



# 21st Transport Sector Coordinating Committee Meeting

22–23 April 2024 • Almaty, Kazakhstan

## 21-е заседание Координационного комитета по транспортному сектору

22–23 апреля 2024 года • Алматы, Казахстан



# Summary of ADB RAM Capacity Development Activities

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Transport Sector Office  
ADB



# INTRODUCTION

RAM Initiatives	DMCs
1. Green Roads Toolkit	BAN, CAM, <b>TAJ</b> , PNG, IND
2. Climate Adaptation Pathways and Investment Concepts	BAN, <b>PAK</b> , PNG
3. Mapping the Future of Road User Charges	BAN, CAM, <b>KGZ</b> , <b>MON</b> , NEP, <b>PAK</b> , PNG, TIM, <b>UZB</b> , VAN
4. Training and Workshops	ADB Transport Forum



# ADB Green Roads Toolkit

Undertaken by MetaMeta and IRF Global

# Need for Green Roads

- Green roads will have a transformative impact on many agendas including Paris Agreement on CC:
- Road transport is a major source (18%) of global energy-related CO2 emissions and has been leading the increase in carbon emissions in recent decades
- Roads are estimated to increase erosion in catchments by 12-40%, which affects soil fertility and water quality.
- Globally, roads consume 30-40% of construction materials. Demand for construction material grew by 64% in Asia compared to the global increase of 17%.
- Roads affect biodiversity (second cause of wildlife kills, disconnect habitats)
- Roads have an important effect on public health (pollution, dust, heat, public hygiene) .
- Green roads can enhance both development and environment by minimizing impacts of roads whilst fostering sustainable growth.



# Green Roads Dimensions

- **What are Green Roads?**

- ✓ Creating connectivity and access
- ✓ Safeguarding safety
- ✓ Making affordable transport possible
- ✓ Working towards decarbonization
- ✓ Ensuring climate resilience
- ✓ Creating beneficial water and land management
- ✓ Reducing pollution
- ✓ Improving quality of life
- ✓ Preserving biodiversity
- ✓ Supporting disaster preparedness
- ✓ Sourcing materials sustainably
- ✓ Fostering inclusive growth

- **Synergies between the themes!**



# Green Roads Toolkit

ADB



## Green Road Practices at Project Level

Step 1: Select Green Road Theme(s) and project characteristics

1	2	3	4	5	6	7	8	9	10	11	12
CO2	Res	W&L	Pol	QoL	Bio	Dis	Mat	Inc	Con	Saf	Aff
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessing how well the project incorporates each of the nine Green Road Themes: A checklist has been developed to assist project teams in assessing how well their projects align with the nine Green Road themes.

Geography and Climate	Mountainous	Flat	Arid	Tropical	Pacific Islands
Standard of road	Low-Volume/rural	Paved highways	Expressed highways	Urban roads	
Road project stage	Planning	Design	Construction/Implementation	Maintenance	
Degree of impact	Incremental	Progressive	Transformative		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

### Step 2:

Select Enabling factor(s) aligning with the current conditions or policies

<input type="checkbox"/> Improved Design Standards	<input type="checkbox"/> Public Awareness and Education
<input type="checkbox"/> Modified Tendering Procedures	<input type="checkbox"/> Collaborative Partnerships
<input type="checkbox"/> Policy Development	<input type="checkbox"/> Roadmaps for Green Roads
<input type="checkbox"/> Environmental Standards	<input type="checkbox"/> Supply systems: available Resources and Materials
<input type="checkbox"/> Regulatory Frameworks	<input type="checkbox"/> Application of New Technologies
<input type="checkbox"/> Improved Planning Systems	<input type="checkbox"/> Connection with other programs

