dependent on imports >> energy security – a critical concern

Policies framed/modified in accordance with needs of a developing country, resource endowment and emerging requirements

Energy Sector Imperatives and Initiatives

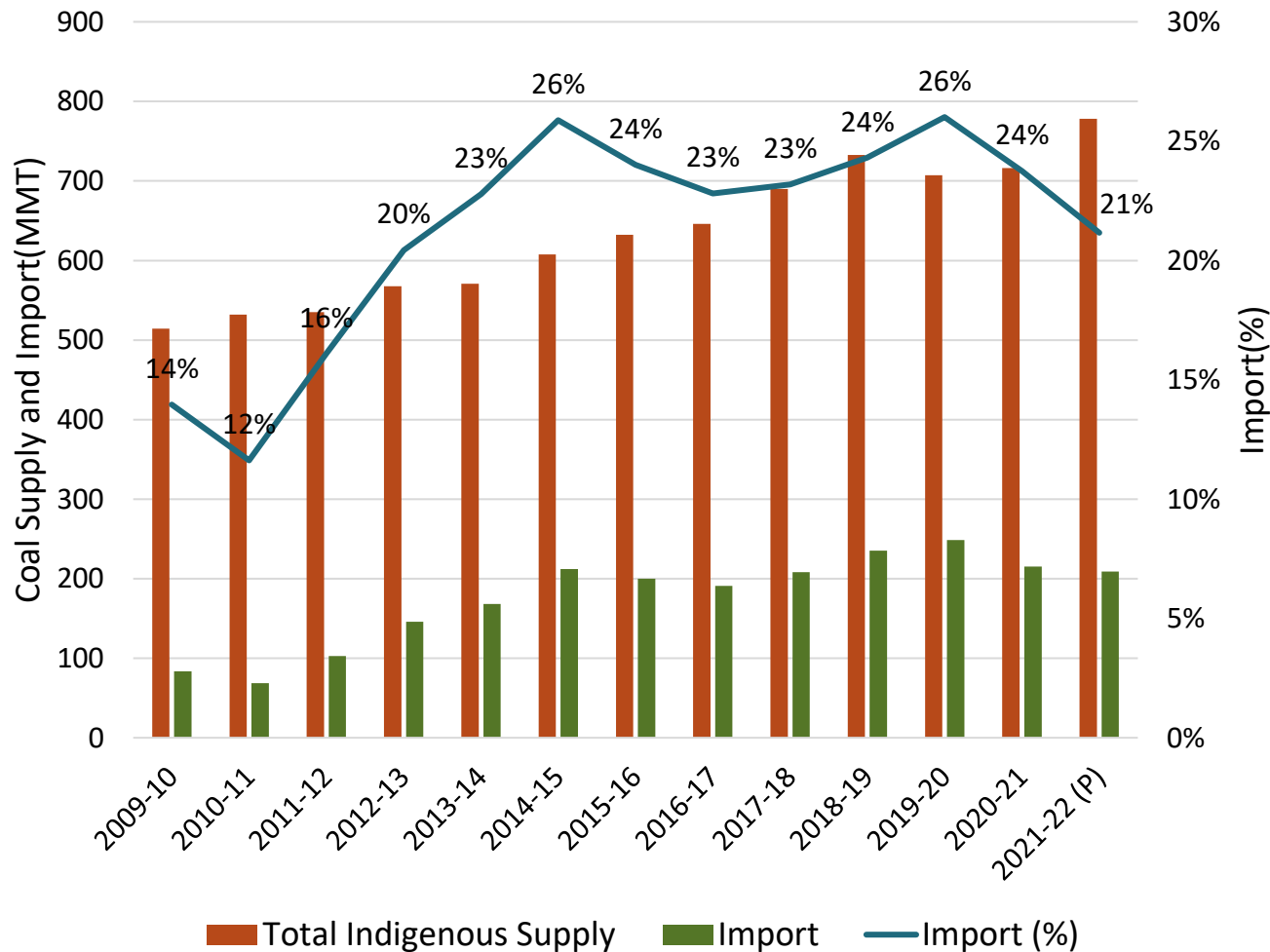


Total Primary Energy Supply



Total primary energy supply (MToE), 2021-22(P)

