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GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS

स्वच्छ भारत
एक कदम स्वच्छता की ओर

CLIMATE CHANGE MITIGATION ACTION PLAN FOR URBAN TRANSPORT IN INDIA

4th November 2022, Kochi

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15th Urban Mobility India Conference & Expo2022

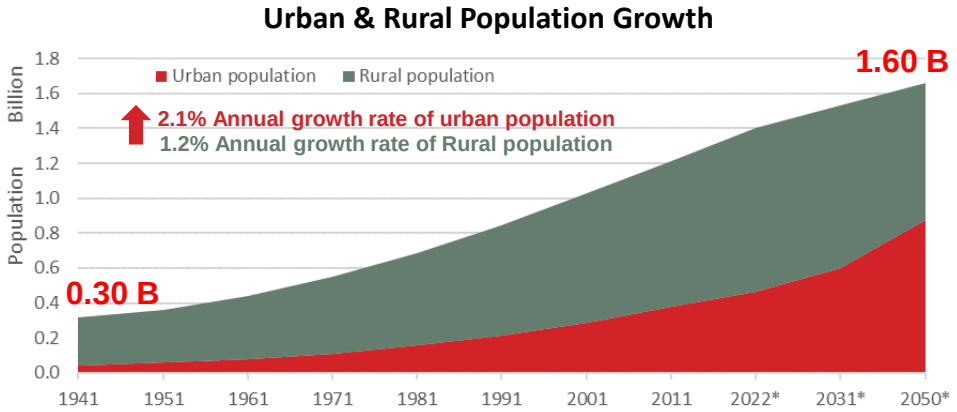
SYSTRA

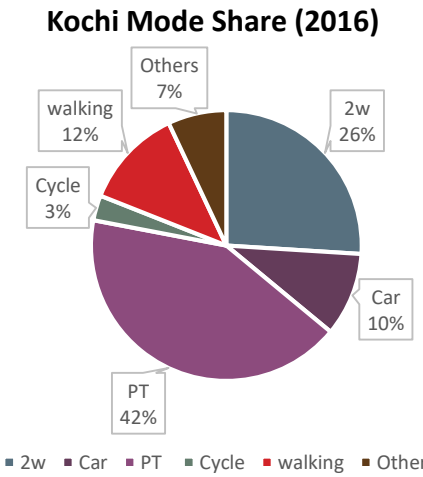
Presentation Structure

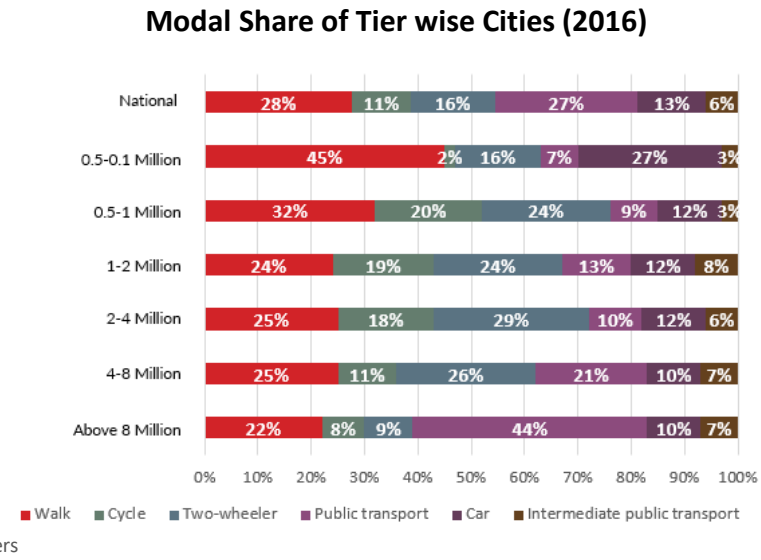
- **Urban Mobility & Climate Change**
- **Emission Targets by Asian Countries**
- **Issues and Barriers – Policy Implementation at Local Level**
- **Vision and Strategies: Low carbon Urban Transport**
- **Methodology for GHG estimation**
- **Way Forward**