Green Road Practices found

13

GR objectives served: ● Core contributions ○ Secondary contributions

Enabling factors




Green Road Theme	Intervention Area	No.	Practice Name	GR objectives served												Enabling factors													
				1 CO2	2 Res	3 W&L	4 Pol	5 QoL	6 Bio	7 Dis	8 Mat	9 Inc	10 Con	11 Saf	12 Aff	Improved Design Standards	Modified Tendering Procedures	Policy Development	Environmental Standards	Regulatory Frameworks	Improved Planning Systems	Public Awareness and Education	Collaborative Partnerships	Roadmaps for Green Roads	Supply systems: available Resources and Materials	Application of New Technologies	Connection with other programs		
1. Decarbonization	1.5 Vegetative measures to sequester carbon	1.5.1	Roadside tree planting for sequestering CO2	●			●																						
3. Water and Land Management	3.1. Water harvesting and run-off storage	3.1.3	Flow diversion from culverts and road drainage (relevant for arid, semi-arid areas)	○	○	●	○	○	○	○																			
3. Water and Land Management	3.1. Water harvesting and run-off storage	3.1.6	Using roads as reservoir embankments	○	○	●	○	○	○	○																			
3. Water and Land Management	3.3. Groundwater management	3.3.4	Use of water harvesting measures upstream and downstream of the road	○	○	●	○	○	○	○	○																		
4. Reducing Pollution	4.6. Capture and remove pollutants	4.6.1	Planting roadside grass buffer filter strips to absorb dispersed road runoff pollutants. Keep deicing agents and dust palliatives out of water sources and streams.				●		○																				
4. Reducing Pollution	4.6. Capture and remove pollutants	4.6.2	Planting roadside vegetation to intercept road dust and ambient pollutants taking into account distance from the road and aerodynamics	○			●		○												●								
6. Preserving Biodiversity	6.1. Protect and harness invertebra biodiversity	6.1.1	Habitat management							●					○		○												



# Green Roads Practices

- Example of practice documentation

<b>2.4.1.</b>	<b>Staying Current on Road Maintenance</b>											
Description	Many roadway drainage problems occur because of lack of maintenance, where ruts form or a road is flat, concentrating water, and leading to erosion and formation of gullies. Culverts that are not cleaned lead to plugging and then damage to roadway from local flooding. Raveling of a road surface can be a safety problem, as well as dust problems and loss of valuable roadway materials											
Area of applicability	Geography and Climate		Mountainous	Flat	Arid	Tropical	Pacific Islands					
			x	x	x	x	x					
	Standard of road		Low-Volume/rural	Paved highways	Expressed highways	Urban roads						
			x	x	x	x						
Road project stage	Planning		Design	Construction/Implementation		Maintenance						
	x					x						
Degree of impact	Incremental		Progressive		Transformative							
	x											
Green Road objectives served	1 CO2	2 Res	3 W&L	4 Pol	5 QoL	6 Bio	7 Dis	8 Mtl	9 Inc	10 Con	11 Saf	12 Aff
		•	•					•				
Details of the good practice, incl. examples	Road maintenance is a fundamental part of road management so planned ongoing and recurrent maintenance is a must. Additionally, some maintenance items are occasional and may be in the category of deferred maintenance. A road maintenance plan needs to be developed and executed.											
	Road maintenance typically includes grading and reshaping the road surface, cleaning ditches, clearing brush for sight distance, cleaning culverts, filling potholes, painting or replacing signs, replacing riprap armoring, and periodically surface treatments such as seal coats.											
	Environmentally Sensitive Maintenance is a concept used today to accomplish needed timely maintenance but also to not create environmental problems by excessive grading, removal of too much vegetation, or conducting maintenance at a time harmful to wildlife.											
Maintenance can be accomplished in a variety of ways, including contracts, Performance based contracts, force account teams, micro-enterprises, or community-based maintenance. All have advantages and disadvantages, but the key is that some maintenance scheme is set up for every road network. Ideally a maintenance group will consist of some mechanized equipment, (such as a grader, compactor, water, and dump trucks, backhoe), and hand laborers to do brushing, pothole filling, culvert cleaning, etc. A road should not be built unless a guaranteed maintenance plan is in place!!												

