WORLD SUSTAINABLE DEVELOPMENT SUMMIT 2022

TOWARDS A RESILIENT PLANET: ENSURING A SUSTAINABLE AND EQUITABLE FUTURE

UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY

UK Government

Bloomberg Philanthropies

SHAKTI SUSTAINABLE ENERGY FOUNDATION

TATA CLEANTECH CAPITAL LIMITED

CIFF CHILDREN'S INVESTMENT FUND FOUNDATION

Virtual Stakeholder Roundtable on 'Sustainable Mobility' for *COP26*
Charter of Actions

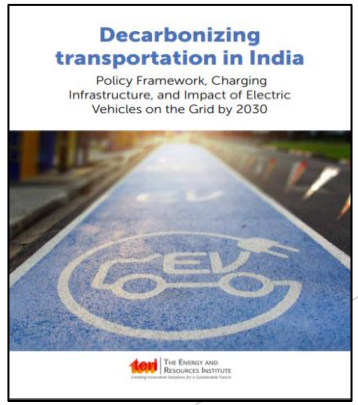
Date: 31st August, 2021 | **Time:** 3:00 PM to 4:30 PM | **Duration:** 90 minutes

Project: Supporting Enhancement in India's NDC Ambition

Two studies focused on the transport sector:

- *Decarbonization of the Transport Sector in India: Present Status and Future Pathways*

- *Decarbonizing Transport in India: Policy Framework, Charging Infrastructure and Impact of Electric Vehicles on the Grid by 2030*



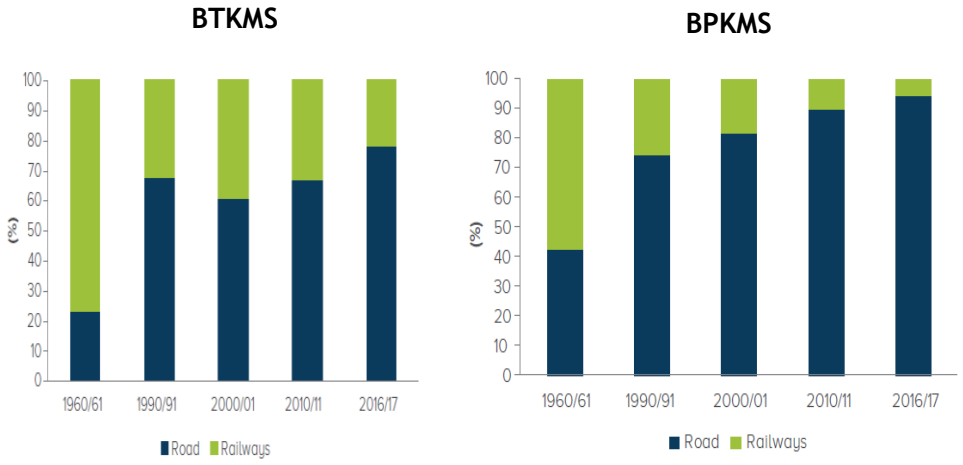
Supported by: Children's Investment Fund Foundation (CIFF)

Available at: www.teriin.org

Background

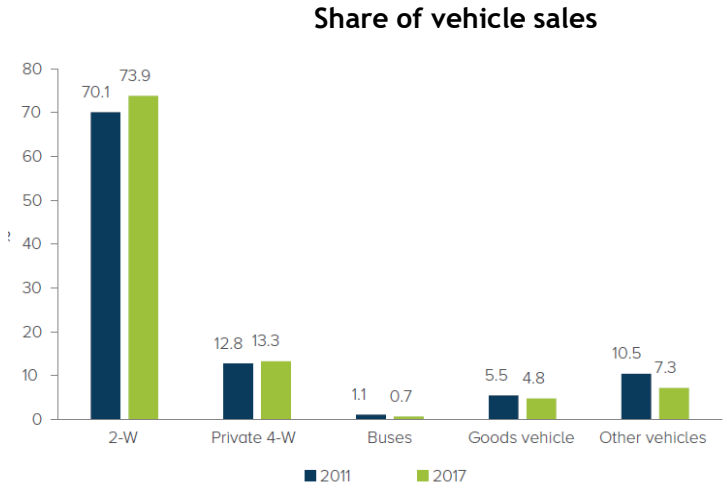
- Passenger and freight activity has grown by 8-fold and 6-fold since 1992 (TERI).

