

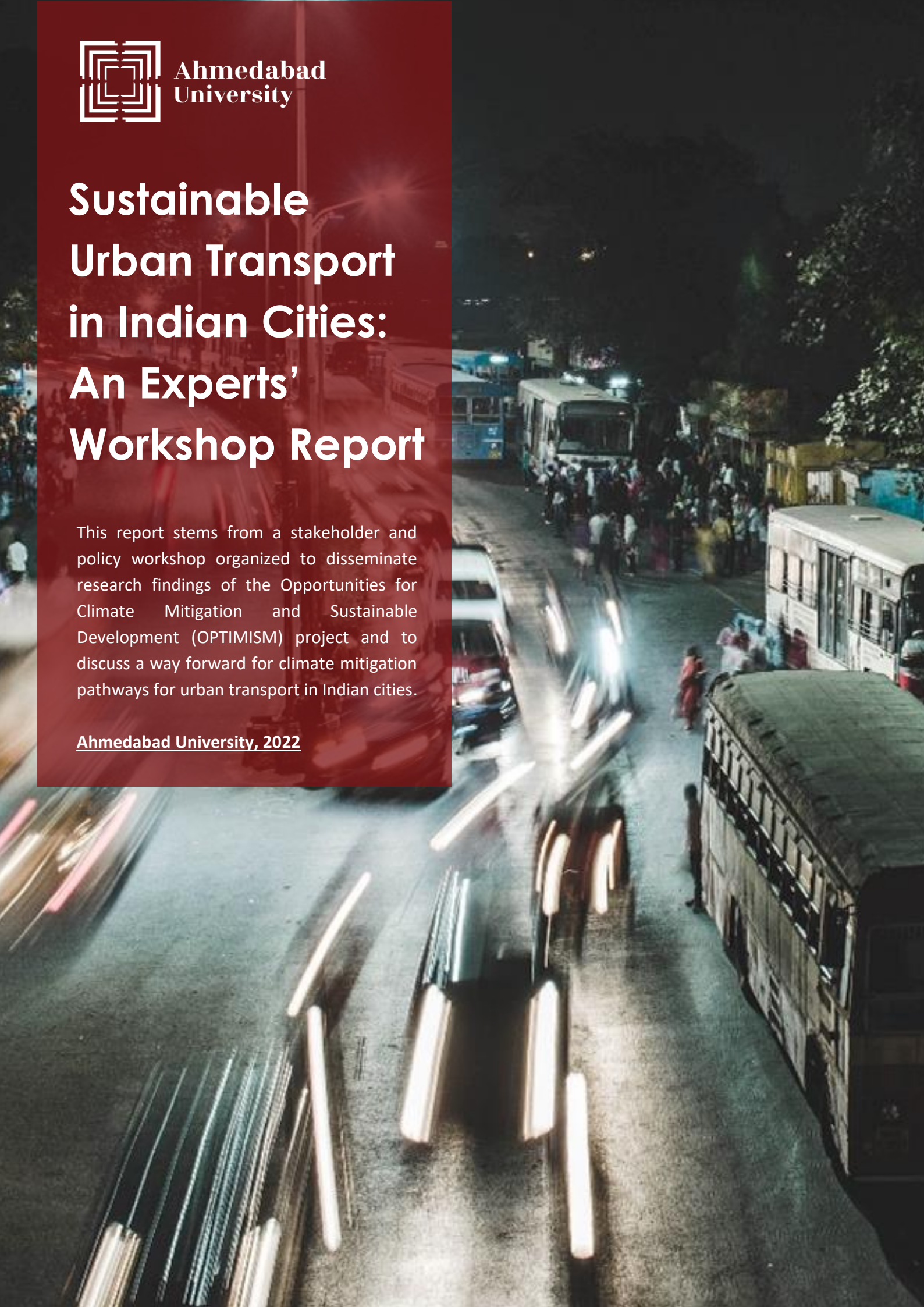


Ahmedabad  
University

# Sustainable Urban Transport in Indian Cities: An Experts' Workshop Report

This report stems from a stakeholder and policy workshop organized to disseminate research findings of the Opportunities for Climate Mitigation and Sustainable Development (OPTIMISM) project and to discuss a way forward for climate mitigation pathways for urban transport in Indian cities.

Ahmedabad University, 2022



## ACKNOWLEDGEMENTS

We express deep gratitude to Department of Biotechnology, Government of India for funding the workshop and all the panellists for enriching discussions. We express our heartfelt gratitude to Ahmedabad University and its departments: the Events & Conference team, the Hospitality team, the Travel Desk team, the IT Support and Audio-Visuals team, the Reprographics team, the Procurement team, the Finance team, the Communications team, and the Admin team of School of Arts & Sciences, for enabling the workshop.

**Report Preparation Team:** Saumya Lathia, Shaurya Patel, Satya Oza, Amitkumar Dubey, Satvik Singh, Riddhi Rathore, Darshini Mahadevia and Minal Pathak

**Workshop Organization Team:** Darshini Mahadevia, Minal Pathak, Saumya Lathia, Monel Desai, Azure Dave, Riddhi Rathore, Zinaz Dumasia, Sahil Dhandhukiya, Satvik Singh, Satya Oza, Amitkumar Dubey and Abir Mukherjee

**OPTIMISM Team (at Ahmedabad University):** Darshini Mahadevia, Minal Pathak, Saumya Lathia, Chandrima Mukhopadhyay, Kanika Gounder, Amitkumar Dubey, Bandish Patel and Saleem Yakoo

**Photo Credits:** Shaurya Patel

**This workshop report should be cited as:**

Lathia, S., Patel, S., Oza, S., Dubey, A., Singh, S., Rathore, R., Mahadevia, D. and Pathak, M. (2022). Sustainable Urban Transport in Indian Cities: An Experts' Workshop Report. Ahmedabad University.

**Disclaimer:** The comments and opinions in this document are of the author(s) alone and not of the School of Arts & Sciences, Global Centre for Environment and Energy at Ahmedabad University and Department of Biotechnology- Government of India or any other OPTIMISM project partners.

## TABLE OF CONTENTS

<b>Acknowledgements</b>	<b>2</b>
<b>Table of Contents</b>	<b>3</b>
<b>Agenda</b>	<b>4</b>
<b>Abbreviations</b>	<b>5</b>
<b>OPTIMISM Project</b>	<b>7</b>
<b>Introduction and Workshop Agenda</b>	<b>7</b>
<b>Highlights</b>	<b>7</b>
<i>Net-Zero and Decarbonization Pathways</i>	7
<i>Meeting Transport Sector Climate Goals along with Sustainable Development Goals</i>	8
<i>Sustainable Mobility in a Decarbonizing Future</i>	9
<b>Inaugural Session</b>	<b>11</b>
<i>Welcome Note</i>	11
<i>OPTIMISM Background &amp; Research Findings</i>	11
<i>Gujarat’s State Action Plan on Climate Change</i>	13
<i>Panel Discussion</i>	13
<b>Technical Session 1: Transportation and Net Zero Emissions</b>	<b>15</b>
<i>Opening Ideas</i>	15
<i>Panel Discussion</i>	17
<b>Technical Session 2: Mitigation, Mobility and SDGs</b>	<b>20</b>
<i>Opening Ideas</i>	20
<i>Panel Discussion</i>	22
<b>Technical Session 3: Towards Sustainable Mobility</b>	<b>25</b>
<i>Opening Ideas</i>	25
<i>Panel Discussion</i>	27
<b>Appendix 1: Panelists</b>	<b>29</b>
<b>Appendix 2: Participants</b>	<b>34</b>

## AGENDA

### INAUGURAL SESSION

Panellists	Presentation	Time (IST)
Darshini Mahadevia (PI, OPTIMISM Project)	Welcome	10.00 – 10.05
Pankaj Chandra (Vice Chancellor, AU)	Welcome and Ahmedabad University's Vision	10:05 - 10:15
Shwetal Shah (Advisor, CC Dept. Govt. of Gujarat)	Initiatives of Government of Gujarat on Climate Change	10:15 - 10:25
Raphael Slade (OPTIMISM Project Co-ordinator)	OPTIMISM Background – Pre-recorded message	10:25 - 10:30
Darshini Mahadevia & Minal Pathak (Co-PI, OPTIMISM Project)	OPTIMISM Methodology & Findings	10:30 - 10:45
Open Discussion		10:45 - 11:00

### TECHNICAL SESSION 1: TRANSPORTATION AND NET ZERO EMISSIONS

Panellists	Presentation	Time (IST)
Technical Session 1- Transportation & Net Zero: 11:30 am - 1:00 pm (Moderator Dr. Amir Bazaz)		
Vaibhav Chaturvedi (Fellow, CEEW)	<u>Discussion Questions:</u> 1. Is net zero in the urban transport sector feasible? 2. What methods and tools can be used to measure net zero? 3. How can net zero interventions be up-scaled? 4. What are the knowledge gaps in implementing net zero?	11:30 – 11:40
Subhash Dhar (Senior Economist, UNEP-CCC)		11:40 – 11:50
Sanjay Gupta (Dean Research and Professor, SPA Delhi)		11:50 – 12:00
Ashish Verma (Manager- Energy & Climate, IURC)		12:00 – 12:10
Talat Munshi (Senior Advisor, UNEP-CCC)		12:10 – 12:20
Open Discussion		12:25 – 1:00