Photos/Graphics				
				
				
	LACK OF MAINTENANCE ON ROADS AND CULVERTS			
	HAND AND MACHINE MAINTENANCE WORK ALONG A ROAD			
Enabling factors	Improved Design Standards	x	Public Awareness and Education:	
	Modified Tendering Procedures	x	Collaborative Partnerships	x
	Policy Development		Roadmaps for Green Roads	x
	Environmental Standards	x	Supply systems: available Resources and Materials	x
	Regulatory Frameworks		Application of New Technologies	x
	Improved Planning Systems	x	Connection with other programs	x
Costs/Benefits	Maintenance costs will vary widely, depending on how the work is done, geographic location, and work needed. Whatever the cost, the initial investment in a road will be lost if the road is not maintained. Deterioration curves on asphalt roads show the significant benefits of early and periodic maintenance.			

Remarks/Further reading or viewing/References	Douglas, R. 2015. Low-Volume Road Engineering: Design, Construction, and Maintenance. CRC Press, Taylor & Francis Group. ISBN: 978-1-4822-1263-1. 328 p.
	Gesford, A; Anderson, J. 2006. Environmentally Sensitive Maintenance for Dirt and Gravel Roads. PA-2006-001-CP-83043501-0, Pennsylvania State Center for Dirt and Gravel Roads Studies, in cooperation with Commonwealth of Pennsylvania, Pennsylvania DOT, & EPA. Harrisburg, PA. <a href="http://www.epa.gov/owow/nps/sensitive/sensitive.html">http://www.epa.gov/owow/nps/sensitive/sensitive.html</a>
	Giummarra, G., Editor. 2009. Unsealed Roads Manual: Guidelines to Good Practice, Third Edition. Australian Roads Research Board (ARRB Group Ltd.), Vermont South, Victoria, Australia. A useful manual for gravel road design and maintenance, particularly in semi-arid regions. <a href="http://www.arb.com.au/admin/file/content13/c6/LocalRoadsNews69.pdf">http://www.arb.com.au/admin/file/content13/c6/LocalRoadsNews69.pdf</a>
	World Bank 2010. Highway Development and Management Model-HDM-4, The World Bank Washington, DC. (Available at: <a href="http://www.worldbank.org/transport/roads/rd_tools/hdm4.htm">http://www.worldbank.org/transport/roads/rd_tools/hdm4.htm</a> )





# Summary

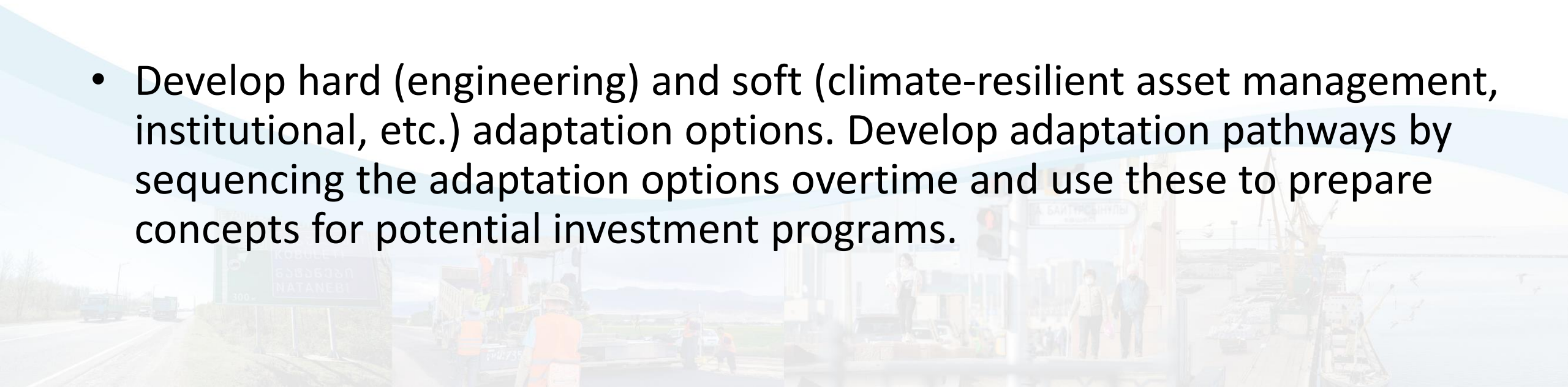
- **Formal launch during ADB Transport Forum, 14<sup>th</sup> and 16<sup>th</sup> May 2024**
- **Additional good practice guides can be included on a continual update basis**
- **Join our Green Roads Webinar Series to learn more**



