Accelerate Action on Adaptation in the Transport Sector

For

Low Carbon & Sustainable Mobility in India
(Decarbonisation of Indian Transport Sector)

Lead

FICCI

Knowledge Partners

IPPMG

WWF

SHAKTI SUSTAINABLE ENERGY FOUNDATION



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PREFACE

To move down the path of reduced emissions from the Indian transport sector and provide direction to low carbon and sustainable mobility for India, FICCI embarked on the initiative for Developing an **India Roadmap** for Low Carbon and Sustainable Mobility with thrust on decarbonisation of the Indian transport sector. FICCI is supported in this initiative by knowledge partners, WWF-India, Paris Process on Mobility and Climate (PPMC) and Shakti Sustainable Energy Foundation (SSEF). The India Roadmap has eight distinct components outlined below.

1. Urban transformation for healthier, inclusive lifestyles and efficient, resilient, prosperous cities
2. Low-carbon energy supply strategy
3. Improve intermodal and mode-wise system efficiencies
4. Optimise supply chains to manage freight transport emissions
5. Avoid vehicle kilometres for commuting, shopping and accessing services
6. Provide low-carbon solutions for the rural (non-urban) populations
7. Accelerate action on adaptation in the transport sector
8. Large scale deployment of economic instruments and leveraging finance

Each of these components is covered in detail under individual reports, available separately as Theme Reports. The India Roadmap provides summaries of each component and actionable recommendations for short-term (2020-22), medium-term (2022-30) and long-term (2030-50). For detailed narrative of each component, the reader may refer to the individual theme reports of the respective component. For getting an overview of all components, the India Roadmap provides the complete context for low carbon and sustainable mobility for India.

This report covers the seventh component on "Accelerate Action on Adaptation in the Transport Sector".

The work on the India Roadmap has been guided by the FICCI Core Group on Sustainable Mobility consisting of eight working groups, each of which has worked on the eight components. The components are based on the Global Macro-Roadmap developed by PPMC. This methodological approach developed by PPMC is at the heart of the India Roadmap, with components of the India Roadmap being customised to Indian context and circumstances.

INTRODUCTION

Transport systems and services are already being severely disrupted by climate-related events, with an increasing number of incidents in both developed and developing countries. It is clear that a transport system that cannot withstand the emerging impacts of climate change will impose high costs for maintenance and repair, limit transportability and access, and result in significant economic losses.

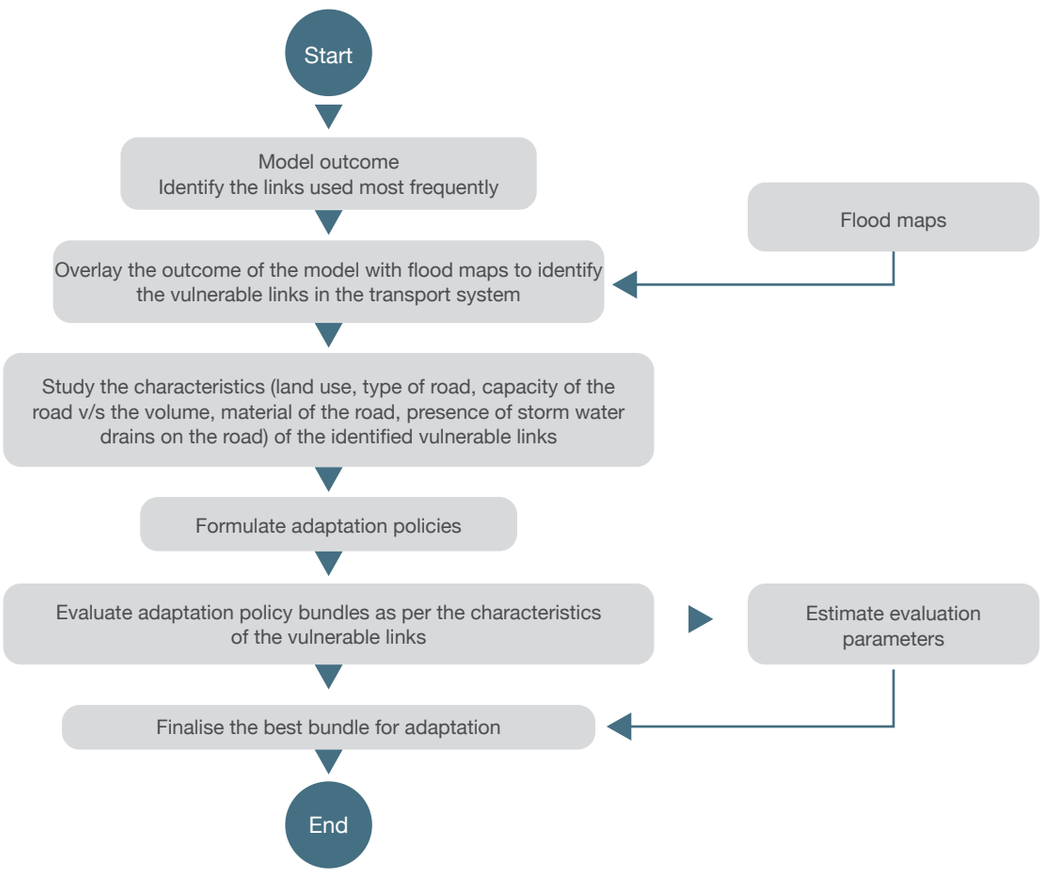
Ensuring climate resilience of transport investments is critical as it will also allow other sectors to quickly rebound after climate-related disasters.

