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**AFDI Lecture Series to Commemorate
30 Years of Partnership
between the
Asian Development Bank
and the
People's Republic of China**

**Connecting People, Places, and Markets
in the PRC:
The Role of Sustainable Transport**

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Part 1: Introduction to ADB in the PRC

ADB in Brief

- Founded in 1966
- Goal is an Asia Pacific free of poverty
- 67 member countries – 48 regional, 19 nonregional
- HQ in Manila, 29 resident missions, 3 rep offices
- Provides loans, grants, TA, equity, policy dialogue
- In 2015 ADB provided \$27B of assistance in total
- Assistance to the PRC is about \$1.5 billion per year

ADB's Role in Infrastructure Development

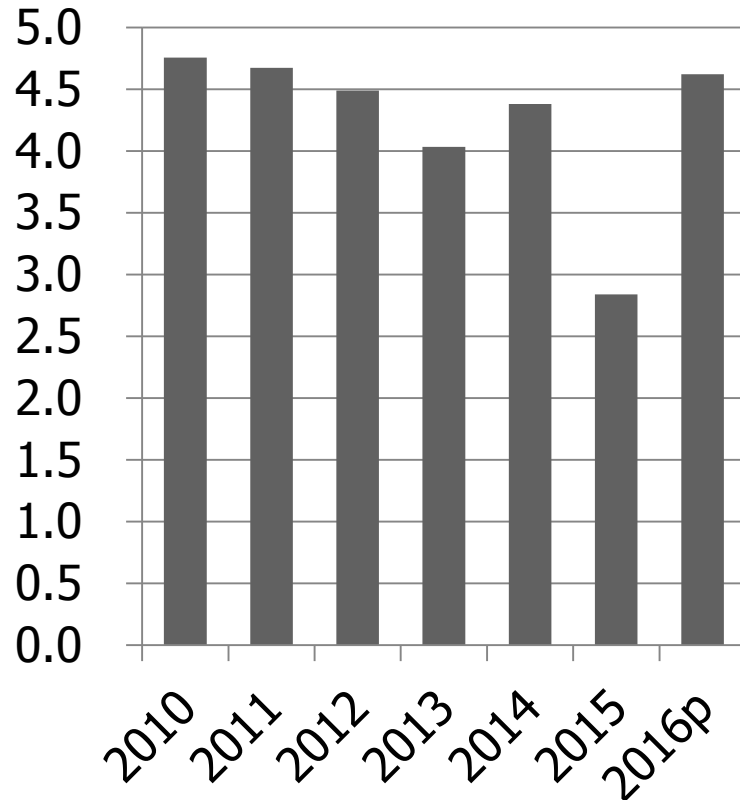
- Preparing, planning and packaging projects
- Introducing improved technologies to achieve quality infrastructure
- Support and advice during implementation
- Market-based, concessional, innovative financing
- Credit enhancements & equity investments to share risks with private sector
- Environmental and social safeguards
- Developing the regulatory environment

Massive investment needs

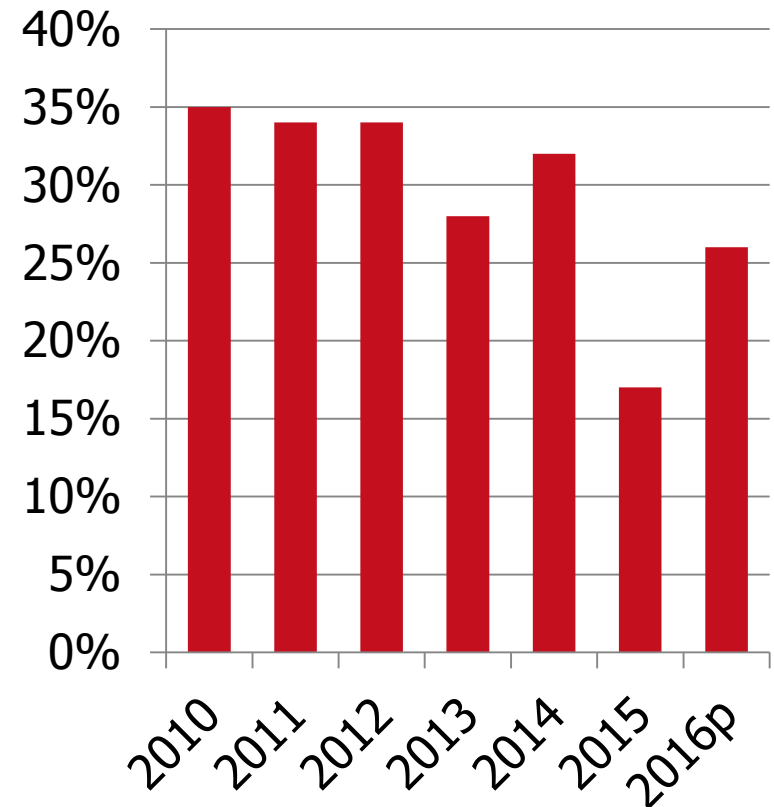
- \$2.5 trillion needed for transport in developing Asia from 2010-20
- Poor countries and regions need basic access
- Others face capacity bottlenecks
- Asia's rapidly growing cities need urban transport

Transport is largest sector for ADB lending

Transport lending (\$ B)



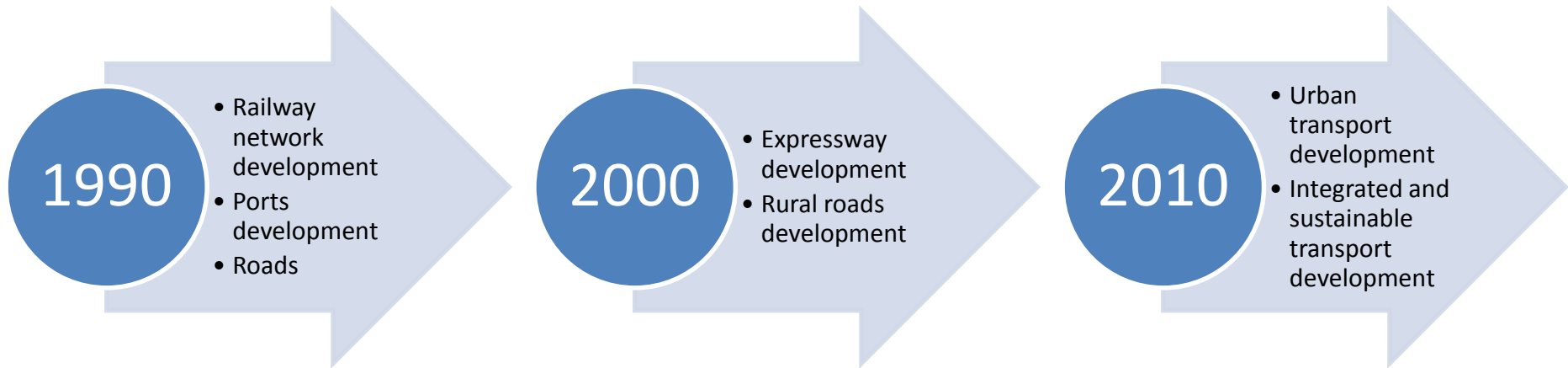
Share of ADB lending



Transport is largest sector for PRC loans

PRC Portfolio and Sector Distribution (1986–2015)			
Sector	Number of Loans	Approved Loan Amount	
		\$ million	%
Transport and ICT	95	17,027.5	54.8
Agriculture and Natural Resources	38	3,641.3	11.7
Education	4	300.0	1.0
Water Supply and Other Municipal Infrastructure and Services	34	4,051.2	13.0
Finance	8	680.0	2.2
Industry and Trade	5	674.8	2.2
Energy	38	4,199.8	13.5
Multisector	5	510.1	1.6
Total	227	31,084.7	100.0

The PRC transport portfolio has evolved: three distinct phases



Part 2: Why transport?