# Climate Adaptation Pathways and Investment Concepts

# Project Goals

- Undertake a criticality analysis of the transport system in selected DMCs (including Pakistan) aimed at quantitatively measuring the importance of each transport link and the disruptive impact on the transport system if this link becomes unavailable due to climate-related shocks
- Conduct a multi-hazard risk analysis for transport network in relation to climate change and applicable geohazards
- Develop hard (engineering) and soft (climate-resilient asset management, institutional, etc.) adaptation options. Develop adaptation pathways by sequencing the adaptation options overtime and use these to prepare concepts for potential investment programs.



# Transport risk analysis -> a multi-layered approach

## Hazard Database

 Hazard footprint

## Asset-Level Exposure & Vulnerability

 Origin/Destination

## Network Failure & Service Disruptions




 Infrastructure Services

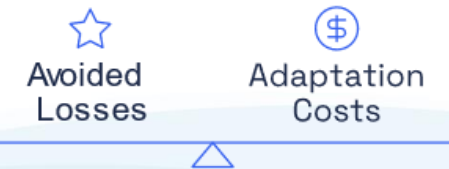
## System-level Risks

 Regional loss metrics



## Adaptation Appraisal

-  Asset-level strategies
-  System-level strategies
-  Network-level strategies

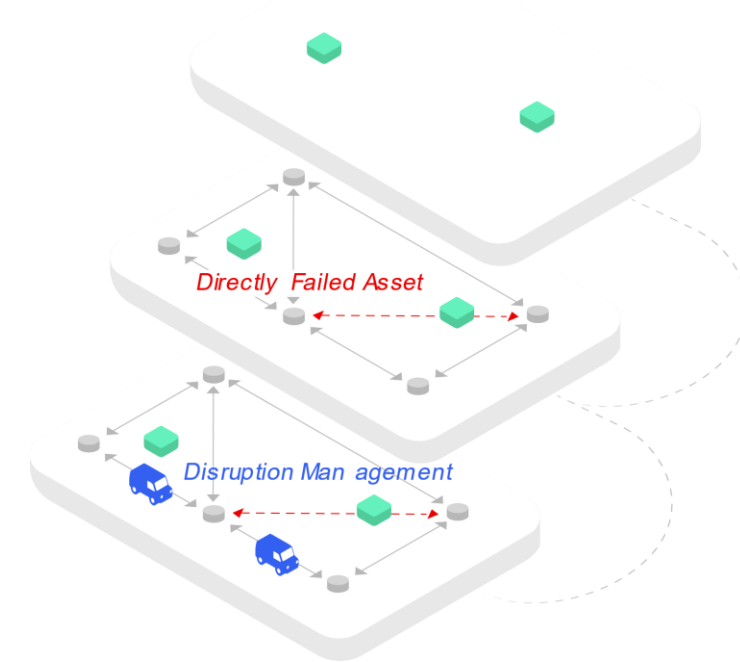
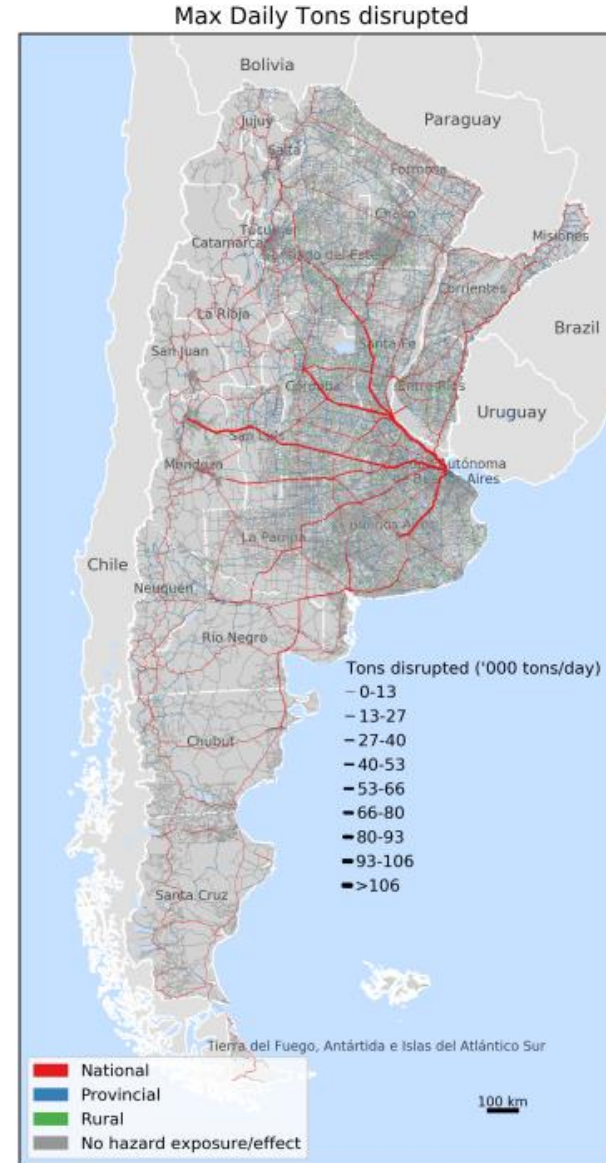


