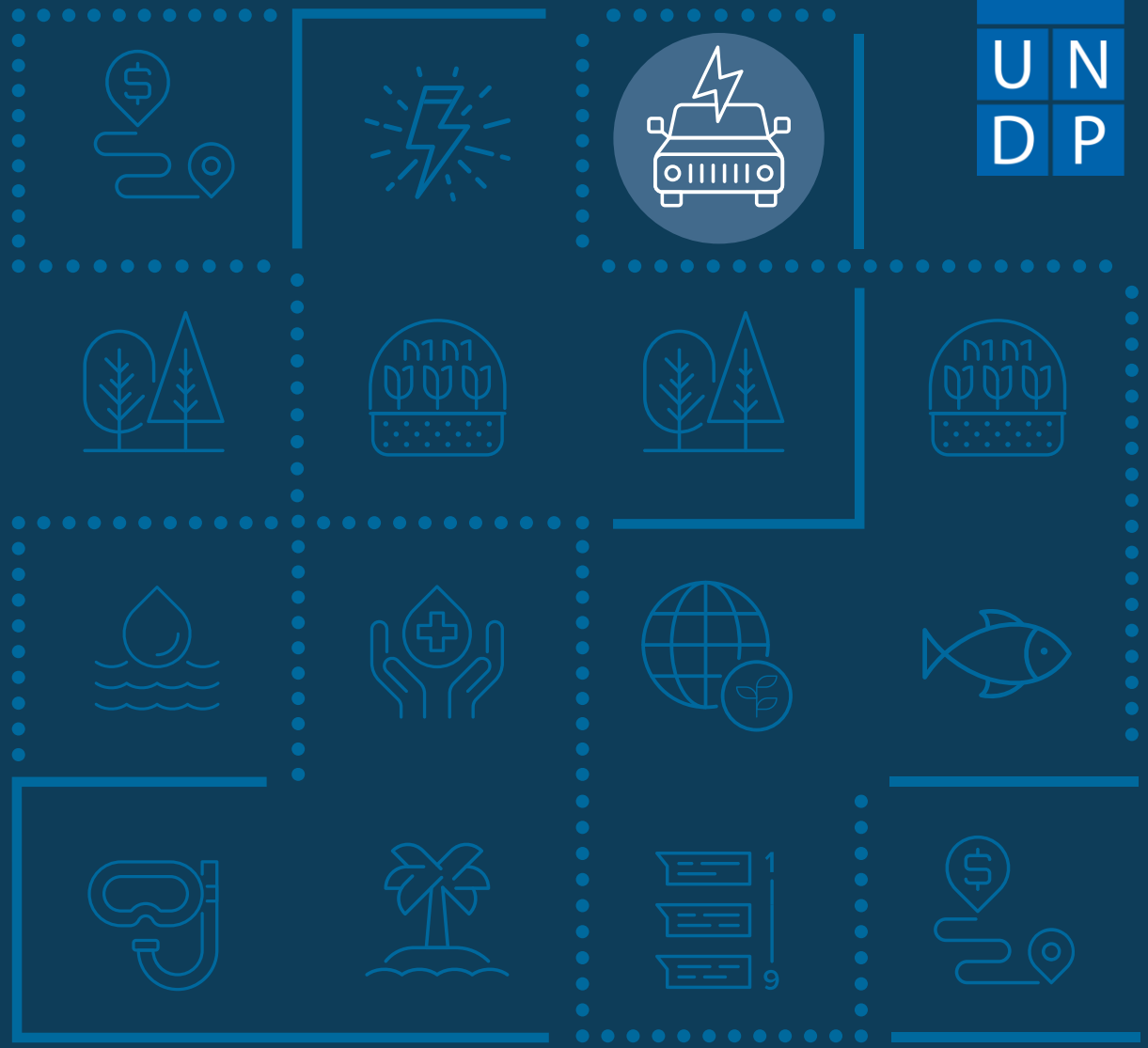
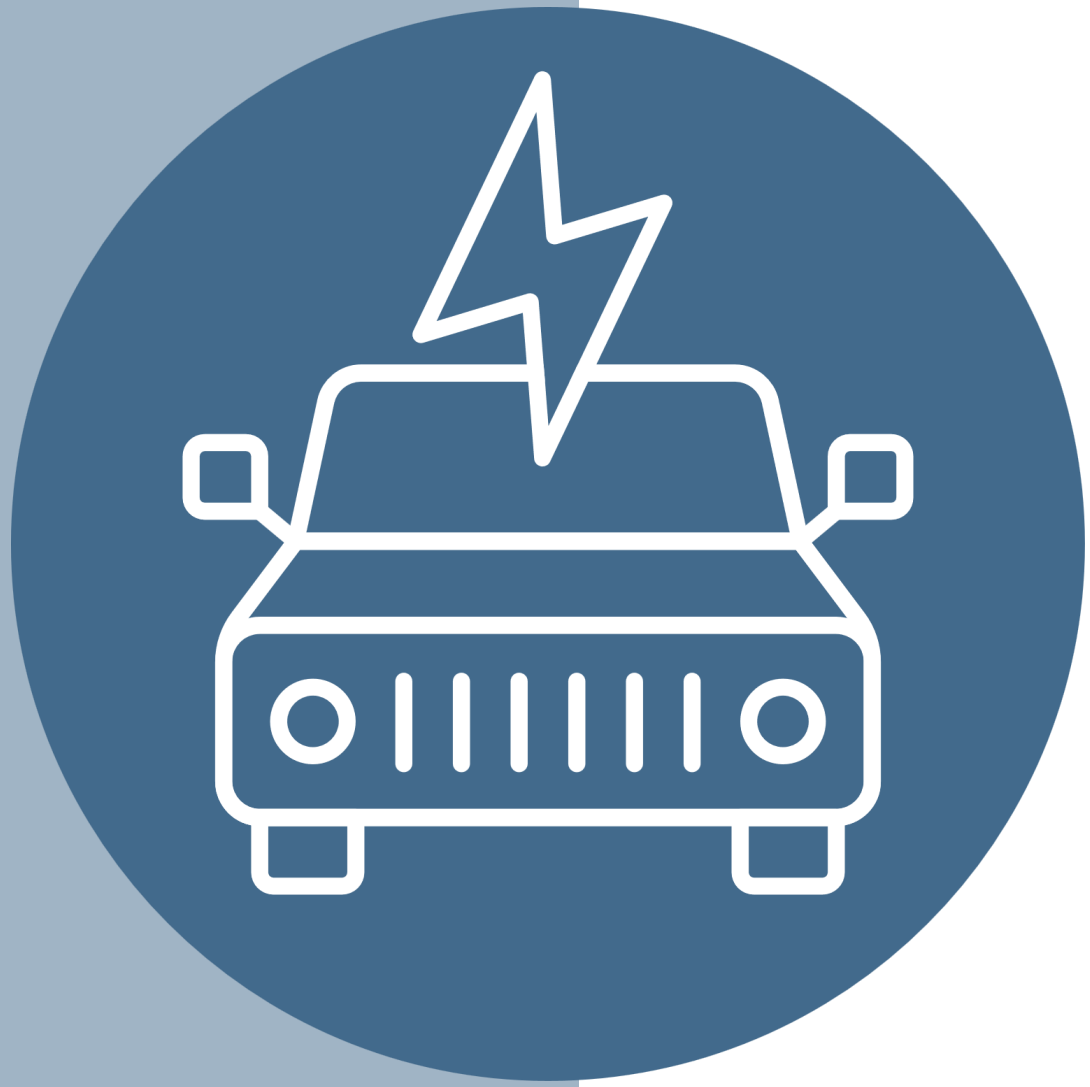
UNITED NATIONS DEVELOPMENT PROGRAMME