The development context

- Problems . . .
 - Need to connect people and markets
 - Poor infrastructure, high costs
 - Poor sector governance, weak regulation
- Opportunities . . .
 - Transition from rural to urban production
 - Creation of diversified modern economies
 - Specialization and comparative advantage
 - Beneficial for socio-economic development

Video: transport for economic development

Infrastructure investment is the key

- Infrastructure facilities and services are prerequisites to social and economic development.
- Sustained growth requires continuous, predictable, and affordable transport infrastructure and services.
- These conditions support productivity, investment, job creation, human development, and country competitiveness

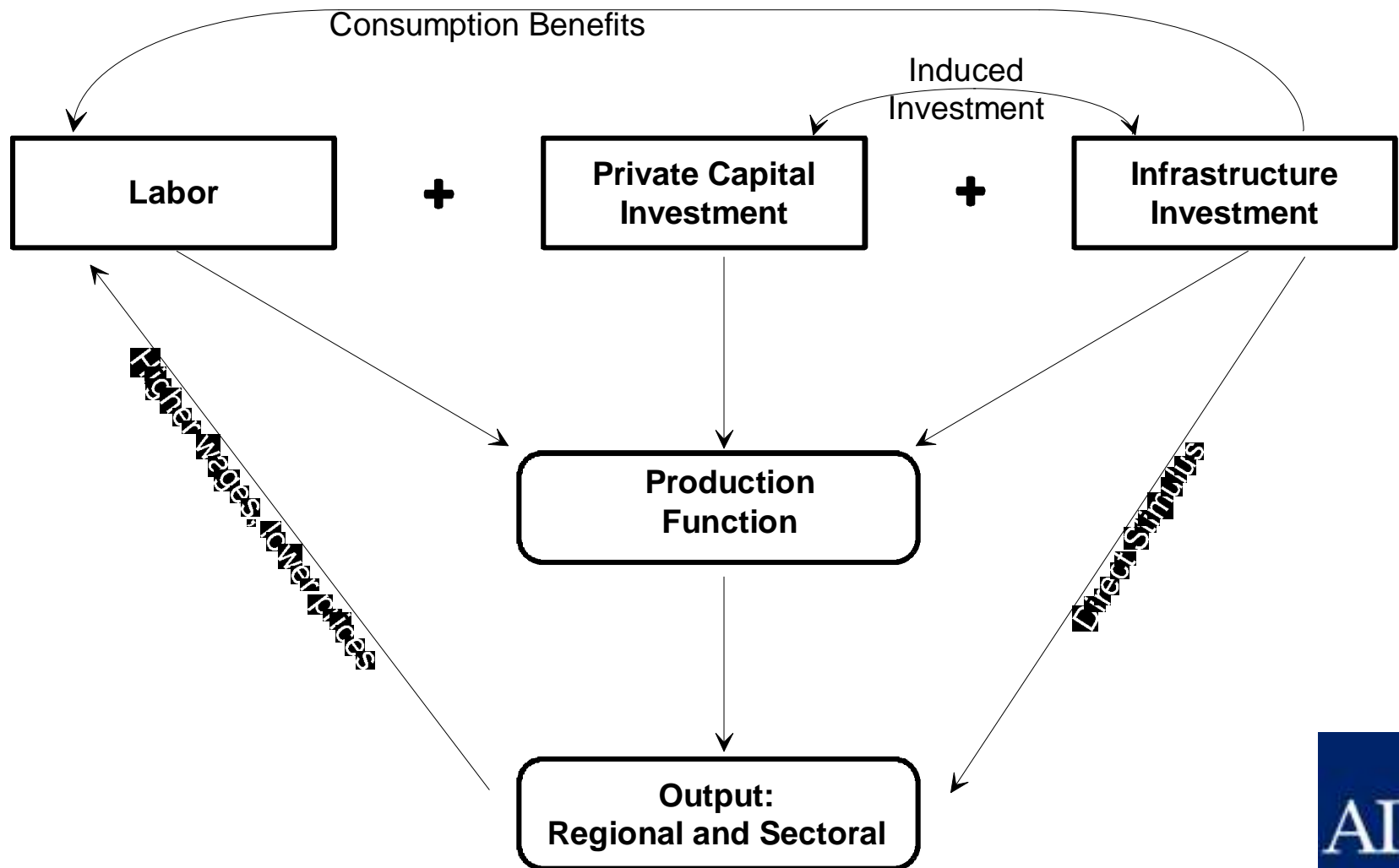


Timor Lste

Opportunity: the role of infrastructure

- Why countries develop and grow
 - use of resources
 - economies of scale and scope
- The contribution of infrastructure and services
 - productive input
 - effects on labour and capital
- The socio-economic impacts
 - sectoral development
 - social development

Opportunity: the role of infrastructure



What are the challenges?

- Scale, scope, and geography
- Financial, technical, and managerial capacity
- Institutional and policy constraints
- Too many state enterprises
- Limited private sector
- The quality of regulation and oversight