 Investment decisions

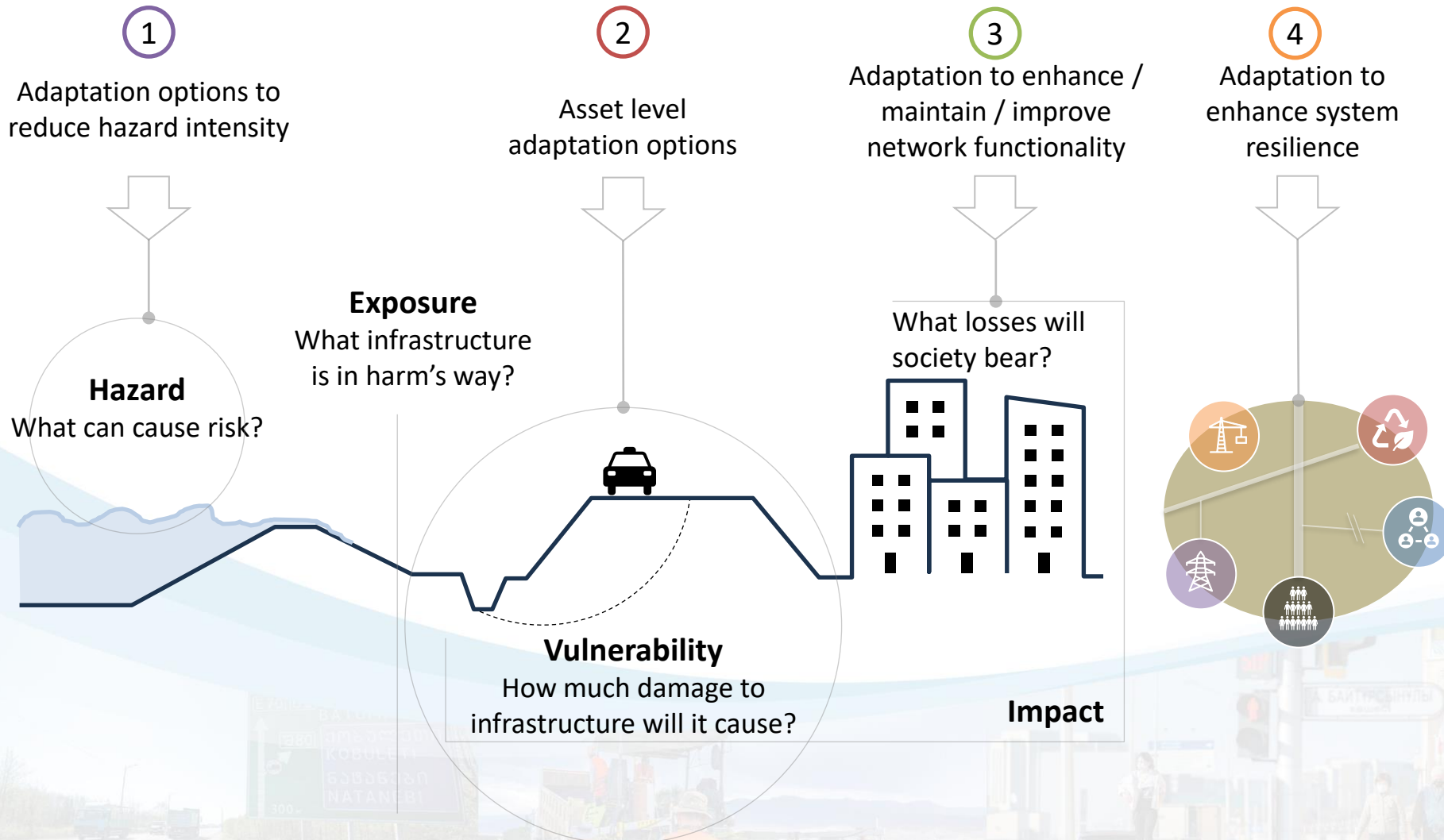
# Transport risk analysis -> network-level disruptions

