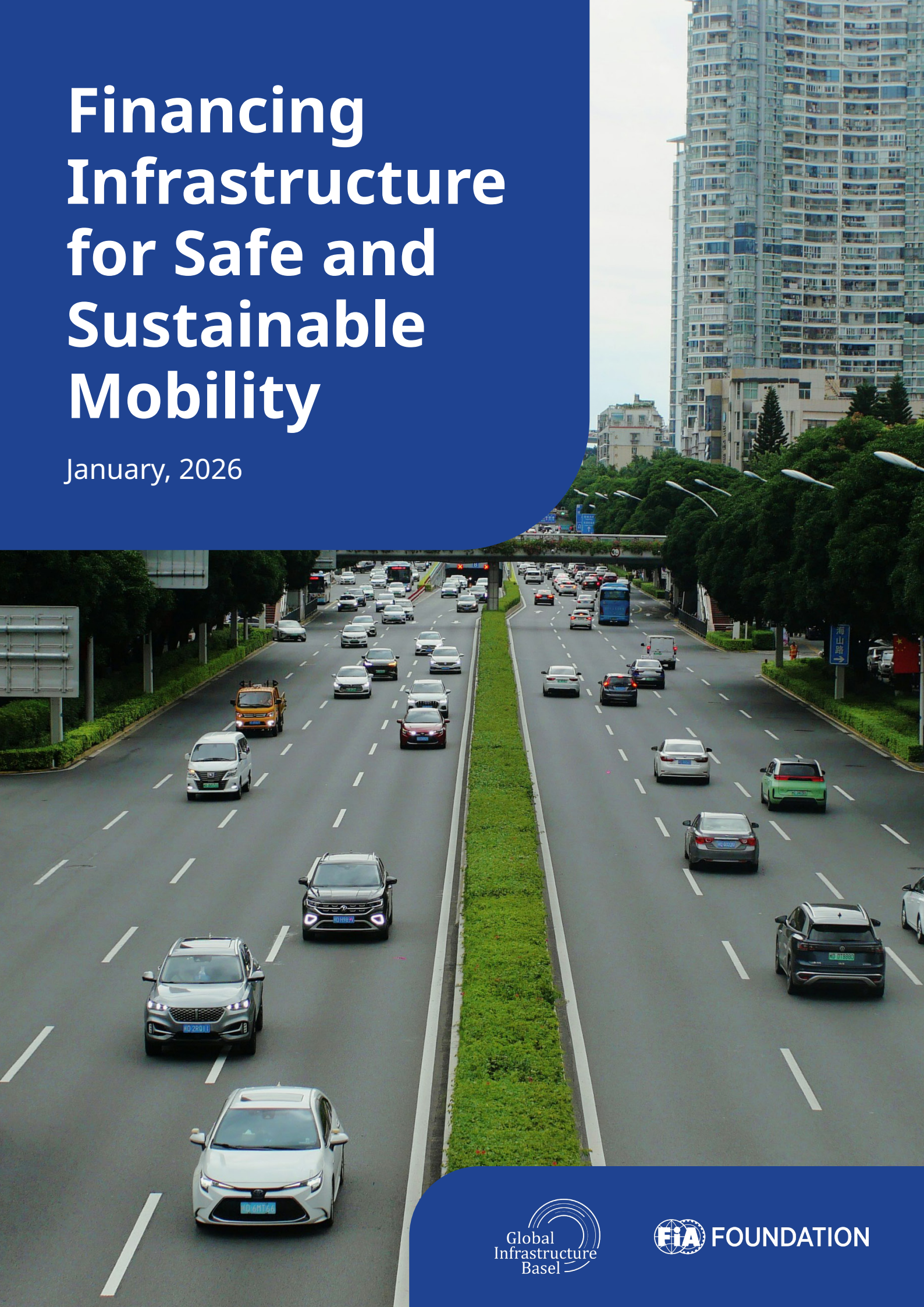
Financing Infrastructure for Safe and Sustainable Mobility

January, 2026



Global Infrastructure Basel

FIA FOUNDATION

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Financing Infrastructure for Safe and Sustainable Mobility

January, 2026

Publication Designed by City Collab
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Global Infrastructure Basel

FIA FOUNDATION

Foreword

Chairman of FAST-Infra Group (FIG), Founder and CEO of Meridiam

In infrastructure investment, the critical question is no longer *can* we deliver sustainability, but *how* do we structure it so that capital flows reliably toward systems that preserve the environment and improve people's lives. This has been Meridiam's mission since its creation 20 years ago, and it will continue to guide us in the decades to come.

