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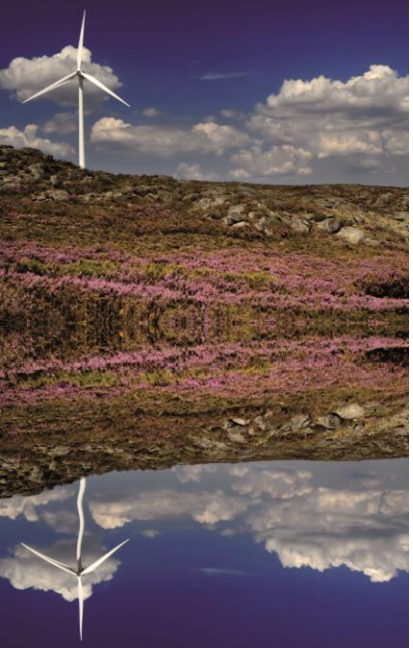

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**Title: Climate Co-benefits in Urban Areas**
**Date and time: 18 November 10:30am-11:30am**
**Venue: Japan Pavillion (Level 1 - D4)**

# Tools for planning urban co-benefits

Christopher Doll, Research Fellow
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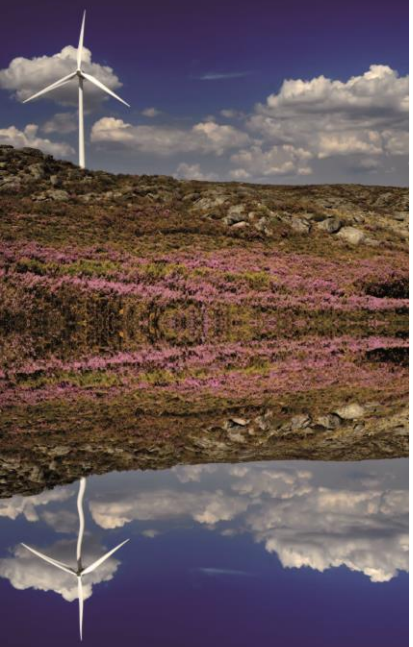

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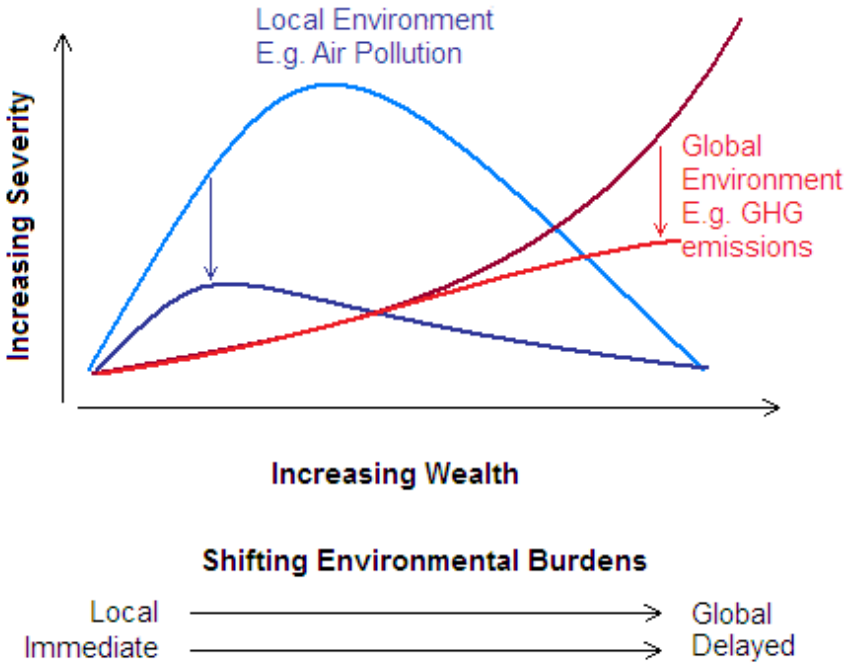
# Urban development with co-benefits

- The Co-benefits approach is a means of achieving multiple outcomes with one policy initiative
- Here, it refers to policies which simultaneously address global and local environmental problems; GHG and air pollution reductions
- Particularly pertinent for developing countries
- The approach offers developing countries a different development path than that of developed countries



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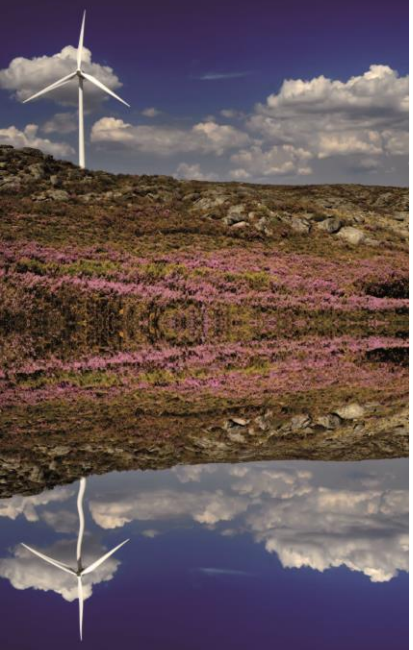

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# The tools

- Excel based: Transport; Energy; Waste, Governance (for transport)
- Designed to evaluate co-benefits of interventions into respective sectors for first order policy screening
- Four basic steps to the tools:
  - Input data
  - Examine initial baseline/results
  - Apply changes to the sector (Avoid, Shift, Improve)
  - Calculate co-benefits
    - GHG emissions
    - Local Air pollution, fuel saving etc