Estimating and disrupting services by combining:

- network information (e.g. topology characteristics)
- the assets that are potentially vulnerable (hotspot analysis)
- information about network usage (capacity and usage)
- This allows for a better estimation of the real consequences (and costs) of disruptions. And helps prioritize investments.

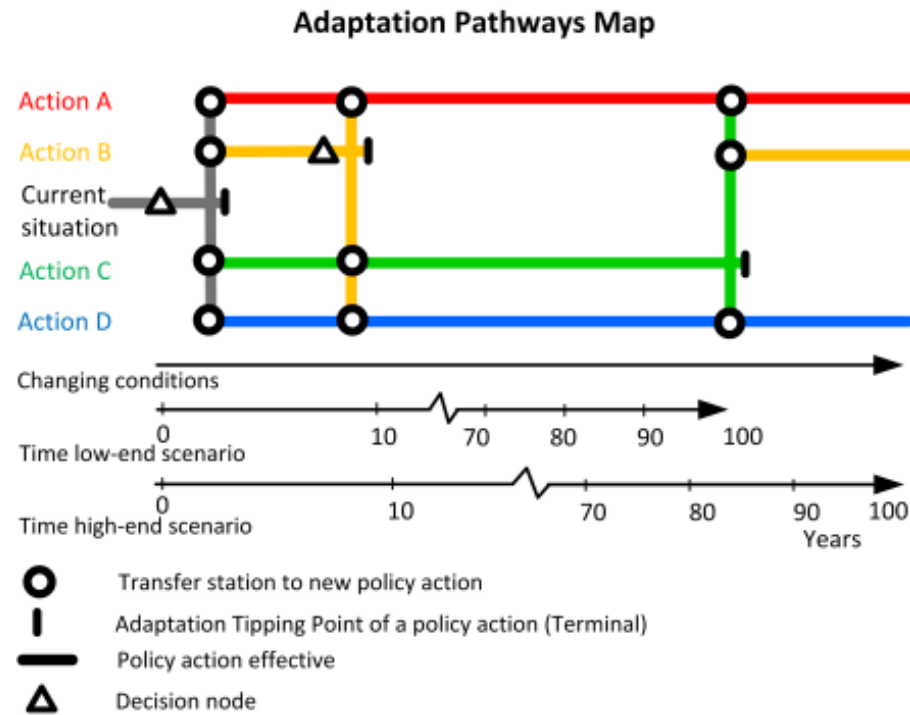


# Transport risk analysis -> Adaptation Appraisal



# Transport risk analysis -> adaptation appraisal

- Adaptation pathways can be a valuable tool for mapping out various adaptation strategies and comparing them.
- For instance, they assist in finding a balance between incremental adaptation and transformative adaptation.
- While incremental adaptation is often cheaper in the short term, transformative adaptation may be necessary to become climate-resilient to more extreme changes.