The difference today is that we are no longer alone: most Development Finance Institutions (DFIs), along with many investors, have adopted policies, norms, and standards that make sustainability not just a premium, but a core decision-making criterion for investing in infrastructure projects. It is what FAST-Infra Group is advocating and demonstrating through its Label for Sustainable Infrastructure among other activities.

There is no domain where this is more urgent than in the mobility sector and more specifically in designing, financing and operating road projects: daily, in countless cities and rural corridors, each design decision, speed limit, and maintenance contract eases traffic, help reduce pollution and travel time on road, smoother journey, improve driving conditions and contribute to reinforcing safety.

For investors and asset managers, road safety must evolve from a reputational add-on to a measurable performance variable embedded in procurement, financing, and management of the assets. When safety is internalised, it becomes a source of value: reducing accident risk, insurance exposure, litigation costs, reputational liability, and costly retrofits. It also strengthens the social licence of infrastructure, an increasingly non-negotiable dimension of long-term finance.

In our portfolio of roads and mobility assets, we have begun to operationalise this principle such as in the US with the **SR 400 Express Lane** or in **Africa with the Dakar Mobility Projects**. We place emphasis on asset maintenance programmes and intelligent systems which detect defects early, thereby reducing fatal failure risk.

To mobilise private capital at scale for safer and sustainable roads, we must innovate in structuring financial instruments and in aligning risk/return formulas, as proposed in this report.

I would like to extend my sincere thanks to all the contributors to this valuable report.
I trust that the knowledge it offers will support developers, investors, and operators in making more informed and effective decisions regarding the integration of road safety into infrastructure projects.