Accelerated modal shift to the road sector



Source: MoR & MoRTH

Increased share of private modes of travel



Source: SIAM

- The Indian aviation industry has emerged as a fast-growing sector. Air movement grew at a CAGR of 7.2% between 2009 and 2019 (DGCA).
- Railways has seen a significant switch towards electric traction, with large-scale electrification of broad-gauge lines

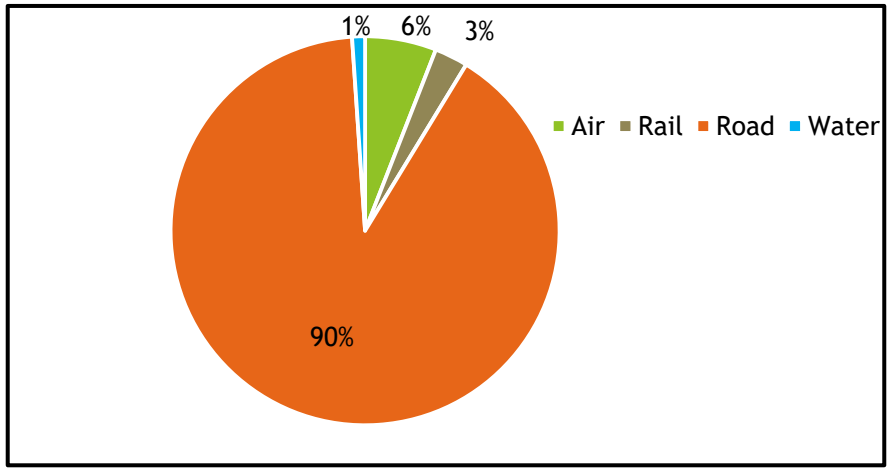
Unique Features

- Traditionally high share of bus and non-motorized transport users, presently declining.
- Largest two-wheeler market in the world.
- Dependence on informal intermediate public transport (IPT).
- Lower per capita income requires investment in most affordable modes of passenger transport.
- High logistics cost, around 14% of GDP.
- Robust automobile manufacturing industry known for cost-effective innovation.

Energy Consumption and CO2 Emissions

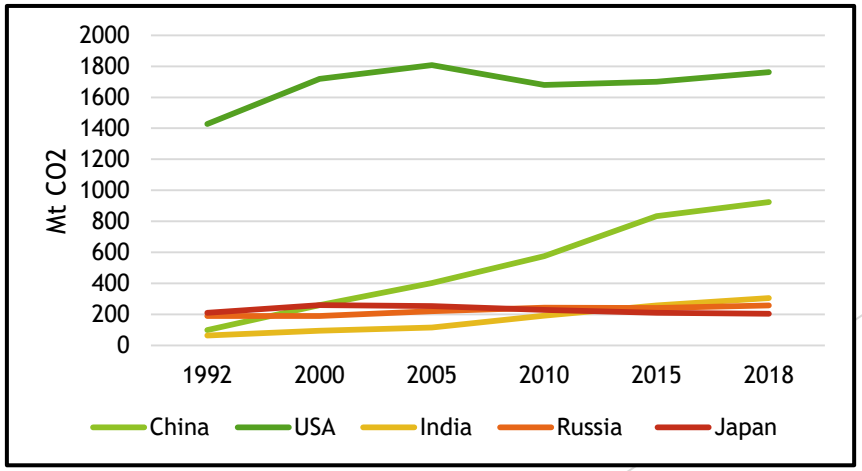
- Between 2008 and 2018, the annual energy consumption from Indian transport has increased by 22% (TEDDY).
- The sector accounts for 70% and 99% of the total high-speed diesel (HSD) and petrol consumption, respectively (Nielsen, 2013).
- In 2016, Indian transport sector estimated to emit 274 million tonnes of CO2 equivalent emissions, 13% of total emissions (Biennial Update Report-3).