### TECHNICAL SESSION 2: MITIGATION, MOBILITY AND SDGs

Panellists	Presentation	Time (IST)
Technical Session 2- Mitigation, Mobility & SDGs: 2:00 – 3:30 pm (Moderator- Professor Minal Pathak)		
Abhijit Lokre (Partner, The Urban Lab)	<u>Discussion Questions:</u> 1. Do current urban transport projects consider SDGs? 2. Should and could urban transport projects address the simultaneous challenges of net-zero and meeting SDGs? 3. What methods and tools can be used to measure SDGs for Transport? 4. How can one upscale mobility options to meet SDGs? 5. What are some of the knowledge gaps in SDG & Mobility?	2:00 – 2:10
Spurthi Ravuri (Senior Associate, CSTEP)		2:10 – 2:20
Sanskriti Majmudar (Director Institute of Climate Change Research, MSU)		2:20 – 2:30
Ratoola Kundu (Assistant Professor, TISS Mumbai)		2:30 – 2:40
Mohini Bhaire (Senior Associate, NIUA)		2:40 – 2:50
Open Discussion		2:50 – 3:30

### TECHNICAL SESSION 3: TOWARDS SUSTAINABLE MOBILITY

Panellists	Presentation	Time (IST)
Technical Session 3- Towards Sustainable Mobility: 3:30 – 4:25 pm (Moderator: Professor Darshini Mahadevia)		
Geetam Tiwari (Programme Chair, TRIPP)	<u>Discussion Questions:</u> 1. What would be the conceptualization of 'Sustainable Transport' in Indian Cities? 2. What does sustainable mobility look like in Indian cities and what are the challenges? 3. What are the challenges of planning and implementation (financing and governance related) of sustainable transport in Indian cities; metros and non-metros? 4. Can we develop methodologies for assessing Urban Transport Projects through the 'Sustainability' Lens?	3:30 – 4:25
Ashish Verma (Manager- Energy & Climate, ICLEI)		
Amir Bazaz (Associate Dean, School of Environment and Sustainability, IIHS Bangalore)		
Kajri Misra (Dean, School of Human Settlements, XIM University)		
Minal Pathak (Senior Scientist WGIII Technical Support Unit IPCC & Associate Professor, Ahmedabad University)		

### ABBREVIATIONS

CMP- Comprehensive Mobility Plans

EV- Electric Vehicles

GHG- Greenhouse Gases

JNNURM- Jawaharlal Nehru National Urban Renewal Mission

LCMP- Low Carbon Mobility Plan

MoHUA- Ministry of Housing and Urban Affairs

NMT- Non-Motorized Transport

OPTIMISM- Opportunities for Climate Mitigation and Sustainable Development

PT- Public Transport

SDGs- Sustainable Development Goals

TOD- Transit Oriented Development

VKT- Vehicular Kilometres Travelled





## OPTIMISM PROJECT

The Opportunities for Climate Mitigation and Sustainable Development (OPTIMISM) project is an international multi-stakeholder partnership and research network that aims to address the challenge of how we can make sure that rapid and extensive action to mitigate climate change can be leveraged to deliver both United Nations Sustainable Development Goals (SDGs) (Agenda 2030) and a well below 1.5° C world. The project takes a whole system perspective. It uses the sustainable development goal framework to analyse (i) how interactions between human development and the environment change with rapid and extensive climate mitigation, and (ii) how policy and practice interventions informed by a better understanding of enabling interactions can come together to create transformational change.

### Project Partners:

- UK - Imperial College London (Mitigating land use impacts with dietary change strategies)
- SWEDEN –Lund University (Tackling hard to decarbonize industrial sectors)
- JAPAN –Waseda University (100% renewable energy networks: the role of demand side responses)
- INDIA – Ahmedabad University (Low Carbon Transport Transition)

Dr. Darshini Mahadevia (Principal Investigator) and Dr. Minal Pathak (Co-Principal Investigator) lead the project team placed in Ahmedabad University, India, that is supported and funded by Department of Biotechnology (DBT), Government of India. They investigate low-carbon urban transport's interactions with Sustainable Development Goals (SDGs). The project is grounded in two Indian cities, an industrial metropolis Surat and a tourist city Udaipur. This document is a part of the Low-Carbon Urban Transport research by the project team placed in India.

## INTRODUCTION AND WORKSHOP AGENDA

The School of Arts and Sciences and the Global Centre for Environment and Energy at Ahmedabad University co-hosted a Stakeholder and Policy Workshop on Sustainable Urban Transport – a Way Forward at Ahmedabad University on September 14, 2022, as a part of the OPTIMISM project. The workshop's objectives involved disseminating findings from the OPTIMISM project, and discussing the way forward on Climate Mitigation Pathways in Urban Transport, addressing the Sustainable Development Goals. A dominant theme in the Assessment Report Six of the IPCC is if climate change mitigation and SDGs have to go hand in hand, their synergies and trade-offs need to be accounted for in the policies, planning, and implementation of the transport projects. Hence, the workshop brought together government organizations and transport experts to collectively work towards identifying actionable strategies to decarbonizing urban transport and fostering sustainable mobility in Indian cities. Each technical session began with panellists presenting opening ideas, followed by panel discussions. 18 speakers and 102 attendees participated in the workshop.

## HIGHLIGHTS

### NET-ZERO AND DECARBONIZATION PATHWAYS

- In 2021, average annual greenhouse gas emissions were the highest ever in human history (59 Giga tons, 2019). Although the Paris Agreement was significant in creating policy framework to meet stringent climate goals, the current national pledges under the Paris Agreement are insufficient in meeting the 1.5oC or 2oC scenario.
- Furthermore the implementation gap between country commitments and existing situation highlights that unless there are immediate and deep emission reductions across all sectors, a 1.5°C scenario seems beyond reach. This would mean reaching net-zero goals for all sectors by 2050.



- Transport sector emissions contribute to 15% of the global emissions; with land-transport contributing to about 70% of the transport-sector emissions. Although transport sector emissions are growing at a slower rate, urban passenger transport continues to grow at high ‘absolute’ rates.
- India’s NDCs and the National Net-Zero Commitments for 2070 have prompted policy changes at all levels of governance. But the duration of commitment delivery severely undermines the climate emergency and the need for rapid de-carbonization.
- Meeting transport-sector net-zero commitments will be very challenging globally, especially when one accounts for synergies with Sustainable Development Goals (SDGs).
- Systemic changes in cities that promote sustainable modal choices - like Non-Motorized Transport (NMT) and Public Transport (PT) - presents a huge potential to achieve a near-net-zero scenario along with maximizing the co-benefits with sustainable development.

## MEETING TRANSPORT SECTOR CLIMATE GOALS ALONG WITH SUSTAINABLE DEVELOPMENT GOALS

- Cities and sub-regions fail to mainstream sustainable development into their existing city level plans, resulting in ad-hoc and fragmented transport projects that fail to function as an integrated system. There is a dire need to lead with robust policies and plans that direct “the right kind of” transport infrastructure.
- Lack of comprehensive planning, lack of clarity on who drives decision making, lack of representation of vulnerable groups, and the undemocratic nature of transport planning keeps cities from achieving sustainable development.
- Even with the focus of transport planning transitioning from a technological and largely mechanical aspect to inclusion of the social dimensions of transport and climate action, urban local bodies continue to invest heavily in road-based solutions. This not only

promotes unsustainable behaviour but also deepens transport inequity.

- Misplaced priorities even while implementing conventionally sustainable and lucrative solutions (like EVs), ULBs, state authorities and practitioners often neglect public transport improvement (ex. E-buses).
- For cities that consider public transport to be a vital element of their transport landscape, the lack of a holistic approach in addressing India’s sustainable mobility challenges and the ad-hoc nature of transport infrastructure is prevalent. ‘Pilot efforts’ by cities are insufficient in addressing the climate emergency.
- There is a need to focus on transport demand management instead of road-based solutions. Exercising economic measures (congestion pricing, parking charges, vehicle tariffs, etc.) to demote the use of personal vehicles in Indian cities is the need of the hour.
- While it is crucial to achieve a modal shift towards public transport and non-motorized transport, asking ‘aspiring’ Indians to not own vehicles, in a culture that is highly ‘asset-drive’, lacks appeal and understanding of behavioural economics.
- Current transport systems are designed for ‘able-bodied men’ and fails to cater to the needs of the vulnerable groups like women, urban poor, elderly, children, specially-abled people, etc. who are far more dependent on public and non-motorized transport systems in cities. Developing an in-depth understanding of the travel needs and patterns of vulnerable groups is the first step to retaining and promoting sustainable transport modes.
- To maximize the adaptability and inclusivity of public transport and active transport systems, cities must build a platform where all stakeholders (especially the vulnerable) can jointly discuss transport system improvements.
- Upcoming technologies and tools like Big Data, GIS and Remote Sensing play a crucial role in identifying and tailoring transport mitigation measures that prompt a modal shift towards NMT and PT. Cities must build



institutional capacity and skills to optimize their usage in forwarding climate and sustainable development goals.

- Informal transport and livelihoods have a key role in forwarding sustainable behavior choices; yet there is as a wide knowledge gap in understanding exactly how they interact with these shifts

## SUSTAINABLE MOBILITY IN A DECARBONIZING FUTURE

- Small- and medium-sized cities form about 70% of urban settlements in India, yet there is a growing knowledge gap in understanding their growth patterns, economic bases and diversity socio-demographic factors. Planners and practitioners need to shift their focus from Metro cities to these small- and medium-sized cities.
- Governance structure in Indian cities, inconsistency in leadership and the dearth of urban managers, community development organizations and civil societies hampers the delivery of SDGs, climate actions and improved quality of life.
- Current development plans tend to focus on infrastructure projects instead of a long-term vision for well-being and development via transport. Cities lack the perspective to approach transport as means to economic development and equity. Along with holistic planning, decentralized plans (regional, sub-regional, metropolitan and city-level plans) that share the same vision is the crucial in achieving sustainable mobility.
- Since India's motorization is driven by 2-wheelers (not cars), how can public transport systems meet the flexibility, the convenience, and the economy offered by 2-Wheeler – so a modal shifts to public transport (Metro, BRT and City Buses) is prompted
- How can cities retain the benefits of high non-motorized transport and intermediate public transport (IPT) in small- and medium-cities, while ensuring improved access to opportunities
- Since most Indian cities exhibit a fair share of mixed land-use and public transport share,

how can cities retain and enhance the benefits to achieve their climate goals?

