



Assessing Investment & Financial flows for Mitigation in the **TRANSPORT** Sector

UNDP I&FF Methodology Guidebook: Mitigation

Relevance of transport sector

- Greenhouse Gas (GHG) emissions of transport sector are one of the major contributors to global warming
- Account for $\sim 1/4$ of total global GHG emissions & currently experience rapid growth
- Developing world will account for the largest share of this growth, with forecasted growth rates (2000-2030) between 3.5% & 5.3% per year

1. Establish key parameters of the assessment

- Define scope & boundaries for the assessment
 - ▣ What are the key subsectors to be included?
- Define the institutional framework
- Specify the time horizon for the analysis: 2015-2030 recommended, base year 2015 recommended
- Build on existing model for the sector where possible

1. Establish key parameters of assessment

Define boundaries for the assessment

Possible subsectors for screening & prioritization

Sub-sectors	Passenger Transport Urban/interurban/domestic/international	Freight Transport
Road transportation	Passenger cars	Trucks
	Motorcycles	
	Buses	
	Motorized tri-cycles	
	Taxis	
	Non-Motorized Transit	
Railways	Interurban Rail/Metro/Light Transit Rails/Tram	Inter-urban rail
Civil Aviation	Domestic Aviation /International Aviation	Domestic Aviation / International Aviation
Water –borne navigation	Domestic water-borne navigation / International water-borne navigation	Domestic water-borne navigation / International water-borne navigation
Pipeline Transport		Oil, gas, chemicals, others
Off Road	Vehicles & mobile machinery used within the agriculture, forestry, industry, residential, & sectors, such as airport ground support equipment, agricultural tractors, chain saws, forklifts, & snowmobiles	

2. Compile historical I&FF data and other input data for scenarios

- Focus: Local data at adequate aggregation level to identify investment types (e.g. public sector, private sector etc.), public programmes, their costs & financing sources
- Recommended options: Sector investment & public programmes data, projections & development plans
GHG Inventories, National Communications to UNFCCC

2. Compile historical I&FF data and other input data for scenarios

Helpful information to build the baseline and mitigation scenarios:

- Characterization of passenger & freight demand, by transport modes
- Characterization of modal split by transport modes
- Characterization of automotive fleet by category & fuel type
- Travelled kilometre by category & transport mode
- Occupation rate per vehicle mode
- Characterization of available technologies within the market for the transport sector

2. Compile historical I&FF data and other input data for scenarios

- Planning studies of transport & mobility
- Economic growth data, population growth
- Sales by fuel type & sub-sector
- The **System of National Accounts** (SNA) constitutes the primary source of information about the economy
- **Systems of integrated environmental & economic accounts** (SEEA) were developed to address statistical gaps
- Environmental & social impact studies, economic valuation studies

2. Compile historical I&FF data and other input data for scenarios

Data collection, rely on national accounts data

Examples of I&FF data disaggregation in each sub-sector

Category of Investment Entity	Source of I&FF Funds	Investment Flows (2005 \$)		Financial Flows (2005 \$)	
		Facility / Technology Type 1	Facility / Technology Type 2	Practice / Measure Type 1	Practice / Measure Type 2
Households	Domestic				
	Total Household Funds (all domestic)				
Corporations	Domestic (e.g. Business investments in hotels, restaurants)				
	Foreign (e.g. Int'l service industry- travel agencies, tourism info centers)				
	Total Corporation Funds				
Government	Domestic (e.g. Physical infrastructure- roads, communication)				
	Foreign				
	Total Government Funds				

3. Define Baseline Scenario

- Define the physical basis for the Baseline Scenario
- **A baseline scenario:** description of what is likely to occur in the absence of ADDITIONAL policies to address climate change; expected socioeconomic trends (e.g., population growth & migration, economic growth), technological change (if relevant), & expected business-as-usual investments in the sector.