Hence, it is immensely critical to strengthen the ongoing discussion on adaptation in the transportation industry – a factor that will play a significant role in enabling and guiding climate change adaptation strategies worldwide.

Sustainable and resilient transport is a cross-cutting issue under the 17 SDGs (Sustainable Development Goals) set by the international community in 2015. It is key to achieving the progress of several goals.

The increasing climate change impact requires countries to develop strategies for resilient transport infrastructure and systems.

However, a lot of international debate and action around climate change and international transport has focused on addressing the causes (mitigation) rather than coping with the impacts (adaptation). Therefore it is pertinent to reflect on how to develop a proactive approach to climate change adaptation strategies through bottom-up industry consultation. It is crucial to think through on how to engage more stakeholders to practice efficient climate-resilient measures and to make recommendations for next steps. A simple diagram encapsulates a sample of adaptation strategies to address climate change impacts:



SECTION 1

RAISING ADAPTATION DISCUSSIONS

CHAPTER 1

HEART OF THE PROBLEM & IN RESPONSE

The only way to eliminate a problem is to solve it.

The phenomenon of climate change is causing a wide range of impacts in several ways. Excess rainfall, reduced rainfall, drought, temperature increase, extreme cold, cyclones and storms, increased radiation, sea-level rise, storm surge and flooding… these words are now common in our conversations and need to be addressed urgently.

Tasks at hand

Transport systems are the veins of the economy. Transport interconnects all land-uses and is linked to all aspects of human life: leisure, residential, business, commercial and industry etc. With climate change, the frequency of extreme weather conditions is projected to increase. Climatic changes will not only increase the risk of delays, but will cause major disruptions, damage, and failure across all modes of transportation. They will also affect all types of infrastructure and are expected to increase the cost of transportation systems worldwide. Lack of assessment of the emerging climate change impacts will result in significant economic losses. It is therefore imperative to understand the impact of climate change and to focus on building sustainable, resilient, and reliable transportation systems. It is equally important that infrastructure is designed, built, and operated in a way that it anticipates, prepares for, and adapts to the changing climate conditions.

The need would be to build a Climate-Resilient Transportation System that is flexible and changes with shifting trends and climatic conditions.

Such a system:

- Encourages maintenance of public assets with a large replacement value.
- Avoids domino or cascading effects.
- Is ready for disaster management, e.g., evacuation of people to shelters.
- Protects the health and safety of people – for instance, reduced GHG (greenhouse gas) emissions and fossil fuel consumption.
- Ensures reliable mobility.

Building resilience into transport will not happen overnight. It will require deeper thinking about:

- How to improve road climate resilience
- Design of emergency maintenance and response systems during a disaster
- Development of risk evaluation monitoring tools
- Improving the accuracy of weather/disaster forecasting tools/models
- Inclusion of integrated climate analysis in different maintenance plans e.g. in the operationalisation of a bridge maintenance plan
- Improvement and construction of roads to provide improved connectivity to disaster shelters
- Improved infrastructure maintenance
- Climate risk evaluation and vulnerability assessment tools for infrastructure projects
- Climate vulnerability assessment for existing projects
- Build sufficient redundancy in the transport system to overcome climate risks and prepare for emergency route planning

A resilient transportation system is paramount to the prosperity of all cities. It allows people to move into, out of, and around their city despite climate shocks and stresses that degrade and damage infrastructure and lead to service disruptions.[1]

[1] https://www.iisd.org/sites/default/files/publications/pcc-brief-climate-resilient-city-transportation-infrastructure.pdf

CHAPTER 2

CHALLENGES ALONG THE WAY & ROUTES TO CHANGE

A problem is an opportunity to improve.

General Impacts: Every climate factor leaves in its wake, impacts that must be considered importantly. These impacts together make up the challenges that must be surmounted in the pursuit of a climate-resilient transportation system.

Climate Factors	Expected Impacts and Consequent Challenges
Excess Rainfall	• Extreme floods further damaging roads and other infrastructure • Increased moisture content leads to corrosion of metal structures
Reduced Rainfall/ Drought	• Affects water-borne transport • Excessive drying of soil leads to soil cracking and impacts the foundations of infrastructure
Temperature Increase and Heat Waves	• Damage to asphalt or rails designed for lower temperatures • Increase in demand for cooling in the transport sector adding to higher demand for electricity
Cyclones & Storms	• Disproportionate structural loading causes structural failure, which may lead to collapse or significant structural damage • Infrastructure in ports could face severe damage during extreme weather events
Increased Radiation	• Faster degradation or withering away of the surface coating
Sea-level Rise & Flooding	• Increased risk of a storm—surge flooding and coastal erosion • Submerging of low-lying areas and damage to the drainage system of the city