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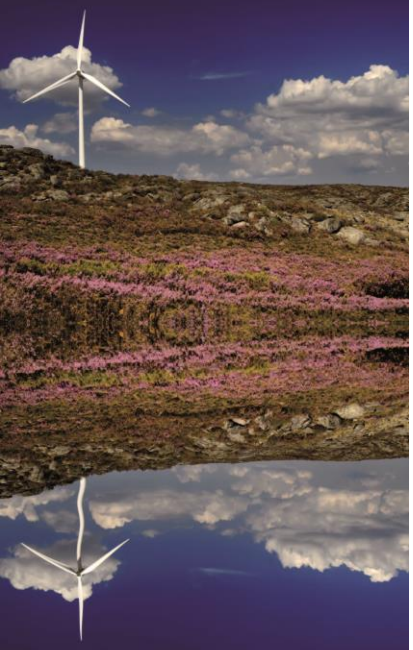

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# Common elements

- Bottom up assessments of GHG emissions and air pollution in each sector based on local information
  - Transport
    - Fleet size, activity (distance), occupancy, fuel efficiencies & fuel
  - Energy
    - Dwelling size distribution, economic sectors, power plant sources
  - Waste
    - Waste generation, technologies waste composition

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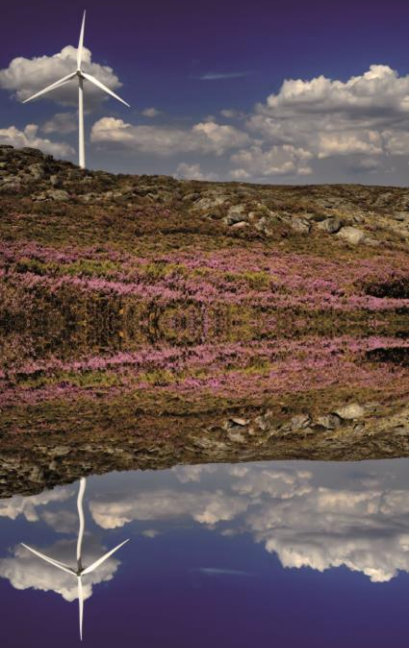

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# Avoid, shift, improve

- ASI framework is applied to the tools in each sector
  - Transport
    - Travel activity (fleet size & distance)
    - Mode share
    - Fuel efficiency
    - Fuel Type
  - Energy
    - Dwelling sizes
    - Building management
    - Energy sources (local generation)
  - Waste
    - Waste generation, waste composition
    - Waste processing method (compost, incineration..)
    - Technology  used within a processing method

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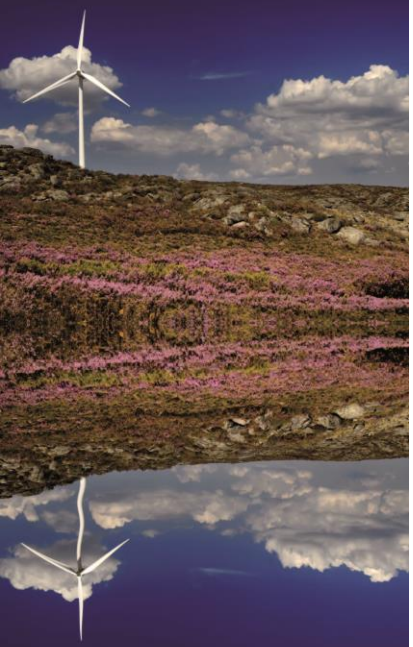

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# Co-benefits

- Transport
  - GHG emissions
  - Air pollution
  - Fuel demand
- Energy
  - GHG emissions
  - Air pollution
  - Energy balance
  - Cost-benefit analysis
- Waste
  - GHG emissions
  - Air pollution
  - Lechate production (landfill)
  - Electricity/heat generation potential

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# Transport tool

- Step 1. Mode selection


About Tool
Data Initialization
Output Panel
Future Projection
Database
Guidebook

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**Model Identification**

| | |
|---|---|
| Region | Delhi-India |
| Scenario Number | 1 |
| Scenario Name | Delhi Transport |
| Project Name | SUF- Co-benefit |
| Purpose | |
| Author | Hooman Farzaneh |
| Date of Origen | |
| Base Year | 2010 |

**Mode Selection**

| | |
|---|---|
| Before/After Analysis | ☐ |
| Future Projection | ☑ |

**Vehicle group and Refuling method**

| | Vehicle group |
|---|---|
| 1 | Bus |
| 2 | Car |
| 3 | Taxi |
| 4 | Motorcycle |
| 5 | 3W |
| 6 | Train |
| 7 | Metro |
| 8 | NMT |
| 9 | Other |
| 10 | |

| Fuel type | Unit |
|---|---|
| Diesel | Liter |
| ULSD | Liter |
| Petrol | Liter |
| CNG | Liter |
| Hybrid | Liter |
| Electric | kWh |
| Other | Liter |