- Transport planners and professionals must shift their focus from solutions that ease car congestion to solutions that enable mobility for the masses while ensuring equitable road-space distribution and access to opportunities.
- There is an increasing need to re-imagine sustainable mobility, and expand it to incorporate non-material aspects of transport-like mental health, time poverty, opportunity costs, perception of safety and SDGs. Successful indexing of these non-material aspects of transport at city-level via tangible indicators and robust evidence will pave the way to 'real' sustainable mobility.
- While cities need a modal switch to sustainable modes like walking, cycling and public transport, we need innovative planning and design solutions that enable user comfort and safety during extreme weather events, especially for pedestrians and cyclists.
- To achieve successful modal switch to public transport, we must investigate the role of urban density, urban form and population sizes in determining feasibility of PT modes like Metro, BRT, Light Rail, Monorail, City Buses, etc.
- Re-wiring cities to achieve sustainable mobility via 'fixed transport modes' (Metro, BRT, etc.) requires large-scale institutional, legislative and procedural reforms. A reassessment of all existing policies and national acts related to the urban sector is essential to achieve sustainable mobility.







## INAUGURAL SESSION

### WELCOME NOTE

**Dr. Darshini Mahadevia**, OPTIMISM project's PI, welcomed the participants and discussed the workshop agenda. In her introductory address she discussed how the focus of transport planning transitioned from a technological and largely mechanical aspect to inclusion of the social dimensions of transport, with emphasis on the climate action. Urban transport becomes crucial in the Indian context as cities across India experience a paradigm shift in transport planning- from a more congestion reduction and speed-oriented road based transport planning to one with focus on public transport. About 23 Indian cities got approvals for metro-rail projects and many more for Bus-Rapid Transit (BRT) projects. With more investment in public transport, we must address two challenges- climate mitigation and expansion of the notion of 'development' to incorporate UN's Sustainable Development Goals (SDGs). Briefly introducing the OPTIMISM project, she mentioned how the project is located at the intersection of both challenges- of improving mobility for all, along with emission reduction measures.

**Dr. Pankaj Chandra**, Vice-chancellor of Ahmedabad University, highlighted the importance of investigating behavioural aspects of climate actions rather than the technological aspects, especially for a pertinent sector like urban transport. While discussing Ahmedabad's expansive and 'technological-sound' public transport network including a large fleet of electric buses, he mentioned that mobility choices and behavioural choice of motorized vehicle owners drive city's carbon footprint and pollution, calling for an inter-disciplinary approach towards transport planning, one that combines psychology, behavioural economics, social sciences, climate sciences, urban design and public policy. He concluded with discussing Ahmedabad University's vision of interdisciplinary approach to deal with the rising concerns of society- climate action and sustainability being at the core of it.

### OPTIMISM BACKGROUND & RESEARCH FINDINGS

**Dr. Raphael Slade**, OPTIMISM project Coordinator & Senior Research Fellow at Imperial College London, introduced the OPTIMISM project, its

conception, and all four project teams. While discussing the project background, he mentioned that the project finds its basis in the essential transitions to achieve internally pledged climate goals as identified in IPCC's 1.5° C report. These transitions include rapid decarbonisation of the industrial and transport sector, dramatic increase in renewable energy, extensive land-use and dietary changes to food systems and massive modal shift to public transport. The project also addresses the lack of literature on specific countries and economic sectors observed in the IPCC 1.5° C report via a series of case studies that explores the interactions between climate mitigation and sustainable development goals in-depth. The case studies involve industrial decarbonisation in Sweden – led by Dr. Lorenzo Tunizia at Lund University, hundred percent renewable energy networks in Japan- led by Dr. Miguel Esteban at Waseda University, Land-use and dietary change in the UK- led by Dr. Raphael Slade and decarbonisation of the urban transport sector in India- led by Dr. Darshini Mahadevia. Stakeholder engagement forms a vital part of the project and serves as a cross-cutting element across all case studies.

**Dr. Minal Pathak**, OPTIMISM Project's Co-PI & Associate Professor at Ahmedabad University, discussed the key findings from the IPCC Assessment Report Six 2022. The report- jointly authored by scientists from 60 countries- finds that the average annual greenhouse gas emissions are the highest in human history (59 giga tons, 2019). The implementation gap between country commitments and existing situation highlights that unless there are immediate and deep emission reductions across all sectors, a 1.5° C scenario seems beyond reach. This would mean reaching net-zero goals for all sectors by 2050. Transport sector emissions contribute to 15% of the global emissions; with land-transport contributing to about 70% of the transport-sector emissions. The report also lays down mitigation solutions for the transport sector, emphasizing on both behaviour choices and technological advancements. With substantial reduction in cost of renewables, the report finds that electric mobility that is powered by renewable, functioning in urban forms with

conductive land-use offer the greatest emission reduction potential. This requires substantial investment in infrastructure that support electric mobility. Hence program that encourage a behaviour change like transport pricing, urban design, switch to public transport that provides connectivity and accessibility, serve as low-cost or no-cost solutions and have significant potential to quickly reduce emissions. Meeting transport-sector net-zero commitments will be very challenging globally, especially one accounts for synergies with Sustainable Development Goals. The report finds that a modal shift to public transport and non-motorized transport depicts highest synergies in terms of health benefits from air pollution benefits.

**Dr. Darshini Mahadevia**, OPTIMISM Project's PI & Associate Dean Arts at Ahmedabad University, discussed the challenges and methodology of grounding the assessment in cities. The study investigates urban transport sector interactions between six SDGs SDG 1 – No Poverty, SDG 3- Health & Well-being, SDG 5- Gender Equality, SDG 8- Economic Development, SDG 11- Sustainable Cities, SDG 13- Climate Action. Transport intervention show several synergies with climate mitigation and SDGs, as well as trade-offs. The project also discussed mediating conditions to enhance synergies and minimize trade-offs with SDGs, created via careful urban planning and policy intervention. The project began with extensive literature reviews to identify possible interactions, then grounded in case study cities (Surat and Udaipur) via critical assessment of their transport plans (Surat's Comprehensive Mobility Plan and Udaipur's Low-Carbon Mobility Plan) and fieldwork. All of these were then used for scenario building in both cities. The project considers four scenarios- BAU Scenario (projection of current transport trends in absence of any interventions), Reference Scenario (based on CMP's / LCMP's proposals), Deep Decarbonisation Scenario (based on aggressive adoption of clean technology and sustainable behaviour choices) and Sustainable Scenario (based on the on-going processes of democratization and empowerment). After a detailed discussion on methodology and assumptions, Dr. Mahadevia briefly discussed



project findings. Deep Decarbonisation Scenarios in Surat and Udaipur lead to a VKT reduction of 49% and 90% respectively, while reducing GHG emissions by 59% and 35% respectively. The sustainable scenarios in both cities result in higher GHG emissions than the Deep Decarbonization scenario, yet show the most synergies with SDGs, and improve mobility for all, especially the vulnerable groups.

## GUJARAT'S STATE ACTION PLAN ON CLIMATE CHANGE

**Mr Shwetal Shah**, Advisor at the Climate Change Department, Government of Gujarat, discussed initiatives undertaken by the state to meet net-zero goals, especially in the transport sector. As land transport is a major contributor to air pollution, among other state initiative, Mr Shah emphasizes on Gujarat Government's revamped Electric Vehicle Policy 2022. The policy enables faster and easier adoption of EVs as the primary source of public and private transportation. While elaborating, he mentions that India is at an important juncture in its development journey, as it embarks on its '*Amrut Kala*' (*golden era*), urging us to achieve severe progress in emission reduction, especially in the transport sector. In the context of India's rising energy demand, he adds that the state of Gujarat aims to forward the mission of the central government and become '*atmanirbhar*' (self-sufficient) in production and supply of clean energy solar infrastructural projects in the Kutch region. He also discusses Gujarat's progress on production and adoption of CNG, leading to massive air-quality improvements in cities. Energy demand will increase dramatically. Ending on a high note, he says path-breaking research studies (like this one), along with adoption of clean technology, production of clean fuel and promotion of public and active transportation, net-zero goals are "comfortably achievable"

## PANEL DISCUSSION

**Question:** What are the strategies to achieve a scenario which would reconcile SDGs, climate change emissions and sustainable transport?

**Answer:** The scenario building exercise was much detailed than presented. Successful implementation of the CMP and LCMP proposals builds the basis of the scenario building exercise, but the team recognizes that implementation of long-term interventions- like land-use and transport integration- could be challenging. For example public housing, its location and the relation to sustainable urban transport is not considered in the CMPs and LCMPs. Effective land mechanism involving land-use allocation for public uses (like affordable housing and creation of green spaces) could solve this. Similarly, interventions need to happen in the gendered aspect of transport. Women safety and workforce participation needs special attention. This requires an intervention at the city-level. The project proposes numerous such mediating conditions to achieve the scenarios described in the presentation and fuel. Describing the Desert Economy, he highlights the solar energy abundance in the state of Gujarat, and discusses

**Question:** Did you receive the model for GHG emissions and scenarios from Surat city, or have you built the model?

**Answer:** The team received the data from Surat CMP and build the model with certain set of assumptions. The team co-authored a paper detailing all technology and sustainable behaviour choice assumptions.

**Question:** Could you please elaborate on the conflicts of transport projects with different SDGs, and how does action grow from there?

**Answer:** One of the most prominent conflict of mega transport project in cities is usually massive evictions and displacement, resulting in deepened poverty of the already vulnerable groups. Even road-based solutions like road-widening projects lead to the same, and often only benefit motorized vehicle users, resulting in a higher burden of negative externalities on the poor and vulnerable. Transport projects need to be looked at critically so conflicts can be converted into opportunities and sustainability solutions.







