Elements of T-NAMA MRV

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OUR AIM

Clean Air Asia leads efforts to enable Asia's

1,000+ CITIES

to reduce both air pollution and CO_2 emissions, and thereby contribute to more livable and healthy cities with blue skies and a low carbon footprint. Emissions can be reduced through policies, plans, programs, and concrete measures that cover air quality, transport and industrial emissions, and energy use.

OUR ROLE

Decision makers use **reliable analysis, knowledge, data and effective tools** to understand the program and identify solutions.

Stakeholders at the city, national and regional level **cooperate better through networks and partnerships.**

Policies and programs are in place that are **science-based, stakeholder-inclusive and effective.**

MRV of Transport NAMAs

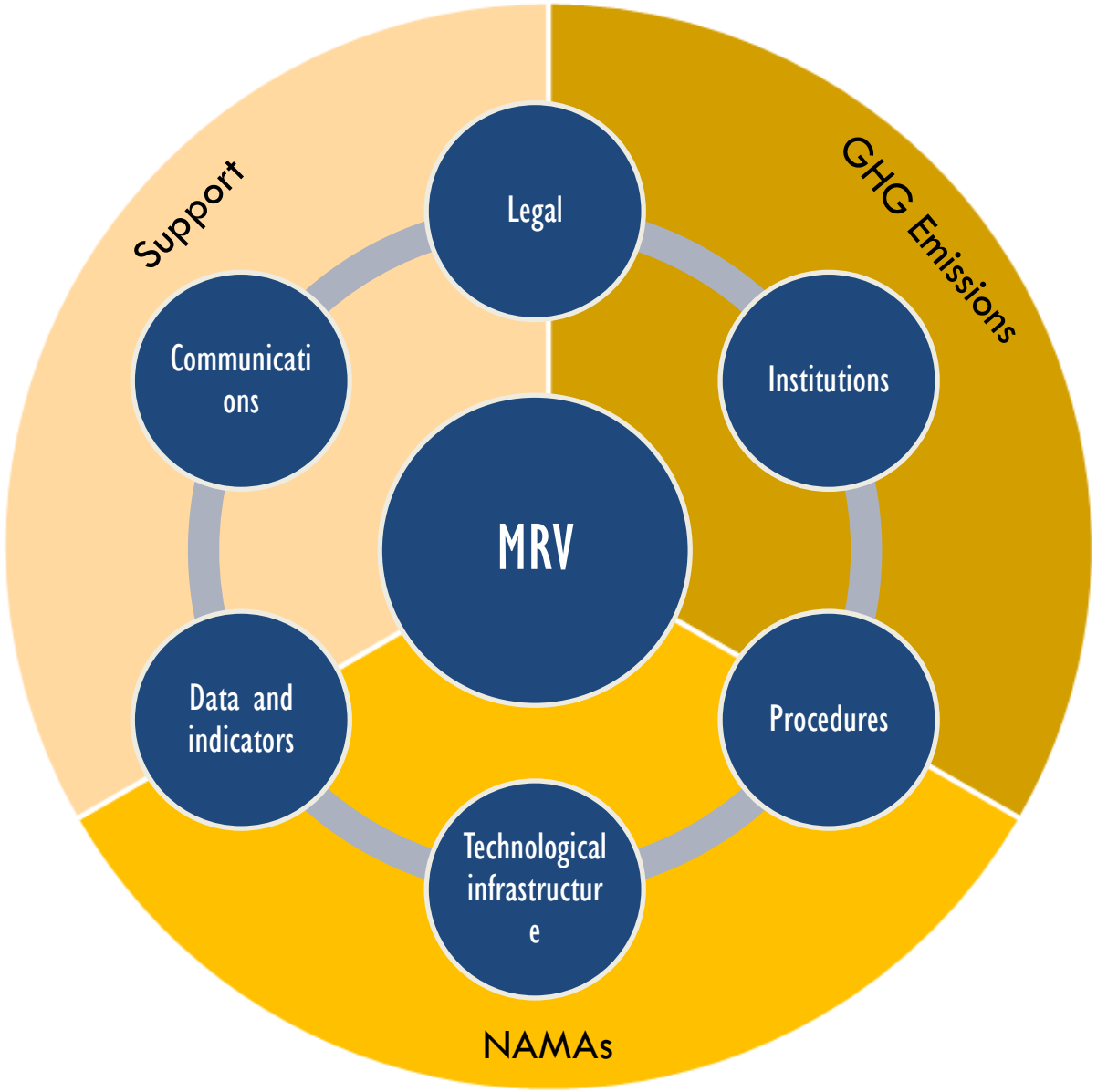
Domestic MRV Guidelines:

"general, voluntary, pragmatic, non-prescriptive, non-intrusive and country-driven, take into account national circumstances and national priorities, respect the diversity of nationally appropriate mitigation actions, build on existing domestic systems and capacities, recognize existing domestic measurement, reporting and verification systems and promote a cost-effective approach."