GUIDEBOOK

on the methodology for financial assessments to address climate change

FINANCIAL ASSESSMENTS TO ADDRESS CLIMATE CHANGE IN THE TRANSPORT SECTOR





Relevance of the transport sector

- Greenhouse gas (GHG) emissions of the transport sector are one of the major contributors to global warming.
- Accounts for ~ 1/4 of total global GHG emissions and currently experiencing rapid growth.
- The developing world will account for the largest share of this growth, with forecasted growth rates between 3.5% and 5.3% per year (Fan *et al.*, 2023).

Step 1. Establish key parameters of assessment.

Step 2. Compile historical IF, FF and O&M cost data (and subsidy cost data if included explicitly) and other input data for scenarios.

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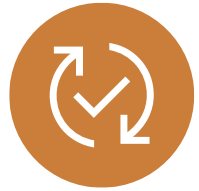

Step 8. Identify policy implications.

Step 9. Synthesize results and complete the report.

Step 1.

Establish key parameters of the assessment.

- Define scope and boundaries for the assessment
- Define the institutional framework
- Specify the time horizon for the assessment, matching the time horizon of national target being assessed
- Specify base year (latest year with data available)
- Build on existing model/analysis/tracking system as applicable

Define boundaries for the assessment

Possible subsectors for screening and prioritization

Subsectors	Passenger transport Urban/inter-urban/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 and mobile machinery used within the agriculture, forestry, industry, residential sectors, such as airport ground support equipment, agricultural tractors, chain saws, forklifts, and snowmobiles	

Select analytical approach

- Development of simple speadsheets based on Excel sheets provided by this financial assessment methodology
- Building on existing transport models, tracking system, budget tagging as applicable
- Use sector projections/trends to determine projected demand and supply in the sector

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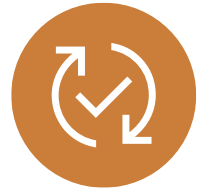

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Step 2.