## TECHNICAL SESSION 1: TRANSPORTATION AND NET ZERO EMISSIONS

**Dr. Bazaz** opens the session with posing two critical questions in the context of achieving net zero; first, how can we address overlaps with other sectors and move in a common direction? Second, do we have the institutional capacity and the knowledge required to scale-up findings from research projects (like this one) to enable interventions that forward the agenda on net zero? With this succinct opening remark, he opens the floor for the panellists and urges them to discuss these questions from all perspectives- research and ideation, a comprehensive planning and policy approach, case studies and best practices approach, as well as in context to the global net-zero debates.

### OPENING IDEAS

**Dr. Subhash Dhar**, Senior Economist at UNEP's CCC, addresses the question of feasibility of net-

zero through a discussion on IPCC's Sixth Assessment Report. Dr. Dhar presented the progress and challenges in meeting net-zero at the global level. Firstly, he mentioned that although transport sector emissions are growing at a slower rate, road-transport still continues to grow at high 'absolute' rates. Second, describing the significance of the Paris Agreement for creating policy framework to meet stringent climate goals, Dr. Dhar highlighted that the current national pledges under the Paris Agreement are insufficient in meeting the 1.5°C or 2°C scenario. In the context of national economy-wide GHG emissions and increase in direct and indirect climate legislations, he mentioned that ambiguously defined net-zero targets and insufficient climate funds flow raises questions regarding strict and effective implementation across all sectors in many countries. He then briefly described various transport decarbonisation pathways clubbed by Primary Fuels, Energy Carriers, Vehicle Technologies and Transportation Segments. Dr. Dhar discussed transport sector's heavy reliance on internal combustion energy and fossil fuels, requires rapid decarbonisation of fuels (cleaner and more efficient fuels like synthetic fuels,

biofuels, green hydrogen fuel cells, etc.). While discussing the aggressive adoption of Electric Vehicles (EV) globally, he highlighted the crucial need to generate energy from renewable sources to reap benefits of electrifying transport. He discussed adoption potential of various pathways, with EVs illustrating the highest potential globally, followed by hydrogen cells. Pivoting the discussion to urban passenger transport, he emphasized on retaining, and promoting walking, cycling and public transport as they have the lowest fuel emission per person. Dr. Dhar concluded with stating that although achieving net-zero for the transport sector may seem impossible, systemic changes in cities that promote sustainable modal choices present a huge potential to achieve a near-net-zero scenario along with maximizing the co-benefits with sustainable development.

**Dr. Vaibhav Chaturvedi**, Fellow at CEEW, opened with questioning the national net-zero goals pledged for 2070. He further discussed that although this prompted several national and state-level policy reforms (like the state decarbonisation plans), the duration by which net-zero is pledged to deliver (i.e. 2070) underestimates the climate emergency and need for rapid decarbonisation by 2030. Dr. Chaturvedi highlighted that net-zero pledge for 2070 activated both the public and private sector, yet, there is a growing mismatch in how they define climate goals or even urbanization. Discussing the urban transport sector, he emphasizes that currently, with growing income levels, Indian cities see a switch from sustainable modes like NMT and PT to unsustainable modes like personal motorized vehicles.

Even with a very low car ownership penetration in Indian cities (24 cars per 1000 people) compared to Europe (350 cars per 1000 people) and USA (700 cars per 1000 people), India contributes to about 11% of global transport sector emissions. And with increase in purchasing power and income levels, the growth rate of car ownership is expected to rise exponentially. In his critique of the existing public transport systems, Dr. Chaturvedi emphasizes that Public Transport modal share is declining in major Indian cities,

because planners and policy makers overlook the “behavioural aspects” of mode choices. He discusses the need to make PT ‘lucrative and convenient’ for enabling net-zero, otherwise, it would result in a sustainable technology shift (increase in personal EVs) instead of a sustainable modal shift.

He also sheds light on the importance of economic measures like congestion pricing, carbon pricing, vehicle tariffs in demoting the use of cars and 2-wheelers. He concludes with a discussion around institutional capacities to drive net-zero in the transport sector. While describing the ‘helicopter consultant phenomenon’ in the context of wide knowledge and skill gap in local urban bodies, he highlights the importance of locally-tailored pathways for individual cities, state-level capacity building trainings, regulations for private sector to support the local-sustainability vision and collaborative governance structures to achieve sustainable development along with net-zero.

**Dr. Sanjay Gupta**, Dean Research and Professor at SPA Delhi, approached the net-zero conversation from an urban planning and policy perspective. Expanding on the Avoid-Shift-Improve (ASI) framework, he provided an in-depth understanding regarding the importance of incorporating urban freight into urban transport planning.

Dr. Gupta later presented the audience with new dimensions of sustainable mobility by posing several innovative questions; first, he inquired whether achieving net-zero in brown-field (existing) cities was feasible and proposed planners and practitioners also weigh the possibility of creating green-field cities that can be designed with the ‘15-minute city’ concept. Second, he called for a detailed inquiry on how remote working, partial ‘work-from-home’ practices and remote learning affect urban emissions.

Third, in the context of the rise in Mobility-as-a-Service (MaaS) and online shopping, increased private sector engagement in supply chains and e-commerce affected emissions and local-level



policies need investigation. Fourth, he inquired how the role of urban form (linear cities, concentric cities, etc.) governed sustainable mode choices. And fifth, in the context of promoting a modal switch to PT, he discussed a need to investigate the role of urban density, urban form and population sizes in determining the feasibility of several PT modes like Metro, BRT, Light Rail, Monorail, City Buses, etc. He concluded with a more technical question on types of mobility datasets (primary and secondary) that enable GHG emission inventory creation in cities.

**Dr. Talat Munshi**, Senior Advisor at UNEP's CCC, discussed the short-comings of urban planning and design interventions that keep cities from achieving net-zero goals or sustainable mobility. Using the case of five Indian cities, Dr. Munshi posed a vital question of whether redesigning or re-engineering cities can forward sustainable development.

He critiqued the current urban forms in Delhi and Rajkot, where rapid urbanization, sprawl along with motorization is leading to ample sustainability challenges like frequent and longer traffic congestions, air pollution, spatial and modal mismatch as well as longer trip lengths and lower trip rates for vulnerable groups. In the context of transport justice, he discussed the alarming state of non-motorized transport in cities of the Global South lead to numerous road safety challenges.

For example, in Rajkot although 40% trip were made via NMT- predominantly by women, children and elderly- only 2% of the total road network had NMT infrastructure. He emphasized that cities must focus on ensuring equitable access to opportunities via sustainable modes like NMT and PT to not only achieve net-zero, but 'all-round sustainable development'. He concluded his remarks with discussion on the role of Big Data in enabling 'meaningful interventions' to trigger a modal shift towards NMT and PT. Reiterating other panellists' remarks on knowledge and skill gap, he stated that India had a long way to go in order to achieve net zero.

Dr. Bazaz furthered the conversation on knowledge gaps in resilience planning and disaster management. Urging the audience to expand the conventional notion of transport planning to incorporate elements of social justice and resilience.

**Mr. Ashish Verma**, Senior Expert on Sustainable Urban Development at IURC, in his brief address discussed the progress towards sustainable development, especially in the transport sector in Indian cities. He discussed various sustainable transport initiatives in Panaji (state of Goa), Ranchi (state of Jharkhand) and Kanpur (state of Uttar Pradesh). He highlighted the importance of parking management as a mechanism to demote the use of personal vehicles and to ensure equitable road-space distribution. While discussing local-level governance challenges in meeting climate goals, he discussed the Global Covenant of Mayors (a forum with 26 Indian signatories) served as a great platform for Indian cities to forward their Climate Action Plans and local-level sustainability goals.

Dr. Bazaz concluded the session with emphasis on creating a localized partnership for implementing climate action plans and integrated decision-making eco-system where all sectors can forward climate goals. He also discussed how every city will need a tailored approach towards decarbonisation pathways and policies, and innovative financial mechanisms to fund these pathways.

## PANEL DISCUSSION

**Question:** Is challenge only about upscaling net-zero efforts? In the energy sector, there is increased privatization and decreased government role. What does this mean for the transport sector?

**Answer:** Panellists had different opinions on this. A panellist mentioned that public transport is not a technology debate but rather a political economy debate. The Indian Public Transport systems lack an appeal to India's aspirational class, with the Delhi Metro being the only exception. Since the state doesn't have adequate financial or human resources to drive the required change, its role must be restricted to facilitation, so the private

sector can take over the infrastructure provision. Another panellist disagreed and stated that public transport can never be profitable, hence to ensure equity and justice, it should be managed solely by the state, as the private sector won't operate favourably if it incurs losses.

**Question:** How can we implement all the pathways and solutions discussed so far?

**Answer:** Panellists had consensus on this; they stated that once there are enabling policy frameworks in place, appropriate investment will follow. They also emphasized on the importance of re-evaluating where the private sector can best intervene and support the public sector in ensuring the delivery of climate goals.











## TECHNICAL SESSION 2: MITIGATION, MOBILITY AND SDGs

Dr. Minal Pathak opens the session with recapping the first technical session on net-zero and deep decarbonisation technology options. While introducing the session theme, Dr. Pathak discussed how sustainable development is still approached from a co-benefits angle and the lack of sectoral integration of development, climate mitigation and SDGs. She also emphasized on the need to assess cross-sectoral interactions at all scales. She opens the floor for the panellists by highlighting plausible conflicts in goal prioritization for cities, if one were to prioritize mobility, it may lead to higher emissions, while traditional deep decarbonisation pathways may continue to curtail mobility for many.