Urban Mobility Scenario In India

- At National level, Urban population is projected to increase above 50% by 2030
- Passenger travel more than doubled and car ownership levels increased by 50% between 2005 and 2015
- Automobile industry contributes 7.1% of India's GDP and Two-wheelers and passenger cars accounted for 76% and 17.4% market share, respectively
- Vehicular growth rate is increasing at CAGR of 8.2% (2016-2021)
- Meanwhile, non-motorized travel shares and public transport shares are decreasing, respectively from 36 % to 31% and from 54% to 36%







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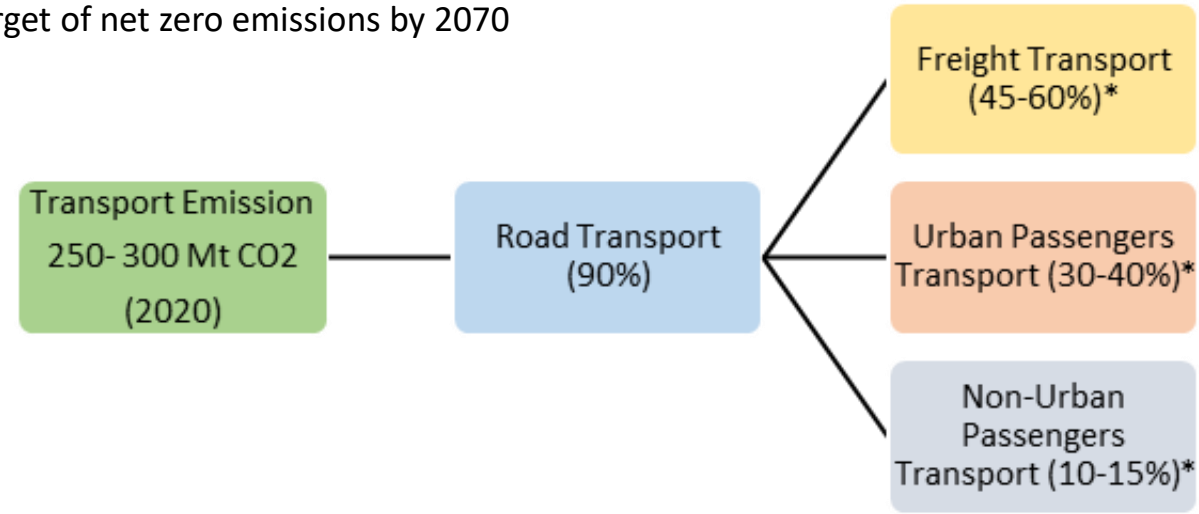
Urban Mobility and Climate Change

- At National Level, Transport is third-largest CO_2-emitting sector, most dominant mode is road transport
- As per India's third Biennial report, India's total Greenhouse Gas (GHG) is **2,531 MtCO2e** therein **13% of emission attribute to Transport sector**

COP 26 India's NDC:

- India now stands committed to reduce Emissions Intensity of its GDP by 45 percent by 2030
- 50% of India's energy requirements from renewable energy by 2030.
- Reduction of total projected carbon emissions by one billion tonnes from now to 2030
- Achieving the target of net zero emissions by 2070