3. Define baseline scenario

Define baseline scenario

- Characterizing baseline for each relevant transport subsector over the assessment period
 - ▣ Assuming no new climate change policies are implemented
- Baseline scenario reflects
 - ▣ Current sectoral & national plans
 - ▣ Expected socioeconomic trends
 - ▣ Expected investments in the subsectors
- Use of available model/s (e.g. used for National Communication) may facilitate scenario definition

3. Define baseline scenario

Define physical basis for the Baseline Scenario

- Information should be disaggregated by:
 - ▣ Year (starting 10 years before the Base Year)
 - ▣ Source (by corporations & government)
 - ▣ Type (national funds, foreign direct investment, official development assistance)

4. Derive I&FF for baseline scenario

- Compile annual estimates, disaggregated by investment entity, source, investment flow type, & financial flow type & disaggregated costs of transport options
- Calculate the **total investment cost** in real, unannualized terms over the planning period
- Estimate **annual investment costs** associated with the new plan
- Develop a **breakdown of total investments** into major categories (e.g., ODA, FDI, domestic funds)

4. Derive I&FF for baseline scenario

Estimate annual I&FF

Adding costs to baseline scenario

Funding entity category	Source of funds	Cumulative investment (2015-2030)	
		(billion 2015 \$)	(%)
Governments	Domestic funds (budgetary)		
	Foreign borrowing (loans)		
	Foreign aid (ODA)		
Corporations	Domestic equity		
	Foreign investment		
	Domestic debt		
	Foreign borrowing		
	Government support		
	Foreign aid (ODA)		
Total			

5. Define Mitigation scenario

- **Mitigation scenario:** incorporates measures to reduce GHG emissions
- The mitigation scenario should describe expected socioeconomic trends, technological change (if relevant), relevant measures to mitigate GHG emissions, & the expected investments in key areas of the transport sector (different subsectors) to implement those mitigation measures.
- Costing tools & international information sources may help to identify I&FF needs for different mitigation options

5. Define mitigation scenario

Transport Sector Mitigation Measures

Emission reduction per kilometer driven	Emission reduction per unit transported (passenger per km or ton per km)	Emission reduction through reducing distance driven or the number of trips
<ul style="list-style-type: none"> - Fuel switch from high to low carbon fuels (bio-fuels, natural gas, electricity) - New vehicle technologies as hybrids, hydrogen in fuel cell vehicles, electric vehicles - Introducing best practices (improved maintenance, ecological driving) - Changing behavior: buying energy efficient vehicles etc - Infrastructure improvements to reduce congestion: fly-over, intelligent traffic signals etc - Better vehicle dispatch 	<ul style="list-style-type: none"> - Modal switch from high to low emission vehicle; for passengers: from car to public transit or motorized vehicle to NMT; for freight: road to rail or road to ship etc. - Usage of large(r) units with comparable occupation rates - Improvement of occupation rates: improved vehicle dispatch or increased attractiveness of transport mean etc - Increase public transport ridership 	<ul style="list-style-type: none"> - Behavioral change of people - Better traffic management: information on congestion, free parking lots etc. - Integrating urban land development with public transport development by building dense, mixed-use, & pedestrian-friendly urban “nodes” concentrated around public transportation stations - Road pricing (toll roads) - Restriction on car use - Infrastructure measures to reduce trip distances: shorter road connections, tunnels, bridges, etc

6. Derive I&FF for Mitigation Scenario

- Compile annual estimates, disaggregated by investment entity, source, investment flow type, & financial flow type
- Estimate annual investment costs associated with the alternative management plan
- Calculate the total investment cost in real, unannualized terms over the planning period.
- Develop a breakdown of total investments into major categories (e.g., ODA, FDI, domestic funds)

Adding costs to mitigation scenario

Funding entity category	Source of funds	Cumulative investment (2015-2030)	
		(billion 2015 \$)	(%)
Households	Equity & debt		
Governments	Domestic funds (budgetary)		
	Foreign borrowing (loans)		
	Foreign aid (ODA)		
Corporations	Domestic equity		
	Foreign investment		
	Domestic debt		
	Foreign borrowing		
	Government support		
	Foreign aid (ODA)		
	Total		

7. Estimate changes in annual I&FF needed to implement mitigation

- Subtract the baseline annual I&FF, by entity & source, from the mitigation annual I&FF, by entity & source
- Subtraction of the Baseline Scenario from the Mitigation Scenario
- Sum incremental amounts over all years, by entity & source

7. Estimate changes in annual I&FF needed to implement mitigation

Subtract the baseline annual I&FF from the mitigation annual I&FF

- For each chosen transport mitigation option, the analysis should identify the incremental investment (total dollars) by source (domestic funds, ODA, FDI etc.) up through 2030 necessary for its implementation