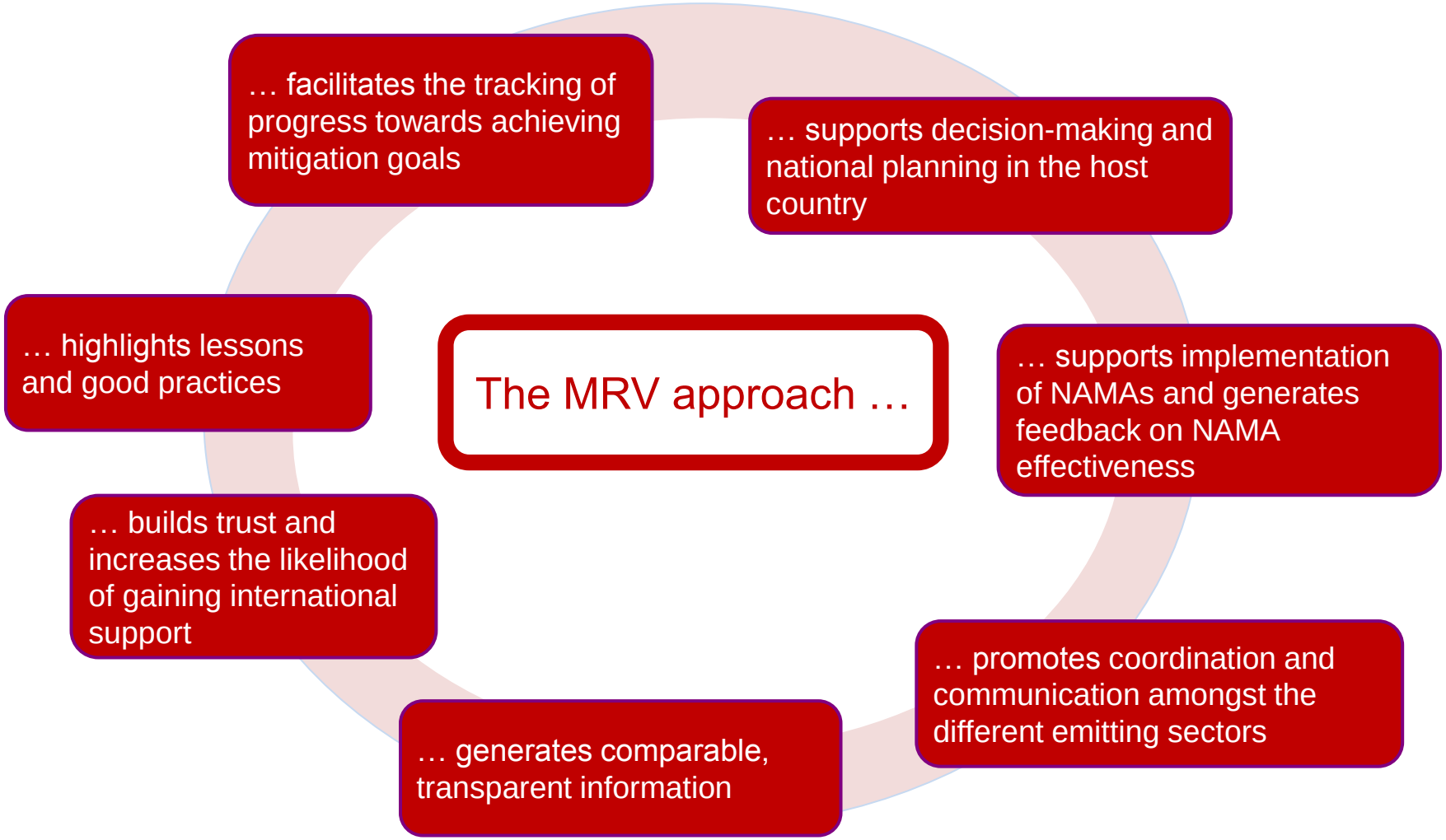
In-line with the priorities of the country (and/or locality)

Policy/programme/measure/ project that reduces GHG emissions in the transport sector

MRV Systems


Support
GHG Emissions
NAMAs
Legal
Communicati ons
Institutions
MRV
Data and indicators
Procedures
Technological infrastructur e

Rationale for MRV



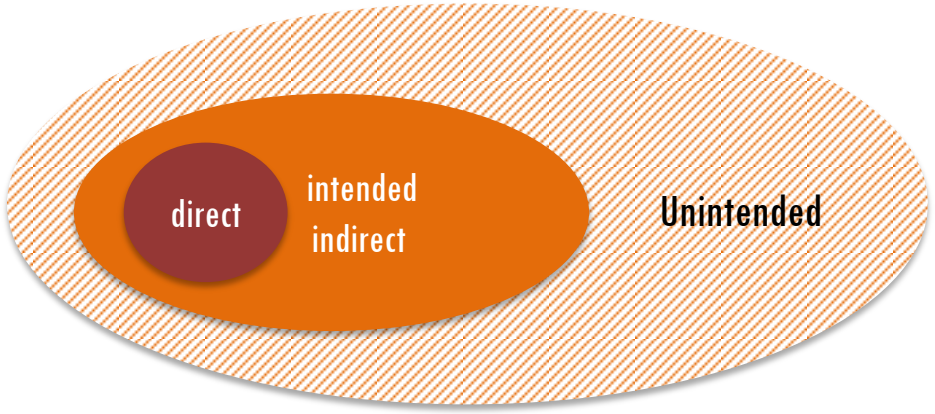
Source: GIZ TRANSfer Colombia. MRV of NAMAs and the case of the Colombian Freight NAMA

Challenges in T-NAMA MRV

- Unique nature of mobile sources of emissions in the transport sector
- Complexity and cost of data collection methods
- Lack of clear definitions
- No institutionalized data collection
- At this stage, TNAMAs can take different forms, non-GHG priorities can also be different → difficulties in pinning down indicators
- Lack of Cause-impact analysis guidance