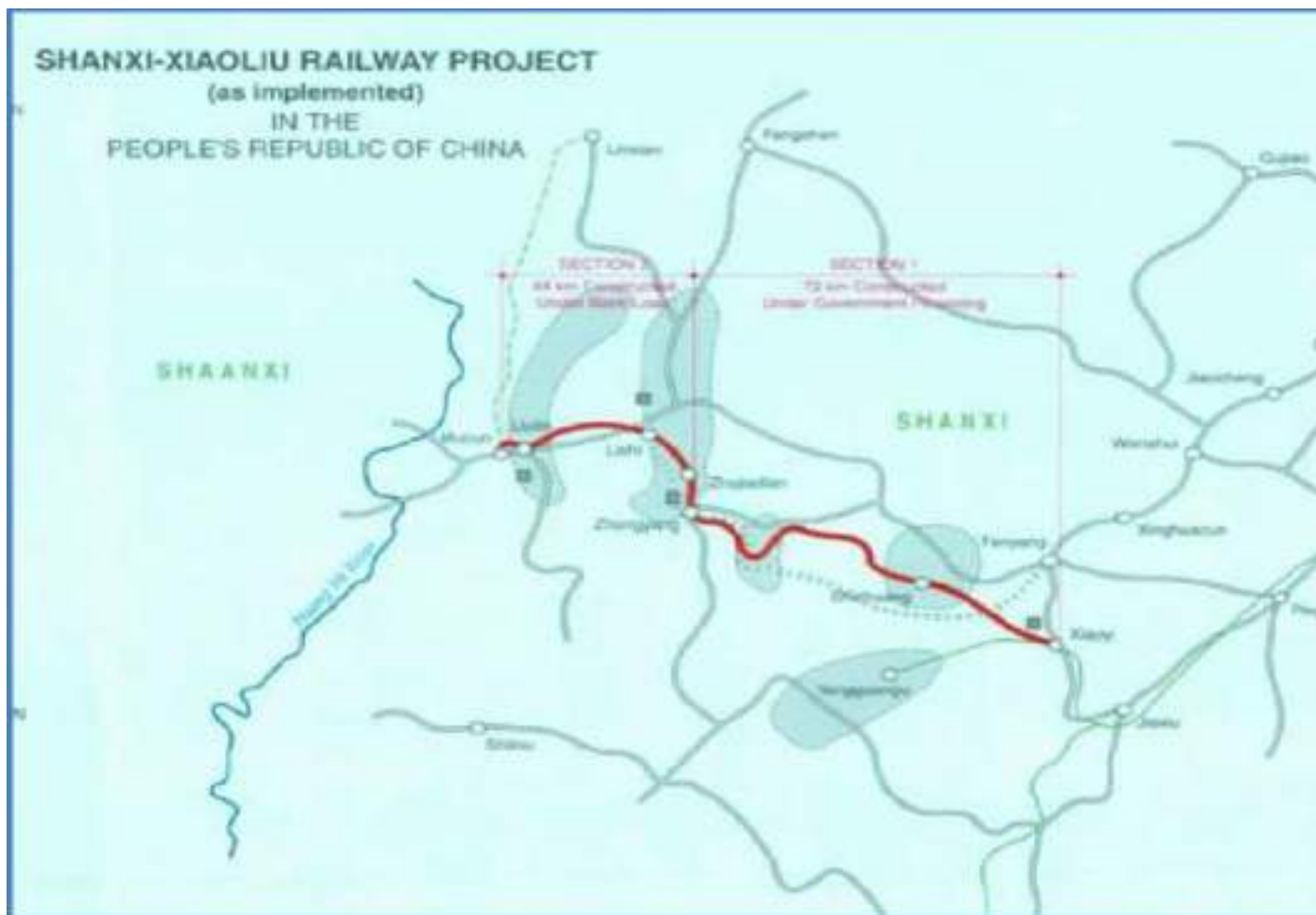
An integrated approach

- Financing of priority infrastructure, operations, and maintenance through loans
- Support for policy reforms, institutional development, and management through TA
- Monitoring and managing for development results



Case Study 1: Shaanxi Xiaoliu Railway

Shaanxi-Xiaoliu Railway



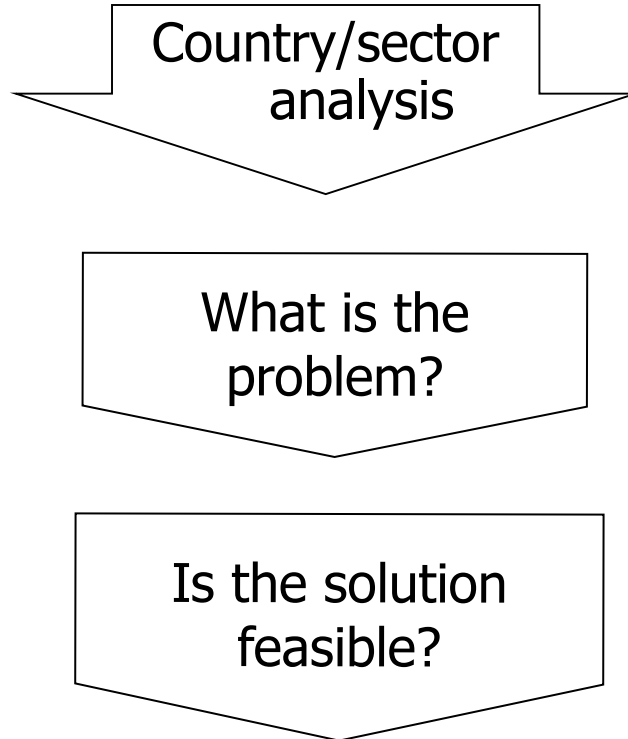
Shaanxi-Xiaoliu Railway

- ADB's first infrastructure project in the PRC
- Approved 1988, successfully completed in 1993
- \$40 million to build 44 km with 4 stations, tunnels, bridges, signalling, workshops
- Technical assistance to strengthen institutional capacity of rail operator

Development context

- One of the poorest areas in PRC, but a clear development plan
- Population of 2.7 million, GDP = 1/3 average
- Significant transport bottlenecks to expand energy and industry
- Primary objective to support expansion of coal industry, provide inputs for power and industry, and increase trade
- Investment and institutional strengthening required to implement

Dimensions of Economic Analysis

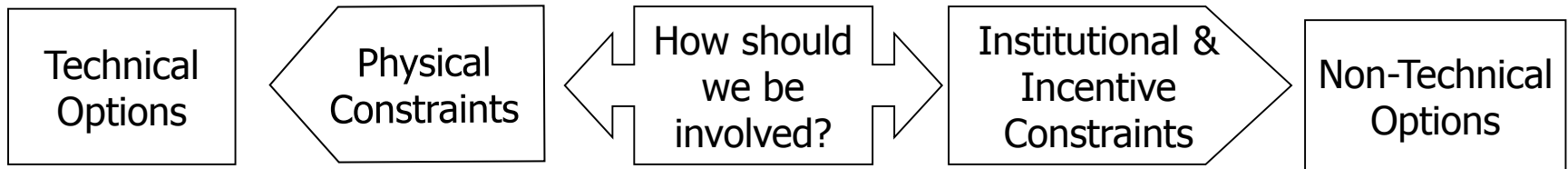


These questions identify basic problems/needs, underlying causes, and appropriate answers

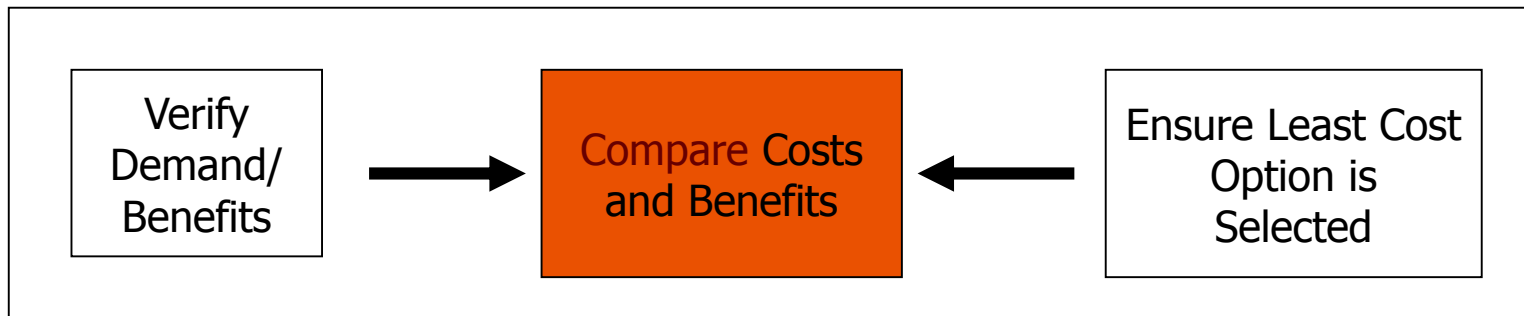
Economic Analysis

- More than rate of return calculations; Integrated framework/tool to select and design good projects
- To help identify areas where investment is needed
- To establish the economic rationale for public sector involvement
- To help make the choice among alternative instruments and solutions
- To assess a project's economic benefits and costs, potential development impact, and potential risks

Economic Analysis



There is a menu of choices for taking actions;
solutions must be appropriate to achieve goals