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# Step 2: Data input

- Step 2. Data input by Mode

Home | Data Initialization | Output Panel | Future Projections | Database

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bus | | | | | | | | |
| Total number of vehicles | 61,471 | | | | | | | |
| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | Total |
| Share of vehicles by fuel use | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.914% |
| Utilization rate | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% |
| Annual average distance travelled (km) | 0 | 0 | 0 | 67453 | 0 | 0 | 0 | 67453 |
| Occupancy rate | 1.00 | 1.00 | 1.00 | 41.34 | 1.00 | 1.00 | 1.00 | 41.34 |
| Fuel Efficiency (km/Unit) Speed Dependency | 3.550 | 3.900 | 2.420 | 2.420 | 1.000 | 1.000 | 1.000 | 2.420 |
| Car | | | | | | | | |
| Total number of vehicles | 2,173,323 | | | | | | | |
| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | Total |
| Share of vehicles by fuel use | 10.5% | 0.0% | 82.0% | 7.5% | 0.0% | 0.0% | 0.0% | 32.3% |
| Utilization rate | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% |
| Annual average distance travelled (km) | 10950 | 0 | 10950 | 10950 | 0 | 0 | 0 | 10950 |
| Occupancy rate | 2.38 | 1.00 | 2.38 | 2.38 | 1.00 | 1.00 | 1.00 | 2.38 |
| Fuel Efficiency (km/Unit) Speed Dependency | 11.250 | 16.000 | 14.000 | 15.120 | 1.000 | 1.000 | 1.000 | 13.795 |
| Taxi | | | | | | | | |
| Total number of vehicles | 57,958 | | | | | | | |
| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | Total |
| Share of vehicles by fuel use | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| Utilization rate | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% |
| Annual average distance travelled (km) | 0 | 0 | 0 | 29200 | 0 | 0 | 0 | 29200 |
| Occupancy rate | 1.00 | 1.00 | 1.00 | 1.92 | 1.00 | 1.00 | 1.00 | 1.92 |
| Fuel Efficiency (km/Unit) Speed Dependency | 11.250 | 16.003 | 14.000 | 15.840 | 1.000 | 1.000 | 1.000 | 15.840 |
| Motorcycle | | | | | | | | |
| Total number of vehicles | 4,342,403 | | | | | | | |
| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | Total |
| Share of vehicles by fuel use | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 64.6% |
| Utilization rate | 0.0% | 0.0% | 60.0% | 0.0% | 0.0% | 0.0% | 0.0% | 60.0% |
| Annual average distance travelled (km) | 0 | 0 | 9125 | 0 | 0 | 0 | 0 | 9125 |
| Occupancy rate | 1.00 | 1.00 | 1.26 | 1.00 | 1.00 | 1.00 | 1.00 | 1.26 |
| Fuel Efficiency (km/Unit) Speed Dependency | 1.000 | 1.000 | 57.200 | 1.000 | 1.000 | 1.000 | 1.000 | 57.200 |
| 3W | | | | | | | | |
| Total number of vehicles | 88,181 | | | | | | | |
| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | Total |
| Share of vehicles by fuel use | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 1.3% |
| Utilization rate | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% |
| Annual average distance travelled (km) | 0 | 0 | 0 | 36500 | 0 | 0 | 0 | 36500 |
| Occupancy rate | 1.00 | 1.00 | 1.00 | 1.92 | 1.00 | 1.00 | 1.00 | 1.92 |
| Fuel Efficiency (km/Unit) Speed Dependency | 1.000 | 1.000 | 1.000 | 32.333 | 1.000 | 1.000 | 1.000 | 32.333 |
| Train | | | | | | | | |

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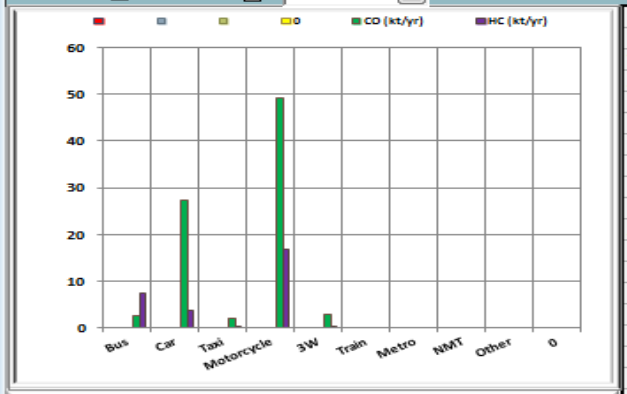
# Policy scenario sheet

Home | Data Initialization | Output Panel | Future Projections | Database

Before ☑ After ☐ Train




☐ CO2 ☐ SO2 ☐ NOx ☐ PM10 ☑ CO ☑ HC

Baseline | Reset

Train

| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other |
|---|---|---|---|---|---|---|---|
| Number of vehicles by fuel use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vehicle kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual Passenger kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mode share | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Intensity (Unit/passengers.km) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Greenhouse gas emissions | | | | | | | |
| CO2 (tCO2/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CH4 (tCO2eq/yr) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 |
| N2O (tCO2eq/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| Air pollutants | | | | | | | |
| SO2 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| NOx (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| PM10 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CO (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| HC (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |

## Activity change

1. Percent change method
Vehicle group: Taxi
Change in fleet size
Change in V-km

Fleet | V-km

2. Direct input method

| | Fleet (%) | V-km (%) |
|---|---|---|
| Bus | 0.00% | 0.00% |
| Car | 0.00% | 0.00% |
| Taxi | 0.00% | 0.00% |
| Motorcyc | | |
| 3W | | |
| Train | | |
| Metro | 0.00% | 0.00% |
| NMT | 0.00% | 0.00% |
| Other | 0.00% | 0.00% |
| 0 | 0.00% | 0.00% |