2.1 Impact on Transport Infrastructure

As the change in climate threatens to impact Transport Infrastructure, there is an impending need to devise solutions and possible adaptation measures. Some such measures are outlined:

Type of Impact	Impact on Road Infrastructure	Possible Adaptation Measures
Improve road climate resilience	1. Deformations on road, slowing down or disrupting of transport, melting asphalt 2. Increased asphalt rutting due to material constraints under severe exposure to heat	1. More resilient design standards 2. Planting roadside vegetation to decrease the exposure of roads to heat 3. Reduce overall exposure and provide cooling through green and blue infrastructures such as parks and lakes 4. Proper design/construction overlay with more rut-resistant asphalt 5. Risk evaluation tools and urban planning that avoid high-risk areas
More frequent droughts	1. Dry soil in combination with more intense rains will lead to more landslides and subsidence 2. Road foundation degradation 3. Dust and sand on the road can lead to safety hazard	1. Assess the likeliness of impact using risk mapping tools and then avoid development in high-risk areas 2. Monitor soil conditions of existing roads 3. Increase cleaning and maintenance of roadways
Sea-level rise and coastal erosion	1. Risk of inundation of road infrastructure and flooding of underground tunnels in coastal cities 2. Degradation of the road surface and base layers from salt penetration	1. Assess the likeliness of impact using risk mapping tools and then avoid development in high-risk areas 2. Integrate transport planning with coastal zone management 3. Protective features such as sea–walls 4. Manage retreat, possibly including abandoning of certain transport infrastructure in mid & long term 5. Build redundancy of roads in the system 6. Design material standards to include corrosion-resistant material 7. Improve drainage
Extreme rainfall and flooding	Road damages & decrease of structural integrity	1. Assess the likeliness of impact using risk mapping tools and then avoid development in high-risk and flood-prone areas 2. Improve drainage infra with frequent audits 3. Enhance pumping facilities 4. Early warning systems and evacuation planning 5. Install signs high-above the ground that can alert pedestrians and motorists of unsafe zones and low lying areas
	Dirty roads and roads with limited foundations and no /poor drainage are at risk	1. Enhance foundations 2. Build all-weather roads 3. Improve green spaces and flood protection
More intensive storms	1. Damage to infrastructure 2. Obstruction of roads due to fallen trees, buildings or vehicles	1. Assess if current design standards can withstand intense storms and adapt to new standards if required to improve drainage 2. Improve weather forecasting leading to better preparation 3. Plan emergency and evacuation routes 4. Improve maintenance of roads and drainage

2.2 Impact on Vehicle (Public Transport) & Mobility Behaviour and Possible Adaptation Measures

Type of Impact	Impact on Vehicles	Possible Adaptation Measures
Increased temperature and heat-waves	1. Increased temperature in buses and other modes leading to driver discomfort and exhaustion, further leading to accidents 2. Increased requirement for more intensive air-conditioning increasing energy demand 3. Wearing off/Melting tyres 4. Overheating of equipment	1. Sufficiently large and tinted windows 2. White-painted roofs 3. Improve thermal insulation and cooling systems 4. New standards to withstand higher temperatures
Extreme rainfall and flooding	1. Difficult driving conditions with implications on safety, performance and operations 2. Flooding of the public transport fleet, causing economic damages	1. Manage speed limits in bad weather conditions 2. Driver training to face inclement weather and difficult driving conditions 3. Plan emergency/redundant routes 4. Early warning signs 5. Flood insurance
More intensive storms	1. Difficult driving conditions 2. Overturning of vehicles	1. Driver training to face inclement weather and difficult driving conditions 2. Speed restrictions 3. Improved weather forecasting 4. Emergency planning and evacuation routes

A summary of adaptation measures needed:

A combined and comprehensive set of adaptation measures to be implemented to address the impacts of climate change.

- Responsive Design & Standards: Design standards for road, rail infra etc. will need to be more resilient, and a change in design parameters and standards for vehicles need to be warranted.
- Checkpoints for Improvement: Better drainage and maintenance of infrastructure will be a must.
- Driver training on disaster management will help deal with post disaster management activities
- Risk & Forecast Tools: Risk evaluation tools and urban planning can help avoid high-risk areas. Additionally, better weather/disaster forecasting tools can help predict imminent dangers, helping prepare in advance.
- Disaster Management: Building sufficient redundancy including shelters, emergency/redundant route planning, creating frameworks to evaluate the preparedness of transport infrastructure for climate change related disasters, are crucial to improve the responses towards extreme events.

Several regulations exist for Public Transport in terms of Road and Motor Vehicle Standards – such as vestibule or articulated buses with heavier axle loads. Question is, are they responsive enough?

The transport sector is facing huge challenges because of rapid urbanisation, motorisation, and climate change.

There is an urgent need for high-quality, sustainable urban transport solutions that can be developed quickly and cost-effectively.

2.3 Possible Measures to Improve Public Transport

The fast-rising demand for mobility can be sustainably addressed through public transport. Adopting public transport has many advantages, both economic as well as environmental. It not only helps in decongesting traffic-choked cities but also plays an important role in combating growing vehicular pollution. The current public transport system in India is under severe pressure and needs considerable revamping to ensure mass adoption.