Benefit Identification

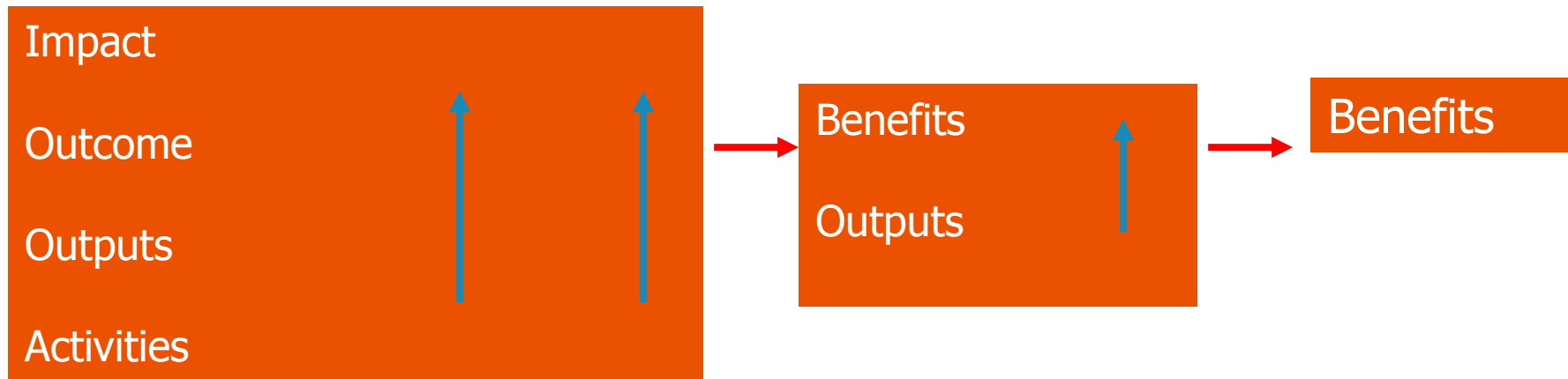
Define Targets
(from Project Framework)

Specify Outputs-to-Benefits
Linkage

Value Benefits,
use in EIRR
calculation and
distributional
analysis

Target

Risks/Assumptions



Economic analysis procedure over time

Benefit Identification: Transport Sector

Type of Project	Potential Non-incremental Benefits	Potential Incremental Benefits
a) Road Improvement/ Rehabilitation	<ul style="list-style-type: none"> i) Reduced operating costs for existing traffic ii) Reduced operating costs for traffic diverting from alternative route iii) Travel time savings iv) Reduced road maintenance expenditures 	Willingness-to-pay of new traffic generated by improved conditions of road.
b) Railway Construction	<ul style="list-style-type: none"> i) Resource cost savings from diverting from roads ii) Resource cost savings for traffic remaining on existing roads (reduced congestion) 	<p>Willingness-to-pay of new cargo and passenger traffic.</p> <p>Increased trade.</p>

Shaanxi-Xiaoliu Railway

- Projected FIRR = 6.6%
- Projected EIRR = 19.0%
- Since completion, in only 5 years;
 - Communities and industrial plants built
 - Industrial production increased by 27 %
 - Per capita income grew by 25 %

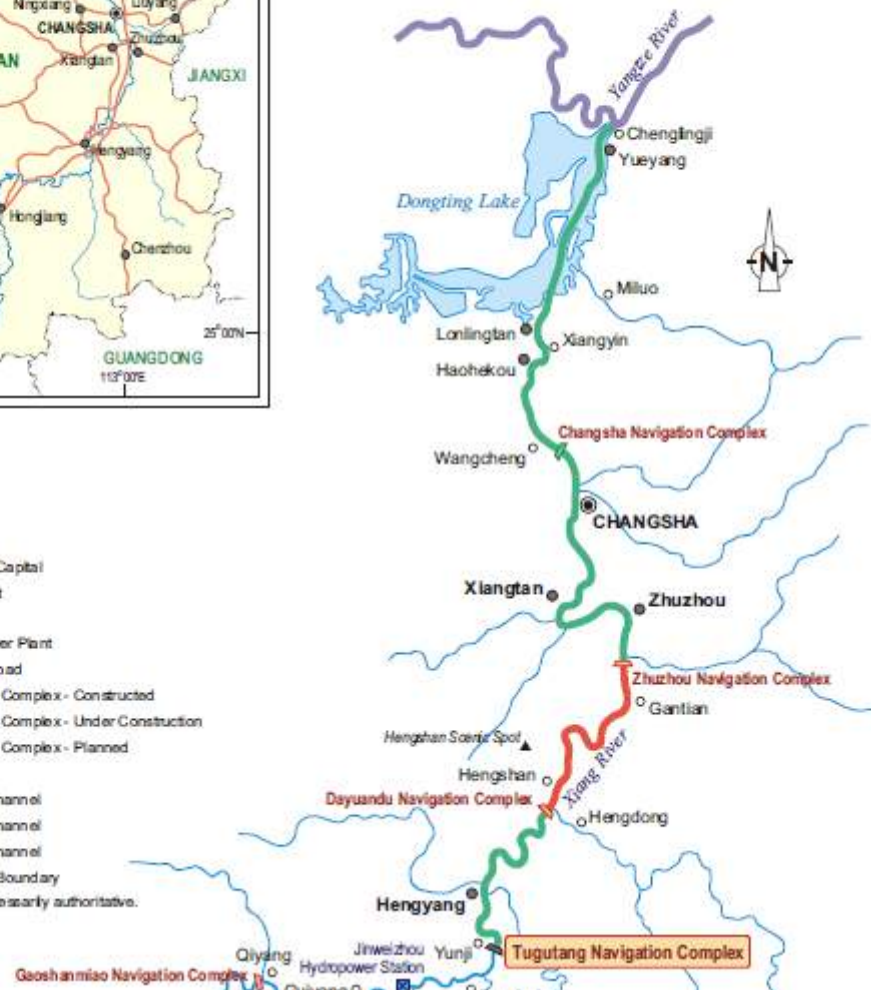
Case Study 2: Hunan Inland Waterway

Hunan Inland Waterway



- Provincial Capital
 - City/District
 - County
 - Hydro Power Plant
 - National Road
 - Navigation Complex - Constructed
 - Navigation Complex - Under Construction
 - Navigation Complex - Planned
 - River
 - Class I Channel
 - Class II Channel
 - Class III Channel
 - Provincial Boundary
- Boundaries are not necessarily authoritative.

PROPOSED HUNAN XIANGJIANG INLAND WATERWAY TRANSPORT PROJECT IN THE PEOPLE'S REPUBLIC OF CHINA



Hunan Inland Waterway

- ADB's first IWT project in the PRC; approved 2012, ongoing
- \$400 million for navigation, cargo and passenger terminals, and hydropower generation
- Capacity of waterway agencies enhanced
- ADB financed \$150 million, MOT \$50 million, Hunan province \$130 million, China Construction bank \$70 million

Development context

- Need to connect inland provinces with Yangtze river, but navigation conditions poor
- IWT is the lowest cost transport mode for bulk shipments, but need larger vessels and ports
- Improving river channels and raising levels creates opportunities for irrigation, power

Hunan Inland Waterway



ADB

EAST ASIA

Hunan Inland Waterway

- Projected FIRR = 3.3%
- Projected EIRR = 14.0%
- At completion:
 - Cargo traffic should increase 5% per year
 - Maximum vessel size will double and keep tariffs low
 - 290,000 tons of CO₂ eliminated via hydropower

Part 3: Sustainable Transport

2 sides of transport...