Reset

**Transport Activity (A)**

## Mode Shift

| Select the vehicle group | | Change (%) | Base (%) | New (%) | Occupancy rate |
|---|---|---|---|---|---|
| ☑ | Bus | 9.55 | 59.635 | 69.18 | 48.0 |
| ☐ | Car | -4.66 | 19.705 | 15.04 | 1.8 |
| ☐ | Taxi | -0.27 | 1.130 | 0.86 | 1.5 |
| ☐ | Motorcycle | -4.11 | 17.370 | 13.26 | 1.0 |
| ☐ | 3W | -0.51 | 2.150 | 1.64 | 1.5 |
| ☐ | Train | 0.00 | 0.000 | 0.00 | NA |
| ☐ | Metro | | .010 | 0.01 | 0.8 |
| ☐ | NMT | | .000 | 0.00 | NA |
| ☐ | Other | | .000 | 0.00 | NA |
| ☐ | 0 | | .000 | 0.00 | NA |

Reset

**Mode Share (S)**

## Efficiency Improvement

Insert new fuel efficiency (km/Unit)

| | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other |
|---|---|---|---|---|---|---|---|
| Bus | 3.550 | 3.900 | 2.420 | 2.420 | 1.000 | 1.000 | 1.000 |
| Car | 11.250 | 16.000 | 14.000 | 15.120 | 1.000 | 1.000 | |
| Taxi | 11.250 | 16.003 | 14.000 | 15.840 | 1.000 | 1.000 | |
| Motorcycle | 1.000 | 1.000 | 57.200 | 1.000 | 1.000 | 1.000 | |
| 3W | 1.000 | 1.000 | 1.000 | 32.333 | 1.000 | 1.000 | |
| Train | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | |
| Metro | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.014 | |
| NMT | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | |
| Other | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | |
| 0 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | |

Reset

**Fuel Efficiency (I)**

**Fuel share (F) below**

## Fuel Switch

Insert new shift in fuel share (%)

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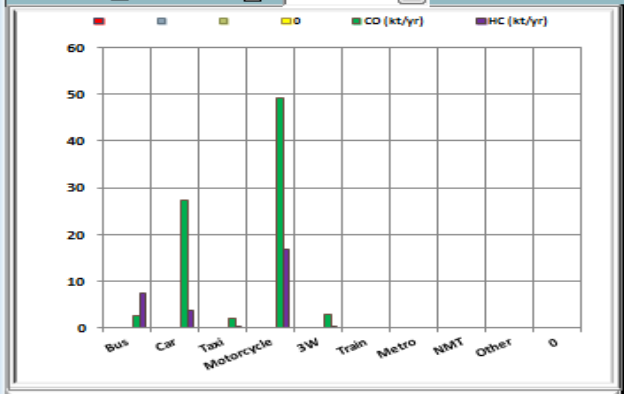
# Policy scenario sheet

Home | Data Initialization | Output Panel | Future Projections | Database

Before ☑ After ☐ Train




☐ CO2 ☐ SO2 ☐ NOx ☐ PM10 ☑ CO ☑ HC

Baseline | Reset

Train

| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other |
|---|---|---|---|---|---|---|---|
| Number of vehicles by fuel use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vehicle kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual Passenger kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mode share | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Intensity (Unit/passengers.km) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Greenhouse gas emissions | | | | | | | |
| CO2 (tCO2/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CH4 (tCO2eq/yr) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 |
| N2O (tCO2eq/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| Air pollutants | | | | | | | |
| SO2 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| NOx (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| PM10 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CO (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| HC (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |

**Results**

## Activity Change

1. Percent change method
Vehicle group: Taxi
Change in fleet size
Change in V-km

Fleet | V-km

2. Direct input method

| | Fleet (%) | V-km (%) |
|---|---|---|
| Bus | 0.00% | 0.00% |
| Car | 0.00% | 0.00% |
| Taxi | 0.00% | 0.00% |
| Motorcycle | 0.00% | 0.00% |
| 3W | 0.00% | 0.00% |
| Train | 0.00% | 0.00% |
| Metro | 0.00% | 0.00% |
| NMT | 0.00% | 0.00% |
| Other | 0.00% | 0.00% |
| 0 | 0.00% | 0.00% |

Reset

## Mode Shift

| Select the vehicle group | | Change (%) | Base (%) | New (%) | Occupancy rate |
|---|---|---|---|---|---|
| ☑ | Bus | 9.55 | 59.635 | 69.18 | 48.0 |
| ☐ | Car | -4.66 | 19.705 | 15.04 | 1.8 |
| ☐ | Taxi | -0.27 | 1.130 | 0.86 | 1.5 |
| ☐ | Motorcycle | -4.11 | 17.370 | 13.26 | 1.0 |
| ☐ | 3W | -0.51 | 2.150 | 1.64 | 1.5 |
| ☐ | Train | 0.00 | 0.000 | 0.00 | NA |
| ☐ | Metro | 0.00 | 0.010 | 0.01 | 0.8 |
| ☐ | NMT | 0.00 | 0.000 | 0.00 | NA |
| ☐ | Other | 0.00 | 0.000 | 0.00 | NA |
| ☐ | 0 | 0.00 | 0.000 | 0.00 | NA |