Road sector responsible for 90% of emissions



Source: TERI analysis

Emission have skyrocketed, but remain below the two major emitters



Source: Compiled from IEA estimates

Decarbonization Policies: Progress Towards Transport NDC

NDC Goal: Improve Fuel Efficiency

- Corporate Average Fuel Economy (CAFÉ-1) norms introduced in 2017 have shown good results for passenger cars.
- Estimated fleet average CO2 emission for FY 2018–19 was 121.9 g/km (ICCT,2020).
- The Bureau of Energy Efficiency notified fuel efficiency standards for commercial vehicles above 12 tons in 2017. Standards for vehicles between 3.5 to 12 tons were notified in 2019.
- Compliance for commercial segments has been much less encouraging.

NDC Goal: Promote electric vehicles

- Both Central and State Governments have notified EV policies, providing purchase and manufacturing incentives.
- There has been significant support from the automobile industry as well.
- Actual EV sales have remained below the ambitious targets.
- 95% of e-vehicle sales in two and three-wheeler segment.
- High upfront costs, limited financing options and lack of charging infrastructure are the biggest hurdle.

NDC Goal: Increase share of rail in land transport from 36% to 45%.

- The share of rail has been declining. Present estimates suggest that the share of rail in freight movement is around 25%-27% (TERI, National Rail Plan).
- Historical underfunding leading to infrastructure bottlenecks. However, investments have been stepped up since 2015.
- Need to improve competitiveness with the road sector through better marketing and tariff policies.
- Two DFCs are expected to be fully commissioned by 2023.
- 42% and 34% of the Western and Eastern DFC, respectively, have been completed.

NDC Goal: Develop mass rapid transit systems and mass urban transports systems

- Significant progress in expanding urban metro systems. As of 2021, 786 km of the metro network has been constructed in India.
- National Infrastructure Plan envisages USD 123.56 bn investment in urban mass transit systems.

NDC Goal: Promote biofuels

- Strong policies and recent proposed mandates for achieving 20% blending of ethanol in petrol.
- Actual blending rates remain below 10%.
- Need to consider the implications and scalability of second and third generation biofuels.

Some Gaps

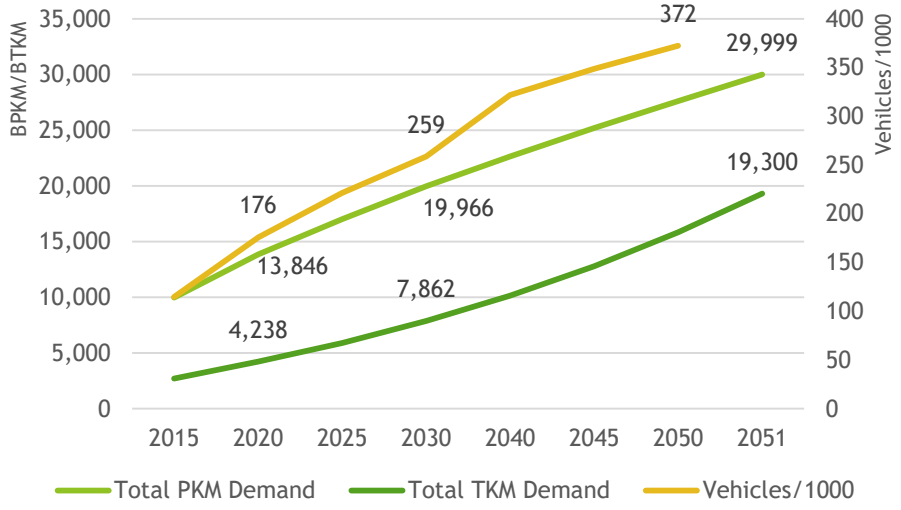
- Public bus system continues to be inadequate. Indian cities would require investment to the tune of $15.4 billion to procure new buses to meet expected demand (Janaagraha, 2020).
- Low share of urban expenditure on infrastructure suited for less energy efficient transport modes.
- Lack of differentiated strategies for cities based on existing mobility patterns.
- Transport planning capacity remains limited.

