Asian Transport Observatory

Rail's policy landscape for Decarbonization and Resilience

Aiming for convergence: Multiple Actors- One Framework

Adwait Limaye
Data and Policy Analyst
Asian Transport Observatory

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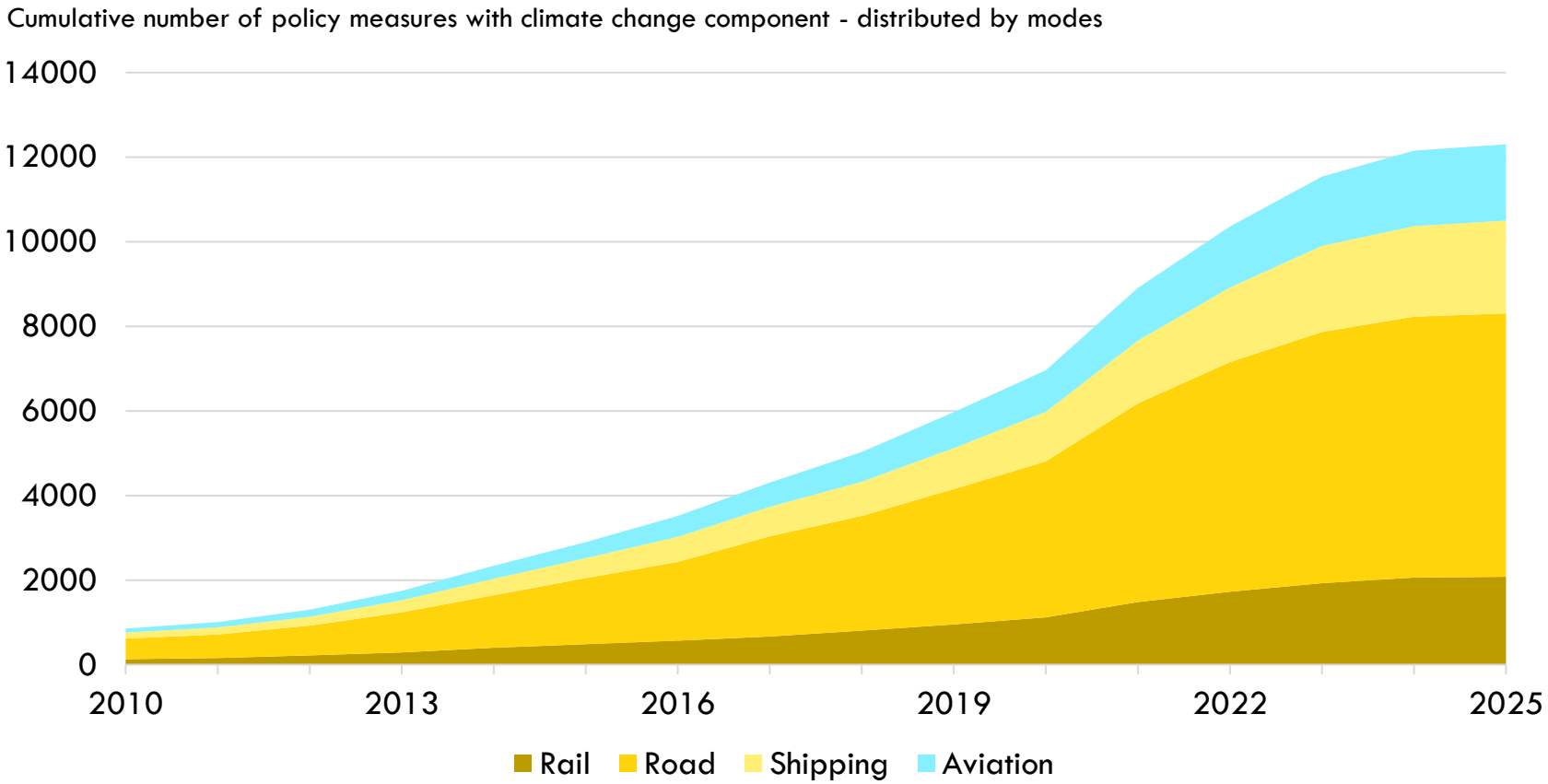
Rail Climate Policies on the Rise:

Rail climate policies are increasing, yet the sector remains underrepresented compared to road



Rail as a **multi-goal accelerator**

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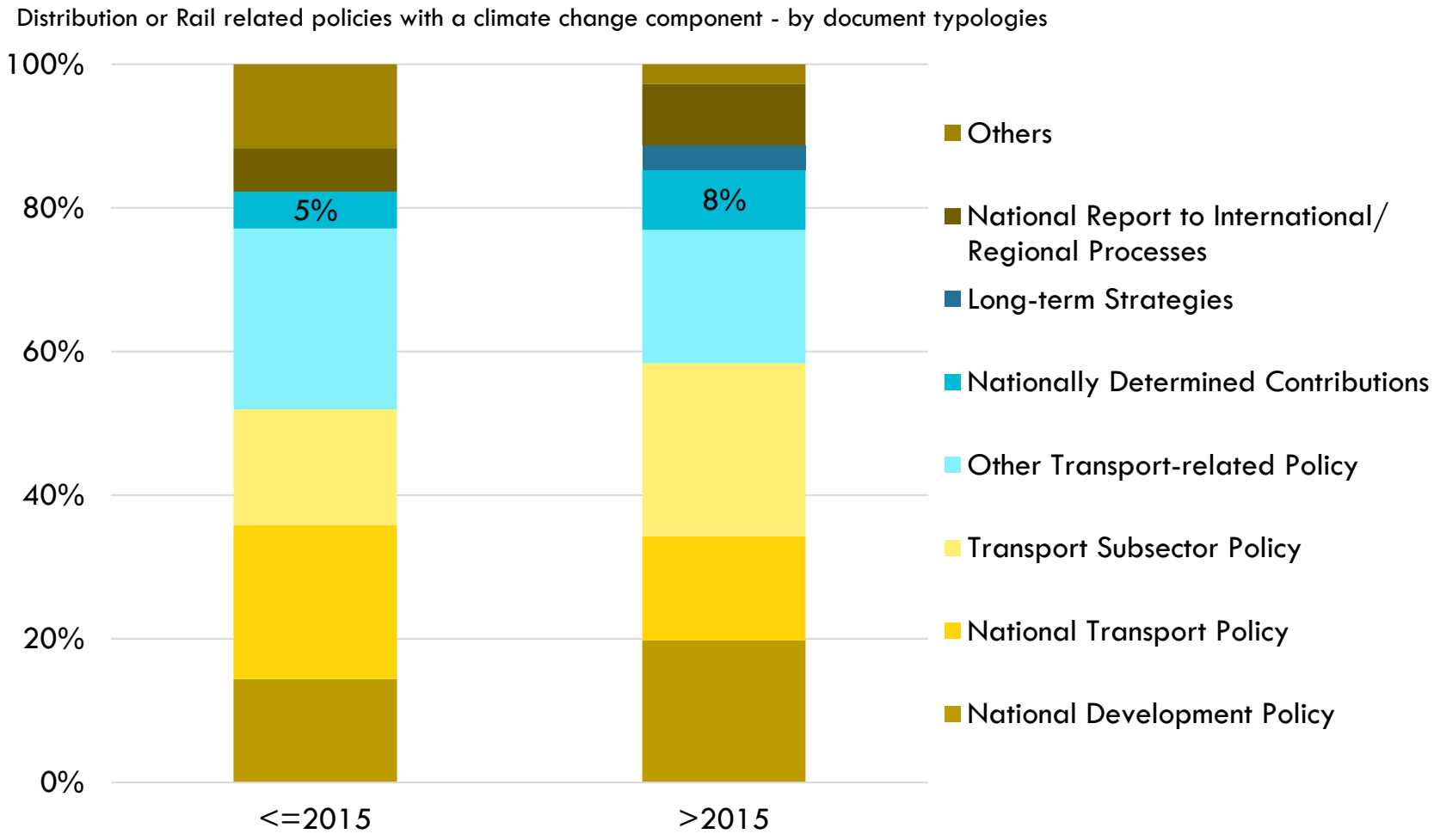
* Based on the policy analysis of 43 economies in the Asia-Pacific region