### OPENING IDEAS

Dr. Abhijit Lokre, co-founder at The Urban Lab and Visiting Faculty at CEPT University, introduced a practitioner’s perspective to the question of urban transport and SDGs. He contextualized his remarks along urban transport linkages with four SDGs- SDG3 on Health and Well-being, SDG10 on Reducing Inequalities, SDG11 on Sustainable

Communities, and SDG13 on Climate Action. He further added that cities across India grapple to address these components in their transport plans. Dr. Lokre raises three important concerns regarding the current state of urban transport, and its implications for the future. First, he highlights misplaced priorities even while implementing conventionally sustainable solutions- like EVs. Urban local bodies often champion the aggressive EV adoption in terms of personal vehicles, instead of buses. Hence, even while implementing lucrative sustainable solutions like EV, authorities and practitioners often neglect public transport improvement (ex. E-buses). Dr. Lokre further adds that replacing conventional personal vehicles with cleaner personal vehicles doesn’t address any of the existing mobility challenge and in fact promote “unsustainable” behaviour (dependence on personal vehicles). Second, in the context of cities that do consider public transport as a vital element of their transport landscape, he critiques lack of a holistic approach in addressing India’s sustainable mobility challenges and the ad-hoc nature of transport infrastructure. He emphasizes on the need to begin with robust policies and plans which can direct “the right kind of” transport infrastructure. And third, Dr. Lokre uses examples of a few Indian cities to illustrate how urban local bodies continue to invest heavily in road-based solutions, which not only promotes unsustainable



behaviour but also deepens transport inequity. He concludes by urging planners, policy makers and practitioners to focus on demand management instead of road-based solutions and exercise economic measures (congestion pricing, parking charges, vehicle tariffs, etc.) to demote the use of personal vehicles in Indian cities.

Adding to Dr. Lokre's critique on EVs, Dr. Pathak shed light on the short-sightedness around EV adoption and discussed plausible challenges in scaling EVs; dated building codes that don't support building EV charging infrastructure, availability of critical minerals for aggressive EV adoption and safe battery disposals of EV.

**Ms Spurthi Ravuri**, Senior Associate at CSTEP, reiterated Dr. Lokre's remarks on urban transport with select SDGs and discussed the significance of urban transport in achieving social and economic development, its function in promoting equity via access to opportunities for all and its role in climate mitigation actions. She reflected on the need to reduce transport resource demand and consumption, provide affordable public transport, and promote clean and green transport. She discussed several state initiatives and policies like the Gati Shakti project and TOD policies that in theory advance the nation's movement towards net-zero, but in reality seldom translate into social and economic development.

Ms Ravuri then pivoted her remarks to behavioural shifts required in meeting SDGs. She mentioned that while it is crucial to achieve a modal shift towards public transport and non-motorized transport, asking 'aspiring' Indians to not own vehicles, in a culture that is highly 'asset-drive', lacks appeal and understanding of behavioural economics.

Dr. Pathak responded to Ms. Ravuri's brief remark on the role of E-commerce in emission reduction, to state that reports show often the opposite as consumers now tend to order in higher frequency, quantity and from longer distances. She also discussed the need for thorough investigation on how E-commerce interacts with sustainable development and all SDGs. Adding to Ms Ravuri's critique on E-busses adoption at the city level, she described that 'pilot efforts' by cities weren't sufficient in addressing the climate emergency and

inquired about the on-ground challenges of implementation. To this, Dr. Lokre responded that some initiatives like the Grand Challenge (where the central government acquires E-buses for a group of cities, reducing operating costs) could provide solution to many such limitations in electrifying urban public transport.

**Dr. Sanskriti Majmudar**, Director Institute of Climate Change Research at MSU, in her brief address, highlighted the transport and land-use inter-relationship via a GIS-based model on Temperature Variations in Ahmedabad, Surat and Vadodara. Geo-processing of satellite images from April 2020 and April 2022 illustrated clear effect of urban heat island effect – in terms of built density as well as traffic congestion. Dr. Majmudar mentioned that while reversing existing (unsustainable) land-use patterns seems unlikely, planners and practitioners could assess the possibility of introducing interventions that promote 'alternative transport'; among many examples, she emphasized on the direct benefits of 'no-vehicle' zones on land-surface temperatures, air-pollution and emissions. She discussed the importance of tools like GIS and remote sensing in identifying 'micro-heat' islands and tailoring transport mitigation measures to combat those.

To that, Dr. Pathak added that if robust transport systems do not accompany the compact city policies and plans, then it is likely to result in more traffic congestion, more air pollution and aggravated urban heat island impacts.

**Dr. Ratoola Kundu**, Assistant Professor at TISS Mumbai, highlighted the knowledge gaps in creating socially-sustainable transport systems. Reiterating the previous panellists' remarks on SDG and urban transport linkages, she discussed how these often manifest differently in the cities of the Global South. Using the example of Brazil's plan to deliver on SDG target 11.2 (enhanced accessibility for all), she inquired whether cities of the Global South could plan for the vulnerable groups (women, children, elderly, specially-abled, etc.) when there isn't adequate knowledge on their needs and mobility challenges. Elaborating on that, she described how cities, and especially

transport systems were designed for young, able-bodied men, curtailing access and mobility for everyone else. Using the case of Mumbai Urban Local Trains, Dr. Kundu highlighted a few planning and governance challenges that deter women for using the mode. Among many factors discussed in her address, she emphasized on lack of route-rationalization for women's safety and convenience (fewer trains during conventional 'off-peak' hours), lack of safe last-mile connectivity around "less popular", and sub-urban stations, absence of an immediate 'women's safety' cell in Mumbai Suburban Railways division. She also highlighted the lack of clarity on who drives decision making at local level, lack of representation of vulnerable groups in transport planning, and in-general, the undemocratic nature of public transport planning. Concluding, she stated that the first step towards sustainable mobility would be an in-depth understanding of travel needs and patterns of vulnerable groups, and a platform where various stakeholders can jointly discuss public transport system improvements.

To that, Dr. Pathak inquired if gender-sensitive transport was always approached as an added layer to traditional transport planning. Dr. Kundu mentioned that transportation- like any other sector- isn't designed to cater to women's needs, neither provides space for women to engage in decision making. Although the sexual safety of girls and women finds a thin space in the current transport planning discourse- a "tokenism" approach that fails to foster women's mobility and accessibility to socio-economic and civic opportunities.

**Ms Mohini Bhisare**, Senior Associate at NIUA, expanded on the urban transport and SDG interactions mentioned by the panellists before her. She also included SDG 3- Good health and Well-being for impacts on air-pollution and road accidents, SDG 5- Gender Equality for its impacts on women's safety, SDG-7- Energy for its impacts on fossil fuels consumptions, SDG-9- Industry, Innovation and Infrastructure for its impacts on clean technology, SDG 10- Reducing Inequalities for its impacts on the vulnerable groups, SDG-11-

Sustainable Cities for its clear relationship with sustainable transport, SDG-13- Climate Action for its impacts on GHG emissions, and SDG 17- Partnership for Goals for its impacts on multi-stakeholder approach. She later described the progress on NIUA's flagship project, 'Climate Smart Cities Assessment Framework's' fourth theme- Mobility and Air Quality. While discussing the status of 126 partner cities, Ms Bhisare highlighted the dire state of NMT infrastructure, and inadequacy of public transport provision. Concluding with optimism, she mentioned 90 of the 126 cities had already started preparing for a Climate Action Plan, implementing these plans would present fair chances of achieving the NDCs.

## PANEL DISCUSSION

**Question:** Are the current data systems adequate to address net-zero? Why are current framework largely inaccessible?

**Answer:** Data continues to be a challenge, even for the public sector. Hence the ministry along with NIUA is creating data portals with numerous indicators touching upon all aspects of city development- including transport and mobility. Apart from that NIUA is also trying to host regular meetings with climate scientist and practitioners to understand data gaps and areas for improvement. The data portal for about 126 Indian cities will soon be available on the NIUA's website.

**Question:** In the context of demand management and demoting personal vehicle- especially car usage- do we have enough alternative modes that can ensure comfort and 'status' for car users to switch to other modes? Also, sustainable modes like BRT 'take-way' right-of-way from personal vehicles, so is Metro a better investment, since it doesn't contest existing road space?

**Answer:** Demand management doesn't necessarily translate into banning car usage; demand management is an economic tool/ measure that promotes sustainable modes. So if users are willing to pay the additional costs like congestion charging, parking charges, vehicle tariffs, etc. they're welcome to use their personal vehicles. But there would be plenty users who value to cost-savings from switching to other sustainable modes like public transport- hence, if one finds maximum

comfort in using expensive cars, they would still be able to do so at a higher cost. The debate around leading the modal shift to public transport and other sustainable modes lies in whether demand management should be implemented first, or the infrastructure should be laid out. Kuala Lumpur adopted the latter, and two decades later is facing severe impacts of motorization. While Singapore did both (infrastructure provision and demand management) simultaneously, and now has one of the highest PT and NMT mode share across the globe. So investments in said modes depend on the city's vision and goals.

**Question:** What is the status of CMPs in Indian cities? Did they deem useful?

**Answer:** While there is consensus that the Comprehensive Mobility Plans (CMPs) drafted by cities didn't result in concrete action on ground, it was still useful in many ways. It helped cities establish baseline and catalogue transport infrastructure. But even CMPs heavily relied on project-based interventions rather than developing a holistic vision for the city's mobility and integrating it with City Development Plans (CDPs). If these plans receive a statutory status, it would help us push the sustainable mobility agenda forward.

**Question:** How does informality and livelihoods in the transport sector come contribute to modal shifts in cities?

**Answer:** Many panellists agreed that informal transport and livelihoods have a key role in forwarding sustainable behaviour choices, but discussed that there was a wide knowledge gap in knowing exactly how they interact with shifts. Worker unions like the Auto-rickshaw Union, could be fundamental in the movement.