The Unique-ness of NAMAs

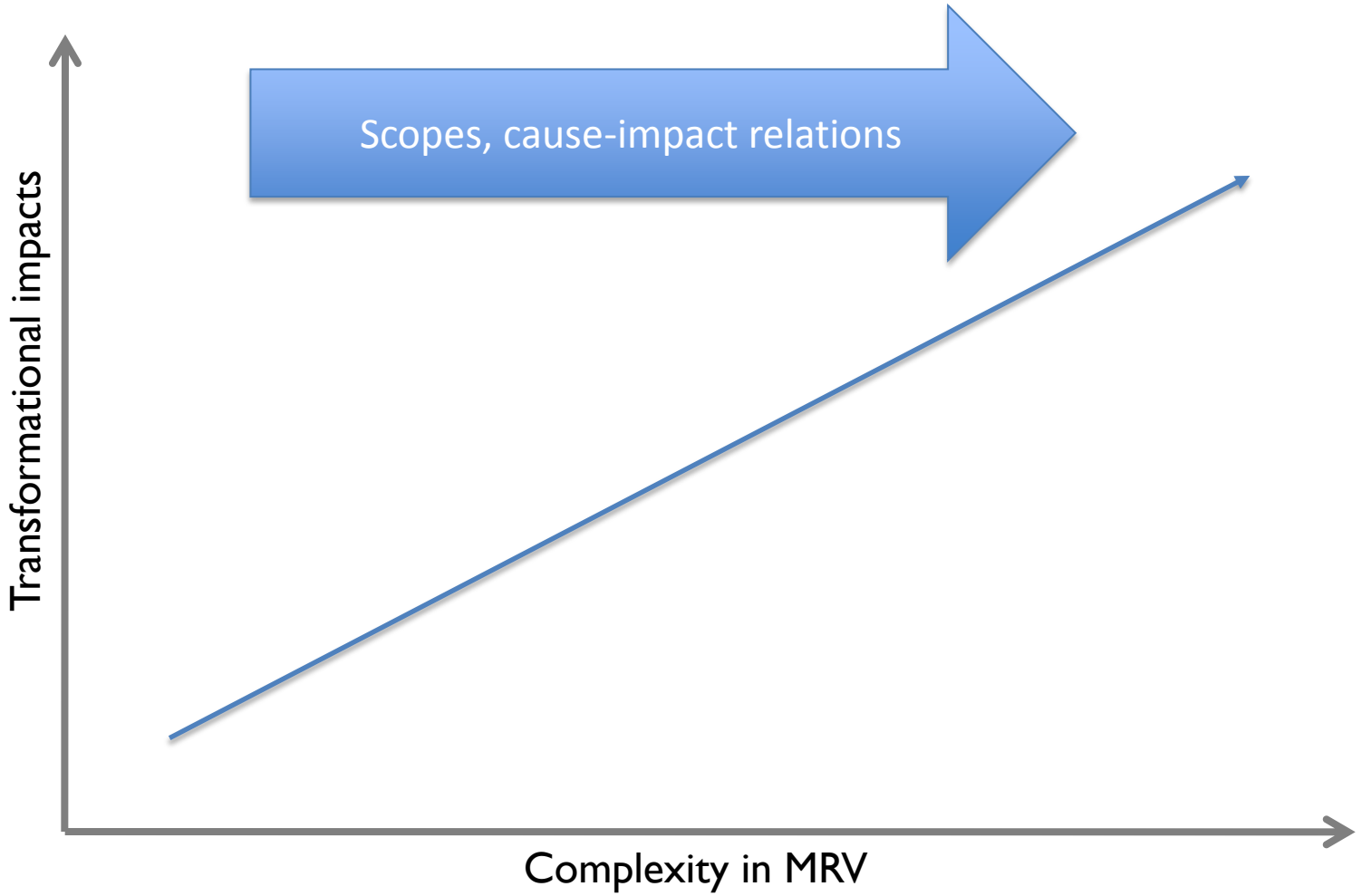
- Reduction of air pollution
- Increased energy efficiency
- Improved mobility
- Improved access
- Reduced accidents
- Improved economic efficiency



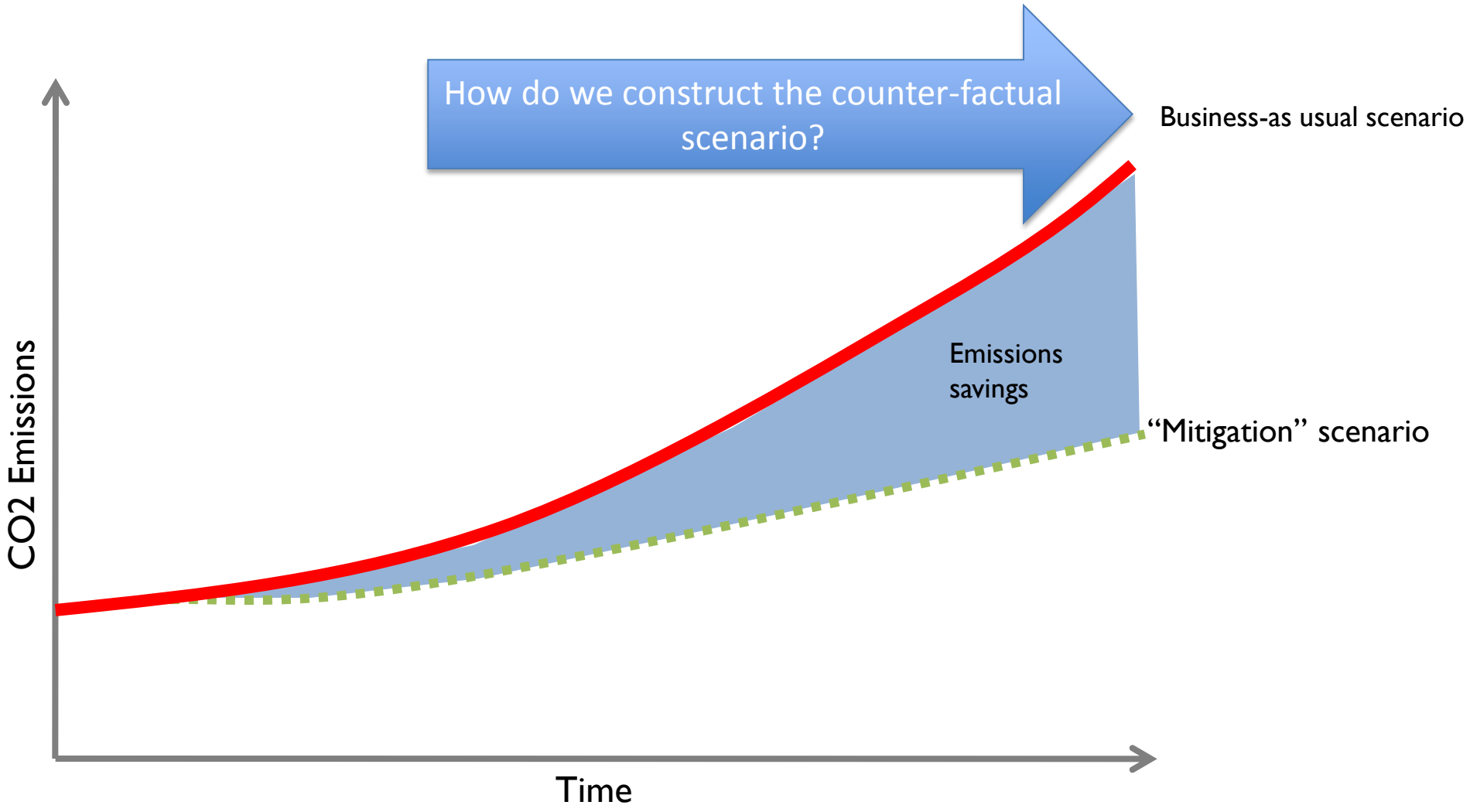
Transport-related priorities can include environmental, economic and social dimensions and can come in different forms