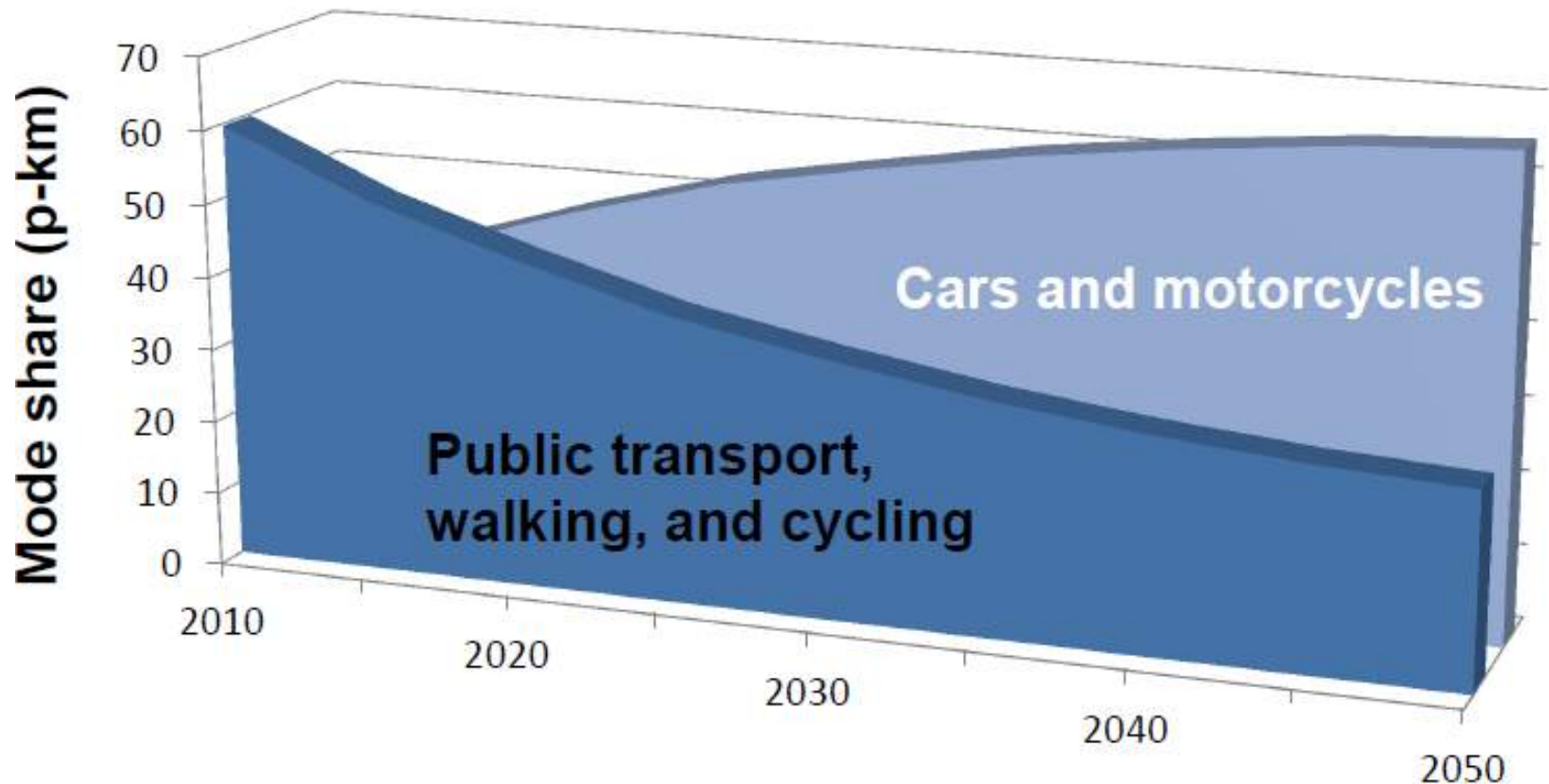
- Transport **enables** economic & social activity, provides access to opportunities, services
- But it also has **negative effects** too - congestion, emissions, environment impacts, accidents

Video: transport challenges and the role of MDBs in addressing them

Extending access, connectivity



Problem of rapid motorization



Source: ADB and IEA, 2011

Congestion



2-5% of GDP

Air pollution



2-4% of GDP

Rising GHG emissions

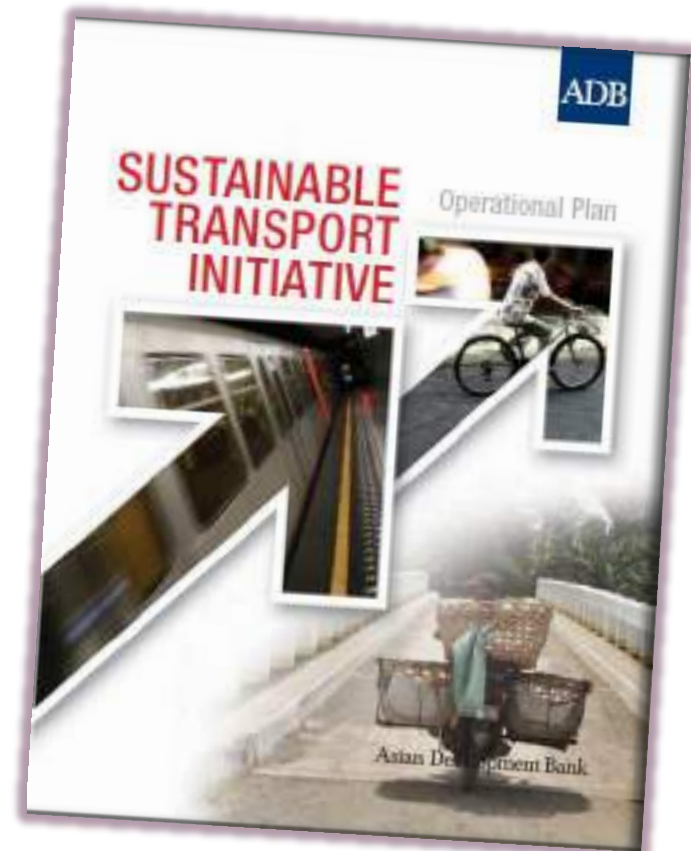
- Transport is **23%** of global energy-related GHG emissions
- Land transport is $\frac{3}{4}$ of transport GHG emissions
- Land transport GHG emissions to **double by 2050** based on current trend

Unsafe roads

- **645,000 annual road deaths** and 30 million injuries in developing Asia
- Leading cause of death for 15-44 year olds, 2nd leading cause for 6-14 year olds
- Costs 2-5% of GDP

ADB's Sustainable Transport Initiative

- To respond, STI approved in 2010
- Aims to transform ADB transport operations
- Covers a 10 year period, 2010-20





Sustainable transport is...