Reset

## Efficiency Improvement

Insert new fuel efficiency (km/Unit)

| | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | | |
|---|---|---|---|---|---|---|---|---|---|
| Bus | 3.550 | 3.900 | 2.420 | 2.420 | 1.000 | 1.000 | 1.000 | | |
| Car | 11.250 | 16.000 | 14.000 | 15.120 | 1.000 | 1.000 | 1.000 | | |
| Taxi | 11.250 | 16.003 | 14.000 | 15.840 | 1.000 | 1.000 | 1.000 | | |
| Motorcycle | 1.000 | 1.000 | 57.200 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| 3W | 1.000 | 1.000 | 1.000 | 32.333 | 1.000 | 1.000 | 1.000 | | |
| Train | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| Metro | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.014 | 1.000 | | |
| NMT | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| Other | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| 0 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |

Reset

## Fuel Switch

Insert new shift in fuel share (%)

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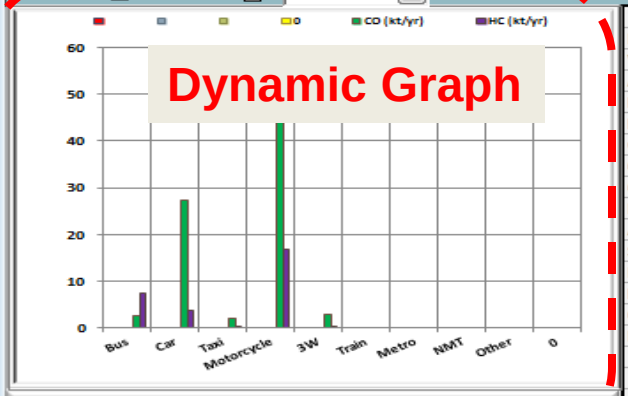
Before ☑ After ☐ Train




☐ CO2 ☐ SO2 ☐ NOx ☐ PM10 ☑ CO ☑ HC

Baseline | Reset

**Train**

| Fuel type | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other |
|---|---|---|---|---|---|---|---|
| Number of vehicles by fuel use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vehicle kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual Passenger kilometers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mode share | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Intensity (Unit/passengers.km) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Greenhouse gas emissions | | | | | | | |
| CO2 (tCO2/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CH4 (tCO2eq/yr) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 |
| N2O (tCO2eq/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| Air pollutants | | | | | | | |
| SO2 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| NOx (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| PM10 (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| CO (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| HC (t/yr) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |

## Activity Change

1. Percent change method
Vehicle group: Taxi
Change in fleet size
Change in V-km

Fleet | V-km

2. Direct input method

| | Fleet (%) | V-km (%) |
|---|---|---|
| Bus | 0.00% | 0.00% |
| Car | 0.00% | 0.00% |
| Taxi | 0.00% | 0.00% |
| Motorcycle | 0.00% | 0.00% |
| 3W | 0.00% | 0.00% |
| Train | 0.00% | 0.00% |
| Metro | 0.00% | 0.00% |
| NMT | 0.00% | 0.00% |
| Other | 0.00% | 0.00% |
| 0 | 0.00% | 0.00% |

Reset

## Mode Shift

| Select the vehicle group | | Change (%) | Base (%) | New (%) | Occupancy rate |
|---|---|---|---|---|---|
| ☑ | Bus | 9.55 | 59.635 | 69.18 | 48.0 |
| ☐ | Car | -4.66 | 19.705 | 15.04 | 1.8 |
| ☐ | Taxi | -0.27 | 1.130 | 0.86 | 1.5 |
| ☐ | Motorcycle | -4.11 | 17.370 | 13.26 | 1.0 |
| ☐ | 3W | -0.51 | 2.150 | 1.64 | 1.5 |
| ☐ | Train | 0.00 | 0.000 | 0.00 | NA |
| ☐ | Metro | 0.00 | 0.010 | 0.01 | 0.8 |
| ☐ | NMT | 0.00 | 0.000 | 0.00 | NA |
| ☐ | Other | 0.00 | 0.000 | 0.00 | NA |
| ☐ | 0 | 0.00 | 0.000 | 0.00 | NA |

Reset

## Efficiency Improvement

Insert new fuel efficiency (km/Unit)

| | Diesel | ULSD | Petrol | CNG | Hybrid | Electric | Other | | |
|---|---|---|---|---|---|---|---|---|---|
| Bus | 3.550 | 3.900 | 2.420 | 2.420 | 1.000 | 1.000 | 1.000 | | |
| Car | 11.250 | 16.000 | 14.000 | 15.120 | 1.000 | 1.000 | 1.000 | | |
| Taxi | 11.250 | 16.003 | 14.000 | 15.840 | 1.000 | 1.000 | 1.000 | | |
| Motorcycle | 1.000 | 1.000 | 57.200 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| 3W | 1.000 | 1.000 | 1.000 | 32.333 | 1.000 | 1.000 | 1.000 | | |
| Train | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| Metro | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.014 | 1.000 | | |
| NMT | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| Other | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |
| 0 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | | |

Reset

## Fuel Switch

Insert new shift in fuel share (%)

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# Co-benefits over time

Home | Data Initialization | Output Panel | Future Projections | Emission Factors | Help