- **Expand capacity for service through increased efficiency, not through more of the same.** Transit providers who operate at the edge of their capacity in terms of vehicles or personnel need to create a margin. This way, small mishaps would not derail the service and ripple throughout the system and day. If in doubt, it is better to operate fewer lines or a slightly less frequent service and do it reliably rather than doing more and being overextended and vulnerable.

- **Create a service hierarchy:** Careful analysis of origins and destinations will allow the creation of priority trunk lines that become the backbone of reliable fast service. Those lines should be branded and be ambassadors for the entire system by being extra reliable, fast, and convenient.

- **Last-mile connectivity:** It will be important to provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport and integrating them with the last-mile connectivity provided by a fleet of electric vehicles. Transit-oriented developments by promoting ZEV (Zero Emission Vehicles) like e-Autos for last-mile mobility by connecting metro infrastructures.

- **Use increased speed as the magic bullet:** If the service area is large and fixed, and additional funds are hard to come by, capacity, efficiency, and reliability can be enhanced by increasing the speed of the buses. This is the Southwest Airlines approach, which cuts gate time by using a new boarding method and flying into less congested airports. This effectively makes them more reliable and efficient with more jets in the air than the competition.

For buses, this means three things:

a) **Cut long routes because they are more vulnerable than short ones.** Shorter lines make operations easier to manage and more predictable. The disadvantage of more transfers is offset by the convenience of a more reliable service.
b) **In collaboration with local government, attack external slow-downs** like conflicting car traffic, signals, bad road surfaces, and bad stop locations
c) **Accelerate the bus by eliminating overly frequent stops and long dwell times** which slow down the buses more than anything else. Both of these causes can be controlled by the transit agency. The biggest contributor to long dwell times is cash payments at the fare-box, followed by the number of stops, and thirdly their placement.

These three principles should be central to any improvement plan and once addressed, will immediately lead to increased rider satisfaction and happiness.

Quicker buses will result in predictably better fleet utilisation, lower labour cost, more revenue and increased flexibility. Buses that save 10 to 25% of their running-time on a route will be back faster for the next service. No cash payments also will result in less cost for maintenance, vaults and cash management, potentially resulting in large savings.

Further, some additional measures that can be taken include:

Routes to Reliability

1. Break long routes into shorter parts. Connect the route ends in transit hubs for easy transfer at any point in time.

Routes to Speed

1. **Get rid of cash payments** in favour of digital payments.

2. **Eliminate about 25% of bus stops,** especially in areas where stops are located in each block. The selection of stops to be eliminated must be based on public input and on-boarding data.

3. **Negotiate with the local government** about signal priority, queue jumpers and dedicated bus lanes in strategic areas. This, too, should be based on clear metrics i.e., focused on areas where the other improvements still leave the bus travelling with a below-average speed. It is easier to make these improvements in select areas with a high return on investment than trying to bring about a general policy change.

Routes to Convenience

1. Implement an app for smartphones combined with a call-in service that allows real-time bus information for each line and every stop. Knowing when the bus will exactly arrive is possibly the biggest advantage for riders even if it doesn't make the bus faster or more on time. It, however, gives users certainty and allows them to manage their time avoiding unproductive and excessive wait times.

2. **Larger cities should tier their services** into clearly differentiated and branded service types such as local bus, rapid bus, circulator or shuttle, and commuter bus. Within each type, simplicity should rule and the confusing thicket of variations be eliminated in which buses with the same line designation run as express or take different loops on the route depending on the time of day or their schedule time. The services on top of the hierarchy need to have the biggest ridership and run the fastest.

3. **Opt for higher-end bus models** as they are fuel-efficient and also ensure quieter and smoother rides. Clean and well-maintained buses have a positive impact on ridership. Good bus, good service equals better image and more riders.

4. **Provide good information** on paper, online, on the bus, and on the route about where buses go to and where transfers are located.

5. **Provide some basic amenities at bus stops.** With fewer bus stops this will be less costly to do, especially when amenities such as shelters are sponsored by private industry. Generally, as the need for amenities decreases, the more reliable and predictable the service becomes.

6. **Provide impeccable customer service** and allow riders immediate and simple feedback about each service. Use that feedback to steadily refine and improve the service. In spite of union rules, try to implement performance bonus payments based on customer satisfaction.

7. **Ensure that public transportation is available round the clock** in major cities that could help in decongesting.

Public transportation agencies across the country are taking actions to reduce the GHG intensity of their operations. Some agencies are building new administrative and maintenance facilities to Leadership in Energy and Environmental Design (LEED) standards or higher.

CROSSROADS OF CHANGE



New York City Transit built a LEED-certified maintenance facility that has fuel cell units, rooftop solar panels, natural lighting, and rain-water storage to wash buses and cars. The agency is also reducing emissions from construction by using recycled construction materials. In Phoenix, the new light rail system uses regenerative braking to lower electricity consumption.

SECTION 2

INTEGRATING ADAPTATION INTO PROJECT DESIGN

CHAPTER 1

HEART OF THE PROBLEM & IN RESPONSE

A road without challenges is not the right road.