- ✓ Accessible
- ✓ Affordable
- ✓ Environment friendly
- ✓ Safe

Avoid-Shift-Improve Paradigm

Avoid
the need to
travel

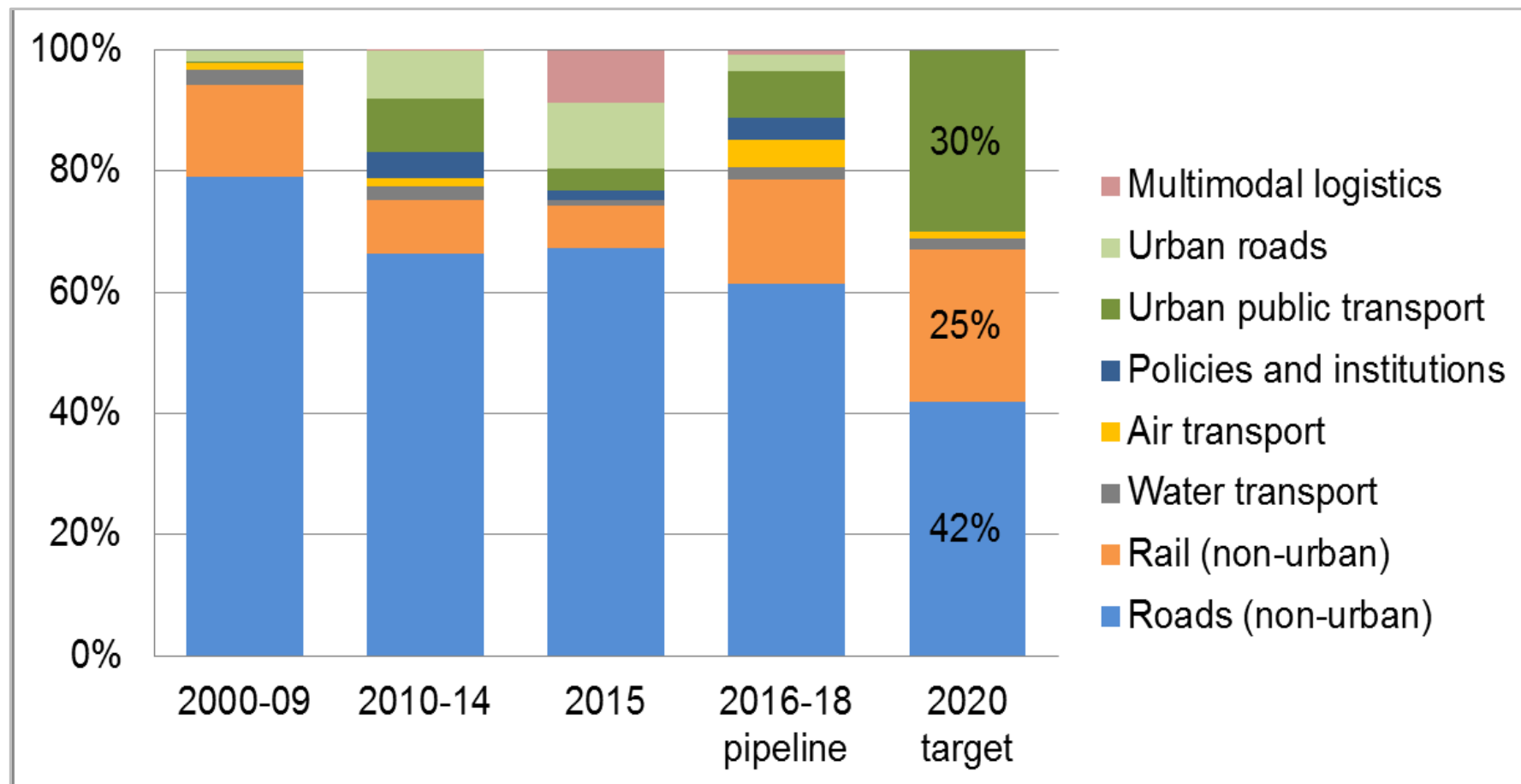
Shift
to sustainable
modes

Improve
efficiency of
all modes

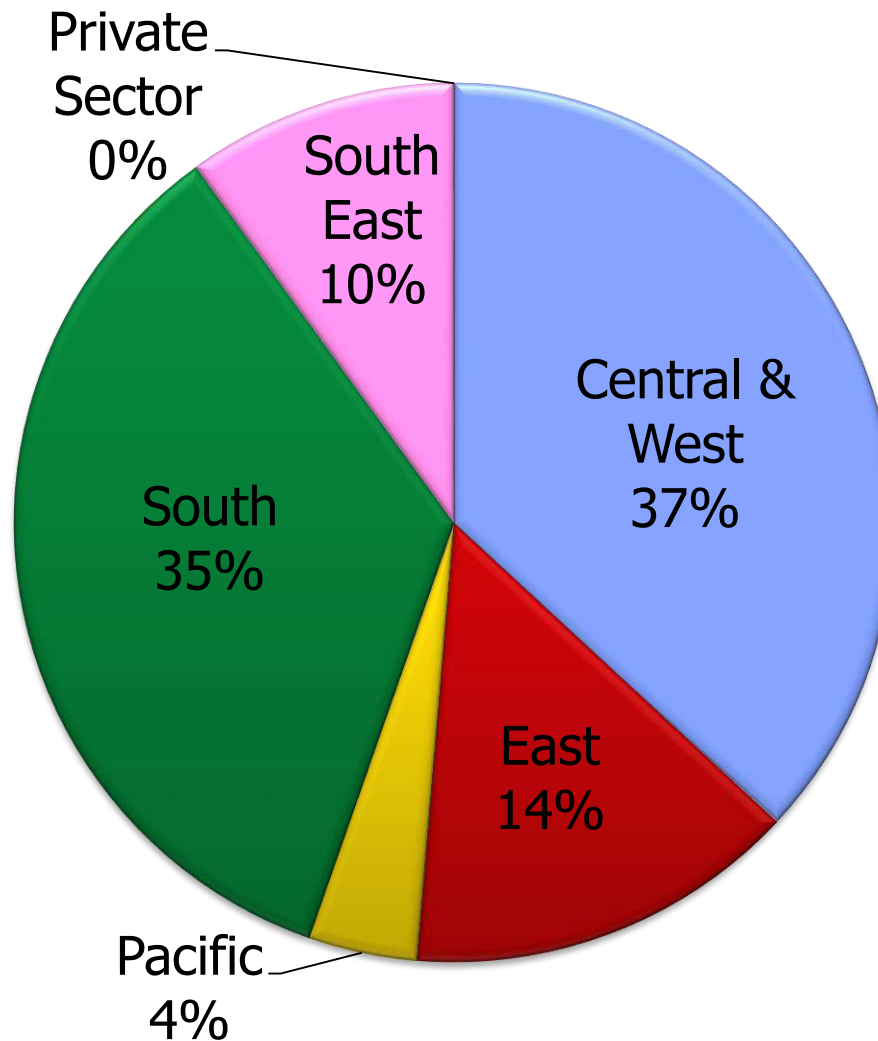


**Lower congestion, emissions,
air pollution, road accidents
Better health**

STI targets and progress



Transport approvals by subregion, 2015

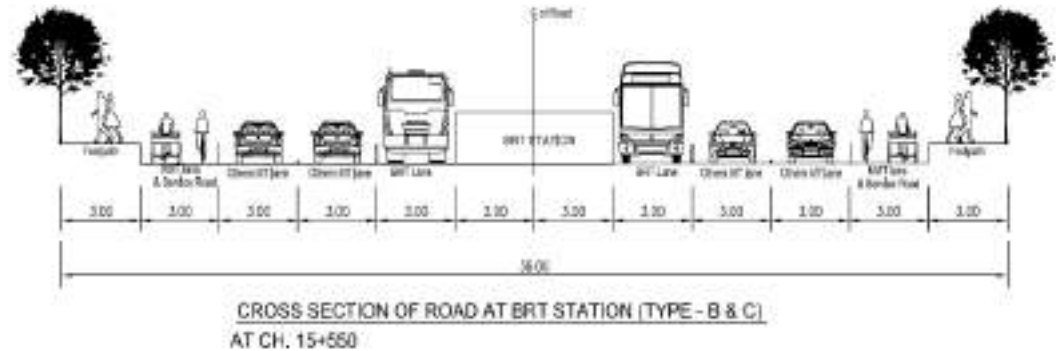


ADB transport operations: 2015 in numbers

Total of **28** loans and grants and **29** technical assistance projects approved