Use of UNU-IAS Database ☑ Delhi

BAU Scenario ☐

New Scenario ☐

PKM | Energy Consumption

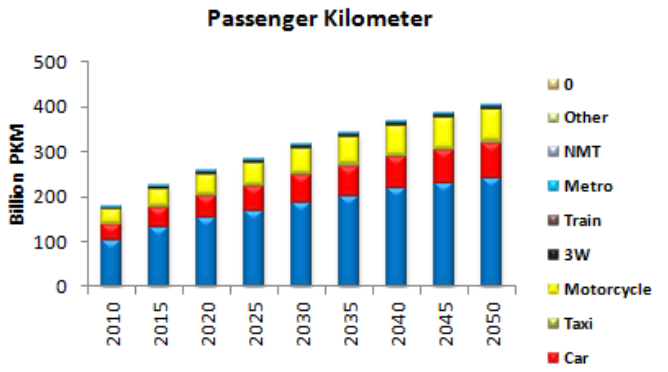
Vehicle Population | Emissions

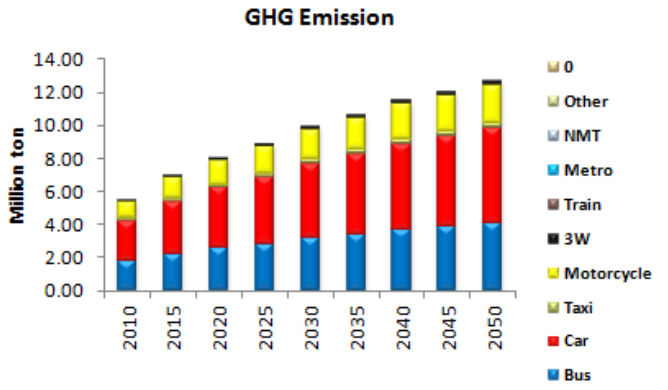
*Estimation of BPKM (Billion Passenger Kilometer)*

| Time | Bus | Car | Taxi | Motorcycle | 3W | Train | Metro | NMT | Other | 0 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | 103 | 34 | 2 | 30 | 4 | 0 | 2 | 0 | 0 | 0 | 175 |
| 2015 | 132 | 44 | 2 | 38 | 5 | 0 | 2 | 0 | 0 | 0 | 223 |
| 2020 | 152 | 50 | 3 | 44 | 5 | 0 | 3 | 0 | 0 | 0 | 257 |
| 2025 | 167 | 55 | 3 | 49 | 6 | 0 | 3 | 0 | 0 | 0 | 284 |
| 2030 | 187 | 62 | 4 | 55 | 7 | 0 | 3 | 0 | 0 | 0 | 317 |
| 2035 | 201 | 66 | 4 | 59 | 7 | 0 | 3 | 0 | 0 | 0 | 341 |
| 2040 | 217 | 72 | 4 | 63 | 8 | 0 | 4 | 0 | 0 | 0 | 367 |
| 2045 | 228 | 75 | 4 | 66 | 8 | 0 | 4 | 0 | 0 | 0 | 386 |
| 2050 | 239 | 79 | 5 | 70 | 9 | 0 | 4 | 0 | 0 | 0 | 405 |

*GHG Emission (Million ton)* PM10

| Time | Bus | Car | Taxi | Motorcycle | 3W | Train | Metro | NMT | Other | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | 1.75 | 2.48 | 0.13 | 1.01 | 0.10 | 0 | 0.00 | 0 | 0 | 0 | 5.47 |
| 2015 | 2.23 | 3.16 | 0.17 | 1.29 | 0.12 | 0 | 0.00 | 0 | 0 | 0 | 6.97 |
| 2020 | 2.57 | 3.64 | 0.19 | 1.48 | 0.14 | 0 | 0.00 | 0 | 0 | 0 | 8.03 |
| 2025 | 2.84 | 4.02 | 0.21 | 1.63 | 0.16 | 0 | 0.00 | 0 | 0 | 0 | 8.86 |
| 2030 | 3.17 | 4.49 | 0.24 | 1.83 | 0.18 | 0 | 0.00 | 0 | 0 | 0 | 9.90 |
| 2035 | 3.41 | 4.82 | 0.26 | 1.96 | 0.19 | 0 | 0.00 | 0 | 0 | 0 | 10.65 |
| 2040 | 3.68 | 5.20 | 0.28 | 2.12 | 0.20 | 0 | 0.00 | 0 | 0 | 0 | 11.48 |
| 2045 | 3.86 | 5.46 | 0.29 | 2.22 | 0.21 | 0 | 0.00 | 0 | 0 | 0 | 12.05 |
| 2050 | 4.05 | 5.74 | 0.31 | 2.34 | 0.23 | 0 | 0.00 | 0 | 0 | 0 | 12.66 |



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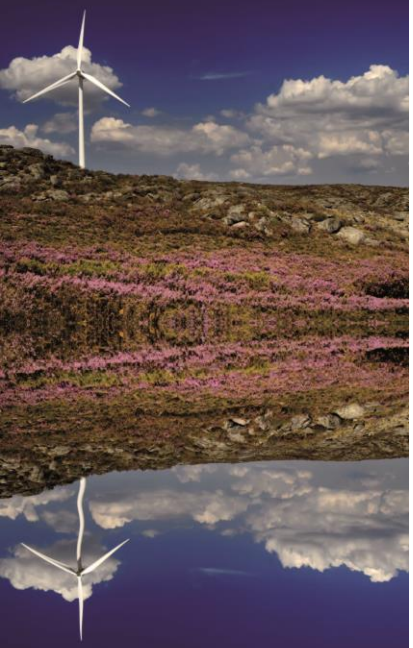