**Costs and benefits of pathways**

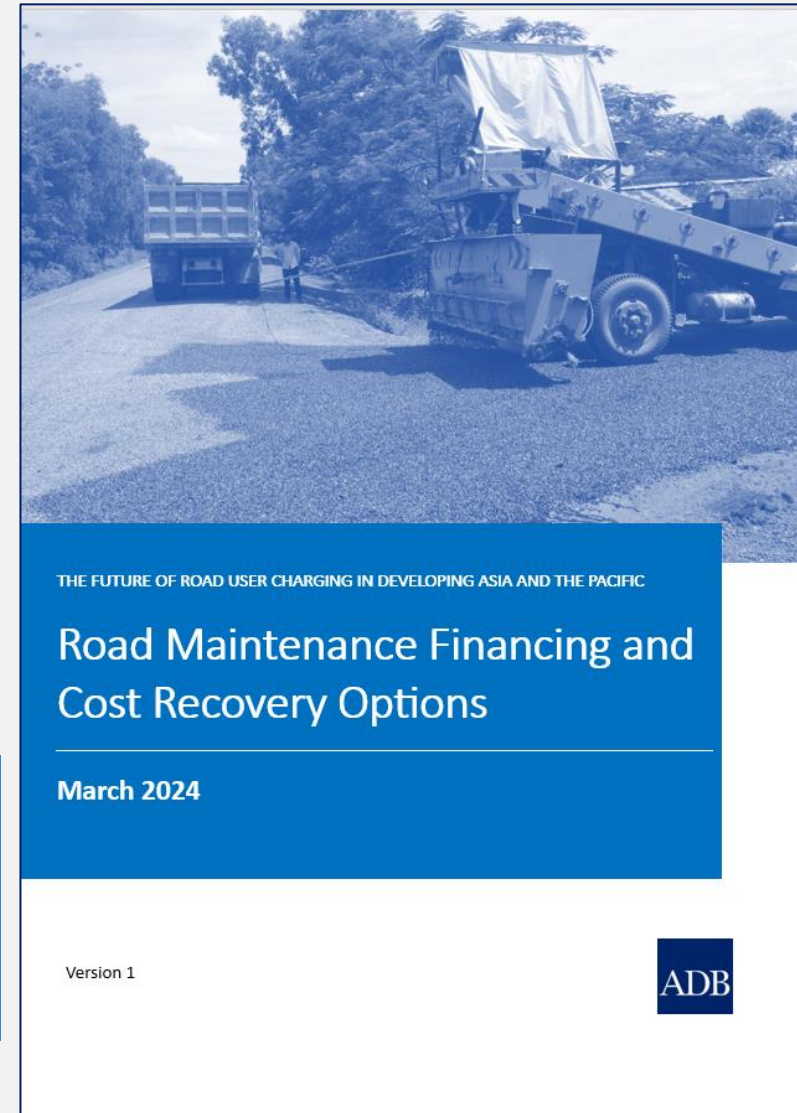
Time horizon 20 years			
Time horizon 50 years			
Time horizon 100 years			
Pathway	Costs	Benefits	Co-benefits
1	+++	+	0
2	+++++	0	0
3	+++	0	0
4	+++	0	0
5	0	0	-
6	++++	0	-
7	+++	0	-
8	+	+	---
9	++	+	---