**Question:** What are your thoughts about the lack of implementation of the 74<sup>th</sup> amendment and lack of decentralization in cities?

**Answer:** Panellists had mixed opinion about the statement. While some panellists were of the view that Indian cities lack transparent and 'genuine' participatory planning practices, while some panellists believed Indian cities are so diverse that one isn't in the position to generalize this

statement. A panellist used the example of Madurai, Vizag and Nashik to discuss their non-compliance with 'rigid' state policies and their drive to shape their development, served as the perfect anti-thesis to the above statement.







### TECHNICAL SESSION 3: TOWARDS SUSTAINABLE MOBILITY

**Dr. Darshini Mahadevia** opens the session with critical questions about transport planning discourse in India, the need to move away from the strictly technical and mechanical nature of transport and expand this sectoral understanding to incorporate mobility (physical, social and economic mobility) for all via inclusive planning and design. This means recognizing that transport either functions as an enabler in achieving majority of SDGs, or it poses a threat to the gains of sustainable development in cities across the globe. Dr. Mahadevia opens the floor for the panellists with an appeal to shift the narrative from ‘transport sector development’ to ‘development via transport’.

#### OPENING IDEAS

**Dr. Geetam Tiwari**, Program Chair at TRIPP, challenges the conventional notion of sustainable mobility and states that ‘sustainable mobility’ is a subset of ‘sustainable city’. Furthermore,

highlighting the lack of homogeneity in cities across India, she inquires who leads the visioning for cities, and represents people’s needs. She discussed the need to focus on smaller size cities- with population of one to three lakhs- as they form a large portion of urban settlements in India. Critiquing the governance structure in Indian cities, she discussed rapidly changing leadership at the city level hampers the delivery of SDGs, climate actions and improvement in quality of life. Comprehensive Mobility Plans have become largely project-based that deliver lucrative outcomes for political leaders and do not necessarily contribute to long-term vision of ‘mobility for all’. Adding to that, she discusses that the 74<sup>th</sup> Amendment provides solutions to various such issues, but it hasn’t been successfully implemented yet. She also poses an important question on localizing SDGs and the institutional capacity and decentralization required to achieve the same. Concluding, she poses three questions vital in shaping sustainable mobility in cities. First, in the context of modal shifts to public transport (Metro, BRT and City Buses), since India’s motorization is driven by 2-wheelers (not cars), how does one ensure that public transport meets

the flexibility, the convenience, and the economy that is offered by 2-Wheeler. Second, in the context of informal transport and non-motorized transport, since a large share of trips are made via non-motorized transport or informal transport in small- and medium-sized cities- how do we retain and maximize the benefits of the same? Third, in the context of road-space distribution, transport planners and professionals must shift their focus from solutions that ease car congestion to solutions that enable mobility for the masses. How do we retain and enhance public transport mode shares and current land-uses (i.e. mixed land-use).

**Dr. Amir Bazaz**, Associate Dean, School of Environment and Sustainability at IHS Bangalore, forwards the discussion by stating that sustainable mobility starts with understanding what the city is and what the city needs. After briefly reflecting on Dr. Tiwari's questions, Dr. Bazaz offered three interjections to conceptualize sustainable mobility. First, in the context of transport finance, he urges transport professionals look towards household expenditure on transport rather than tariffs, capital investments, congestion pricing, etc. This is vital as incremental mobility expenditure often overcrowds household expenditure in other 'necessary' category (nutrition, health, etc.). He emphasizes on the city's vision and goals for their transport landscape, and states that if cities focus on improving the quality of life of their citizens (like cities should), then assessment of how mobility expenditures intersect with household income and expenditure is crucial in achieving that vision. Second, agreeing with Dr. Tiwari's remarks on small- and medium- towns holding the greatest potential to lead sustainable mobility discourse, Dr. Bazaz critiques the state of current development plans and states how they often focus on infrastructure projects instead of a long-term vision for well-being and development. He highlights the lack of focus on 'mobility' in these plans, often resulting in ad-hoc and fragmented transport systems and emphasizes the need to embed economic development in the city's master-plans and mobility plans. He also discusses the lack of decentralized plans (regional plans, sub-regional plans) that target economic development via transport. With resilience planning gaining

centre-stage in cities across the world, he concludes the critique by stating that city-level resilience plans embed economic development via transport as a large portion of the population depends on public and non-motorized transport systems. Third, reflecting on incorporation of SDGs into transport planning, Dr. Bazaz urges transport practitioners to re-imagine mobility, where the non-material aspects of transport- like mental health, time poverty, opportunity costs, perception of safety. Successful indexing of these non-material aspects of transport at city-level via tangible indicators and robust evidence will pave the way to actually achieve 'sustainable mobility'.

**Dr. Kajri Misra**, Dean, School of Human Settlements at XIM University, amplified Dr. Tiwari and Dr. Bazaz's thoughts on the future of sustainable mobility lies in comprehensive planning for socially, economically, and culturally sustainable cities. Dr. Misra opened with the notion that the traditional comprehensive planning exercises need to be restored at the urban level and further expanded the discussion to address local governance challenges in implementing the same. She also discusses the contrast nature of decentralization in urban and rural context; local, decentralized, and micro-planning, and the dovetailing of departmental plans is far greater in rural areas compared to urban. In the context of transport planning, she discussed the necessity to re-imagine sustainable mobility, but with emphasis on user comfort and safety during extreme weather events, especially in the case of non-motorized transport. While reflecting on the need to re-wire existing cities towards sustainable mobility, she discusses the difference in 'fixed transport modes' and 'free transport modes' fixed transport modes like metro, light-rail, BRT, while catering to transport needs also have the potential to shape land-use and density, governing the structure of the urban fabric. But re-wiring cities to achieve sustainable mobility via 'fixed transport modes' requires large-scale institutional, legislative and procedural reforms. A reassessment of all existing policies and national acts related to the urban sector is essential to achieve sustainable mobility. . Concluding, Dr. Misra discusses the gaps in planning for small- and medium- sized cities (70%



of the country's urban area); the knowledge gaps of their growth trajectories, their economic bases and the diversity they offer, as well as the dearth of urban managers, community and development organizations who can take charge of urban development in their cities.

### PANEL DISCUSSION

**Question:** Since markets don't respond to plans, they respond to incentive structures, so in a rapidly growing economy like ours, how does one expect the markets to comply with the plans without incentives?

**Answer:** Using the example of a green housing project, a panellist stated that markets often desire an enabling environment to function in, rather than incentive structures. Hence, if the plans *create* such enabling environment, compliance from the markets is plausible.

*In respect of time, all other questions were addressed informally later during high-tea.*







## APPENDIX 1: PANELISTS

Abhijit Lokre	Abhijit Lokre is the founder of 'The Urban Lab', where he mentors and leads teams to provide practical solutions for creating liveable cities. With an experience of over twenty years, his work spans a variety of areas including urban and transport planning, urban design, and urban management integrating services like consultancy, research, training, advocacy, and capacity building. His key interest areas in the field of urban transport and urban planning are land use and transport, street design, transit-oriented development, and transport policies. He has a PhD in planning from CEPT University, Ahmedabad, and a Master of Planning from SPA, Delhi
Amir Bashir Bazaz	Amir Bashir Bazaz is the Associate Dean, School of Environment and Sustainability, IHS. He holds a PhD in Management from the Indian Institute of Management Ahmedabad, with a specialization in Public Systems. He works on issues at the intersection of economics, climate change mitigation, adaptation, and sustainable development. He has substantial experience in working with various integrated assessment frameworks and modelling arrangements. His current research interests are low-carbon societies/infrastructure, climate change adaptation, and mitigation (across scales), with a specific focus on urban-climate change linkages and climate, energy, and environmental policy. Amir has a first degree in Electrical Engineering from the Indian Institute of Technology Roorkee and started his career in the manufacturing industry, working across functional responsibilities of projects, production planning/control, and engineering. He has previously been the National Expert Consultant to the Ministry of Environment, Forests and Climate Change, Government of India for the Second National Communication to the UNFCCC.
Ashish Verma	Ashish Verma has worked on several projects related to climate change, adaptation, mitigation, and renewable energy projects. He developed the energy and emissions inventory of 54 South Asian cities and was instrumental in coordinating all the important activities in the project supported by the British High Commission. Ashish has prepared detailed energy reports for Thane, Visakhapatnam, and Vijayawada for identifying and introducing the RE and EE measures into city-level activities. Ashish has also worked on renewable energy projects supported by the Ministry of New and Renewable Energy, Gol, and has managed all the project-related activities for 15 cities. Currently, Ashish is working on EU funded IURC project and EU funded GCoM Asia project. Both projects engage with local governments on Sustainable Urban Development. His expertise includes project management, coordination, conceptual notes and proposal writing, data analysis and research, and report writing.
Darshini Mahadevia	Darshini Mahadevia, Professor and Associate Dean, Arts, School of Arts and Sciences, Ahmedabad University, has over 25 years of experience teaching and researching urban studies, human and gender development, poverty and inequality, and climate change. Prior to joining Ahmedabad University, she was the director of the Centre for Urban Equity and the Dean of the Faculty of Planning, at CEPT University, Ahmedabad. In particular, Darshini's research has focused on cities, policies, and processes of development from an equity perspective. More specifically, with regard to the modernist, deterministic, and top-down approach taken in the discipline of urban planning, she has argued that a bi-focal view must be developed to assess the impact such an approach has on the economically, socially and politically weak segments of the population (the urban poor, recent migrants, women in general, and women belonging to the low-income segment), and increasingly on the city's ecological resources. Darshini also is a member of the High-Level Committee on Status of Women, India, and has over 120 publications as books, chapters in books, and journal articles. Darshini received her doctoral degree in Urban and Regional Development from Jawaharlal Nehru University
Geetam Tiwari	Geetam Tiwari is Head, of Transportation Research and Injury Prevention (TRIP) Centre and Ministry of Urban Development (MoUD) Chair Professor for Transport Planning at the Department of Civil Engineering, IIT Delhi. She has been Adlerbretska Guest Professor for sustainable urban transport at the Chalmers University of Technology, Sweden 2007-2010. She has been working in the area of traffic and transport planning and traffic safety focusing on pedestrians, bicycles and bus systems. She Heads the WHO Collaborating Centre on