Projects represented a total of **\$2.8 billion** in ADB investment, 17% of total ADB

Serving **25** countries



Video: planning better transport to mitigate climate change

Part 4: Future Opportunities

Future opportunities for innovative transport projects

- Mass transit: rail and bus
- Multimodal transport hubs: pax and freight
- Energy efficient and safer technologies
- Intelligent transport systems
- Electronic road pricing systems
- Electric vehicles
- Green urban corridors

Future opportunities: Metro and light rail mass transit

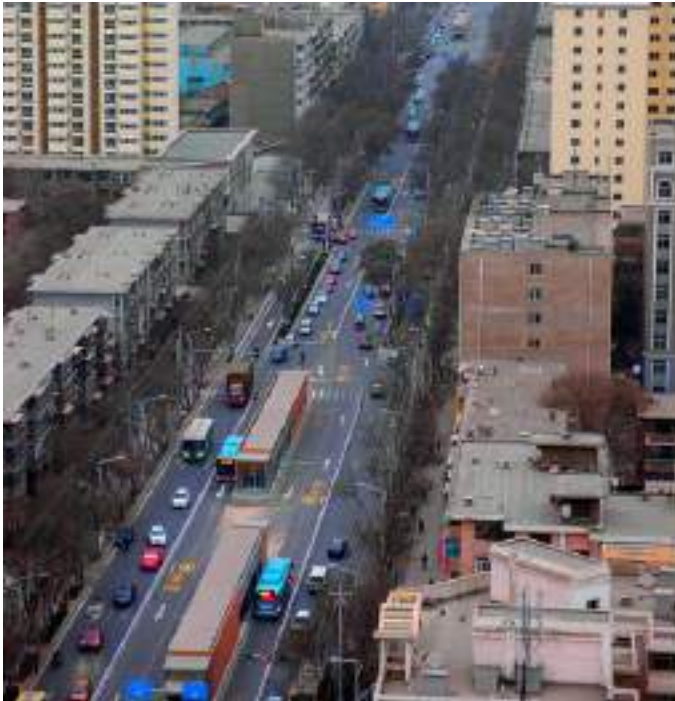


Future opportunities: Metro and light rail mass transit

General rationale	High quality high volume mass transit needed for large, densely populated cities
Types of high-level technology	Overall system design Advanced tunneling Traction system Locomotives and rolling stock Signaling and train control system Telecom Electronic fare collection Train information system for users
Approved projects	Ha Noi and Ho Chi Minh metros, Viet Nam Jaipur metro, India; Tblisi metro, Georgia
Planned projects	Dhaka metro, Bangladesh; Colombo suburban light rail, Sri Lanka

Structure/scale-up finance for large rail and mass transit projects e.g. combine bonds, syndicated loans, guarantees, ADB sovereign financing

Future opportunities: Bus rapid transit



- ADB's first BRT project in Lanzhou, PRC – \$150m loan approved late 2009 for total project of \$462m
- Opened in late 2012, serves **300,000** daily trips
- Bikeshare for **10,000** bikes along BRT corridor

Future opportunities: Bus rapid transit

General rationale	Cities need affordable quality transit option while still at low/middle income stage Cost effective option for secondary cities
Types of high-level technology	Overall system design BRT stations installation Automated traffic management system Bus management system Electronic fare collection Bus information system for users
Approved projects	PRC: Lanzhou, Yichang, Fuzhou and Ji'an Dhaka, Bangladesh; Ulaanbaatar, Mongolia; Vientiane, Lao PDR
Planned projects	Karachi, Lahore and Peshawar, all in Pakistan; Astana, Kazakhstan; in dialogue with Philippines

Video: Lanzhou bus rapid transit

Future opportunities: Multimodal passenger hubs



General rationale	Well-designed hubs ensure ease of passenger transfer between modes, and create complementary commercial opportunities
Types of high-level technology	Advanced passenger station/hub design
Approved projects	TA on improving interchanges, PRC
Planned projects	E'mei-Miyi rail project, PRC Yuxi-Mohan rail project, PRC

Future opportunities: multimodal freight hubs



General rationale	Well-designed hubs ensure easy of passenger transfers between modes, and create complementary commercial opportunities within and near the hubs
Types of high-level technology	Advanced passenger station/hub design
Approved projects	No
Planned projects	Chongqing logistics project, PRC Inland customs depot proposals, South Asia

Video: Ports and waterways development

Future opportunities: energy efficient and safer technologies



General rationale	Introduce technologies by retrofitting or replacement
Types of high-level technology	Lower energy/lower emission and/or safer railway locomotives, rolling stock, buses
Approved projects	Railway energy efficiency and safety, PRC (nearing completion)
Planned projects	Locomotive energy efficiency project, India

Future opportunities: highways ITS

General rationale	Using information on traffic, road conditions and hazards improves transport efficiency and safety
Types of high-level technology	Travel information systems, road safety systems Vehicle registration systems
Approved projects	TA study of overall highway ITS architecture, PRC TA study of ITS for highway safety, PRC
Planned projects	Highway ITS in Kazakhstan, Papua New Guinea



Future opportunities: electronic road pricing

General rationale	Efficient, equitable and sustainable method of charging for road use and externality costs Pricing can moderate urban congestion and generate revenue to finance public transport
Types of high-level technology	Advanced systems for tracking and charging vehicles based on distance and/or time
Approved/planned projects	No