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# Governance indicators

- Developed currently for the transport sector to aid decision making about what changes to make in the tool
- Self assessment of context indicators to determine capacities and most implementable projects
  - Cultural/Lifestyle
  - Legal
  - Orgainisational
  - Coordination
  - Political

- The key question is **what is your ability to change one variable *relative* to another?**

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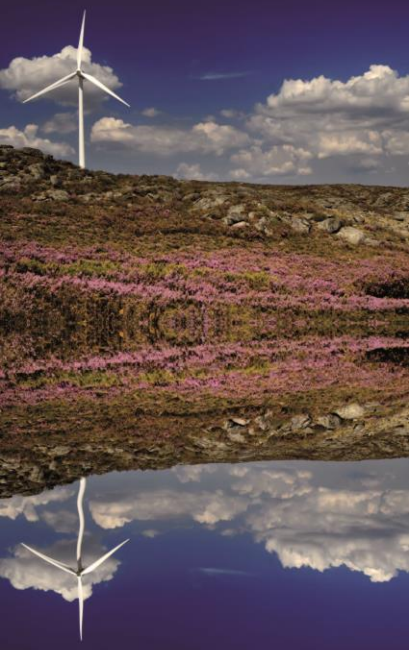

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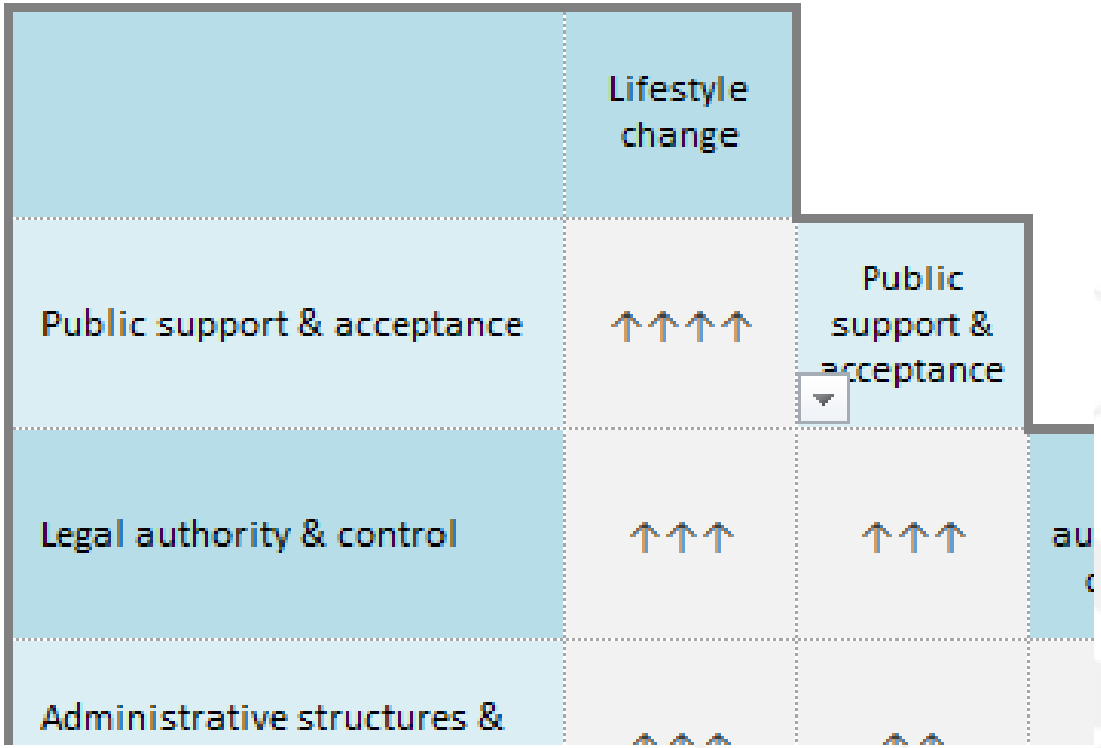
# Prioritizing conditions




*(partial screenshot)*

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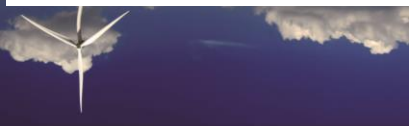
# Ranked policy measures

| Example measures | CONTEXT CRITERIA FOR IMPLEMENTATION (SENSITIVITY TO CONTEXT) | | | | | | | | | | | | Weighted score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Culture & community | | Legal and institutions | | Organization & resources | | | | | Coordination | | Political | |
| | Lifestyle change | Public support & acceptance | Legal authority & control | Administrative structures & enforcement | Openness & learning | Expertise (planning, technical) | Human resources | Financial resources | Technology & infrastructure | Horizontal coordination | Vertical coordination (across tiers) | Consensus & commitment | |
| Public awareness raising programs of vehicle technologies and alternative fuels | | | | | | | | | | | | | 0,395 |
| Improving personal security for walking and cycling | | | | | | | | | | * | | | 0,460 |
| Revision of public transport service connections | | | | | | | | | | | | | 0,494 |
| Awareness-raising campaigns for non-motorized travel | | | | | | | | | | | | | 0,494 |
| Trip planning systems<br>Ride sharing programs | | | | | | | | | * | | | | 0,616 |
| Bicycle sharing | ** | | | | * | | | | | | | | 0,864 |
| Improve access to public transport (e.g., footpath maintenance) | | | | | | | | * | * | * | | | 0,885 |
| Increase density through planning | * | | ** | | * | | | | * | ** | | *** | 1,863 |
| Fare levels and structure | | *** | | | ** | | | * | | ** | | *** | 2,314 |
| Bicycle lanes and routes | *** | * | | * | ** | | | * | | ** | | * | 2,477 |
| Procurement of low-carbon tech. vehicles<br>Vehicle efficiency standards for PT vehicles | | * | | | ** | | | *** | *** | * | | *** | 2,495 |
| Parking charges<br>Congestion charges | | *** | ** | * | ** | | | | * | * | * | *** | 2,556 |
| BRT, LRT | * | *** | ** | | * | * | | *** | *** | ** | * | *** | 3,369 |