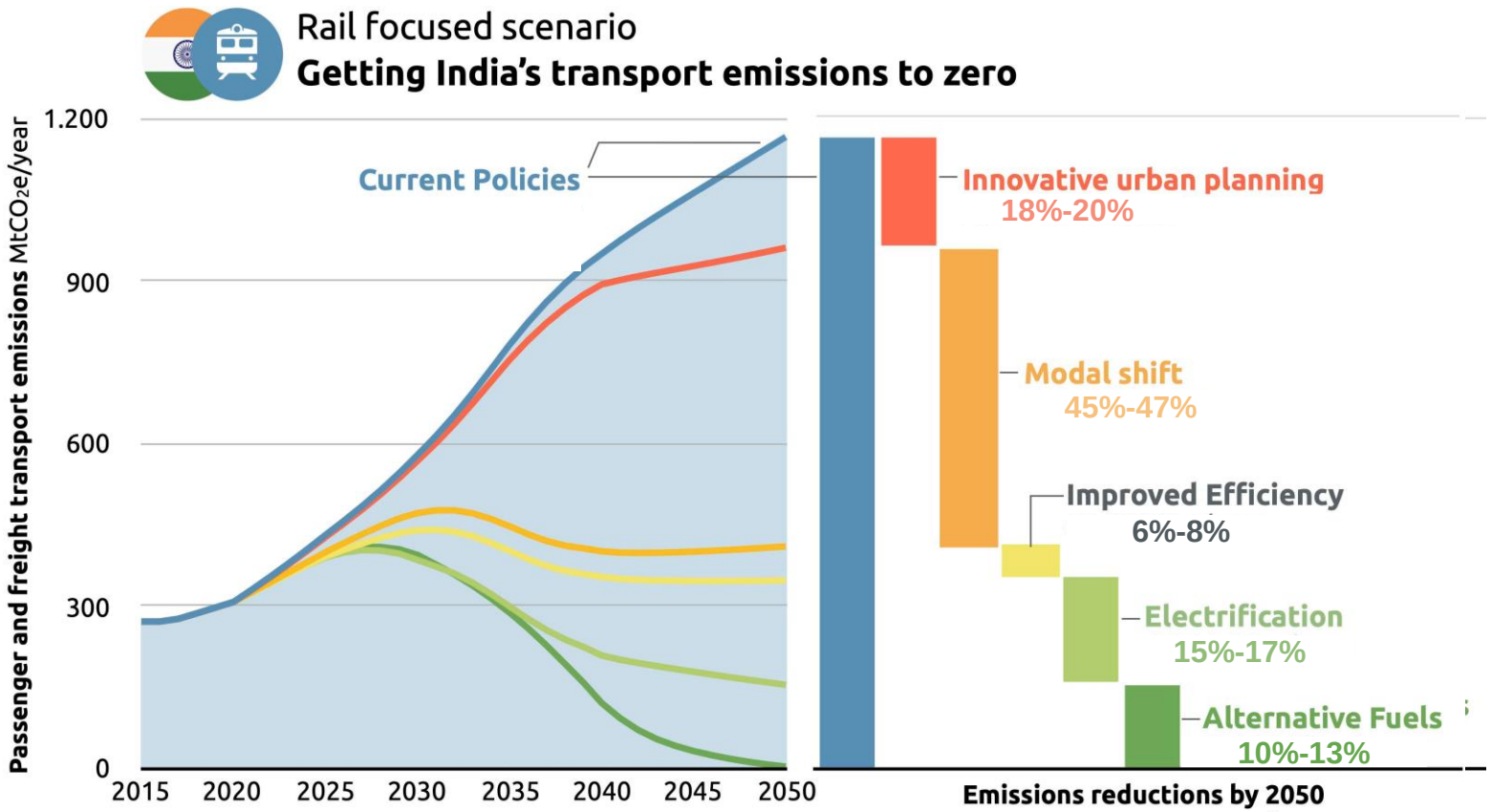


- Need of pan India level strategies to shift the mobility sector to carbon neutral modes

SYSTRA

Measures to meet zero emission by 2050

India needs to reduce its emissions to below **4.5 GtCO2e by 2030** and to below **3.2 GtCO2e by 2050** to be within its fair-share range compatible with global **1.5°C** IPCC scenarios.

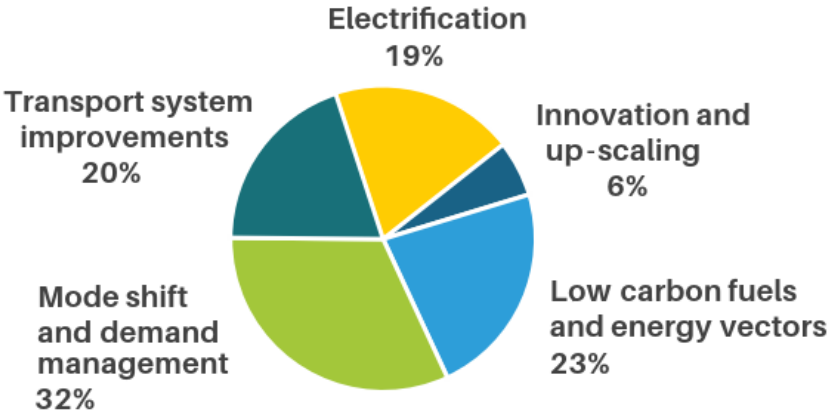


Source: Climate Action Tracker 'Decarbonising the Indian Transport Sector Pathways and Policies, Dec 2020