Thierry Déau

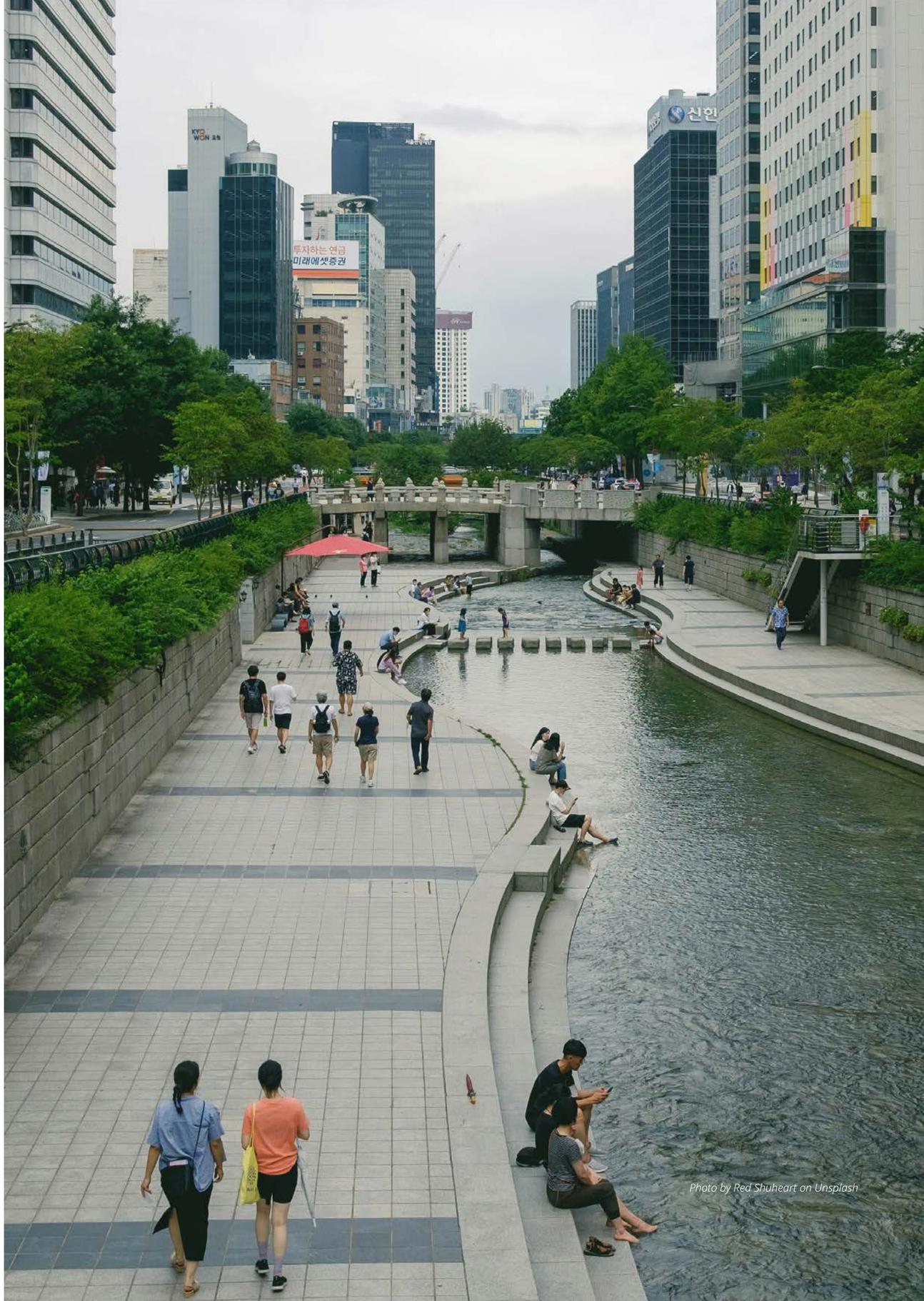
Acknowledgements

This Report was prepared by a team led by Pablo Nunez and Nathalie Gaullier (Global Infrastructure Basel Foundation), with advice from Alexandre Chavarot (Climate Finance 2050) and expert guidance from Avi Silverman (FIA Foundation). The Report was funded by the FIA Foundation.

The main contributors to the Report were Hayden Morgan (Pinsent Masons) on legal provisions for sustainable road development, Emily Wood and Saeed Ibrahim (PIDG), together with James Dunham and Brian Love (Dalmore Capital) on best practices for asset managers and investors, Rob McInerney (iRAP) on the design and implementation of road safety criteria, David Shelton (Visioncast) on the assumptions used in the financial analysis, as well as recommendations relating to different stakeholders, and Tom Bishop and Mélissande Boyer (Amend) on landmark road safety initiatives in Africa. All the contributors provided examples and case studies that evidence the link between improved road safety and enhanced asset performances.

The team is grateful for the valuable feedback received from and information provided by Sergiu Jiduc (FAST-Infra Group), Said Dahdah and Dipan Bose (Global Road Safety Facility – World Bank Group), Fuat Savas (JP Morgan) and Claudia Adriazola-Steil (WRI Ross Centre for Sustainable Cities).

The team would also like to thank Thierry Déau for his foreword and to acknowledge the support of Meridiam to the study.



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Acronyms & Abbreviations

AADT – Average Annual Daily Traffic; standard measure of average daily vehicles on a road.

AdC – Autopistas del Café (Colombia).

AfDB – African Development Bank.

ANI – Agencia Nacional de Infraestructura (National Infrastructure Agency, Colombia).

BRT – Bus Rapid Transit.

BOT – Build–Operate–Transfer; PPP model where a private partner finances, builds and operates an asset for a fixed term before transfer.

CAPEX - Capital Expenditures.

DBFO – Design–Build–Finance–Operate; PPP delivery model including long-term operation and maintenance.

DFI – Development Finance Institution.

DVLA – Driver and Vehicle Licensing Authority (Ghana).

EAAIF – Emerging Africa and Asia Infrastructure Fund (PIDG facility).

EIRR – Economic Internal Rate of Return.

ESF – Environmental and Social Framework (World Bank).

ESG – Environmental, Social and Governance; criteria used by investors and lenders.

E&S – Environmental and Social (safeguards, standards or risk).

FAST-Infra – Finance to Accelerate the Sustainable Transition–Infrastructure; international sustainability label for infrastructure.

FIG – Fast-Infra Group.

FIA Foundation – Fédération Internationale de l'Automobile Foundation for the Automobile and Society.

GoB – Government of Bangladesh.

GRSF – Global Road Safety Facility (World Bank-hosted partnership).

HGV – Heavy Goods Vehicle.

IBRD – International Bank for Reconstruction and Development (World Bank).

IDA – International Development Association; World Bank Group's concessional financing arm for low-income countries.

IFC – International Finance Corporation; private-sector arm of the World Bank Group.

iRAP – International Road Assessment Programme; provides Star Ratings and road safety investment plans.