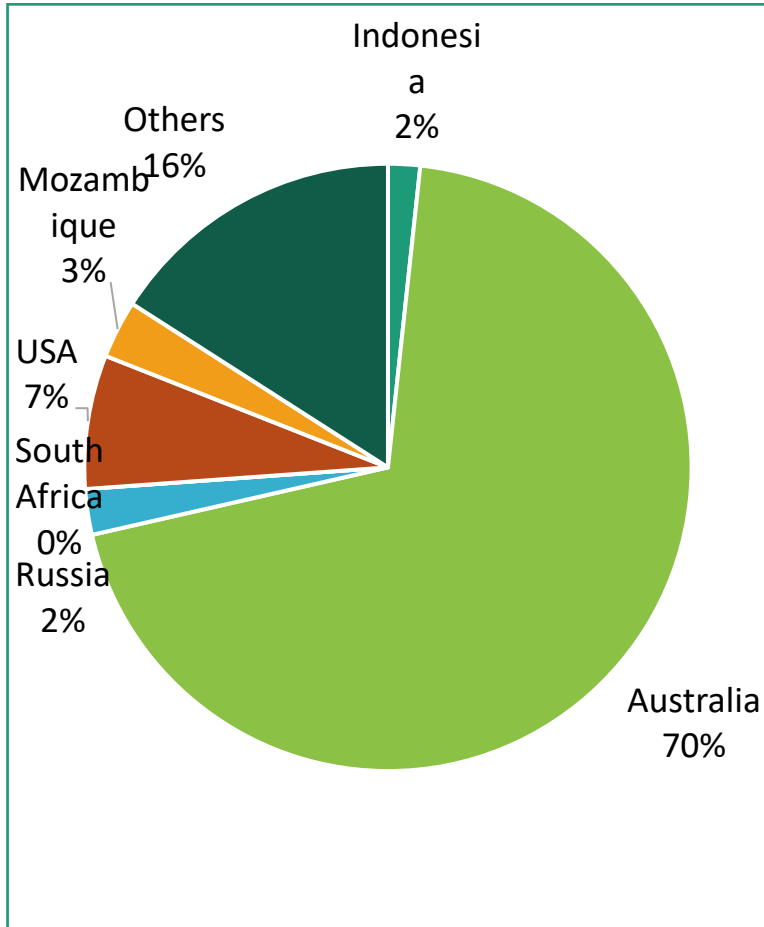
Coal Supply Overview



Source: Ministry of Coal, Annual Report

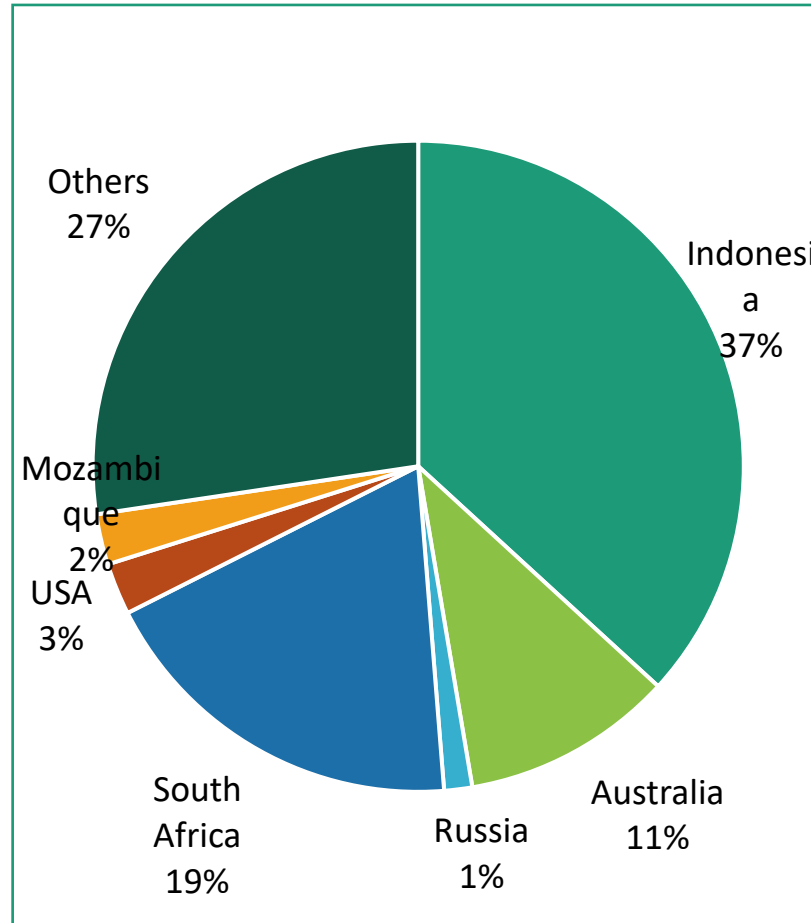
- Non-coking coal constitutes major component (~93%), Coking coal (~7%)
- **Import policy** : coal can be freely imported (under Open General Licence) by the consumers considering their needs based on their commercial prudence.