Transport interconnects all land-uses and is linked to all aspects of human life - whether leisure, residential, business, commercial or industry. The impacts of climate change on transport infrastructure are massive. Paved roads are particularly vulnerable to temperature extremes, while unpaved roads and bridges are vulnerable to precipitation extremes.

The need of the hour is to integrate climate impact adaptation by updating design standards for transport systems, according to climatic projections. Establishing emergency plans, acquiring new technologies to understand and manage climate-related challenges, and creating mechanisms for knowledge sharing among environment professionals and transport professionals: these are vital steps that need to be taken urgently.

Transportation policy and planning requires a sophisticated approach to put in place systems that allow for adaptation to climate change, as an integral component of the transport sector.

Clearly, the focus needs to be on:
- Mapping natural hazards and identifying locations of possible impacts.
- Creating vulnerability maps for different natural hazards.
- Conducting risk assessments.
- Compiling recommendations for adaptation strategies and measures worldwide.
- Climate adaptation in project design

Climate adaptation when built into project design would aim to achieve fewer global deaths and injuries from road traffic accidents. It would also work to develop quality, reliable, sustainable, and resilient infrastructure.

Good design would also integrate land-use, urban, road and transport planning. It would create transit-oriented developments and would include NMT (non-motorised transport) components in transport master plans.

Climate adaptation would entail designing of high-quality public transport services on dedicated infrastructure along major city corridors. Project designing for significant shifts to more sustainable modes for intercity passenger and goods transport would be factored in.

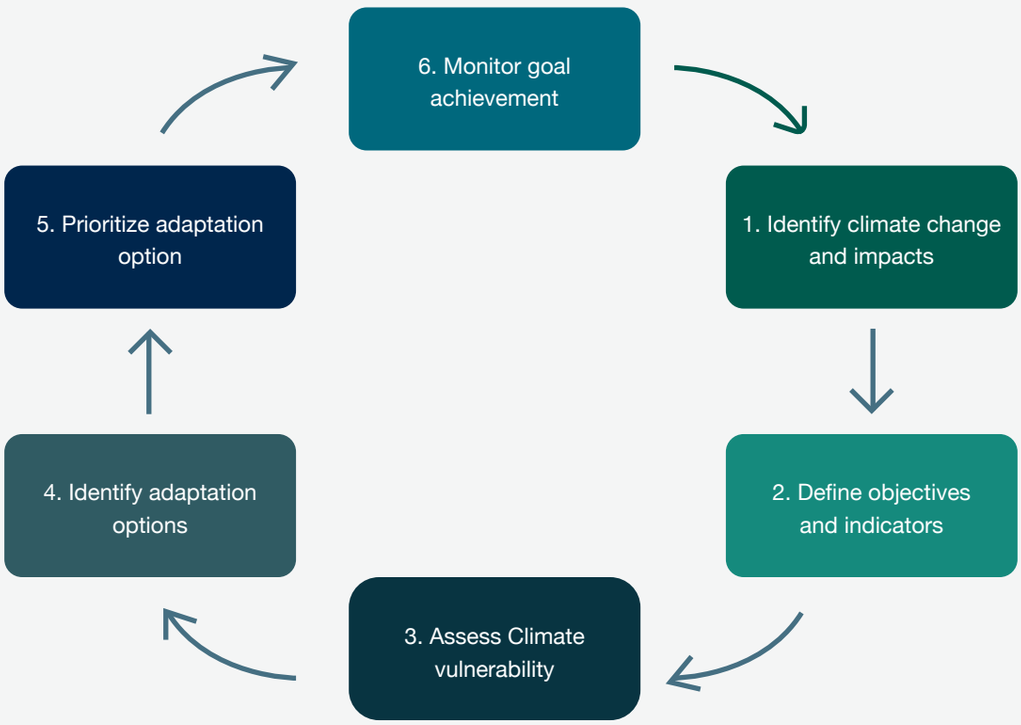
Design for a changing climate would bring the following goals in the spotlight: enhance freight transport efficiencies, viewing social equality as a specific design criterion, and preparing a strategy document ‘low carbon mobility plan for cities’.

To promote climate-proof urban transport design, mitigation and adaptation strategies need to be integrated into the transport planning process. There would be a need to build capacities for climate resilience and adaptation to be undertaken by promoting programmes in academia. Developing quality, reliable, sustainable and climate-resilient infrastructure by integrating transport infrastructure to urban planning will be equally crucial.

1.2 Project Planning Cycle for Adaptation

CROSSROADS OF CHANGE





Integrating Adaptation in the Design of Copenhagen Metro (2015)

Climate change impact assessment has been an integrated part of the design and planning of the Copenhagen metro since the first metro line was designed in the mid-1990s. Apart from the first metro line, which opened in 2002, and the extensions in the following years, which are partly subterranean, Metroselskabet, the Copenhagen metro company, is now constructing the City Ring, an underground metro ring in the city centre of Copenhagen.