What does the future hold?

Projected Trends (BAU)

- Passenger activity is estimated to increase threefold by 2050.
- Even faster increase is seen for freight, around seven-fold.
- Accelerated increase in motorization rate, reaching 372 per 1000 population in 2050, still below saturation levels.
- Dependence on the road sector and private modes of travel to keep increasing without significant interventions.

Estimated transport activity till 2050



Source: TERI analysis

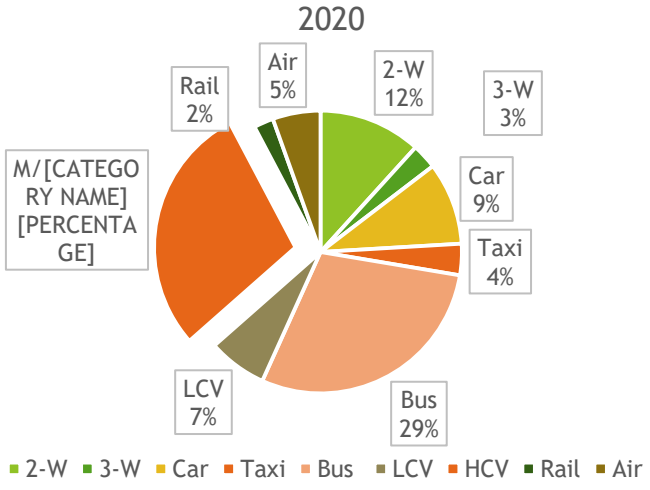
Mode-wise share in transport activity

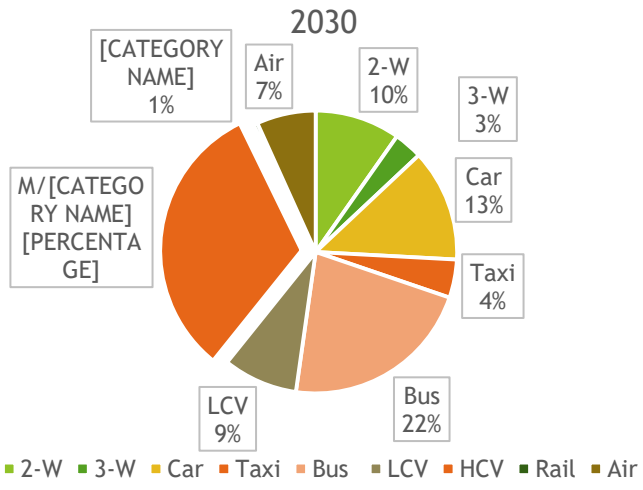
Segment	2020	2030	2040	2050
BPKMs				
Car	5%	10%	12%	15%
2-W	13%	15%	14%	12%
3-W	4%	8%	9%	11%
Taxi	2%	4%	4%	4%
Bus	**64%**	**58%**	**52%**	**48%**
Rail	10%	8%	8%	7%
Air	2%	3%	4%	5%
BTKMs				
LCV	16%	15%	14%	13%
M/HCV	**58%**	**60%**	**63%**	**66%**
Rail	26%	24%	22%	20%
Air	0.09%	0.5%	1%	1.2%