Compile historical IF, FF and O&M cost data, subsidy cost data (if included explicitly), and other input data for scenarios.

- Gather disaggregated IF and FF data on investment types (e.g., wind energy facilities, biomass fired power plant, etc.), investment entities and funding sources for 3-10 years in the recent past
- Gather socio-economic information (demographic development, economic development etc.) for 3-10 years in the recent past

Data sources

Helpful information to build baseline and target scenarios:

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

Data sources

- Studies and models of transport and mobility
- Economic growth data, population growth
- Sales by fuel type and subsector
- Sectoral plans / development plans
- National budget tagging/tracking or transparency mechanisms
- GHG Inventories, National Communications etc.
- Environmental and social impact studies, economic valuation studies

Compile historical data

Template for 1 year of historical IF and FF data (simplified)

Category of investment entity	Source of IF and FF	Investment Type 1 (IF, FF, Total)	Investment Type 2 (IF, FF, Total)	Investment Type 3 (IF, FF, Total)	Total investment
Households	Domestic				
Corporations	Domestic				
	Foreign				
	Total Corporation Funds				
Government	Domestic				
	Foreign				
	Total Government Funds				

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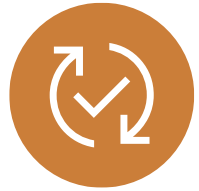

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Define a baseline scenario.

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

Define baseline scenario

- Characterizing each relevant electricity supply and electricity end-use subsector over the assessment period
  - Assuming no new climate change policies are implemented
- Baseline scenario reflects:
  - Current sectoral and national plans
  - Expected socio-economic trends
  - Expected investments in the subsectors

Define physical basis for the baseline scenario

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

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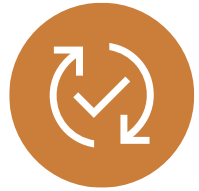

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Step 4.

Identify the annual IF, FF and O&M costs, and subsidy costs (if included explicitly), for baseline scenario.

- Compile annual data, disaggregated by investment entity, funding source, investment flow type, financial flow type
- Calculate the **total IF and FF** in real, unannualized terms over the planning period
- Define **annual IF and FF** of the baseline scenario

Define and project annual IF and FF

Funding entity category	Source of funds	Cumulative IF and FF* 2025-2050 (billion 2025 $)	
		IF	FF
Households	Domestic		
Corporations	Domestic equity		
	Foreign investment		
	Domestic debt		
	Foreign borrowing		
	Government support		
	Foreign aid (ODA)		
Government	Domestic funds (budgetary)		
	Foreign borrowing (loans)		
	Foreign aid (ODA)		
	Total		

* Railways equipment, electric buses, smart ticketing system for public transport…

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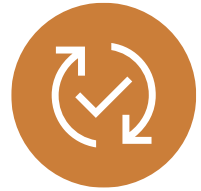

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Define the target scenario.

- **Target scenario:** incorporates new and scaled-up measures to address climate change
- The target scenario should describe expected socio-economic trends, technological change, relevant measures to reduce GHG emissions and the expected investments in the energy sector (e.g. end-use and supply subsectors) to implement those mitigation measures

Project IF and FF of target scenario

Facility/technology	Cumulative infrastructure (2025-2050)	Unit cost
More efficient vehicles	(# units)	(2025 $/unit)
Expanding public transport	(# activities)	(2025 $/activities)
Total		

Transport Sector mitigation measures

Emission reduction per kilometer driven	**Emission reduction per unit transported** (passenger per km or tonne per km)	**Emission reduction through reducing distance driven or the number of trips**
• 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	• 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	• 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, and 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.

Two approaches to define target scenario

- Approach #1: assume an end point for electricity supply emissions:
  - E.g. Set a target in 2030 for emissions from the electricity sector
- Approach #2: assume a set of technologies for electricity supply:
  - E.g. Articulate a set of technological options to meet future energy demand

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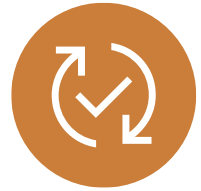

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Step 6.

Identify annual IF, FF and O&M costs (and subsidy costs if included) for the target scenario.