ISR – Implementation Status and Results Report (World Bank).

KPI – Key Performance Indicator.
LMICs – Low- and Middle-Income Countries.

MDB – Multilateral Development Bank (e.g. World Bank, regional development banks).

MRV – Monitoring, Reporting and Verification; system for tracking and assuring performance data.

NDC – Nationally Determined Contribution (under the Paris Agreement).

NHAI – National Highways Authority of India.

NRSA – National Road Safety Authority (Bangladesh).

NRSC – National Road Safety Council (or Committee), depending on country context.

O&M – Operations and Maintenance.

OPEX – Operating Expenditures.

PAD – Project Appraisal Document (World Bank).

PBC – Performance-Based Contract.

PCD – People-Centred Design (Tanzania RISE project).

PIDG – Private Infrastructure Development Group.

PPP – Public–Private Partnership; contract between a public authority and a private party to deliver and/or operate infrastructure.

RHD – Roads and Highways Department (Bangladesh).

RISE – Roads to Inclusion and Socio-Economic Opportunities (Tanzania).

RoI – Return on Investment.

SDG – Sustainable Development Goal.

SIP – Safety Investment Plan (or Safer Roads Investment Plan in iRAP usage).

SLA – Service Level Agreement.

SLB – Sustainability-Linked Bond; bond with coupon or terms linked to sustainability KPIs.

SLL – Sustainability-Linked Loan; loan margin linked to sustainability KPIs.

SPV – Special Purpose Vehicle (project company in a PPP or financing structure).

TAC – Transport Accident Commission (Victoria, Australia).

TA – Technical Assistance.

TANROADS – Tanzania National Roads Agency.

TARURA – Tanzania Rural and Urban Roads Agency.

UNEP – United Nations Environment Programme.

UNRSF – United Nations Road Safety Fund.

VGF – Viability Gap Funding.

VKT – Vehicle-Kilometres Travelled; exposure metric for crash-rate calculations.

Executive Summary

Photo by Edward Ma on Unsplash

Safer roads are not only a moral duty; they are a financial necessity. Crashes disrupt operations, erode public trust, and weaken cash flows. Meeting the UN Decade of Action for Road Safety and the SDG 3.6 target will require US$400-800 billion of additional road safety investments in LMICs[1]. MDBs committed US$6 billion to road safety financing between 2018-2024. Global grants programme such as the Global Road Safety Facility help to leverage public and private financial resources, but the amounts available are not adequate relative to the needs—safety must be made bankable and measurable within mainstream transport finance.

This report sets out how to do that. It moves beyond the traditional economic case to show how safety becomes a performance variable in procurement, financing, and asset management. In practice, that means structuring projects and instruments so capital flows to roads that protect lives and deliver stable financial returns. Recent frameworks from the World Bank, IFC, FIA Foundation and iRAP point the way by defining investible safety interventions, linking financing terms to verified outcomes and embedding safety considerations within ESG templates.

Strengthening connectivity and safe access to public transport is one of the most powerful—and often underestimated—levers to boost ridership and asset performance in mass transport systems. As the case of Tianjin's metro demonstrates, targeted investments in first/last-mile infrastructure such as protected crossings, well-lit sidewalks, cycle lanes and integrated bus–metro–bike hubs can transform underused systems into high-demand networks, with station-area access upgrades contributing to ridership increases of up to 85% and far exceeding original patronage targets. Likewise, preliminary modelling for BRT systems shows that even modest demand uplifts generated by safer, more convenient access can, over time, finance focused safety packages and materially improve projected IRR and payback, while also enhancing reliability and reducing claims and disruption costs. Embedding connectivity and accessibility into the design and financing of safe transport assets therefore delivers a triple dividend: higher and more resilient fare revenues, reduced operational and liability risks, and more equitable access for women, low-income users and people with disabilities—directly reinforcing the SDGs and making safety-led infrastructure more attractive to investors.

On the ground, contracts and covenants drive outcomes. In Public–Private Partnerships, payment mechanisms should adjust to risk-based accident metrics and delivery of a Safety Investment Plan, with independent audits and clear financial penalties for non-compliance—turning safety into relevant performance incentives. Minimum design standards can reference international standards such as iRAP Star Ratings and the FAST-Infra Label, creating a common approach to due-diligence and lowering transaction costs for all capital providers.