Monitoring non-GHG impacts (positive and negative) pose additional challenges (as well as opportunities) to tNAMAs

Transformational NAMAs



CO2 Impacts : BAU vs Mitigation (NAMA) Scenario



General Estimation Approaches : CO2

Top –Down

- Aggregate fuel data

Bottom-up

- Transport activity-based

Advantages and Disadvantages

Top-down approach

+

- probability of data being available
- consistency in data collection

-

- low level of detail
- limitations in assessing specific interventions

National GHG inventories

Bottom-up approach

+

- more detailed information allows better analysis of interventions
- Enables analysis of other co-benefits

-

- time and costs in data collection
- standardized procedures for collecting specific data may not be available

NAMAs

Top Down

Energy contained in fuel (MJ/kg of fuel)

Total Energy consumed (TJ)

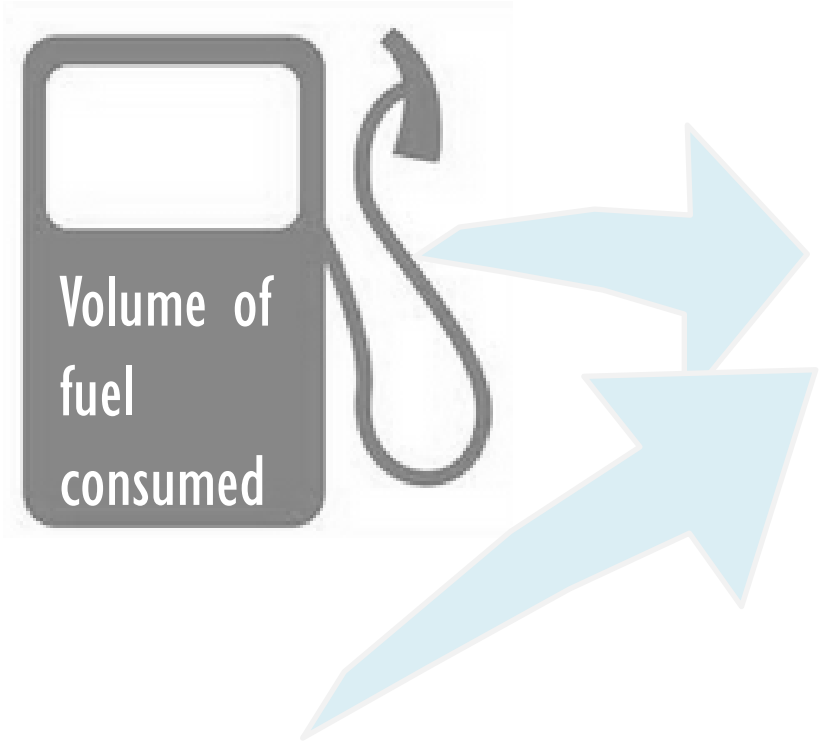
Carbon content per energy unit (ton Carbon/TJ)

Fraction of fuel oxidized (%)

Carbon to CO2 converter (44/12)

Total CO2 emissions (tonsCO2)

Top Down (2) -Simplified

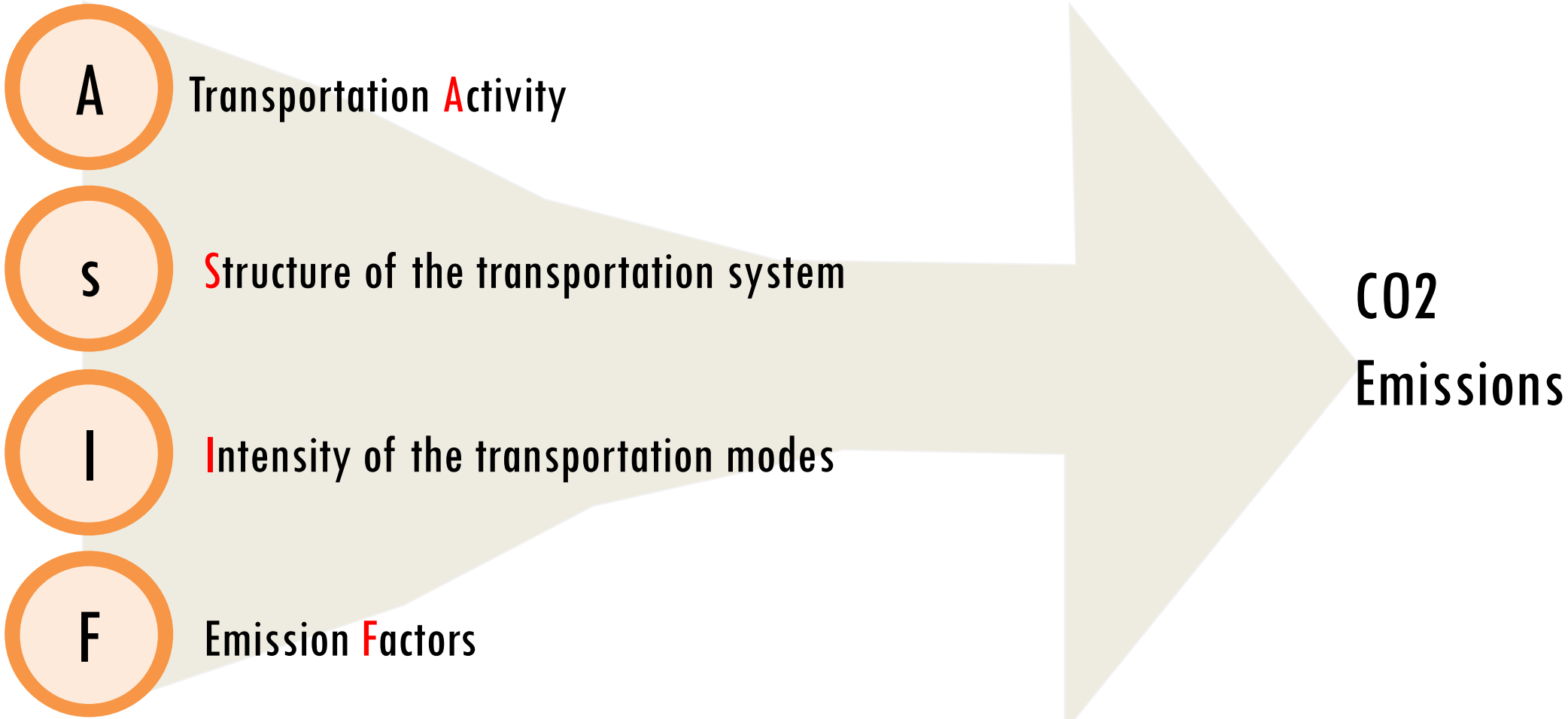


Total CO2 Emissions (kgCO2)