Easiest

Most im



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# Link to Transport Tool

| Example measures | POTENTIAL IMPACT ON TRANSPORT TOOL VARIABLES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Private Motorized Transport | | | | | Public Transport | | | | |
| | Fleet size | Fuel used (share) | Distance traveled | Occu-pancy | Fuel efficiency | Fleet size | Fuel used (share) | Distance traveled | Occu-pancy | Fuel efficiency |
| Public awareness raising programs of vehicle technologies and alternative fuels | x | + | x | x | x | x | x | x | x | x |
| Improving personal security for walking and cycling | x | x | - | x | x | x | x | x | x | x |
| Revision of public transport service connections | x | x | - | x | x | x | x | x | + | + |
| Awareness-raising campaigns for non-motorized trav | x | x | - | x | x | x | x | x | - | x |
| Trip planning systems<br>Ride sharing programs | x | x | x | +++ | + | x | x | x | x | x |
| Bicycle sharing | x | x | - | x | x | x | x | x | - | x |
| Improve access to public transport (e.g., footpath maintenance) | x | x | - | x | x | x | x | x | ++ | x |
| Bicycle parking facilities | x | x | - | x | x | x | x | x | - | x |

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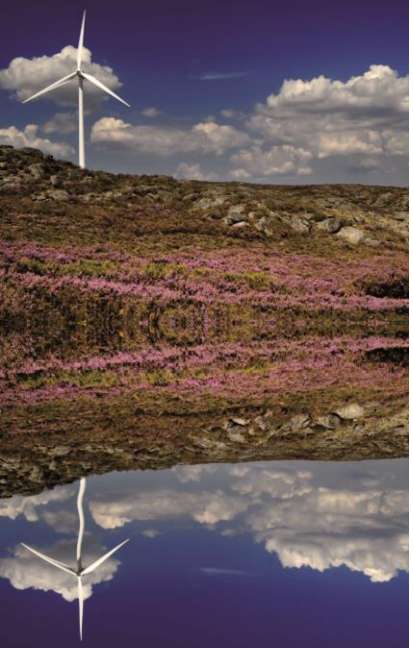

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# Two modes of usage

If no policies under consideration:

- Assess context
  - Determine governance abilities (AHP)
- Determine most implementable options
- Determine coherent policy package
- Set parameter sensitivity of change for transport tool

If policies are in mind:

- Determine policy coherence
- Identify key governance areas of high risk
- Assess context (AHP)
- Compare results to work out which areas of governance need strengthening

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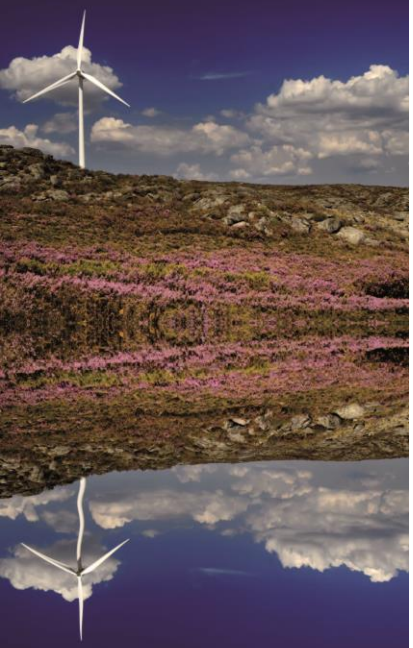

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# Next steps

- Testing with UNCRD/JICA and workshops in Asia to identify user issues and finalise documentation
- To use the tools, a website is being set up where tools can be downloaded after completing a registration process

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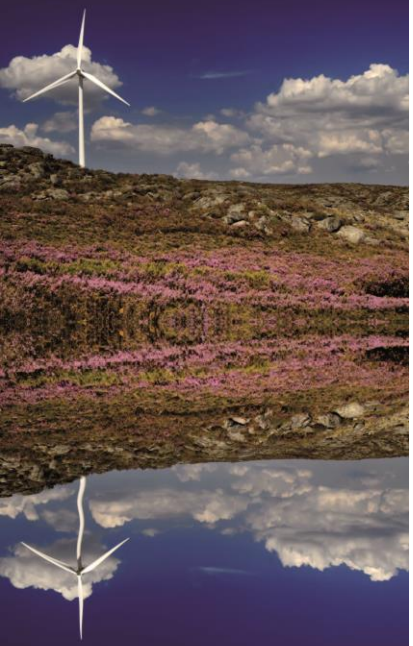

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# Next steps

- Testing with UNCRD/JICA and workshops in Asia to identify user issues and finalise documentation
- To use the tools, a website is being set up where tools can be downloaded after completing a registration process
- Develop the links with urban health