The biggest planning challenge is changing projections of increasingly higher mean sea water level. This means that the entrance, ventilation (plus other infrastructure elements) to stations and shafts near the harbour and the coastline should provide sufficient protection against storm surges. The main objectives of this design would be to protect the metro system against changes in climate, particularly from heavy rainfall, storm surges and storms, that could impact the infrastructure (mainly by flooding), affecting the metro operation and passenger safety.

[2] https://climate-adapt.eea.europa.eu/metadata/case-studies/integrating-adaptation-in-the-design-of-the-metro-of-copenhagen

CHAPTER 2

CHALLENGES ALONG THE WAY

Every challenge opens the gates to something new.

Climate change can potentially impact transport systems in more ways than one. Together, these are massive mountains that the planet needs to cross to achieve better results and a more efficient way of operating transport systems:

Sea-level Rise, Storm Surge, and Flooding: There can be considerable damage to port infrastructure and disruptions in port operations and shipping traffic, as also damage to, or inaccessibility of, low-lying coastal infrastructures such as roads and railway beds and tunnels. A loss of coastal waterway systems may occur and barrier islands may disappear. Aggravated coastal flooding as storm surges also build on a higher base and reach further inland leading to road, rail, and airport closures.

Strong Wind and Storms: There is a greater likelihood of infrastructure failure and disruptions of transport operations for all modes of traffic in such climatic conditions. The structural integrity of long-span bridges is vulnerable to strong winds as are auxiliary infrastructures such as road signs, traffic signals, overpasses, train stations, and toll collection stations. There can be possible damage to overhead lines for railways, power supply, signs, lighting features, and increased tree fall leading to the closure of railway tracks and roads. Delays and cancellation of flights and unreliable air travel services are expected, as also damage to cranes and terminal facilities. Safety hazards are posed to all vehicles.

Increasing Precipitation Intensity: This leads to flooding of roads, railways, and tunnels causing traffic disruptions and road/rail closure. Slope failures and landslides (road/rail) are common and erosion and scrubbing or washout of gravel and earth roads and railway tracks. happens too. There is increased sediment loading of drainage works leading to increased maintenance requirements and costs.

Extreme Heat and Rising Temperatures: Increased pavement, deterioration, softening, and cracking, rail track deformation, thermal expansion of bridge joints are just some of the effects of such a rampant increase in temperatures. Increased energy consumption due to refrigeration of transported goods and the use of air conditioning are common too.

CHAPTER 3

ROUTES TO CHANGE

Change is a way of saying 'yes' to the future.

3.1 Promoting Climate Risk Screening & Vulnerability Assessment of Transport System, Services & New Projects

The journey from potential impact to actual impacts depends not only on the exposure and sensitivity of the transport system but also on the adaptive capacity of the available resources for coping with impacts and minimising damage.

For example, in the coastal road areas, adaptive capacity could include the ability to close the road and reroute traffic with minimal delay. Mobilisation of resources to proactively maintain drainage and pavement; and planning to ensure that new infrastructure is not sited in exposed areas.

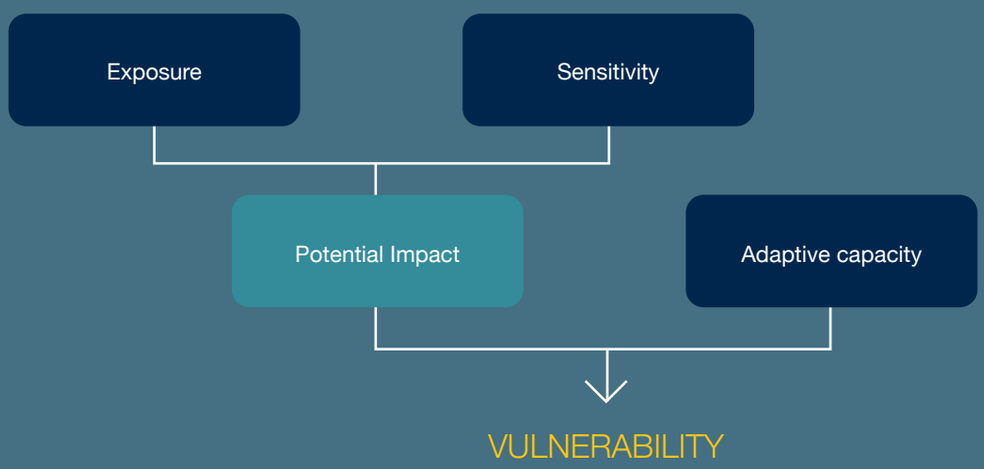
The sensitivity of a system also depends on its structural characteristics—for example, engineered dirt or gravel roads are more likely to become impassable than paved roads during heavy rains.

Poorly maintained assets of any type are more sensitive than better-maintained assets.

The location also plays an important role.

- Settlements and hence transport assets are often concentrated in coastal zones, where climate hazards are particularly challenging.
- For example, a paved coastal road in the tropics could be exposed to sea-level rise and higher storm surges; hotter, longer, and more frequent heatwaves; more frequent or more intense storms; or alternating periods of dry weather and more intense rainfall.