Financing tools already exist and can be scaled. Sustainability–or outcome-linked bonds and loans pricing can vary based on safety results; revenue/securitised notes can be repaid by increases in road agency receipts; and blended structures can use grants, guarantees, or first-loss tranches to de-risk private sector investment in the development and construction of road projects in LMICs. These mechanisms work best within robust monitoring, reporting, and verification (MRV) arrangements anchored in road safety risk assessments and verified by independent auditors. However, approaches that depend less on scarce concessional funds and more on commercially viable structures are ultimately the ones that can mobilise capital at scale. Enhanced safety also complements climate and resilience goals. Investments in reduced speed corridors, safer infrastructure, active mobility and cleaner vehicles lower emissions, reduce crash-related congestion, improve air quality and strengthen social equity—potentially broadening eligibility for green/adaptation finance and crowding in institutional investors.

Governments should (i) mandate safety KPIs and MRV in PPP payment mechanisms; (ii) standardise procurement to require safe design with appropriate disclosure requirements; (iii) develop pipelines of bankable, safety-focused projects and provide blended finance instruments to mobilise private capital; and (iv) publish transparent crash data and Star Ratings that can be used by investors and lenders. Together, these steps recast road safety as investible performance—unlocking private capital, improving credit quality, and delivering safer, more resilient transport systems.

1 Key sources: UN Global Plan for the Decade of Action (2021–2030); World Bank/GRSF portfolio reviews; iRAP Methodology Notes; FAST-Infra Label Documentation.Complete citations appear in the References section

1

The Financial Case for Road Safety

Photo by Dendy on Unsplash

Each year 1.2 million people are killed and up to 50 million are injured in road crashes

Road safety is no longer a peripheral social issue—it is a central determinant of economic performance, fiscal stability, and sustainable development. As global efforts accelerate toward the UN Decade of Action for Road Safety (2021–2030) and the Sustainable Development Goals, there is growing recognition that safer roads not only save lives but also safeguard investments, enhance resilience, and strengthen financial returns.[2]

This report addresses the systemic and recurrent market failure which is linked to the current underinvestment in road safety. Drawing on identified best practices and direct input from infrastructure investors, it presents an alternative empirical approach. It showcases the business models and financing structures which already capture additional sources of revenue and enhance the return on private investment in road safety, so that capital can be mobilised at scale.

This report seeks to move beyond the well-documented economic value of road safety—typically expressed through benefit–cost ratios of public sector spending and social welfare gains—to explore its financial value to investors, lenders, and operators and quantify risk-adjusted returns. While extensive research demonstrates that safer roads generate strong economic returns for society, there is less available research and evidence on how safety performance translates into financial outcomes, such as improved and more reliable cash flows, reduced risk premiums, or enhanced asset valuations. The aim is to identify the key drivers that enable safety to be seen as a financial value proposition, and not only as a social objective. By bridging this gap, the report contributes to an emerging body of work positioning road safety as a measurable and investible dimension of sustainable infrastructure finance.

The initial financial models developed for BRT systems and toll roads indicate that safer and more accessible roads can have a direct impact on asset valuation and profitability.

Safer roads directly support more stable cash flows, stronger licence to operate and, over time, enhanced returns. Targeted safety upgrades—median protection, high-friction surfacing, better lighting, hard-shoulder and refuge management, smarter work zones and faster incident response—can deliver modest traffic uplift plus fewer closure hours over a year. In financial terms, that combination of preserved or slightly higher traffic, lower crash-related repairs and claims, and improved risk pricing (when this is effectively materialised via lower insurance premia and better refinancing terms) makes safety a core driver of predictable, resilient cash flows rather than a purely social add-on.

The report is structured in three core sections: possible business models around road safety which enable private sector participation through blended finance and outcome-based financing structures, contractual incentives in Public Private Partnerships (PPPs), and a last section on recommendations and suggested next steps.

2 World Health Organisation (2023). Global Status Report on Road Safety 2023

1.1 Reframing Road Safety as a Core Investment Metric

Road traffic deaths and injuries are among the world's most severe yet preventable public health and economic crises. Each year, 1.2 million people are killed and up to 50 million[3] injured in road crashes—most of them in low and middle-income countries (LMICs). The economic cost of these losses is immense; equivalent to two to six percent of Gross Domestic Product, eroding the very development gains that transport infrastructure seeks to enable. Beyond the human toll, unsafe roads degrade asset performance, disrupt supply chains, and create significant contingent liabilities for governments and investors[4]. In short, road safety is not just a social imperative—it is an economic and financial one.