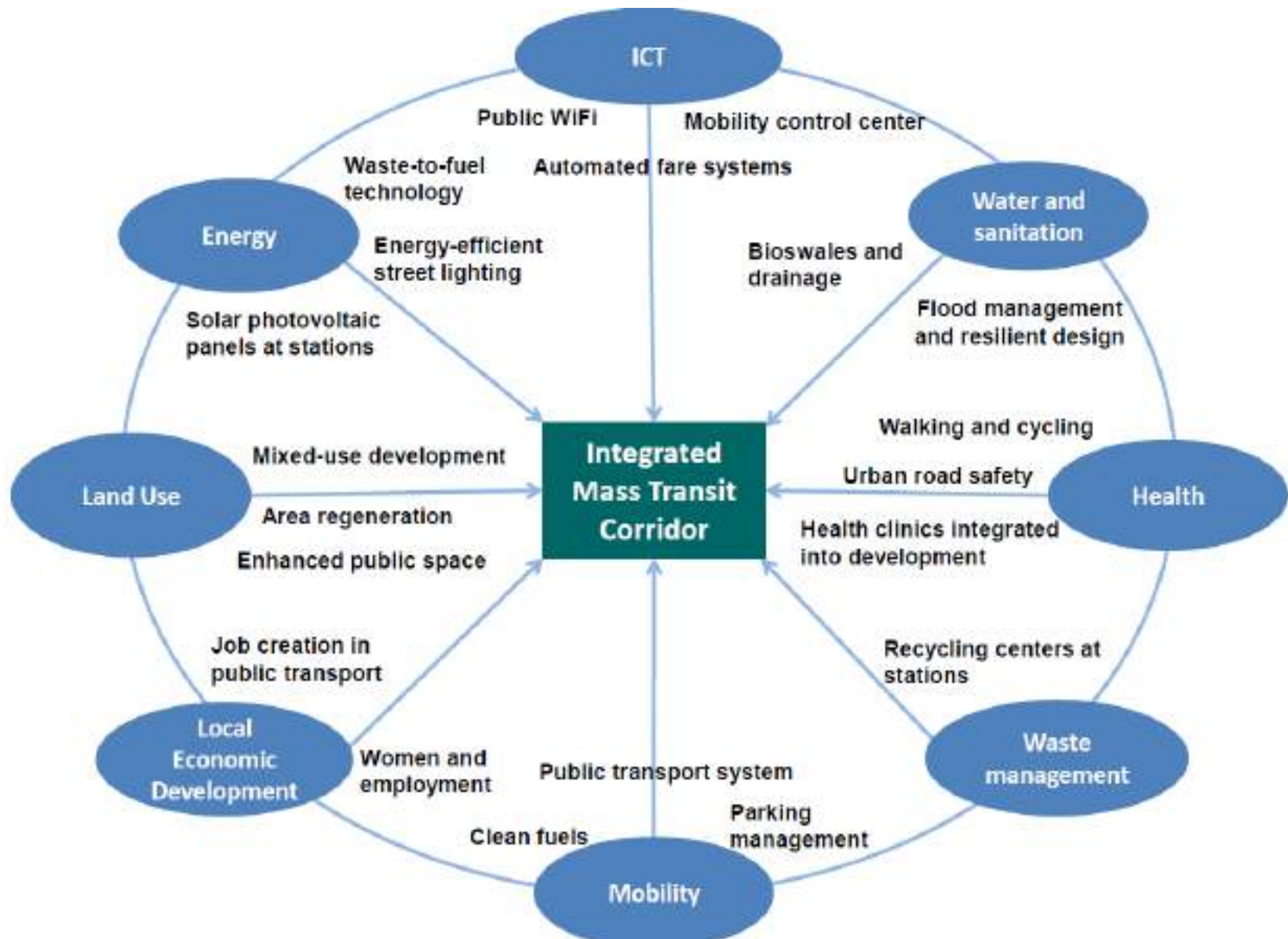


Future opportunities: electric vehicles



General rationale	Infrastructure facilitates e-vehicle take-up
Types of high-level technology	Charging infrastructure
Approved projects	e-trikes, Philippines
Planned projects	No

Future opportunities: green urban corridors built around mass transit



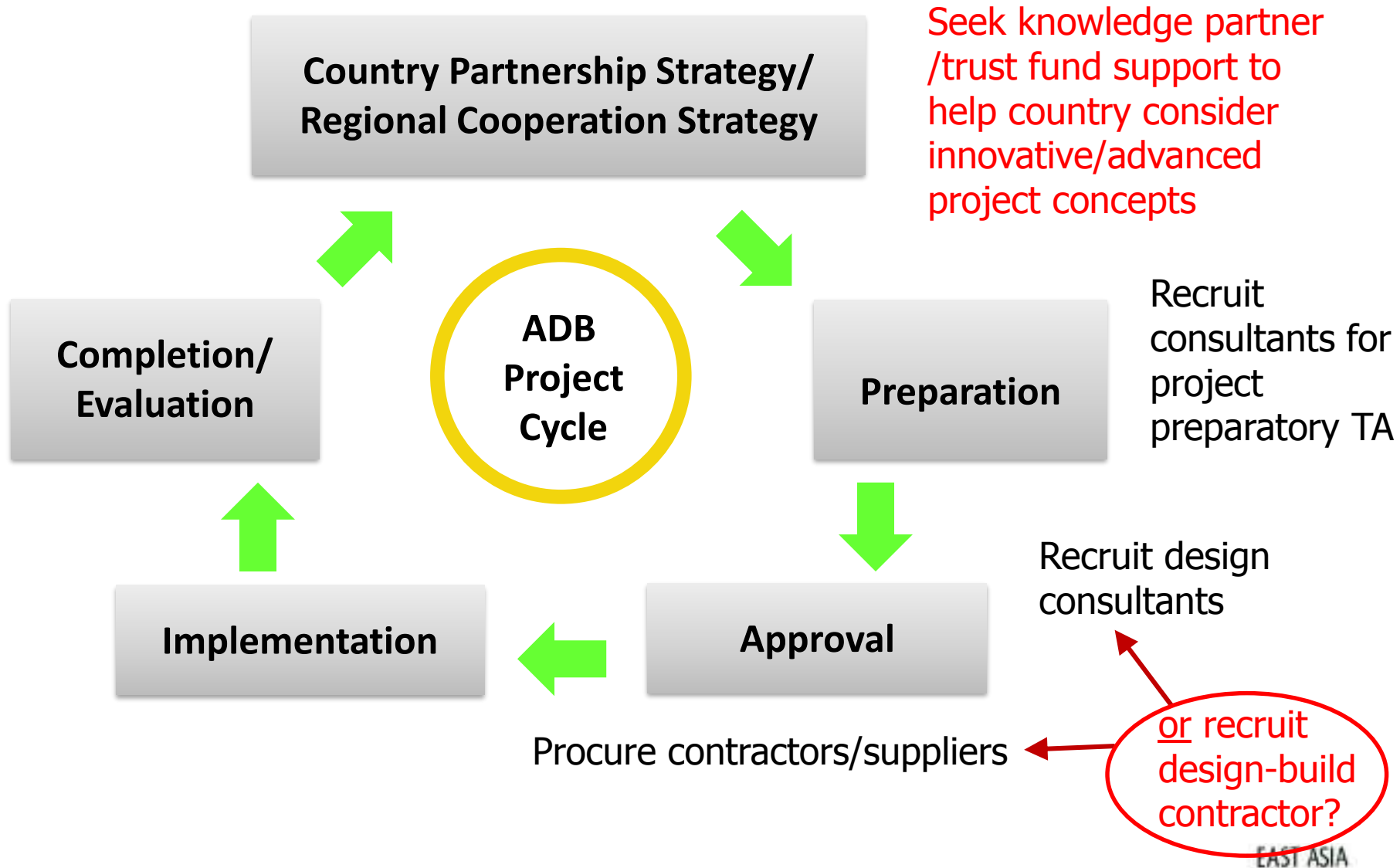
Future opportunities: green urban corridors

General rationale	Construction/renewal of strategic transport transit/pedestrian corridors creates opportunity for smart city development, with part of investment recoverable from land values and commercial activities. More green corridors can be added after initial success
Types of high-level technology	Wide-ranging – mass transit, nonmotorized transport, smart city design and implementation, commercial and residential property development
Approved projects	TA on future cities program. Urban trust funds available to support project concept development
Planned projects	No



Conclusions

Scope for developing innovative solutions within ADB project cycle



- **Transport is essential** for economic and social development
- **Transport is a major part of ADB operations** – about 1/3 of ADB lending in most years
- **ADB now focuses on sustainable transport** – more urban transport, railways, waterways and less roads
- **DMCs need more advanced solutions** to fit their situation
- **Opportunities exist now** to improve sustainability, urbanization, affordability
- **ADB works with partners to speed up transition** – Cofinancers, trust funds, knowledge partners, private sector

谢谢

Thank you!