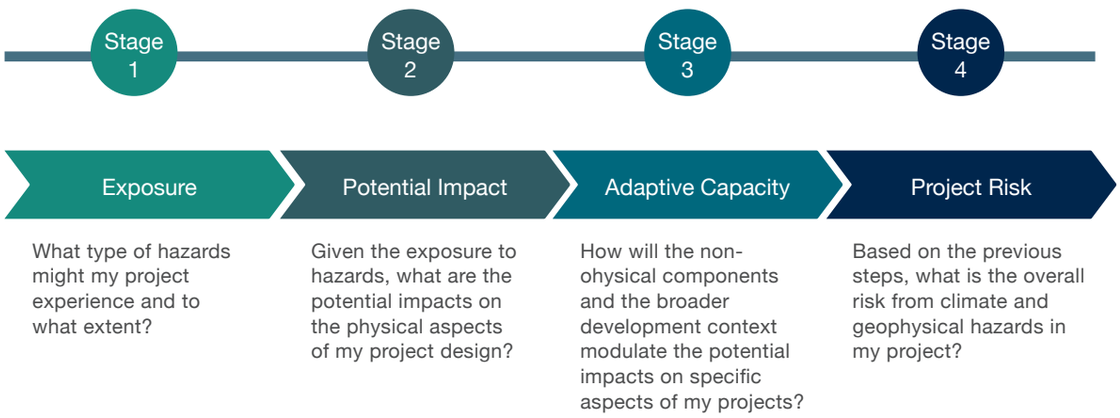
It is also vital to identify vulnerable areas that are prone to extreme climatic events and sensitising policy planners and decision-makers in the region. The potential impacts of climate change in the incidence of extremes should be well known. This is an essential building block for incorporating risk management into the local (state and district) planning process.



3.2 Routes to Promoting Climate Risk Screening

- **Screening Tools for Climate Risk for Use in Early Stages of Investments:** World Bank has already developed a set of climate and disaster risk-screening tools, including those relevant to transport systems. The quality of output produced by the tools depends on expert knowledge and judgement, and the quality of the available climate change and hazards information.

- **How it works:**



- **Decision-support Systems for Alternative Transport Network Investments:**

Decision-support systems are needed during the investment planning process to help cities understand and evaluate the impacts on economic and social continuity of transport network investments.

Such investments might cover the incremental costs of maintenance regimes and assure the provision of spare capacity, back-up systems, and alternative services during spot failures of portions of the transport network.

- **Cost-Risk Assessment Framework under a Given Climate Change Scenario:**

Cost-risk assessment provides a decision-making framework for systematically evaluating the merits of investments that enhance resilience and prioritising them.

The assessment framework estimates how much each option could reduce risk-weighted economic and social costs and compares that result with the cost of implementing the measure.

Under this framework, the options are evaluated against a known probable distribution of climate phenomena and the likely loss of benefits associated with each of them. This approach differs from the 'robust decision-making' approach, which evaluates options under uncertainty about climate risks at a specific location.

- **Decision Making under Uncertainty (DMU):** To cope up with a less predictable climate, a new decision-making tool is needed to reduce risks under conditions of deep uncertainty.

The DMU framework is a formalised approach to evaluating options given uncertainties about long-term climate at a specific location.

This approach contrasts with traditional decision-making tools that rely on knowing the probability distribution of climate phenomena and the likely loss of benefits associated with each of them.

3.3 Emerging Lessons from Screening Transport Projects for Climate Risk

A recent portfolio-level review looked at the experience by using the World Bank's climate and disaster risk screening tools for transport projects financed by the World Bank's International Development Association (IDA). It yielded the following insights:

- Exposure to climate hazards, particularly extreme precipitation and flooding, but also coastal hazards, sea-level rise, and storm surge, is rising.

A project's overall sensitivity to climate change drives potential impacts on physical infrastructures, such as road-surfacing materials, bridges, and ramps.

- This includes increase in the variability of temperature and precipitation, and in the intensity of extreme events like flooding and heatwaves. Extreme precipitation and flooding are especially highlighted.

Considering climate risks early in project design matters.

- For instance, coastal hazards such as sea-level rise and storm surge were not prevalent in many projects analysed, but where they are present it is expected that they would present high-risks to the location and physical investments. Designing projects in a way that accounts for the current and future risks can help to reduce the sensitivity of transport investments in the medium and long term.

- Measures such as capacity building, data gathering, sensitisation of stakeholders, and strategic planning are important for improving the adaptive capacity of the institutions. People that manage and rely on transport networks and should be enhanced.

SECTION 3

DESTINATION ADAPTATION

Action is the only lens to see the future.