	Safety Technologies at TRIP Centre, IIT Delhi. She is editor-in-chief of the International Journal of Injury Control and Safety Promotion since 2009.
Kajri Misra	Kajri Misra is an architect and environmental planner, with a PhD in City and Regional Planning from Cornell University. She has over three decades of teaching, research and consulting experience in the areas of governance reform for public service delivery, gender in planning, urban and rural water management, decentralized local self-governance and participatory planning. She also works on developing professional capacities for sustainable urban development in India, analyzing education and training needs and developing innovative programs and curricula. Kajri has a number of publications in her areas of interest, has been a part of various Committees and Working Groups of the Government of India and Odisha, and continues to serve on the Governing Boards of state and civil society organizations. She is the founding Dean of two Schools of XIM University - the School of Rural Management and the School of Human Settlements.
Minal Pathak	Minal Pathak is currently a Senior Scientist of Working Group III of the Intergovernmental Panel on Climate Change (IPCC). Working Group III covers the mitigation of climate change, i.e. methods for reducing emissions of greenhouse gases and enhancing atmospheric sinks. The Working Group III Technical Support Unit is based at the Global Centre for Environment and Energy at Ahmedabad University and the Centre for Environmental Policy. Working Group III is responsible for one of the three main IPCC reports due in 2021. From 2016-17, she was Associate Professor and Head of the Doctoral Program at CEPT University, Ahmedabad, and Assistant Professor at CEPT University from 2011-2016. She was a drafting author on the IPCC Special Report on Global Warming of 1.5°C and the IPCC Special Report on Climate Change and Land. Her publications focus on low carbon scenarios for India, demand-side mitigation actions, and their inter-linkages with SDGs. Professor Pathak holds a PhD and MS in Environmental Science. She is a Visiting Researcher at Imperial College London and has held visiting scholar positions at the Department of Urban Studies and Planning, Massachusetts Institute of Technology, and Universiti Teknologi Malaysia, Johor Bahru.
Mohini Bhaire	Mohini Bhaire is a Research Associate at Climate Centre for Cities, National Institute of urban Affairs (NIUA). Her work focuses on providing support to the team with research, communication, compilation of technical reports, etc. and coordinating with the sector experts, ULBs, SPVs, etc. for CSCSF phase 2. Prior to joining NIUA, she worked with KPMG (India), Meghraj Capital Advisors Private Limited (India), Utopians (UK), and Brunel University London (UK) advising government and private clients across various sectors including urban infrastructure, smart cities development, environment, transportation, solid waste management, and financial accounting in India and UK. Mohini holds a Master's degree in 'Business Management' from Brunel University London (UK), another Master's degree in 'Urban Policy and Governance' from Tata Institute of Social Sciences (TISS), and a Bachelor's degree in 'Urban Planning' from the School of Planning and Architecture, Vijayawada (SPAV, AP).
Pankaj Chandra	Pankaj Chandra is the Vice Chancellor & Chairman, Board of Management, Ahmedabad University. He was the Director of the Indian Institute of Management, Bangalore (IIMB) and a Professor of Operations and Technology Management at IIMB. He has taught at various institutions such as McGill University in Montreal, University of Geneva, The Wharton School, University of Pennsylvania, International University of Japan, Cornell University, Renmin University, Beijing, and IIM Ahmedabad (IIM A). He has worked briefly with The World Bank in Washington DC. He was the Chairperson of the Doctoral Program at IIM Ahmedabad and the first Associate Dean (Academic) at ISB, Hyderabad. He was part of the founding team at the Centre for Innovation, Incubation, and Entrepreneurship (CIIE) at IIMA and its first Chairperson. Professor Chandra has served as a member of the Government of India Committee on Clusters for Development of the Informal Sector, two High Powered Committees – the Government of India Committee on Rejuvenation of Higher Education (Yashpal Committee) and the Autonomy of Central Institutions. He was a member of two Steering Committees constituted by the Planning Commission of India for the 12th Plan Development, one on Higher and Technical, and the other on Industry. He was a member of Central Advisory Board of Education (CABE) subcommittee on Teacher Education.



Raphael Slade	Raphael Slade is the Head of the Technical Support Unit (Science), IPCC Working Group III, and a senior research fellow at the Imperial College London Centre for Energy Policy and Technology. Raphael's research interests include energy systems analysis and the role of energy policy in supporting technological innovation. Recent work has focused on examining the commercial and environmental prospects of biomass-derived transport fuels. As the TSU's head of science, Raphael has overall responsibility for scientific support to the Working Group III Bureau and dealing with inquiries relating to the scientific aspects of IPCC reports relevant to climate mitigation. He oversees the science team and takes the lead in the scientific aspects of planning for relevant IPCC meetings. Raphael holds a PhD in Bioenergy from Imperial College, an MSc in Environmental Technology (also from Imperial College), and a MA in Chemistry from the University of Cambridge.
Ratoola Kundu	Ratoola Kundu is an Assistant Professor at the Centre for Urban Policy and Governance, School of Habitat Studies at TISS Mumbai. She has a PhD in Urban Planning and Policy from the College of Urban Planning and Public Affairs, University of Illinois Chicago (2010) a Master's degree in Urban Planning from the SPA Delhi, and an MA in Sociology from the Delhi School of Economics. She teaches courses on urban planning and transport. Her areas of research lie at the intersection of understanding the different trajectories of production of urban space and the ways in which particular marginalized urban groups experience and actively resist exclusionary forms of socio-spatial urban transformations. She has worked on several collaborative national and international research projects on urban housing, infrastructure development, informal work, urban governance, and urban planning.
Sanjay Gupta	Sanjay Gupta is a Professor of Transport Planning and Dean Research at the School of Planning and Architecture (SPA), New Delhi. He holds a PhD and Master's degree in Transport Planning from SPA New Delhi. He is also the Coordinator of two Research Centres at SPA namely the Centre for Urban Freight Studies (CUFS) and the Centre for Shared & Electric Mobility (CSEM). He has over three decades of academic, research, and professional experience in the field of transport planning and urban development at SPA. His main research areas include integrated land use - transport planning, public transport systems planning, urban freight logistics, travel demand modelling, sustainable mobility, climate change, and transport policy-related aspects. He was awarded Commonwealth Academic Fellowship at the Institute for Transport Studies, University of Leeds (U.K) from Sep.2012 to Nov. 2012 where he was a Visiting Professor at the University of Leeds between 2013 and 2019 for two successive terms. He was also engaged in two prestigious international research projects namely CLIMATRANS related to transport and climate change issues in Indian cities in collaboration with TOI Norway and UNDERREFORM project related to urban governance and its impact on mobility patterns and transport policy in Smart cities with Leeds University (UK) and Birmingham University (UK) respectively. In addition, he has undertaken several institutional consultancy assignments in the field of transport planning for organizations such as DDA, NCRPB, NCRTC, GMDA, IUT, RITES etc.
Sanskriti Majmudar	Sanskriti Majmudar is the Director of the Institute of Climate Change Research and Associate Professor in Civil Engineering at the Maharaja Sayajirao University of Baroda (MSU). She also is a Member of the Technical advisory committee for the Climate Change Department Government of Gujarat Part of the DST-funded international project under Indo-Uzbekistan joint research. Sanskriti is also associated with the MIETY project on Integrated Urban Flood Management under ITRA, led by IISC Bangalore.
Shwetal Shah	Shwetal Shah is a Technical Advisor for Climate Change to the State Government of Gujarat, India. He has more than 14 years of experience in the field of Climate Policy and Governance, Electric Mobility, Renewable Energy, Climate Finance, Environmental Management, Energy Management, Sustainable Development, and Circular Economy. He currently works on Climate Change Action Plans, Adaptation and Mitigation Policies, and Climate Change Awareness. He also facilitates academic and research organizations for R&D on Climate Change and serves as an Expert in Climate Change Impact Studies and as a Coordinator for matters with the Government of India and International Organizations. Think tank for Subnational Climate Policy, Climate Finance, Projects with Communities, Waste to Energy, Green Building, Solar Rooftop, Energy Efficiency, Green Startup, Energy Transition, Natural Farming, etc. Shwetal holds a Master's Degree in Environment