- Compile annual data, disaggregated by investment entity, funding source, investment flow type, and financial flow type
- Calculate the **total IF and FF** in real, unannualized terms over the planning period.
- Define **annual IF and FF** of the target scenario

Define and project annual IF and FF

Funding entity category	Source of funds	Cumulative IF and FF 2025-2050 (billion 2025 $)	
		IF	FF
Households	Domestic		
Corporations	Domestic equity		
	Foreign investment		
	Domestic debt		
	Foreign borrowing		
	Government support		
	Foreign aid (ODA)		
Government	Domestic funds (budgetary)		
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Calculate the changes in IF, FF and O&M costs (and in subsidy costs if included explicitly) needed to implement target scenario.

- Subtract the annual IF and FF of the baseline scenario, by entity and funding source, from the annual IF and FF of the target scenario, by entity and funding source
- Sum incremental amounts over all years, by entity and funding source

Determine changes in IF and FF

IF and FF of target scenario

minus

IF and FF of baseline scenario

= Additional IF and FF

- For each mitigation option the assessment must identify the additional IF and FF by source (national funds, etc.) throughout the assessment period to implement the national target being assessed.

Calculate incremental IF and FF

Funding entity category	Source of funds	Investment (billion 2025 $)		
		Cumulative (2025-2050)		
		Baseline scenario	Target scenario	Incremental
Households	Equity & debt	Baseline value	Target value	Target minus Baseline value
Corporations	Domestic equity	…	…	…
	Foreign investment			
	Domestic debt			
	Foreign borrowing			
	Government support			
	Foreign aid (ODA)			
Government	Domestic funds (budgetary)			
	Foreign borrowing (loans)			
	Foreign aid (ODA)			
	Total	Sum (Baseline)	Sum (Target)	Sum (Target minus Baseline)

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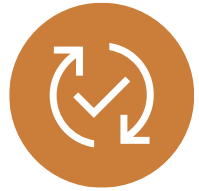

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Step 8.

Identify policy implications.

- Identify the entities responsible for the significant incremental changes in investment and financial flows
- Determine the predominant sources of their funds
- Determine policy instruments and incentives to induce the required changes in investment and financial flows

Measures, instruments and institutions

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	• 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	• Resistance to change
New vehicle technologies: hybrids, hydrogen in fuel cell vehicles, electric vehicles	Tax policies & incentives	National Government, Fuel distributing companies, technology suppliers	• 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	• 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	• Resistance to implementation by public & community institutions • Lack of know-how & experience • Political resistance • Risk of Incomplete implementation

Instruments for implementation

Instrument	Environmental effectiveness	Cost-effectiveness	Equity	Institutional feasibility
Bio-fuel blending mandates	Emissions level set directly, though subject to exceptions, depends on deferrals and 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 programme design; less certain than regulations/standards	Depends on level and programme 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 govern-ments & private fleets companies	Depends on programme design, including clear targets, a baseline scenario, third party involvement in design and review	Depends on flexibility and extent of government incentives, rewards and 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 programme 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 and 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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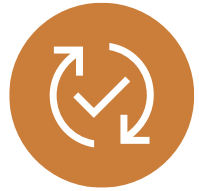

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Synthesize results and complete report.

- Reporting takes place throughout the assessment, does not start at the end of the assessment
- Capturing information and data, decisions and assumptions completely and transparently
- Ensuring credibility of the assessment and enabling follow-up on the assessment results
- The Reporting Guidelines contain key tables required. Excel spreadsheets are available to organize and calculate data.

Q&A
Clarifications

About UNDP

UNDP is the leading United Nations organization fighting to end the injustice of poverty, inequality, and climate change. Working with our broad network of experts and partners in 170 countries, we help nations to build integrated, lasting solutions for people and planet. Learn more at undp.org or follow at @UNDP.

About UNDP's Climate Promise

UNDP's Climate Promise is the UN system's largest portfolio of support on climate action, working with more than 140 countries and territories and directly benefiting 37 million people. This portfolio implements over US$2.45 billion in grant financing and draws on UNDP's expertise in adaptation, mitigation, carbon markets, climate and forests, climate risk and security, and climate strategies and policy. Visit our website at climatepromise.undp.org and follow us at @UNDPplanet.

About this publication

This methodology is an update to the first financial assessment methodology, which was released in 2009. The objective of this methodology is to support countries to implement their climate targets and to identify, reallocate, mobilize and manage the required financial resources and to create a fiscal framework conducive for climate action.

The update to this methodology was developed under UNDP's Climate Promise by the *Pledge to Impact* Programme. Delivered in collaboration with a wide variety of partners, the initiative has supported over 120 countries to enhance and implement Nationally Determined Contributions (NDCs) under the Paris Agreement. From Pledge to Impact is generously supported by the governments of Germany, Japan, United Kingdom, Sweden, Belgium, Spain, Iceland, the Netherlands, Portugal and other UNDP core contributors. This programme underpins UNDP's contribution to the NDC Partnership.

UN disclaimer

CLIMATE PROMISE

From the People of Japan

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