Growing diversity in Rail Climate Policy sources since 2015:

Policies are increasingly integrating rail climate change measures, with NDC rail references gaining prominence



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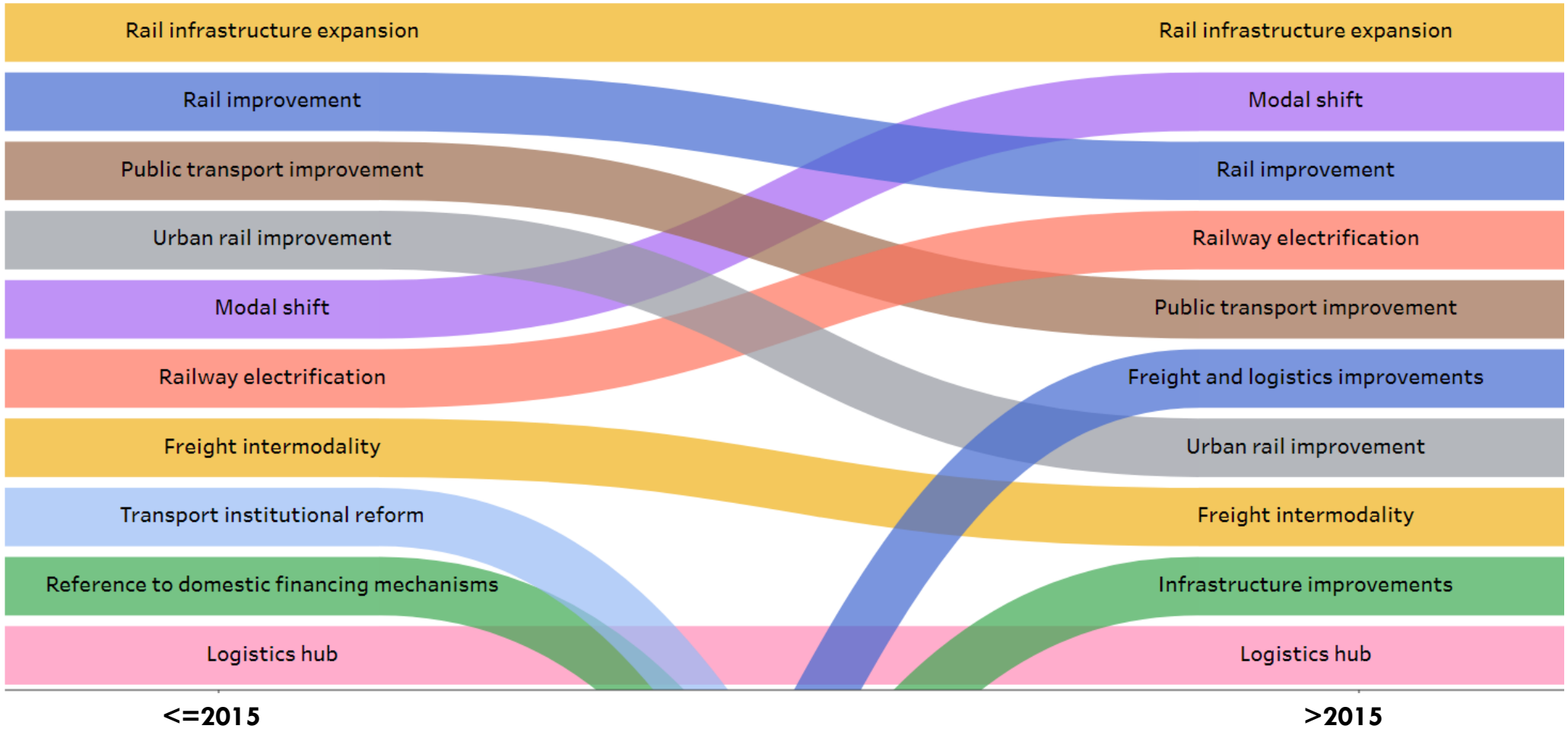
Shifting Focus in Rail Climate Policies:

Policy types show a clear shift post-2015: electrification and modal shift are rising in importance, infrastructure expansion remains strong