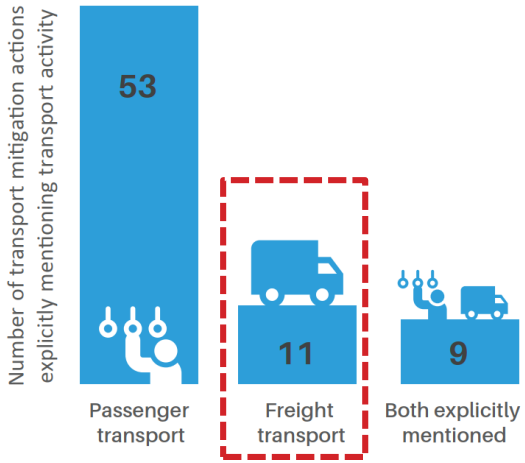
Emission Targets by Asian Countries

- Apart from India, only 5 Asian Countries set GHG targets to reduce transport emissions within NDCs
  - ***Cambodia***, ***Japan***, ***Republic of Korea***, ***Singapore*** & ***Thailand*** – LTS include goals for net-zero emissions by 2050
  - ***Bangladesh*** **-** Reduction of 6.33 MT by 2030
  - ***Georgia*** **-** 15% reduction below BAU level by 2030
  - ***Japan-*** reduction of emissions to 146 million tones CO2 by 2030
  - **Sri Lanka** - reduce transport emissions by 1% and additional 3% below BAU by 2030

Mitigation Actions



11% of mitigation actions : Freight



- Different ways to address climate change impacts - ***balanced approach to mitigation actions*** including:
  - More ***effective management*** of urban mobility
  - Embracing ***new technology*** & ***system improvements***

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Issues and Barriers – Policy Implementation at local level

- At National level, various policies and strategies have been developed by MOEF&CC and line Ministries such as MoHUA, MoRTH, Ministry of Commerce and Industries, MNRE, Ministry of Heavy Industries, Ministry of Power, Ministry of Petroleum & Gas
- Cities face Barriers in Implementation of these policy interventions

Policy Interventions	Barriers
Introduction of MRTS in cities	Selection of a suitable cost-effective transit system & corridor based on demand for Tier II cities
Introduction/Improvement of city bus service	City bus route rationalization along with supporting infrastructure & selecting the right contracting structure- NCC/GCC
Transit Oriented Development Plan	LAP and Master Plans are not revised based on TOD policies adopted by cities
Contiguous NMT Infrastructure	Implementation of NMT Plan due to limited ROW along the corridor
Institutional coordination	Delay in approvals for enacting a UMTA Act in state/city and allocation of technical and financial resources in UMTA
Introduction of feeder system/First and last mile connectivity	Un-organized and Non reliable IPT system acting as feeder without proper timetable, fare and stops;
	MRTS corporations, STUs, Bus operators and IPT are competing amongst each other
Urban Freight Management	Lack of Urban freight activity database & supporting infra such as urban consolidation center's
Introduction of EV Vehicles/buses in city	Availability of Renewable energy for charging EV's
	High Procurement cost of Electric Vehicles
Use of Alternative fuels (Hydrogen/Biofuels)	Higher transition time for low-cost commercial fuel supply
	Lack of Infrastructure for fuel storage/delivery/refilling stations and High Cost of Hydrogen fuel cell vehicles

Reduction of GHG Emissions from Urban Transport : Vision

Vision : "To develop low carbon, climate resilient and energy efficient urban mobility & Public Transit systems in Indian cities".

Adopting **low carbon initiatives** by integrating land use & urban mobility at city level

Making best use of advancements in **technology and alternative fuels** to reduce emission levels.

