Comparative evaluation of alternate policy scenarios for the 3 case cities

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Outline

- Case city contexts
- Climate context and projections
- Framework for evaluation
- Policy packages for case cities
- Evaluation framework with focus on mitigation
- Comparisons of evaluation results with focus on:
  - CO2 emissions
  - PM2.5 emissions
Differences in case cities contexts

- Population and projections
- Economics and economic developments
- Transport infrastructure, land use and travel patterns
- Climate and projections of weather
- Extreme events and projections
Extreme precipitation: Climate scenario RCP8.5
Analysis of «hot days»: Climate scenario RCP8.5

Close match between the mean temperature and number of days above a certain threshold («hot days»). The upper and lower curves represent typically hot and cold seasons (mostly inter-annual spread), whereas the middle curve is the ensemble mean.
Framework for evaluation (1)

**Benefits**
- Mitigation CO2 emissions
- Reduction of local pollutants
- Health effects
  - $\text{PM}_{2.5}$
  - *Other local pollutants*
- Changes in travel pattern due to a policy package
  - *Decrease in traffic congestion*
  - *Time savings and losses*
  - *Increased health effect due to walking and cycling*
- Potential reductions in traffic injuries and fatalities
- Improvement in case cities livability
- Energy security: Reductions in fossil fuel consumption
Framework for evaluation (2)

Costs

- New infrastructure investments
  - Cycling and walking
  - Public transport
  - Road infrastructure

- Improvements in the existing transport infrastructure

- Other infrastructures: IT infrastructures, early warning systems, recharging infrastructure for El-vehicles, ….

- Cost of financing of investments
Policy Packages adopted in the 3 case cities

The selected policy packages differ in the 3 case cities due to:

- Case city context
- Master transport plans
- Consultation with Stakeholders in workshops
- Delphi study among city and national stakeholders

The policy packages selected for each city are hence more realistic for the horizon years

We consider these differences to be a strength of the study
Delhi: Policy packages for mitigation

3+2 Policy packages:

- **Policy package 1:**
  Planning: Increase in Transit Network + Transport Oriented Development (TOD)

- **Policy package 2:**
  *Travel Demand Management: Congestion + Fuel + Car Share*

- **Policy package 3:**
  *Technology adaptation: BAU with Electric Mobility*

- **Combination of Policy packages:**
  - Planning Policy with Electric Mobility
  - **TDM with Electric Mobility**
Mumbai: Policy packages for mitigation:

2 + 2 Policy packages:

- **Policy package 1:**
  - BAU + Policy 3+ Policy 4
  - 3. Transport Infrastructure Development
  - 4. Travel Demand Management
  - **Policy package 1 w/electric mobility**

- **Policy package 2:**
  - Policy 2 + Policy 3+ Policy 4
  - 2. Draft Mumbai Metropolitan Regional Plan 2016-36 scenario
  - 3. Transport Infrastructure Development
  - 4. Travel Demand Management
  - **Policy package 2 w/electric mobility**
Bangalore: Policy packages for mitigation

3 +1 Policy packages:

- **Policy package 1:**
  - Increasing network coverage of Public Transit +
  - Cycling and walking infrastructure +
  - Additional tax on purchasing vehicles

- **Policy package 2:**
  - Additional tax on purchasing vehicles +
  - Strict Vehicles inspection/ Improvement in standards for vehicle emission +
  - Increase in fuel cost

- **Policy package 3:**
  - Increasing network coverage of Public Transit +
  - Defining car restricted zones +
  - Congestion Pricing +
  - Park and Ride +
  - Cycling and Walking infrastructure +
  - Encouraging car-pooling and High Occupancy Lanes +
  - High density mix building use along main transport corridors

- **Policy package 4:**
  - Policy packages 1-3 w/electric vehicles
Focus on CO2 and PM2.5 emissions

In this presentation we focus on:

- CO2 emissions
- Health effects (mainly mortalities due to PM2.5)

PM2.5 is the most important pollutant for health effects
CO2 emissions with BAU and “Best” Policy Bundles

CO2 emissions for BAU and "Best" Policy Packages in 2030 and 2050 for case cities, in million tonnes pr year

Delhi
- BAU 2030: 2.88
- Best PP 2030: 1.71
- BAU 2050: 4.99
- Best PP 2050: 1.27

Mumbai
- BAU 2030: 5.62
- Best PP 2030: 4.08
- BAU 2050: 13.34
- Best PP 2050: 9.64

Bangalore
- BAU 2030: 1.90
- Best PP 2030: 0.30
- BAU 2050: 3.27
- Best PP 2050: 0.33
PM2.5 emissions with BAU and “Best” Policy Bundles

PM2.5 emissions for BAU and "Best" Policy Packages in 2030 and 2050 for case cities, in tonnes pr year

- Delhi: BAU 2030 = 316, Best PP 2030 = 110, BAU 2050 = 259, Best PP 2050 = 33
- Mumbai: BAU 2030 = 341, Best PP 2030 = 147, BAU 2050 = 338, Best PP 2050 = 179
- Bangalore: BAU 2030 = 172, Best PP 2030 = 72, BAU 2050 = 141, Best PP 2050 = 32
Thank you for your attention!