- **Coking Coal import** by Steel Authority of India Limited (SAIL) and other Steel manufacturing units – quantity and quality considerations.
- **Non-coking Coal import** by Coal based power plants, cement plants, captive power plants, sponge iron plants, industrial consumers and coal traders.

Coal Import (2021-22)



Coking Coal

Source: Ministry of Commerce & Industry



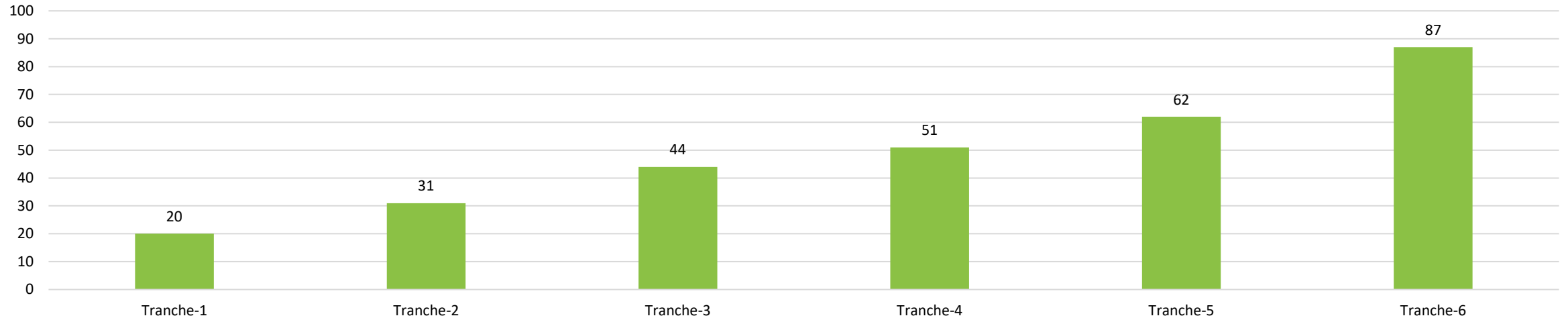
Non-coking Coal

Coal import (2021-22)