- Tells you how much CO2 is emitted
- Doesn't tell you much about the sources
- Doesn't enable mitigation impacts analysis of interventions

CO2 Emission Factor per amount of fuel consumed (e.g. kgCO2/liter of gasoline)

Bottom-up


A
Transportation Activity
S
Structure of the transportation system
I
Intensity of the transportation modes
F
Emission Factors
CO2
Emissions

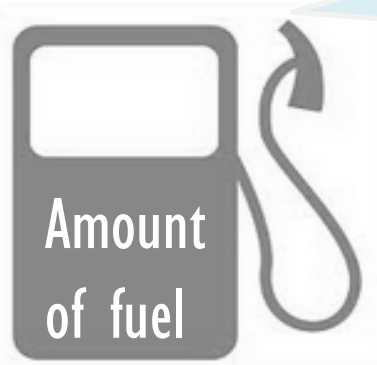
Fitting ASIF

Activity
(Total Passenger-km or ton-km)

Structure
(% of PKM, TKM done by the different modes of transport)

Modal Energy Intensity
(person kilometer/unit of energy)

Occupancies; average energy efficiencies (km/liter); fleet composition



Energy content of fuels

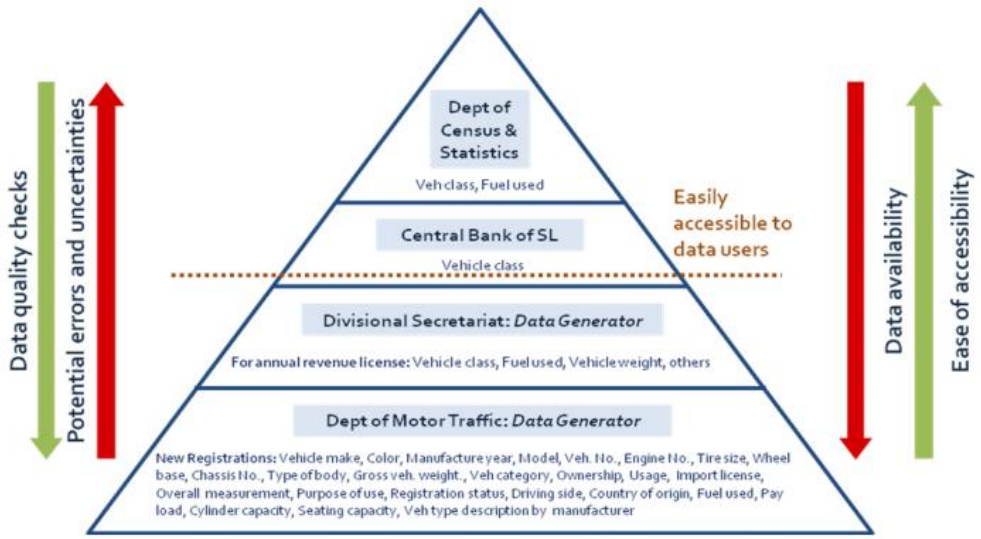
Factor of Emissions
(e.g. kgCO2/liter of gasoline)

Total CO2 Emissions
(kgCO2)

Area	Data Type	Data Usage	Sources
Fuels	Fuel quantity Fuel type Fuel quality	Inventory, top-down GHG calculation, national reports	Tax base (quantities and types) and fuel regulations
Vehicles	Number of vehicles per category age structure annual mileage emission category	Inventory, top-down GHG calculation, national reports	Vehicle registration systems, vehicle tax collection, specific surveys (e.g. mileage)
Emission Factors	Fuel consumption Emission factors	CO2 per km per vehicle category Impact of measures to improve transit	Vehicle registration, modelling, sampling studies, company statistics
Modes	Occupation rates / average trip distance Trip share per mode (as % of trip distance) Trip share per mode baseline	CO2 per PKM per vehicle category Impact of measures to shift transit	Surveys (passengers and/or households), traffic studies, visual observation studies Modelling or surveys for baseline
Trips	Trip distance per mode per annum per inhabitant Trips baseline	gCO2 for transit per inhabitant Impact of measures to avoid transit	Household surveys, traffic observation Modelling or surveys for baseline
SD	Air quality Time required for transit Accident, mortality and morbidity rate transit Health costs air pollution Income/wealth distribution impact	SD impact of measures	Measurements, surveys, traffic observation studies, modelling

Source: PMR Columbia, 2014 as quoted in the powerpoint presentation by GIZ TRANSfer Colombia. MRV of NAMAs and the case of the Colombian Freight NAMA

Data Access



Source: CAI-Asia. 2010. Availability, quality and use of transport and energy data in Asia: A regional case study. Presented by Patdu, K. at the Better Air Quality Conference 2010 held in Singapore, 9-11 November 2010. Available: http://baq2010.org/node/1497

Overview of Data Availability of Input Parameters for Each Country

Data Requirements for Estimating Emissions from Road Transport				BAN	IND	INO	LAO	MAL	NEP	PAK	PHI	PRC	SIN	SRI	THA	VIE
Activity	Vehicle kilometer travelled	By vehicle type	2W													
			3W													
			PC													
			MUV													
			Bus													
			LCV													
			HCV													
Structure	Vehicle population	By vehicle type	2W													
			3W													
			PC													
			MUV													
			Bus													
			LCV													
			HCV													
		By vehicle-fuel type	Gasoline													
			Diesel													
			LPG													
			CNG													
			Electric													
		By technology type	Pre-Euro													
			Euro 1													
			Euro 2													
			Euro 3 or above													
Intensity	Average fuel efficiency	By vehicle type	2W													
			3W													
			PC													
			MUV													
			Bus													
			LCV													
			HCV													
		By vehicle-fuel type	Gasoline													
			Diesel													
			LPG													
			CNG													
			Electric													
	Occupancy Loading	By vehicle type	2W													
			3W													
			PC													
			MUV													
			Bus													
			LCV													
			HCV													
Fuel	Fuel Characteristics	Emission factor														
		Biofuel blend														