Pathways that are not necessary in low-end scenario

# Mapping the Future of Road User Charges

March 2024

ADB TA's for PNG - Status Update



THE FUTURE OF ROAD USER CHARGING IN DEVELOPING ASIA AND THE PACIFIC

## Road Maintenance Financing and Cost Recovery Options

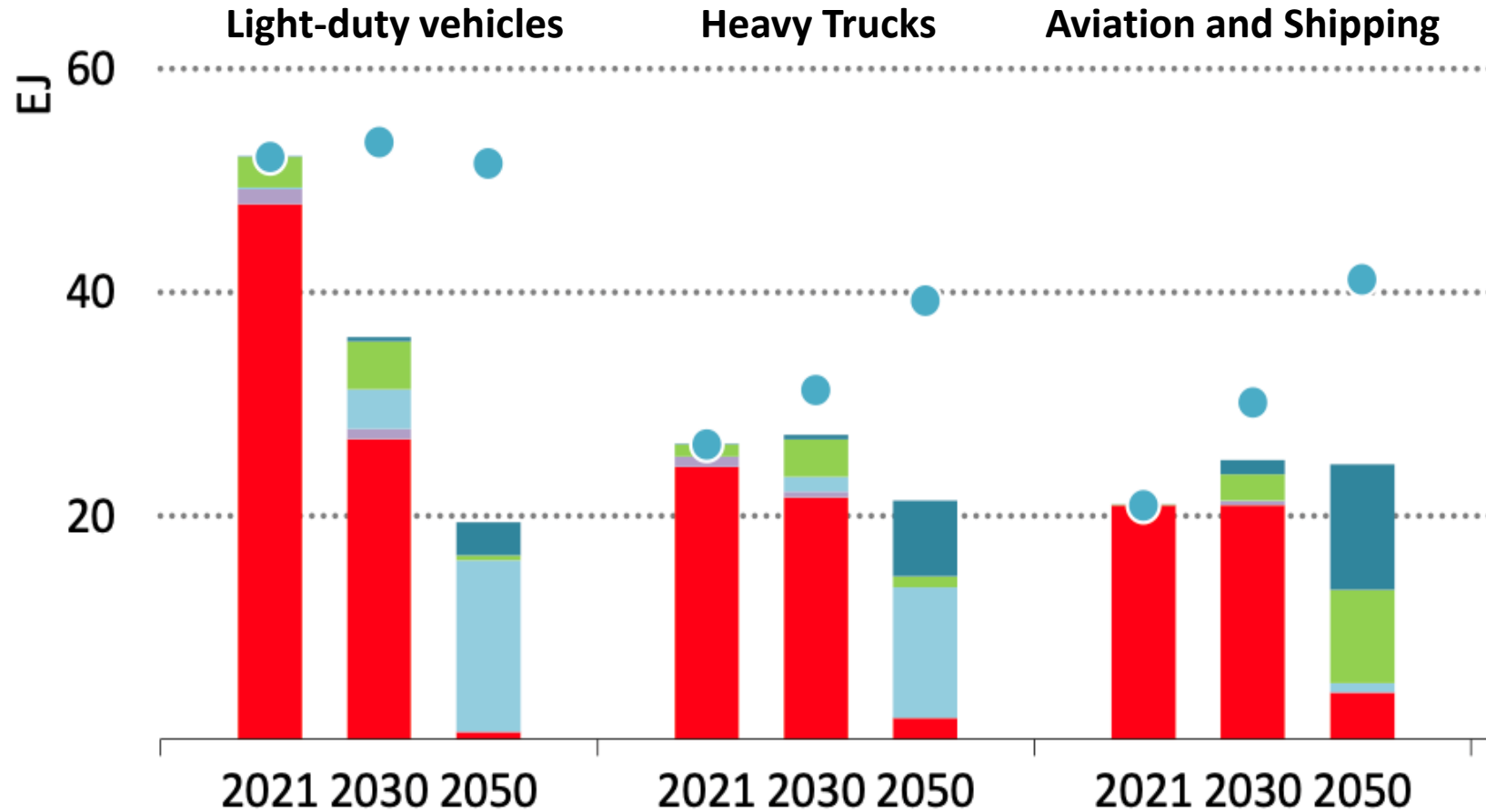
March 2024

Version 1

ADB



# Objectives



- 1. Current Funding Approaches** – identify main sources of road user charge revenues
- 2. Technology Options** – Review and recommend on existing and emerging technologies to collect road user charges and incentivize decarbonization
- 3. Transition Roadmap** – develop RUC transition roadmap for 10 countries covering Asia and the Pacific.

■ Oil 
 ■ Natural gas 
 ■ Electricity 
 ■ Bioenergy 
 ■ Hydrogen and hydrogen-based fuels

● STEPS = Stated Policies Scenario

# Training and Workshops – ADB Transport Forum

Time	16 May 2024	15 May 2024
Morning	Road User Charging Systems for a Green Future	HDM-5 Development
	Changing Cities with Active Mobility	E-mobility Roadmap
	ADB-Korea Climate Technology	Green Ports and Shipping
Afternoon	Green Roads Toolkit	Green Ports and Shipping
	Metro Rail. From corrective to preventive maintenance	
	Safe and Sustainable Urban Streets	

# Thank you

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