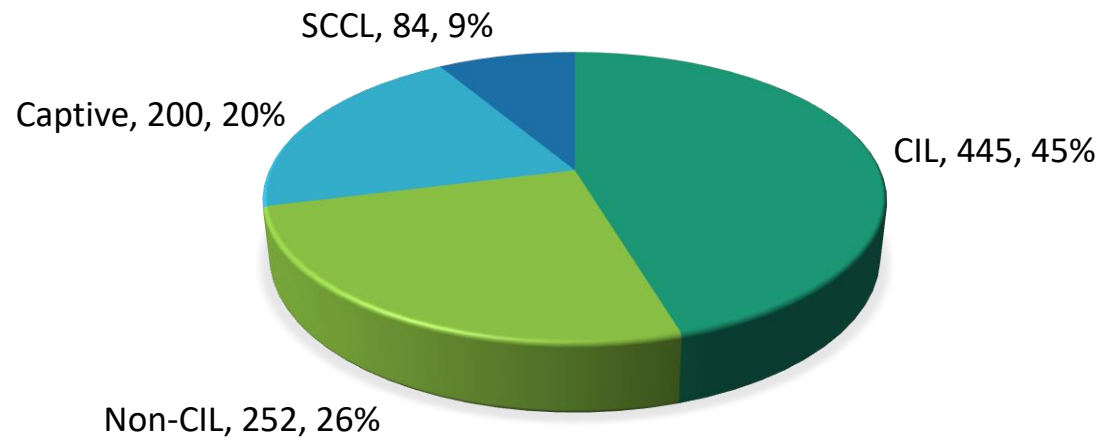
- Coking Coal :
Rs1030 billion
- Non-coking coal :
Rs 1257 billion.
- Major import from
Indonesia, Australia,
South Africa, USA &
Mozambique

Coal blocks auction: 2020-2023

Mines auctioned (cumulative)



Coal Block Share (number, share(%))



India Coal Sector Reforms and Initiatives

- **The Mineral Laws (Amendment) Act, 2020 (March,2020)**
 - Removal of end use restriction to allow wider participation in auction of coal mines
 - Free trade of coal as producer can use, sell or export coal without restriction.
 - Criteria of prior experience dispensed with.
 - Partially explored coal blocks were also put on auction.
 - Adoption of revenue-sharing model instead of rupees per tonne
 - Market-driven prices, as per National Coal Index
 - Rebate to mine allottees in case of early production
 - Rebate for quantity under Coal gasification/ Liquification.
 - Coal Bed Methane allowed for mine allottees.

Coal Sector initiatives in India

- Mission Coking Coal (August 2021) : To augment coking coal production and supply and to meet the demand of steel sector : 12 coking coal washeries of ~30 MTY being constructed.
- Coal Gasification Mission (September 2021):
 - Target to gasify 100 MT of coal by 2030.
 - Surface Coal/Lignite Gasification projects being developed.
 - In October, 2022 strategic bilateral agreements were executed as part of surface coal gasification (SCG): MoU between (a) BHEL & CIL, (b) IOCL, GAIL & CIL
- Coal Bed Methane (CBM):
 - CBM Policy 1997 for exploration and production;
 - Policy for extension of exploration and production under CBM contracts (2007);
 - Guidelines for pricing and commercial utilization of CBM (2011);
 - Grant of right to exploration and exploitation of CBM to CIL and its subsidiaries from coal bearing areas(2015).
 - Production CBM gases from coal bearing areas:
 - ~2600 billion cubic meters estimated CBM reserves in 12 States of India.
- Roadmap for Coal based hydrogen production – Expert Committee constituted (Sep, 2021)

Initiatives across the value chain

- Removal of extraneous, non-combustible material
- Blending of coal with bio-mass, hydrogen/ammonia
- Revised Policy for Biomass utilization for power generation through co-firing in coal-based power plants (October 2021)
- Adani Power Ltd., IHI Corporation, and Kowa Company Ltd. signed MoU to study feasibility on a modification to achieve 20% liquid ammonia co-firing ratio, and extend to 100% mono-firing at Adani Power Mundra coal fired power plant.
- Super-critical and Advanced Ultra Super-Critical technology
- New Environmental norms for thermal power stations
- CCU/S

Decarbonization initiatives by coal companies (1/3)

Promoting Renewable - Moving towards net zero carbon

- **Coal/lignite companies** promoting renewables.