Developing an **Integrated Urban Mobility Network** to encourage people to make sustainable travel choices

Collaboration with public and private sector agencies to **enhance investment in climate-friendly urban mobility plans**.

Decentralize Urban Freight Mobility and encourage use of technology, cleaner fuels and decentralize freight infrastructure

Principles for achieving the Vision

Push Measures

Introduce electronic road pricing mechanism

Reduce parking supply

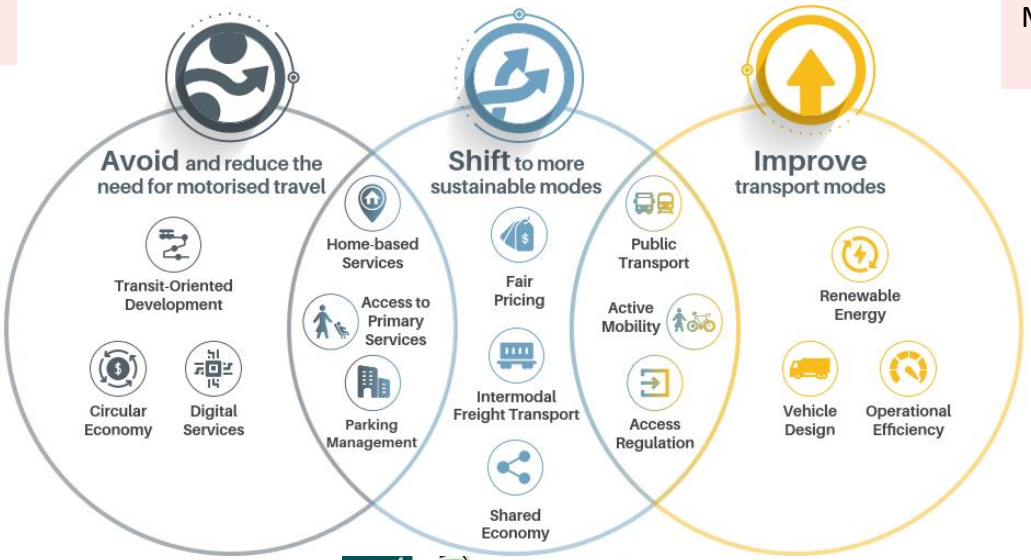
Restrict traffic zones

Impose Excise & import duty on private vehicles

Vehicle Quota system

Push & Pull

ASI Framework



Pull Measures

Introduce & Improve PT system

PT network integration & rationalization

Improve NMT Infrastructure

Multi-Modal Integration and TOD

Encourage shared mobility & MAAS

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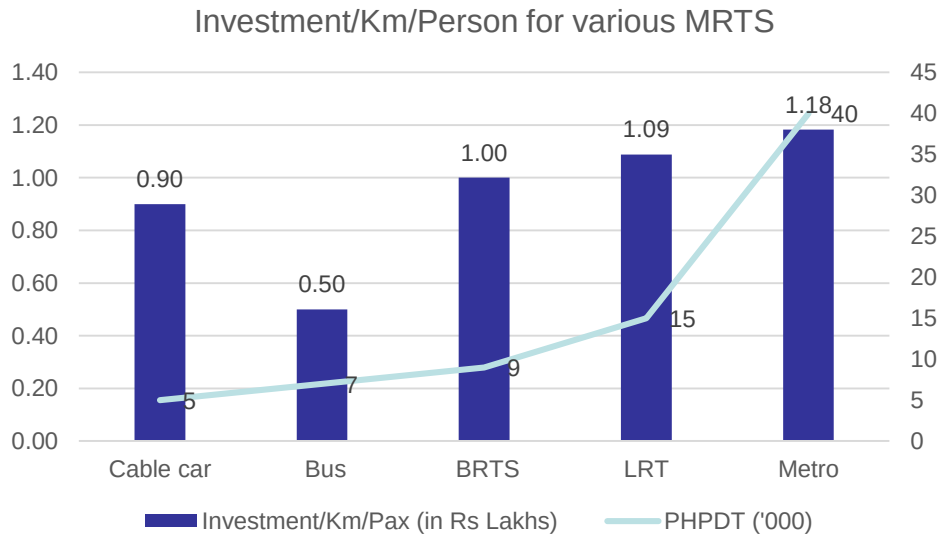
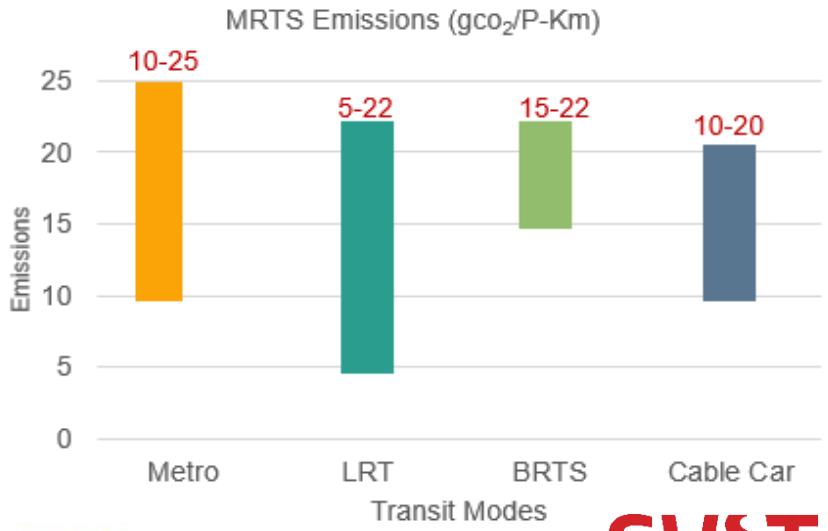
Low Carbon Strategies for Enhancing Passenger Mobility