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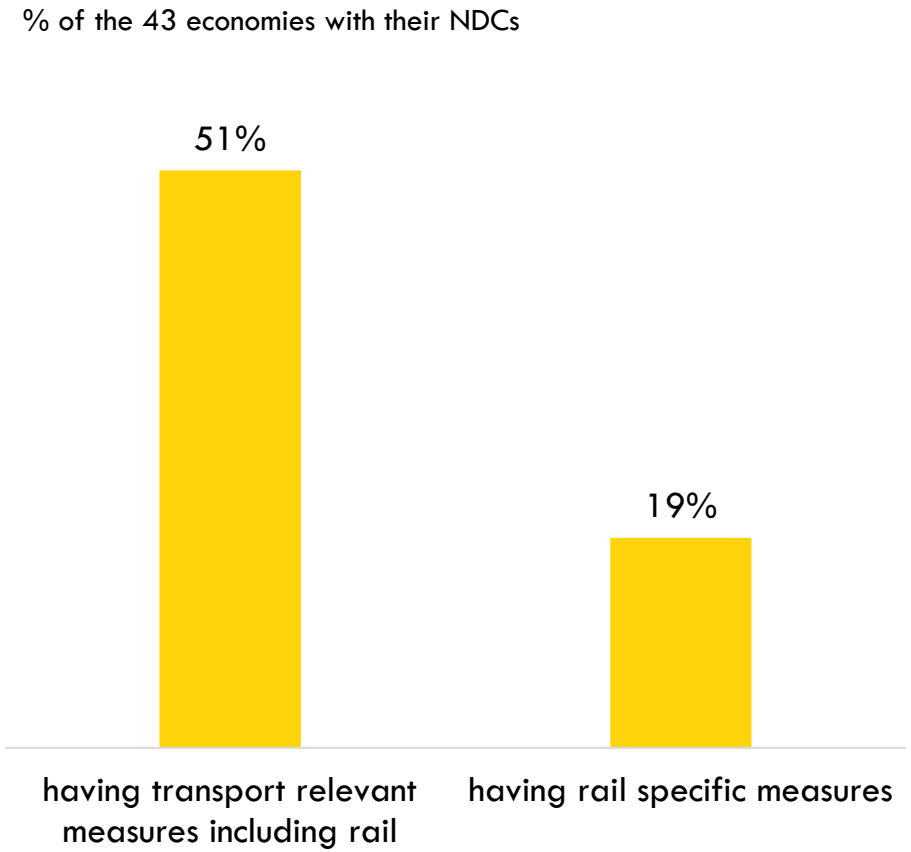
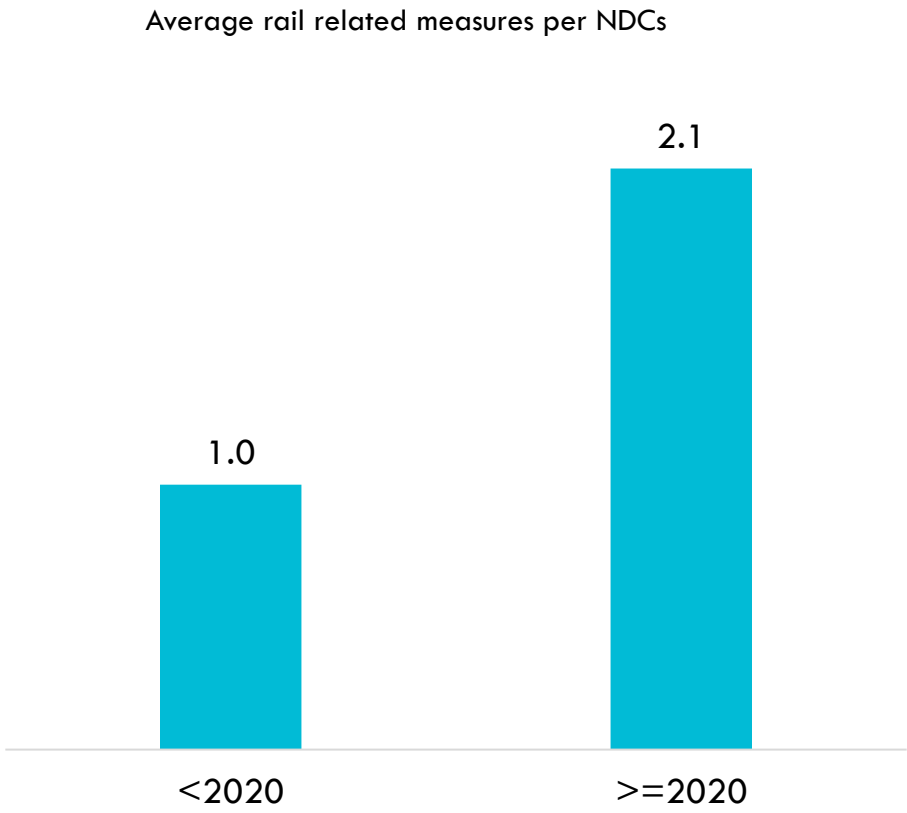
Rail Measures in NDCs - Limited Yet Growing:

About 50% of Asia-Pacific countries include rail, but average measures per NDC have doubled from 1 to 2 since 2020





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Rail Targets in NDCs - Modal Shift leads the way:

Rail-specific NDC targets emphasize modal shift, also focus on electrification and infrastructure expansion

Country	Transport Sector Measure	Target	Target year
Bangladesh	Modal shift	Unconditional: Modal shift from road to rail (10% modal shift of passenger-km) through different Transport projects such as BRT, MRT in major cities, Multi-modal hub creation, Padma Bridge etc. Conditional: Modal shift from road to rail (25% modal shift of passenger-km) through different Transport projects such as BRT, MRT in major cities, Multi-modal hub creation, new bridges etc. (First Nationally Determined Contributions (Updated), 2021)	2030
Bangladesh	Modal shift	To achieve a shift in passenger traffic from road to rail of up to around 20% by 2030 compared to the business as usual. (Intended Nationally Determined Contributions, 2015)	2030
Nepal	Railway electrification	By 2030, develop 200 km of the electric rail network to support public commuting and mass transportation of goods. (Second Nationally Determined Contribution – NPL, 2020)	2030
Singapore	Rail infrastructure expansion	We are expanding our rail network from about 270 km today to 360 km in the early 2030s. (Singapore's Second Nationally Determined Contribution (NDC), 2025)	2030
Türkiye	Modal shift	Railway Passenger transportation share will increase from 0.96% to 4.15% and railway freight transportation share will increase from 5.08% to 11.24%. The share of highways in annual freight transportation will be reduced from 71% to 67%. (First NDC (Updated) – TUR, 2023)	2030

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Rail Targets Beyond NDCs - Broader Climate & Resilience Agenda:

Policies span green energy transition, emissions and energy reduction, climate-resilient infrastructure, rail safety, and modal shift for both passenger and freight transport

Railway Electrification & Green Energy Transition

- People's Republic of China: 75% electrification by 2027, 78% by 2030; new locomotives to prioritize low-emission tech; pilots on hydrogen, low-carbon fuels, and hybrid power.
- Nepal: 200 km electric rail by 2030.
- Sri Lanka: 50% public transport electrification (incl. rail) by 2030; 100% by 2035; electrified line to Kurunegala by 2030.
- Türkiye: Complete electrification by 2053.
- Uzbekistan: 60% railway electrification by 2026.
- Viet Nam: Phase out fossil-fuel rail equipment by 2040; 100% green energy for rail vehicles and stations by 2050.

Modal Shift to Rail

- Indonesia: Passenger share 7–9%, freight 11–13% by 2030.
- Malaysia: 40% urban public transport share by 2030; +10% rail cargo by 2025.
- Pakistan: Rail freight share up from 4% to 22% by 2030.
- People's Republic of China: Strong modal shift with targets for container rail-water transport (+15%/year by 2025), freight turnover +23% by 2027; by 2030, rail to carry 48% passenger and 22% freight turnover.
- Philippines: Rail share of Metro Manila trips to 14% by 2028.
- Singapore: 75% public transport peak share by 2030, >80% by 2040.
- Thailand: Rail freight to 10% by 2036; avg. 7% (2023–27).
- Türkiye: Freight share 5% → 20% (2035) and 22% (2053); passenger share 1% → 5% (2035), 6% (2053).
- Viet Nam: Introduce urban rail in 2 cities, 3 routes by 2030.