Data Available | Limited Data | Data not available | Default value for Asia fleet

Impacts Measurement: Timing

- Establish BAU emissions
- Inform intervention selection
- Inform reduction goals
- Attract financial support

Ex-ante estimation

- What is the potential emissions reduction impact of the intervention?
- Baseline study needed

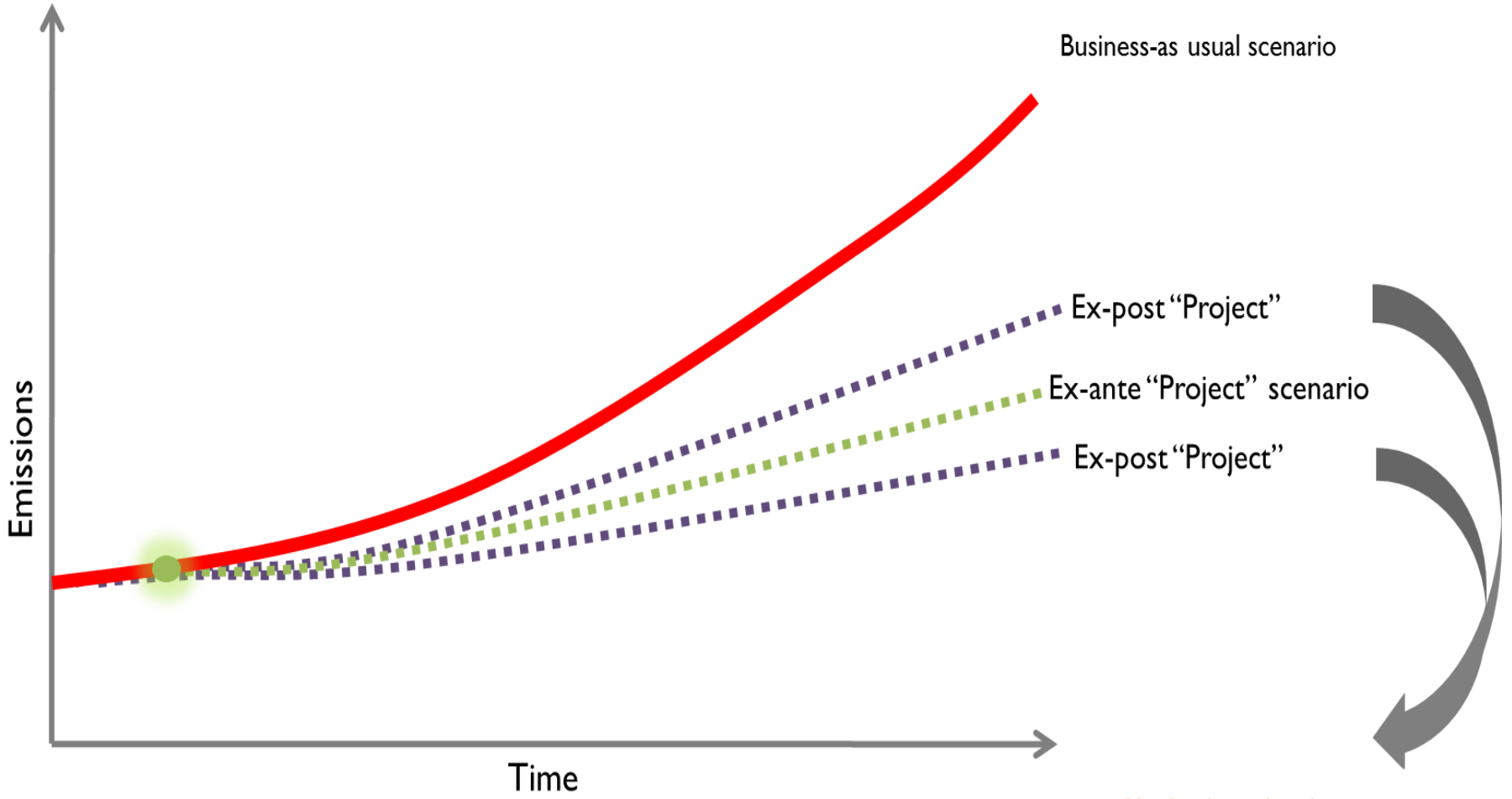
Start of intervention

- Evaluate intervention effectiveness
- Meet funder requirements
- Improve intervention design

Monitoring and Ex-post evaluation

- Is the intervention delivering the emission reduction as expected? Why?
- Monitoring plan and actual monitoring

Ex-post



Monitoring plan is needed

Is the intervention delivering the emissions reductions that it has promised?

Data to be monitored:

-What

-Why

-When

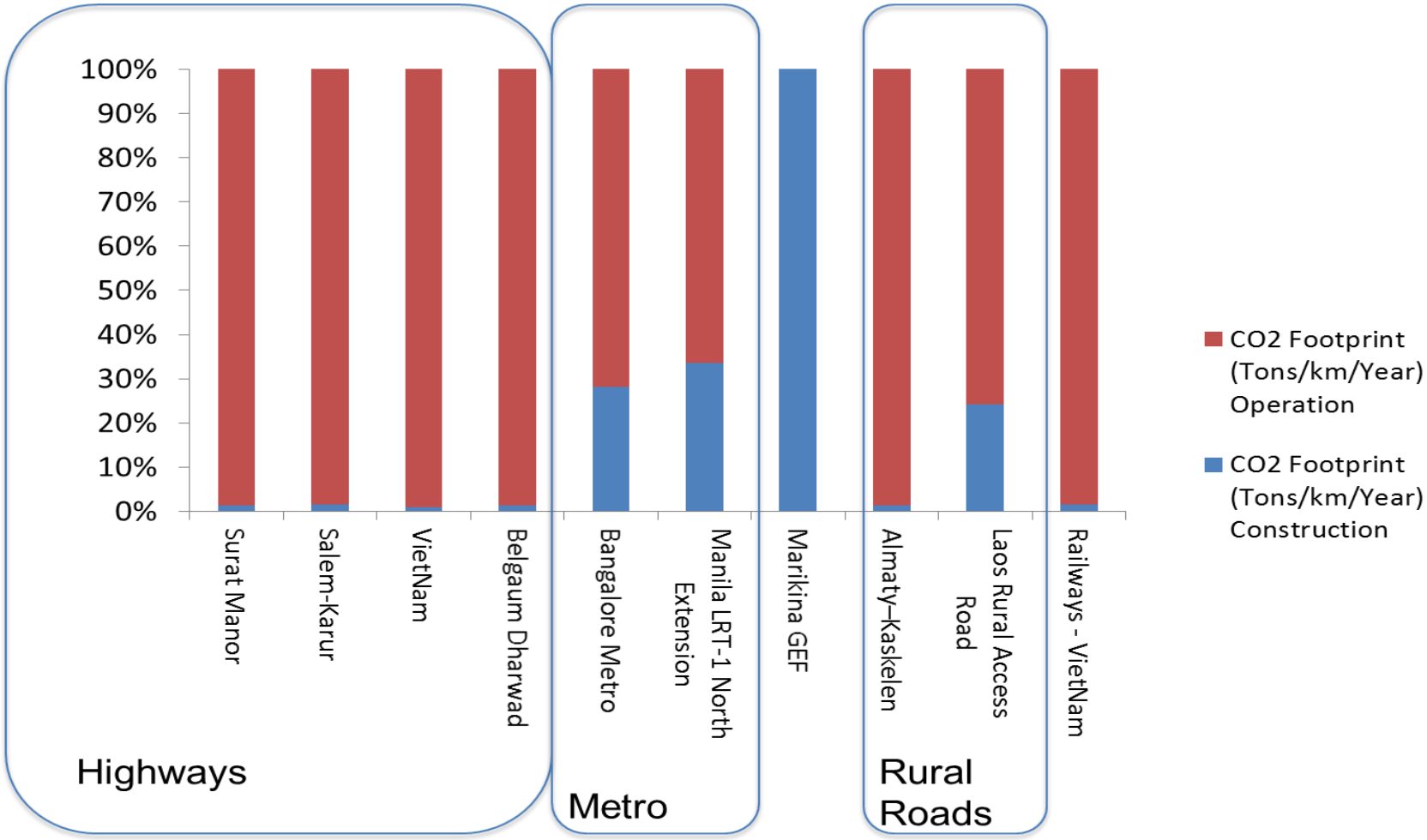
-Where

-How

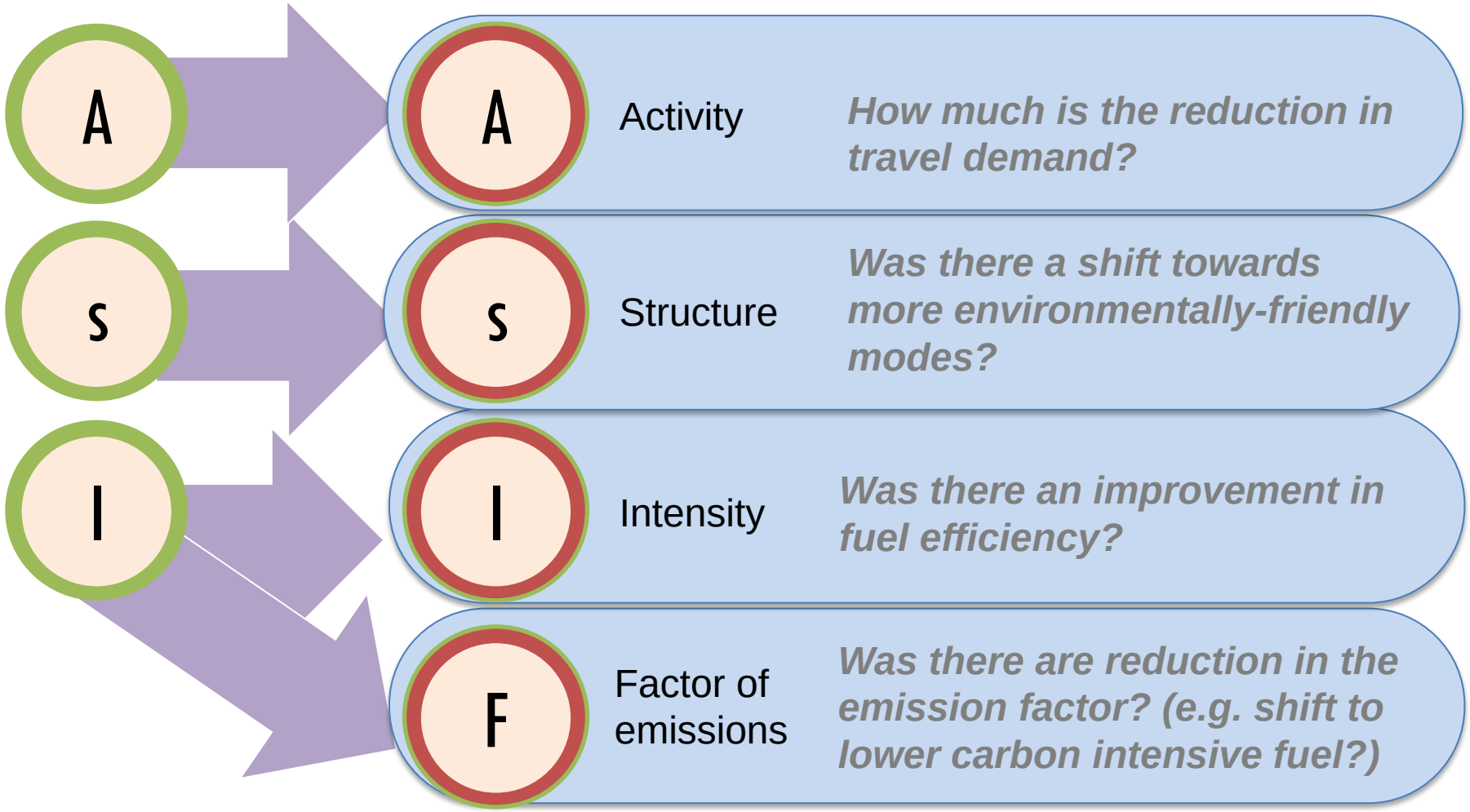
	TransMilenio Phase II to IV							
	Monitoring 2006		Monitoring 2008		Monitoring 2009		Monitoring 2010	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
Passengers transported by project (million)	**94**	**147**	**118**	**356**	**134**	**478**	**149**	**478**
Share of passengers which would have used passenger cars (%)	**4.3**	**5.5**	**2.4**	**5.5**	**2.1**	**5.5**	**2.6**	**5.5**
Share of passengers which would have used taxis (%)	5.5	**5.6**	5.5	**5.6**	4.8	**5.6**	5	**5.6**
Share of passengers which would have used buses (%)	89.1	**88**	91.4	**88**	92.5	**88**	91.6	**88**
Share of passengers which would have used NMT or not made the trip (%)	1.1	**0.8**	0.7	**0.8**	0.6	**0.8**	0.7	**0.8**
Emission reductions	**-40%**		**-70%**		**-74%**		**-74%**	