1. Adopting low carbon initiatives by integrating land use & urban mobility at city level

- Identification of suitable PT system & making it accessible to all user's
- Optimize on selected system capex & opex cost
- Encourage cities to prepare climate resilient CMPs complementing City Climate Action Plans
- Adoption of NMT Master Plan by cities





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Low Carbon Strategies For Enhancing Passenger Mobility

2. *Making best use of advancements in technology and alternative fuels to reduce emission levels*

- Focus on MAAS platforms to bring all mobility services under one single platform
- Provide real time PT information to passengers
- Reduce TCO of Electric Vehicle
- Incentivize production of cleaner fuel

3. *Developing an Integrated Urban Mobility Network to encourage people to choose sustainable travel modes*

- Multi Modal Integration with other supporting networks and services
- City public transport improvement plans
- Unified nodal agency for planning and Implementation like UMTA

4. *Collaboration with public / private sector agencies to enhance investment in climate-friendly mobility projects*

- Technical & Financial assistance for project structuring
- Identify target group & conduct capacity building exercises, for target group
- Assist cities to access funds for UT projects under climate finance framework

Urban Freight

Rapidly growing urban freight system is crucial for a city's economy, but it is faces number of challenges :

	Mitigation Measures
GHG emission by transport sector is 13%, out of which road transport causes 90% of emissions & Urban freight accounts for 45%-60% of GHG emissions *Source: CEEW Report, 2019*	Implementation of urban freight management plans
Urban Freight is responsible for 10-18% of the traffic congestion & occupies about 30% of land use allocation for transport use *Source: Guidelines for National Sustainable Urban Freight Transport System , UMTC , 2020*	Urban consolidation Centers, Logistics parks &Parcel delivery terminals
LCVs share : 26.9% of which 4W (16.2%) & 3W (10.7%). Contribute to 328 kilo tonnes of Particulate Matter (PM) emissions & Nitrogen Oxides (NOx) emissions annually *Source: Roadmap for Electrification of Urban Freight , TERI , 2020; Enhancing Urban Freight systems, RMI, 2021*	Developing optimized routes, Reverse Logistics
Fuel composition : 78% (diesel), 16% (CNG), 4% (Petrol), and 2% (CNG–diesel) *Source: Roadmap for Electrification of Urban Freight , TERI , 2020*	Promote use of clean energy/alternative fuels in urban freight

GHG Estimation

As per IPCC 2006 & 2019 (amendments) guidelines

$$Emissions = (Transport\ demand * \text{Specific energy consumption}) * Emission\ factor$$