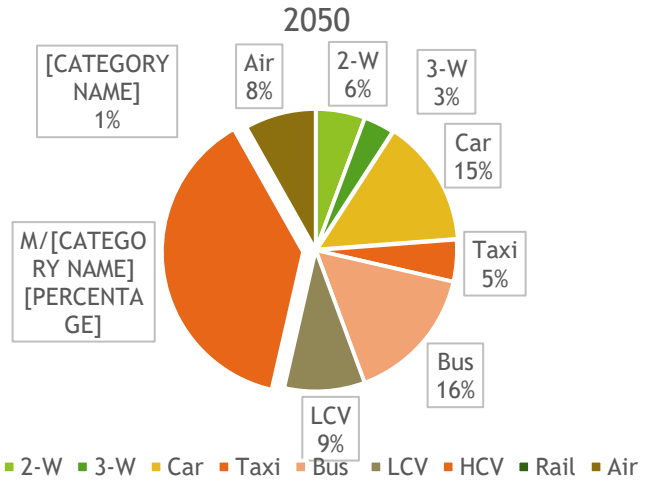
Projected Trends (BAU)

- CO2 emissions are predicted to increase four-fold in the BAU scenario, from 282 million tonnes in 2016 to 1164 million tonnes in 2050.
- Contribution of the transportation sector to total emissions is estimated to increase to 19% by 2050.
- Cumulatively, between 2020 and 2050, Indian transport sector is estimated to emit 24.44 gigatons of CO2 emissions.

Changing share of different segments in CO2 emissions







Source: TERI analysis

Low Carbon Technologies

Electric Vehicles

- EVs are the most prominent zero-emission technology at present backed by declining battery prices and strong policies.
- Cost-effective transition may be difficult for all segments.
- Availability of raw materials and indigenous battery production remain a constraint.

	Battery weight penalty	TCO	Range anxiety	Investment in charging infrastructure
2 and 3 Wheelers	Low	Already competitive	Low	Low
Passenger cars	Low	Already competitive	Moderate	Moderate
LCV	Moderate	Likely to be competitive	Moderate	Moderate
City- Bus	High	Likely to be Competitive	Moderate	Low
Intercity Buses	High	Likely to be Competitive	Very high	High
HDV	High	Difficult to achieve cost parity	Very high	Very High

Source: TERI analysis

Natural Gas

- CNG provides a cost-effective solution for urban commercial segments.
- LNG could be a solution for the long distance heavy-duty segments.
- Risk of infrastructure lock ins.
- Import dependence.

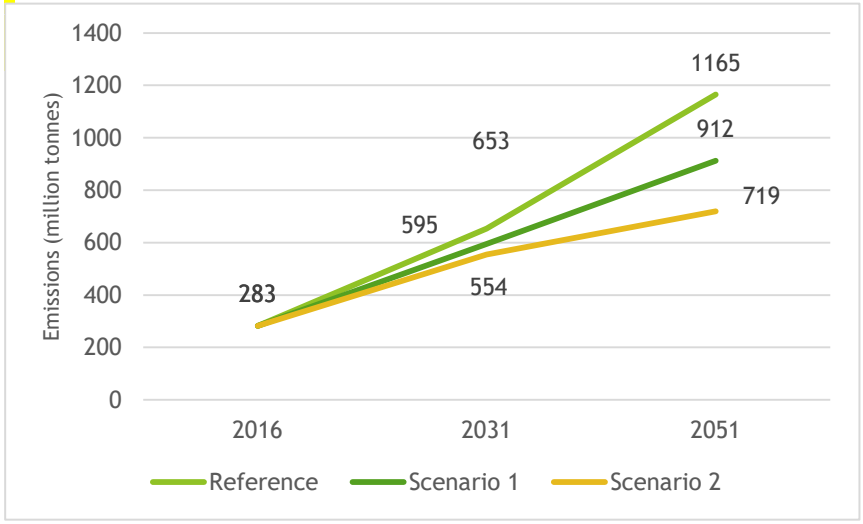
Hydrogen

- Possible long term solution for heavy duty long distance segments.
- Zero emission at point of use.
- Fuel is not import dependent.
- Uncertainty regarding production pathways.