Reducing Emissions & Energy Use

- People's Republic of China: Cut railway energy use per unit turnover by 4.5% (2025) and 10% (2030, vs 2020); peak petroleum use and carbon emissions before 2030.
- Uzbekistan: Reduce CO_2 per t-km by 15% (2025) and 24% (2035).

Climate Resilience & Safety

- Bangladesh: 50% of rail infrastructure climate-resilient/energy-efficient by 2030.
- People's Republic of China: Rail fatality rate <0.3 per bn tonne-km by 2025.

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Multiple actors - One framework

Multiple Rail related Actors

Responsible ministry

Related ministries

National Transport Research organisations

Rail Operators

Rail operation allied companies

Rolling Stock & Component Manufacturers / OEMs

Infrastructure & Engineering organisations

Freight and Logistics organisations

Energy and Technology organisations

Finance and Investors

Urban rail companies

through

Diverse Policy documents

National Transport Policy
Annual reports
Budget speech
White paper, Strategy document
Rail subsector policy
Transport/ Rail related policies

Electrification, Alternative Energy, Climate Change Mitigation, Climate Change Adaptation, Logistics

National Reports to Global Process

NC, BUR, TNA, VNR

National press releases/ Ministerial speech/ presentations
Documents by non-ministerial actors

Corporate ESG / Sustainability reports
Action plans
Vision documents
Annual reports
Operational manuals
Investor presentations
Tender and DPRs

can potentially converge to

One robust Framework

NDC Framework

Multiple actors - One framework

Case example of India

NDCs

- Indian Railways to become **net-zero** by 2030, leading to annual mitigation of 60 million tonnes of CO2
- National Logistic Policy aspires to **reduce cost of logistics** in India to be comparable to global benchmarks by 2030

LTSs

- National Green Hydrogen Mission
- Target of constructing metro rail services in 27 cities across India by 2025 (MoHUA, n.d.)
- Modal share of the railways in freight to 45% by 2030 (NRP)
- Indian Railways to become net-zero by 2030
- Dedicated freight corridors by the railways
- Setting up of the National High-Speed Rail Corporation Ltd
- Adoption of efficient, economical and environmentally sustainable modal-mix (NLP)
- 100% electrified broad-gauge network (MoR)
- Expanding the availability of and access to public transport

The work on this is still in progress. The policy measures indicate a sample sourced from the policies, PIB, agency reports and other reputable sources.

Multiple actors - One framework

Case example of India

Apex Ministry: Ministry of Railways (MoR)

- Net-zero ambition for Indian Railways (scope-1)
- 100% electrification of broad-gauge routes by 2030
- Renewable energy procurement target for traction & operations
- Monsoon / disaster preparedness advisories and climate-resilient construction standards (e.g., elevated alignments, drainage).
- Vision 2030 - freight corridors, modal-shift and capacity expansion

Related Ministries: Environment, Climate Change, Power, Energy, Urban affairs, Heavy industries

- MoP & MNRE — provide renewable generation and grid policy that enables IR's green traction (PPAs, replacement of fossil electricity).
- MoPNG — influences alternative fuel policies (LNG/alternative fuels, hydrogen roadmaps).
- MoHUA, MoRTH, MHI, Finance — urban rail policy, integrated transport planning (Gati Shakti), industrial/manufacturing incentives and green finance. Metro Railways Act - empowers metro agencies to implement climate-smart station design and resilient civil works. National Transit Oriented Development (TOD) Policy
- MCI - National Logistics Plan (NLP) - efficient, sustainable modal mix with innovative rolling stock, digitalised supply chains, and energy-efficient technologies for higher throughput

National Transport Research organisations: Policy and strategy research, Technical standards development, Training and capacity development

- NITI Aayog - Transport decarbonisation roadmap & policy recommendations: NITI published/inputs on electrification, modal shift and policy packages to decarbonise transport (covers rail as a priority path).
- RDSO - Standard Specifications and testing regimes to ensure performance under varying climatic stressors for heat/track performance and electrification.
- IRITM, IRIEEN, NRTI (Gati Shakti Vishwavidyalaya), CAMTECH, NAIR - training, R&D and capacity building for rail operations, electrification, energy management and maintenance practices; lead curricula, research and applied training that support IR