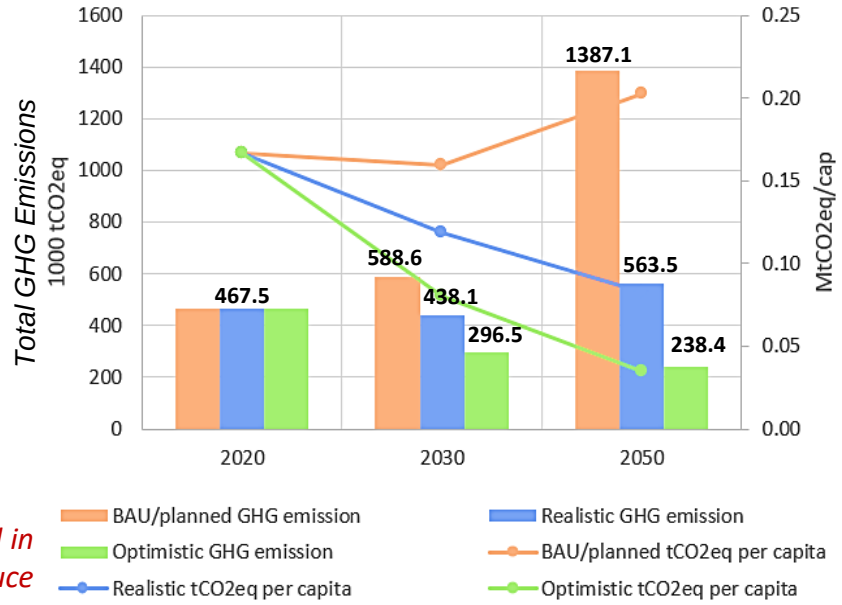
$$Transport\ Demand = (Mode\ wise\ Vehicle\ Kilometers\ Travelled * Mode\ wise\ \%\ Share\ of\ fuel\ )$$

- GHG Estimation can be done at National, City and Project level for three scenarios – BAU, Realistic and optimistic scenarios based on VKT, Modal Shares, status of electrification and use of alternative clean fuels

GHG Estimation for Kochi (Passenger Mobility)

- In BAU: the present situation continues
- In **Optimistic Scenario**:
  - PT Modal share improves from existing 27% to 70% (54% in Realistic, 25% in BAU)
  - Electrification / shift to alternate clean fuels - 75% of vehicles (40% in realistic and 10% in BAU) from existing 1%
  - Reduction of Trip lengths due to land use planning measures – TOD (from 10.2 Km to 8.5Km)
- GHG emission worsens by 3 times if no measures are taken
- GHG emission improves by 80% in optimistic scenario (0.23 MtCo2e) and by 60% in realistic scenario (0.5 MtCo2e)

GHG Emissions (Kochi)



***Passenger and Freight Mobility**: At National level, 214 MtCo2eq is generated in 2022, which is estimated to increase to 685 MtCo2eq (2050), which can reduce to 315 MtCo2eq (2050) on implementation of all the GHG Mitigation measures*

SYSTRA

Way Forward : Climate Change Mitigation Action Plan

To ensure reduction of GHG emission from Urban Transport sector, it is necessary that the cities implement the following mitigation measures:

1. Promoting Integrated Mass Transit Systems
2. Preparation and Implementation of zone wise TOD Plans
3. Improve NMT systems in cities
4. Urban Freight Management to be emphasized
5. Detailed Plan for Financing Urban Transport Projects in urban area
6. Low Carbon Mobility Plan to be adopted

Impact of Measures : GHG reduction

- Encourage Modal Shift (3%-6%) *
- Urban Freight Management (20%-25%) *
- Innovative Urban Planning (15-20%) *
- Improve Technology (Veh/Fuel) (45-55%) *

** Depending on city size*

There is a need to initiate following actions to help cities implement sustainable urban transport projects for reducing GHG emissions:

1. Estimating GHG emissions for all urban transport projects to be made mandatory
2. Launch an Urban Transport Mission on Climate Change - to initiate measures on mission mode
3. LCMP and City Climate Action Plans to be prepared and complement with each other and Master Plan

SYSTRA