BRT Bogotá, Colombia: TransMilenio Phase II To IV (monitoring report 2010)

Construction and Operations (% of total CO2 footprint of projects)

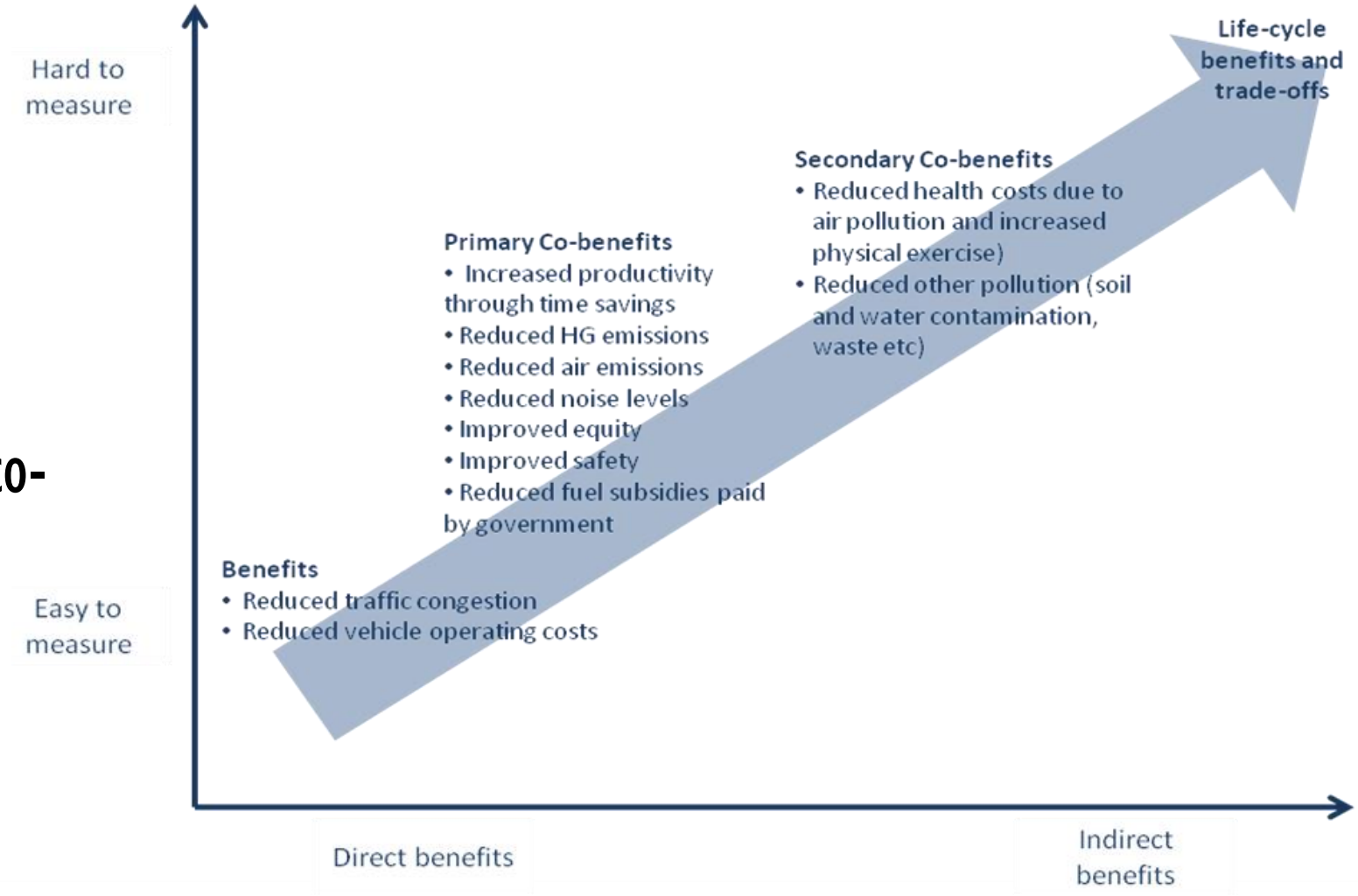


ASI and ASIF : General Relationships



ASIF Approach Enables Co-benefits Analysis

- The data needed for calculating CO2 impacts can be used in analyzing other co-benefits



CDM : BRT – Bogota Transmilenio

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BRT Bogotá, Colombia: TransMilenio Phase II To IV (monitoring report 2010)

Summary

- Maximize the opportunities presented by the NAMAs to build capacity on MRV
- Collective knowledge sharing is important for developing countries
- Build on existing resources
- Low cost data collection methods must be explored (maximize the opportunities brought by modern technologies)
- Clear guidance on how to go about MRVing at different stages is needed
- MRV of NAMAs is also nationally-appropriate
- Flexibility to achieve balance (robustness of MRV, feasibility of MRV)

Photo : Sudhir Gota

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