	Installed	Plan (2030)
Solar	1656 MW	5570 MW
Wind-mills	51 MW	

- Development of solar parks in some of the reclaimed mining areas also envisaged.
- **Coal India Limited** – the largest public sector fossil-fuel producer –
 - committed to become a Net Zero Energy Company
 - installed 11 MW rooftop solar power as in May 2023
 - in the process of implementing 3000 MW solar power program by 2025-26:

FY2024	FY2025	FY2026
400	1442	1158

Decarbonization initiatives by coal companies (2/3)

Creation of Green Cover

- PSUs - **sustained reclamation and afforestation** of areas in and around its operating mines.
- The reclamation activities being carried out in mines **as per well-designed and approved mine closure plans**, which carry detailed Provisions with regard to Progressive as well as Final Mine Closure activities.
- Coal/lignite PSUs have envisaged to bring about 30,000 Ha of **additional area** (in and around coalfields) **under plantation** by 2030 from 2019, enhancing the carbon sink significantly.
- Achievements of Coal/Lignite PSUs on the front of **Bio-reclamation of mined-out areas** and plantation in free areas in and around coal mines

Decarbonization initiatives by coal companies (3/3)

Eco-friendly Use of Abandoned Coal Mines

- As of 2021, 293 mines have been closed/abandoned/discontinued due to various reasons
- The abandoned quarries of CIL are used for :
 - ❖ Dumping /Filling of fly ash in to the worked-out area for suitable reclamation.
 - ❖ Development of eco and mine tourism parks
 - ❖ Afforestation
 - ❖ Pisciculture
 - ❖ Source to supply of drinking water and other domestic use.
 - ❖ Generation of sand from overburden of opencast mines at few places

Commitment of India to Climate Action

2015: COP-21

1

An economy-wide **emissions intensity** target of **33%–35% below 2005 levels**

2

A electric power **capacity** target of **40%** installed capacity from **non-fossil**-based energy resources by 2030, to be achieved with international support

3

A carbon sink expansion target of creating an additional (cumulative) carbon sink of 2.5–3 GtCO₂e through additional forest and tree cover by 2030.

2022: NDCs (2030)