Emission Reduction Potential

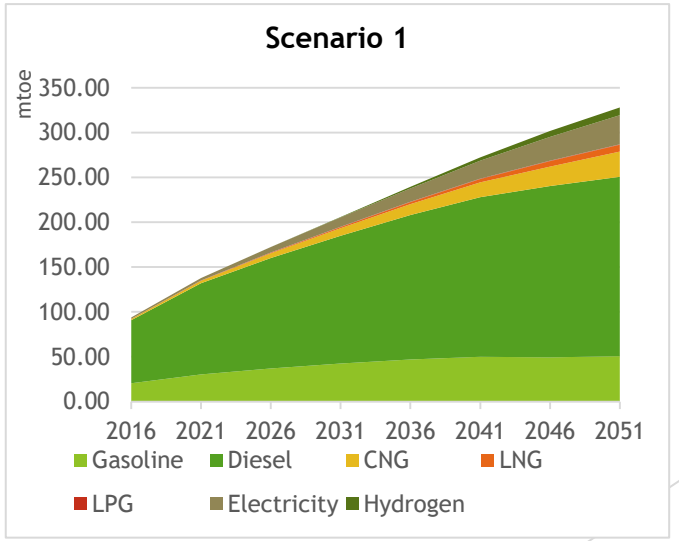
- High uptake of EVs in easier-to-transition segments is estimated to reduce tailpipe CO2 emissions by 22% by 2050.
- When combined with solutions for hard-to-electrify segments, emissions reduce by 38% by 2050.
- Reduction in transport emission intensity of GDP by 2030:
  Scenario 1: 13%
  Scenario 2: 20%

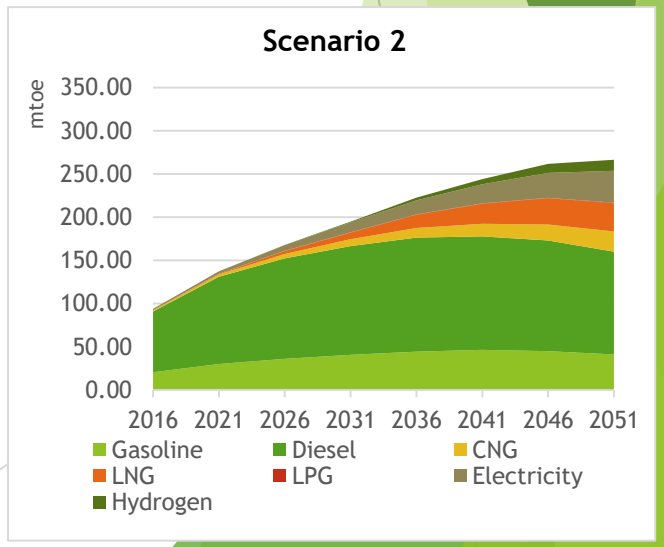
Scenario wise CO2 emissions



Source: TERI analysis

Energy consumption by fuel type across scenarios





Stakeholder Roundtable

Focus Areas

- Solutions for the freight segment, especially M/HDVs
- Accelerate e-mobility
- Clear investment pathways for natural gas and hydrogen
- Prevent shift to private modes
- Avoid/reduce travel demand

Key Questions for Roundtable

1. Given the present trajectory, what is a realistic timeframe for achieving near zero emissions?
2. Which technologies will play a key role in creating a cleaner road sector? What kind of investment is desirable?
3. What gaps need to be filled for enabling newer technologies?
4. How can strategies within the avoid and shift framework be mainstreamed?
5. What measures are needed until 2030 and what measures are needed until 2050?
6. How can the international community play a role? What are the ‘asks’ from the international community?
7. What are implications of the current transport strategies on equity in terms of gender aspects and socioeconomic strata?

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