7. Estimate changes in annual I&FF needed to implement mitigation

Summarizing incremental investments

		Investment (billion 2015 \$)		
		Cumulative (2015-2030)		Incremental
Funding entity category	Source of funds	Baseline scenario	Mitigation Scenario	
Households	Equity & debt	Baseline value	Mitigation value	Mitigation minus Baseline value
Governments	Domestic funds (budgetary)			
	Foreign borrowing (loans)	...	...	...
	Foreign aid (ODA)	...	...	...
Corporations	Domestic equity	...	..	...
	Foreign investment	...	...	...
	Domestic debt	...	...	...
	Foreign borrowing	...	...	...
	Government support	...	...	...
	Foreign aid (ODA)	...	...	...
	<i>Total</i>	Sum (Baseline)	Sum (Mitigation)	Sum (Baseline minus Mitigation)

8. Evaluate policy implications

- Analyze additional efforts, funding & policy needs to implement measures identified in the mitigation scenario
- Determine policy instruments & measures to encourage changes in I&FF
- Identify the entities that are responsible for the significant incremental changes in I&FF
- Determine the predominant sources of their funds, particularly important to distinguish between public & private sources of finance

8. Evaluate policy implications

Possible measures, instruments, institutions and barriers

MEASURE / TECHNOLOGY	INSTRUMENT	INSTITUTIONS	BARRIERS
Fuel switch from high to low carbon fuels: bio-fuels, natural gas, electricity	Bio-fuel blending mandates. Incentives on fuel prices	National Government, fuel distributing companies	<ul style="list-style-type: none"> - Fuel availability - Infrastructure adaptations - Technological adjustments
Introducing best practices: improved maintenance, ecological driving	Voluntary Agreements: between governments & private fleets companies Driver education & awareness	Government transport companies private driver	<ul style="list-style-type: none"> - Resistance to change
New vehicle technologies: hybrids, hydrogen in fuel cell vehicles, electric vehicles	Tax policies & incentives	National Government, Fuel distributing companies, technology suppliers	<ul style="list-style-type: none"> - Technological development - Implementation costs - Relative fuel prices
Improving urban public transit	Implementation of Mass Transport Systems: Bus Rapid Transit, Light Transit Rails, Metros, Tram Reorganization of public transportation	National / local government, transport companies	<ul style="list-style-type: none"> - Investment costs for construction of infrastructure - Resistance of existing transport sector - Technological implementation - Political resistance - Risk of Incomplete implementation
Improved urban planning	Implementation of Transit Oriented Development	National / local government	<ul style="list-style-type: none"> - Resistance to implementation by public & community institutions - Lack of know-how & experience - Political resistance - Risk of Incomplete implementation

8. Evaluate policy implications

Instruments for implementation and evaluation criteria

INSTRUMENT	ENVIRONMENTAL EFFECTIVENESS	COST-EFFECTIVENESS	EQUITY	INSTITUTIONAL FEASIBILITY
Bio-fuel blending mandates	Emissions level set directly, though subject to exceptions, depends on deferrals & compliance	Depends on design; uniform application often leads to higher overall compliance costs	Depends on level playing field. Small/new actors may be disadvantaged	Depends on technical capacity; popular with regulators in countries with weakly functioning markets
Incentives on fuel prices	Depends on program design; less certain than regulations/standards	Depends on level & program design; can be market distorting	Benefits selected participants, possibly some that do not need it	Popular with recipients; potential resistance from vested interests, can be difficult to phase out
Voluntary Agreements: between governments & private fleets companies	Depends on program design, including clear targets, a baseline scenario, third party involvement in design & review	Depends on flexibility & extent of government incentives, rewards & Penalties	Benefits accrue only to participants	Often politically popular; raise awareness among stakeholders, requires significant number of administrative staff.
Driver education & awareness	Depends on how consumers use the information; most effective in combination with other policies	Potentially low cost, but depends on program design	May be less effective for groups that lack access to information.	Depends on cooperation from special interest groups
Tax policies & incentives	Depends on ability to set tax at a level that induces behavioral change	Better with broad application; higher administrative costs where institutions are weak	Regressive; can be improved with revenue recycling	Politically difficult to implement, difficult to enforce with underdeveloped institutions.
Implementation of Mass Transport Systems	Large benefits in the short, medium & long term	High implementation costs	Larger benefit coverage among user groups	Difficult to implement under certain bureaucratic structures, face strong political opposition
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9. Synthesize results and complete report

- For more information on synthesizing results, documentation & the completion of the report, please refer to the Reporting Guidelines

Q&A CLARIFICATIONS