1

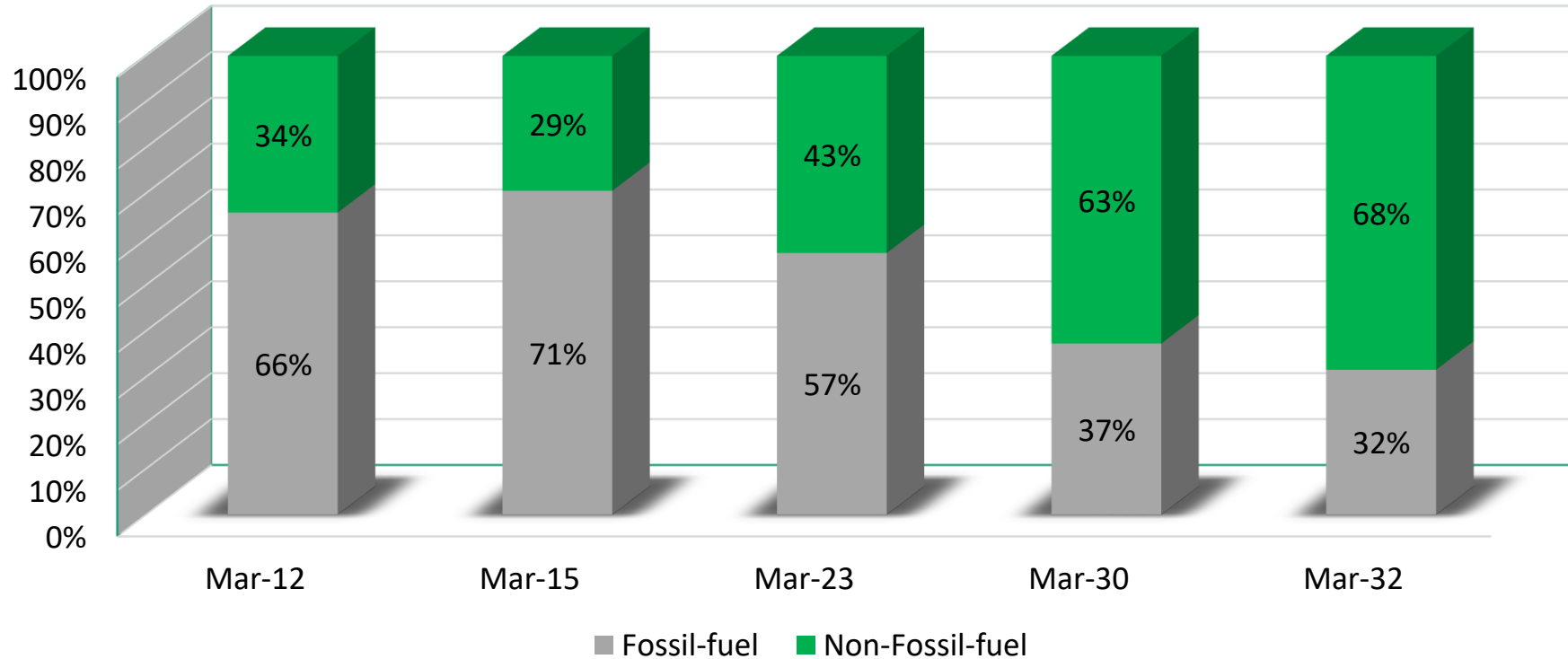
Non-fossil generation capacity: 50%

2

Reduction in emissions Intensity: 45%
from 2005 level

Citizen centric approach : key to combat climate change:
Mass movement for 'LIFE'– 'Lifestyle for Environment'

Clean Energy Transition: Progress and Outlook



Installed Capacity

Source: CEA, TERI (2030) and NEP, 2023

Carbon Market

- ❖ The Energy Conservation Amendment Act, 2022 includes provisions for putting in place a carbon market.
- ❖ **Carbon credit will on priority be used within the country to meet India's NDCs.**
- ❖ The Central Government, or any agency authorized by it may issue **carbon credit certificate** to the registered entity which complies with the requirements of the carbon credit trading scheme.
- ❖ The registered entity shall be entitled to purchase or sell the carbon credit certificate in accordance with carbon credit trading scheme.
- ❖ Carbon Credit and Trading Scheme (CCTS) notified in June 2023 :
 - National Steering Committee for Indian carbon market and other authorities shall develop the detailed procedure for operationalizing the Indian carbon market.
 - Power exchanges shall perform functions regarding trading of carbon credit certificates, in accordance with the regulations notified by the Commission.

Carbon Capture, Utilization, and Storage (CCUS)

'CCUS Policy Framework and its Deployment Mechanism in India' was released by NITI Aayog Study Report (November 2022).

- ❖ Explores the importance of CCUS as an emission reduction strategy to achieve deep decarbonization from hard-to-abate sectors.
- ❖ CCUS can provide a wide variety of opportunities to convert the captured CO₂ to differently value-added products like green urea, building materials (concrete and aggregates), chemicals (methanol and ethanol), polymers (including bio-plastics) and enhanced oil recovery (EOR) with wide market opportunities in India, thus contributing substantially to a circular economy.

Clean Energy Transition: National Hydrogen Mission

The Mission

- National Hydrogen Mission launched on 15th August 2021 aims to aid in meeting India's climate mitigation targets:
 - Envisaged to be the future fuels to replace fossil fuels and reduce dependence on fossil fuels and also reduce crude oil imports
 - ❖ Cut about 50 million metric tonnes of carbon emissions
 - ❖ Save more than \$12 billion on fossil fuel imports
 - Green hydrogen production target of 5 million tonne per annum by 2030

Gas Authority of India Ltd. (GAIL) is setting up a green hydrogen unit that will produce 4.3 tonnes (close to 10 MW) of green hydrogen per day.

Leading companies in Green Hydrogen production

Reliance Industries Ltd., GAIL, NTPC, Indian Oil Corporation Ltd., L&T, Adani Green Energy, JSW Steel, Jindal Stainless.

Thank you!