Rail Operators: Indian Railways, Dedicated Freight Corridor Corporation of India Limited

- Net-zero emissions commitment (operational) - renewable procurement (Solar and Wind) & own installations
- Full network electrification
- Reduce freight emissions; modal shift
- Replacing diesel generator sets on trains, LED lighting, regenerative braking on new rolling stock (operator measures)
- Monsoon & cyclone SOPs, embankment/bridge hardening, heat-tolerant track practices and temperature monitoring

Rail operation allied companies: IRCTC, RailTel, CRIS

- IRCTC - Reduce environmental impacts of catering, tourism and station services
- RailTel - digitalisation enabling energy optimisation for operations

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Multiple actors - One framework

Case example of India

Rolling Stock & Component Manufacturers / OEMs: IR Production Units, Indian Private OEMs, Global OEMs

- IR Production Units - Production focus on electric locomotives & modern energy-efficient coaches
- Indian private OEMs - aligned to electrification and 'Make in India' procurement policies
- Global OEMs - Provide energy-efficient rolling stock, signalling & regenerative braking technology
- Alstom - Alstom's SBTi-approved goals include cutting scope 1 & 2 emissions by 40% by 2030/31 and scope 3 emissions by 42% per passenger-km and 35% per ton-km; also committing to 100% renewable electricity, 25% energy use reduction, and 100% eco-designed solutions by 2025.
- BEML - Achieve carbon neutrality and scale green mobility across its operations
- TRSL - Allocated ₹100 crores by 2025 specifically toward R&D in eco-friendly technologies aimed at reducing carbon emissions by 30%
- BLW - Piloting trackside / removable solar panels and other green energy innovations at the works
- MCF - explicit targets to reach energy-neutral/zero-energy mega-factory status via solar & efficiency measures
- Bharat Forge - Group-level sustainability & emissions targets (energy efficiency, renewable uptake, waste & water targets)

Infrastructure & Engineering organisations: RVNL, RITES, L&T, IRCON, NBCC, Afcons

- Implement electrification, drainage, elevated/grade-separated works and design standards that incorporate resilience and energy efficiency.
- RITES/IRCON also provide project-level environmental & climate assessments for funded projects.

Freight and Logistics organisations: CONCOR, Adani Logistics etc

- CONCOR and DFCCIL strategies explicitly aim to shift freight from road to rail (lower emissions per tonne-km)

Energy and Technology organisations: REMC, BHEL, ReNew Power, NTPC , Infosys etc.

- REMC - Set up to aggregate renewable procurement for Indian Railways
- BHEL provides traction & substation equipment (supporting electrification).
- Adani Green / ReNew / NTPC RE are among suppliers for solar/wind PPAs tied up by IR
- Infosys, TCS (IT Firms) - Digitalisation for energy management & predictive maintenance

Finance and Investors: IRFC

- IRFC - Climate Bonds-certified green bonds to raise funds for electrification/renewable projects – Public Green Bond Framework

Urban rail companies

- DMRC deploys regenerative braking, energy conservation, solar on stations, rainwater harvesting, STPs and has registered for carbon credits — and many depot/station projects follow LEED/IGBC or similar standards.
- NCRTC – solar energy; optimize energy consumption

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Converge the multiple actors in the rail subsector under

one coherent climate framework for

Alignment of decarbonisation and resilience efforts

Demonstration of stronger climate ambition at the national level

Mobilisation of finance for building a sustainable and future-proof rail sector

asiantransportobservatory.org

"ATO translates data into insights, policies, and investments"

ATO Team	info@asiantransportobservatory.org
Jamie Leather	jleather@adb.org
Andres Pizarro	andres.pizarro@aiib.org
Manuel Benard	manuel.benard@aiib.org
Alvin Mejia	alvinmejia@asiantransportobservatory.org
Sudhir Gota	sudhirgota@asiantransportobservatory.org

X: @transportATO

Linkedin: bit.ly/ATOlinkedin