	Management (M.Sc.) and Energy Management (M.Tech.) and Doctorate in International Relations (Ph.D).
Spurthi Ravuri	Spurthi Ravuri is a low-carbon mobility enthusiast, currently working with the Center for Study of Science, Technology, and Policy (CSTEP) as a Senior Associate. She is responsible for policy research and engagement to develop effective strategies to decarbonize the transport sector in India. She contributes through evidence-based decision-making to promote clean vehicle technologies in India, especially in the public transport and road freight sectors. Her areas of interest include transport planning, transit network analysis & design, and urban economics. She holds a Master's in City Planning from the Indian Institute of Technology Kharagpur and a Bachelor's in Architecture from NIT Tiruchirappalli.
Subash Dhar	Subash Dhar is a Senior Economist at UNEP DTU Partnership and a Senior Fellow at the Global Centre for Environment and Energy, Ahmedabad University. He is a Lead Author for the Transport Chapter in the ongoing sixth assessment of the Intergovernmental Panel on Climate Change (IPCC) and was a contributing author for the fifth assessment of the IPCC. His research interests include sustainable urban transport, low carbon development in developing countries, technology transfer, and climate change and he has published a number of peer-reviewed papers on these topics. He has extensive experience in implementing projects and proposal development. He was the project manager for the BMU-funded Promoting Low Carbon Transport project in India and has been the Regional Coordinator for Asia within the Technology Needs Assessment project. He has experience in working with most countries within the Asia Pacific region. He has been involved in promoting electric mobility in Asian cities as a means of reducing air pollution, improving access, and reducing CO2 emissions. Subash holds a doctoral degree from the Indian Institute of Management, Ahmedabad.
Talat Munshi	Talat Munshi is working as Senior Advisor at UNEP Copenhagen Climate Centre. Talat's work and research are in climate change and cities in developing countries, particularly analyzing the role of land use, transport, and geo-information science in mitigation and adaptation. Previously, he worked as an Associate Professor at the Faculty of Planning, CEPT University India, as a Lecturer in Transport at the Faculty of ITC, University of Twente Netherlands, at The Energy and Resource Institute (TERI), India, and with Surat Municipal Corporation, India. He has experience in research and consulting work with countries in Africa, Asia, and Europe on topics related to urban planning, transport, and climate finance and has a significant number of published articles on these subjects. Talat is an engineer by training from CEPT University. He has a Ph.D. from the University of Twente (UT) and Master's degrees in Environmental Planning from CEPT University and in Urban Infrastructure Management from the Faculty of ITC, UT.
Vaibhav Chaturvedi	Vaibhav Chaturvedi is an economist who leads The Council's work on Low-Carbon Pathways. His research focuses on energy and climate change mitigation policy issues, especially those impacting India, within the integrated assessment modelling framework of the Global Change Assessment Model (GCAM). Vaibhav's recent work includes studies on pathways and policies for achieving India's Nationally Determined Contributions (NDCs) and Mid-Century Strategies within the context of sustainable development and national priorities, the climate policy energy-water nexus, transportation energy, and emission scenarios, HFC emission scenarios and mitigation policy, and nuclear energy scenarios for India. Prior to joining the Council, he was a Postdoctoral Research Associate at the Joint Global Change Research Institute/ Pacific Northwest National Laboratory, USA. He has been actively involved in global model comparison exercises like the Asian Modelling Exercise (AME) and the Energy Modelling Forum (EMF). Vaibhav has been a part of Government of India committees on energy and climate policy. He holds a Doctorate in Economics from the Indian Institute of Management Ahmedabad, and a Master's degree in Forest Management from the Indian Institute of Forest Management Bhopal.





## APPENDIX 2: PARTICIPANTS

Full Name	Designation	Name of the Institution
Abhishek Nair	PhD Programme	School of Arts and Sciences
Abir Mukherjee	Master's Programme	CEPT University
Agrim Singh	Master's Programme	CEPT University
Akhil Vardhan Borra	Master's Programme	CEPT
Amal John Jacob	Master's Programme	CEPT University
Amitkumar A Dubey	PhD Programme	Ahmedabad University
Atma Deep Dutta	Master's Programme	CEPT
Avishkar Tiwari	PhD Programme	Ahmedabad University
Bhavya Mathur	Master's Programme	CEPT University
Bhavya Mathur	Master's Programme	CEPT University
Deepak Kumar Swain	Master's Programme	CEPT UNIVERSITY
Deepak Kumar Swain	Master's Programme	CEPT University
Dhruv Solanki	Other:	Ahmedabad university
Divya Mohan	Master's Programme	CEPT University
Diya Halder	Master's Programme	CEPT University
Diya Halder	Master's Programme	CEPT University
Gitika Joshi	Master's Programme	CEPT university
Guneet Singh	Other:	Ahmedabad University
Isha Iyer	Other:	Ahmedabad University
Ishwarya	Master's Programme	CEPT University
Jalvi Contractor	Master's Programme	CEPT University
Kanika	Other:	Ahmedabad University
Kanimozhi Dashnamurthy	Master's Programme	CEPT University
Khushi Shah	Master's Programme	Ahmedabad University
Kopal Agrawal	PhD Programme	Ahmedabad University - AMSOM
Kruti Barpete	Master's Programme	CEPT University
Kumaritee Sinha	Master's Programme	CEPT University
Mahima Varu	Master's Programme	CEPT University
Maitry Patel	Master's Programme	CEPT University
Manisha Sharma	Master's Programme	CEPT University
Manisha Sharma	Master's Programme	Manisha Sharma
Manthan Kirdat	Master's Programme	CEPT University
Moksh Shah	Other:	Ahmedabad University
Nikita Kinge	Master's Programme	CEPT University
Prajakta Garge	Master's Programme	CEPT University
Quresh Bhanpurawala	Master's Programme	CEPT University
R K Nivedhitha	Master's Programme	CEPT University
Rajat Yadav	Master's Programme	CEPT University
Rashika Agarwal	Master's Programme	CEPT University
Rohita Dasgupta	Master's Programme	CEPT University
Sapan Hirpara	Master's Programme	CEPT University
SATYA OZA	PhD Programme	Ahmedabad University
Saurabh Sharma	Master's Programme	CEPT University
Shreya Bajaj	Master's Programme	CEPT University
Shreya Poojara	Master's Programme	CEPT University

Shubhi Tripathi	Other:	Ahmedabad university
Siddharth Yadav	Master's Programme	CEPT University
Sruthy S Kumar	Master's Programme	Ahmedabad University
Veena Shirsath	Other:	Ahmedabad University
Vidhi Narvekar	Other:	Ahmedabad University
Vishnu vyas	Master's Programme	CEPT University
Yuvika Chowdhury	Other:	Ahmedabad University
Dhyey Malkan	Master's Programme	CEPT University
ANKHI NANDI	Master's Programme	CEPT University
Aditya Vaishya	Assistant Professor	Ahmedabad University
Mitul J Panchal	Director	MRJ Associates
Bruno Idini	Junior Analyst	International Energy Agency
Aryaman Srivastava	Student	LD College of Engineering
Siddhi Mehta	Associate Planner & Researcher	Darashaw & Co. Pvt Ltd
Kanika Gounder	Program Associate	World Resources Institute
Bandish Patel	Manager - Urban Climate Action	Janaagraha
Vijay Kumar S	Assistant professor	Nitte Meenakshi Institute Of Technology
M'koumfida Bagbohouna	PhD Candidate	WASCAL
Soumya Mushriff	Consultant	Ernst & Young
Azhan Hasan	Consultant	Turner & Townsend LLC Qatar and Ministry of Environment & Climate Change (MECC) Qatar
Niketa Sharma	Associate architect	Veneklasen Associates
J.A.D. Sandamali Kanchana	Assistant Lecturer	University of Colombo, Sri Lanka
Bhavya Patodi	Student	Ahmedabad University
David Joseph Allieu	National Coordinator	Civil Society Advocacy Network on Climate Change and the Environment Sierra Leone (CAN-SL)
Fenil Shah	Associate Professor and Director	Ahmedabad Design Lab - Ahmedabad University
Nandini Shandilya	Senior Project Officer-Urban	ICLEI South Asia
Dr Sanskriti Mujumdar	Director Institute of Climate Change Research MSU	The Maharaja Sayajirao University of Baroda
Kaushik Jana	Assistant Professor	Ahmedabad University
SUPRATIM DAS GUPTA	Assistant Professor	Ahmedabad University
Satvik Singh	Research Associate	CIAR, AU
Sunil Kale	Professor	Ahmedabad University
KINGSUK JANA	Teaching Assistant	Ahmedabad University
Koushiki Bhattacharyya	PhD Candidate	Ahmedabad University
shivika mittal	research fellow	Imperial College London
Nakshatra Maheshwari	Student	Ahmedabad University
Dhyey Malkan	Master's Programme	CEPT University
ANKHI NANDI	Master's Programme	CEPT University
Rohith Srinivasan	Other:	Ahmedabad University
Abhijit Lokre	Founder	The Urban Lab

Aditya Vaishya	Prof.	Ahmedabad University
Amir Bazaz	Associate Dean	IIHS
Anil Roy	Prof.	CEPT University
Ashish Verma	Manager	IURC
Chandrima Mukhopadhyay	Post Doc	Ahmedabad University
Geetam Tiwari	Program Chair	TRIPP
Lorenzo Di Lucia	Prof.	Imperial College London
Maryam Keshgar	Prof.	Ahmedabad University
Kajri Misra	Dean	XIM
Mohini Bhaisare	Senior Associate	NIUA
Raphael Slade	Head, WG2	IPCC & Imperial College London
Ratoola Kundu	Prof.	TISS
Sanjay Gupta	Dean	SPA Delhi
Sanskriti Majmudar	Director	CED, MSU Baroda
Shwetal Shah	Advisor	CC Dept., GOG
Spurthi Ravuri	Senior Associate	CSTEP
Subhash Dhar	Senior Economist	UNEP- CCC
Talat Munshi	Senior Advisor	UNEP- CCC
Viabhav Chaturvedi	Fellow	CEEW
Azure Dave	Teaching Associate	School of Arts and Sciences/AMSOM
Riddhi Rathore	Teaching Assistant	Ahmedabad University
Zinaz K Dumasia	TA	Ahmedabad University
Suchismita Das	Assistant Professor	Ahmedabad University
Bhumi Shah	Fellow and Analyst	Ahmedabad University





**Ahmedabad  
University**

## **CONTACT US**

School of Arts & Sciences, Ahmedabad University, Commerce Six Roads, Navrangpura, Ahmedabad – 380009, Gujarat, India; Email: [artsandsciences@ahduni.edu.in](mailto:artsandsciences@ahduni.edu.in); Phone: +91.79.61911502

OR

Global Centre for Environment and Energy, Ahmedabad University, GICT Building, Central Campus, Navrangpura, Ahmedabad 380009, Gujarat 380009 Email: [gcee@ahduni.edu.in](mailto:gcee@ahduni.edu.in); Phone+91.79.61911000