TERI - An independent not-for-profit think-tank acting in various facets of sustainable development since 1974

“Creating Innovative Solutions for a Sustainable Future”

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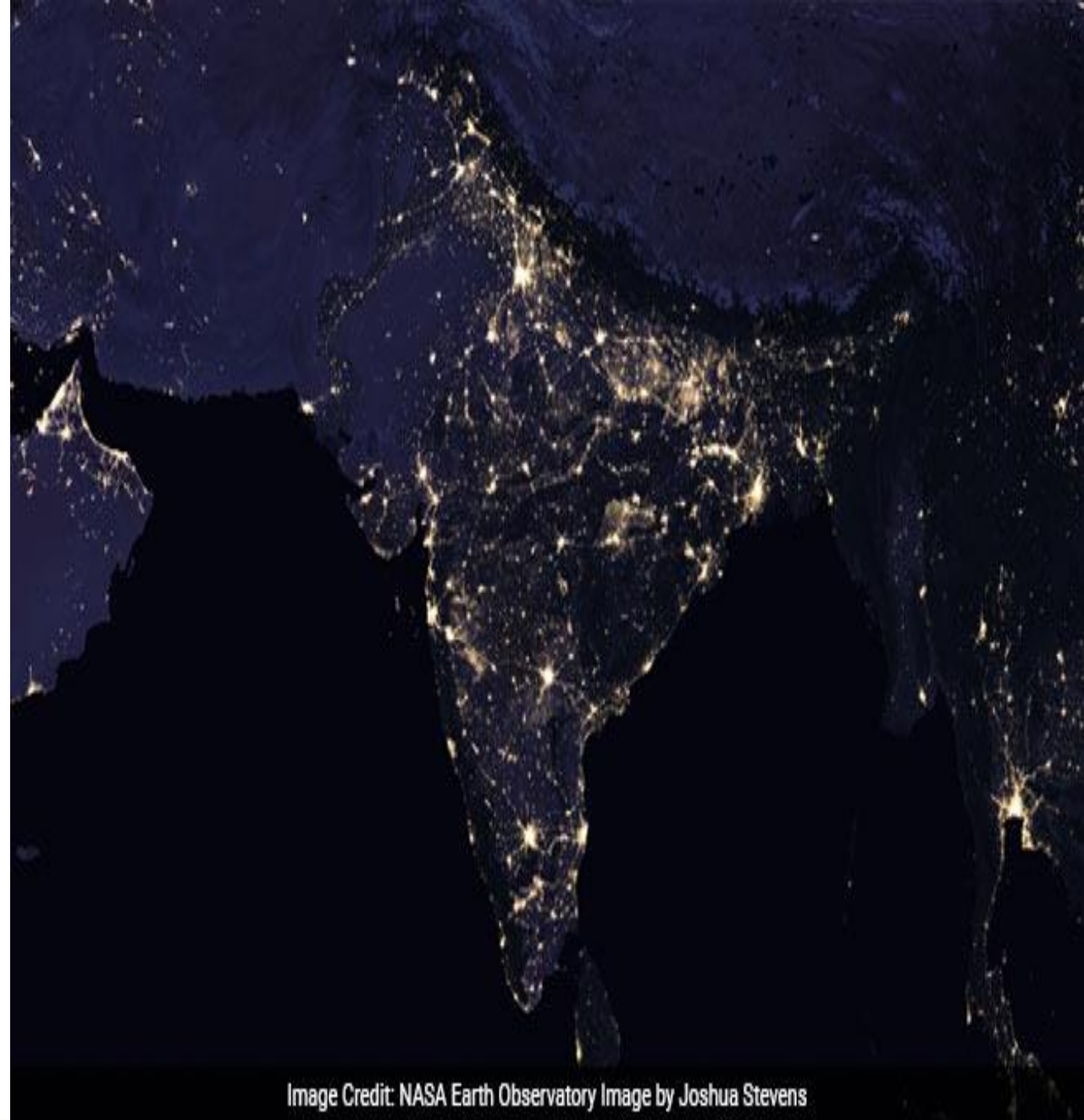


Image Credit: NASA Earth Observatory Image by Joshua Stevens