ACTIONABLE RECOMMENDATIONS

For reducing the impact on transport infrastructure:

1. More resilient design standards
2. Improved drainage
3. Improved maintenance
4. Risk evaluation tool and urban planning that avoids high risk areas
5. Build sufficient redundancy

For reducing the impact on public transport vehicles and mobility behaviour:

1. Change in design parameters and standards
2. Driver trainings
3. Emergency/ Redundant Route planning
4. Better weather/ disaster forecasting tool

Short-Term (2020-2022)

Transport Infrastructure

- Encourage transit-oriented developments by promoting mixed land-use, NMT infrastructure, e-commerce for service at doorstep, encouraging work from home, ZEV like e-Autos for last mile mobility by connecting metro infrastructures, and creating porosity by ensuring all daily needs are within walking distance
- Promote NMT components in transport master plans
- Implement stringent SOP (standard operating procedure) for drainage system
- Develop a climate risk evaluation tool to assess risks and build mitigation strategies

Public transport vehicles & mobility behaviour

- Design high-quality public transport services on dedicated infrastructure along major city corridors
- Driver training on disaster management to help deal with post disaster management activities
- Emergency/redundant route planning
- Better weather/disaster forecasting tools to help predict imminent dangers, and preparing in advance

Medium-Term (2022-2030)

Transport Infrastructure

- Develop quality, reliable, sustainable and climate resilient infrastructure by integrating transport infrastructure into urban planning
- Create frameworks to evaluate the preparedness of transport infrastructure for climate change related disasters
- Prepare strategy document on low carbon and climate-resilient mobility plan for cities integrating them to form the national low carbon mobility vision
- Implement Master Plan for systemic improvement of all utilities in cities
- 3D Mapping of all major cities
- More resilient design standards for infrastructure, utilities and storm water drains
- Ensure Build-Own-Operate-Maintain (BOOM) models are implemented
- Building sufficient redundancy

Public transport vehicles & mobility behaviour

- Change in design parameters and standards
- Project designing for significant shifts to more sustainable modes for intercity passenger and freight transport
- Enhancing freight transport efficiencies by gradually shifting them to low emission alternative fuels

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The FICCI Environment and Climate Change Secretariat steered the entire initiative of the India Roadmap, convening meetings of the Core Group, working groups, stakeholder consultations, and experts' consultation, providing information and background research of government programmes and schemes, gathering feedback of stakeholders and collation and compilation of the reports and roadmap. FICCI also reached out to various government departments during the course of the project, and organised a kick-off event with Shri Nitin Jairam Gadkari, Minister for Road Transport and Highways, Government of India, meetings with Shri C K Mishra, Secretary, Ministry of Environment, Forest and Climate Change, Government of India, and Mr Anil Srivastava, Mission Director, National Mission for Transformative Mobility, Niti Aayog. We thank them for their blessings and feedback. FICCI helped in the finalisation of the theme reports under the guidance of the working group Leads and Members, with complete coordination for six of the eight working groups (Working Groups 2, 3, 4, 5, 7 and 8). The individual meetings of the working groups as well as joint meetings and workshops of all working groups was also coordinated and organised by FICCI.

The formation of working groups was preceded by a brainstorming session of experts in May 2018, thereafter the working groups after being formed met numerous times in the 20 months that followed. A joint workshop of the working groups took place in May 2019 to assess the development of the theme reports and Roadmap halfway through the project. Thereafter, extensive deliberations of the working groups were held alongside stakeholder consultations until the culmination of the final eight theme reports and the India Roadmap. The 8 Leads of the working groups met numerous times through the project period. The joint meetings of the working groups and frequent meetings of the Leads ensured there was no silo in the deliberations or formulation of the eight components of the Roadmap. We are thankful to all of them for devoting their time and energy in this manner.

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WORKING GROUP

Working Group on "Accelerate Action on Adaptation in the Transport Sector"



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ACRONYMS

DMU: decision making under uncertainty
GHG: greenhouse gas
IDA: International Development Association
LEED: Leadership in Energy and Environmental Design
NMT: non-motorised transport
SDGs: Sustainable Development Goals
ZEV: Zero Emission Vehicles

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ABOUT PARTNERS

FICCI

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialisation, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian Private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.

PPMC

The PPMC is an open and inclusive platform that actively invites all organisations and initiatives that support effective action on transport and climate change to join in the process. The PPMC is created to strengthen the voice of the sustainable transport community in the UNFCCC process, especially with a view to the upcoming Conference of Parties (COP21) in December 2015 in Paris. COP21 is expected to result in a new global agreement on climate change, which will shape climate policy in the years to come at a global, regional and national level. By bringing together different actors and stakeholders in the sustainable transport community it will be possible for the transport sector to have its voice heard and speak with one voice on the important contribution that sustainable mobility can make to the mitigation of, and adaptation to climate change.

The PPMC contributes to realising a Global Agreement on Climate Change that empowers transport sector to take action on climate change. The realisation of this objective requires an active engagement of the PPMC before, during and after COP21. It will be equally important to advocate for an agreement that incentivises the transport sector as well as work with the transport and climate community on the implementation of a new global agreement on climate change at the global, regional, national and local levels.

WWF-India

WWF-India is one of the leading conservation organizations in the country. It is a science-based organization that addresses issues such as the conservation of species and its habitats, climate change, water, and environmental education, among many others. Over the years, its perspective has broadened to reflect a more holistic understanding of the various conservation issues facing the country and seeks to proactively encourage environmental conservation by working with different stakeholders- Governments, NGOs, schools and colleges, corporates, students and other individuals.

Shakti Sustainable Energy Foundation

Shakti Sustainable Energy Foundation (Shakti) seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, climate change mitigation and clean energy finance.

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