1.2 The Investment Gap and the Case for Private Finance

Meeting the UN Decade of Action for Road Safety 2021–2030 and the Sustainable Development Goals (SDGs) will require an estimated US$400-800 billion[5] in additional investment over the next decade. Current public resources and MDB financing—amounting to roughly US$3.6 billion annually, or 9 percent of total road-sector lending—fall far short of this need. As of June 30, 2025, the Global Road Safety Facility (GRSF) has been instrumental in catalysing and informing over US$5 billion of World Bank financed road safety investments. To meet global targets, or at least take more significant steps towards them, MDBs, governments, and private investors must converge around new mechanisms that make road safety bankable and measurable within sustainable transport finance.

The core opportunity is to make existing and forthcoming finance work much harder for safety: embedding Safe System requirements into the mainstream of transport, urban, climate and resilience financing which will be deployed anyway. That means treating road safety as a standard of quality and eligibility in highway and urban mobility investments, NDC-aligned climate programmes, resilience and adaptation projects, PPPs and refinancing operations—not as a niche add-on. In practice, closing the safety gap is less about creating a separate pot of dedicated funding, and more about ensuring that every dollar already being spent on roads and mass transit is "safety-tagged" through better project selection, design standards, contracts and performance monitoring so that crash reduction, equity and resilience outcomes are delivered as part of the core infrastructure deal.

3 WHO Global Status Report on Road Safety, 2023
4 UN Economic Commission for Europe (UNECE) – Financing Road Safety: A Shared Responsibility, 2022
5 Global Road Safety Facility – Financing Road Safety: Catalysing the Sustainable Finance Market to bridge the gap.

CASE STUDY

Innovative Financing for Safe, Inclusive and Resilient Pedestrian Infrastructure: Safe Schools Africa, 5 African Countries

Road development projects in LMICs are typically managed by government roads agencies, which procure consultants and contractors to undertake the design and construction of roads. As such, the standard to which projects are implemented is heavily dependent on the capacity of these agencies, consultants and contractors. But in many countries, these road project teams do not have the capacity to effectively address the safety of all road users, in particular the most vulnerable.

Safe Schools Africa is a partnership that was initiated by the FIA Foundation and the road safety non-profit, Amend. It provides direct assistance to roads project teams to ensure that safe pedestrian infrastructure is designed and built in high-risk areas, in particular around schools. The partnership is currently providing assistance to roads projects teams on nine projects in five countries across Africa, influencing the design of roads on projects with a value totalling over US$2 billion, working to improve the safety around hundreds of schools and for hundreds of thousands of children.

The Safe Schools Africa partnership develops innovative funding models—with governments, development banks, philanthropic foundations and others—to be able to provide the assistance free-of-charge to the project teams. Safe Schools Africa also provides capacity building to project teams and supports in the development of tender documents, guidance and manuals.

Box 1

iRAP: Influencing safer road investments

Through its Star-rating methodology, Safer Roads Investment Plans and Safety Insights Explorer, the International Road Assessment Programme (iRAP) has become a key reference point for investors and policymakers seeking to integrate safety into transport investment decisions. Partnerships in more than 130 countries have already helped make over US$110 billion of transport infrastructure investment safer[i]—a scale that reflects the uptake of iRAP tools by governments, MDBs and private sponsors. At the same time, modelling published in the Business Case for Safer Roads module of the iRAP Safety Insights Explorer estimates that achieving the UN Global Road Safety Performance Target of at least 75% of travel on 3-star-or-better roads for all users would require around US$610.4 billion of additional road infrastructure investment worldwide.[ii] Taken together, these numbers underline iRAP's role in both influencing large volumes of real-world capital towards safer designs and quantifying the remaining global investment gap—giving DFIs, governments and private investors a common, evidence-based framework for prioritising projects, tracking impact and aligning portfolios with SDG-aligned road safety targets.

i iRAP, Marrakech Declaration: A Roadmap to Safer Roads, 2025
ii iRAP Safety Insights Explorer – Business Case for Safer Roads (interactive tool; figure reported in global "all countries" scenario)

1.3
Integrating Safety into the Sustainable Finance Architecture

Recent frameworks from the World Bank, International Finance Corporation (IFC), and FIA Foundation, in partnership with the International Road Assessment Programme (iRAP), outline practical pathways to mobilise private capital for road safety. These include:

Structuring investible project archetypes—such as safer corridor upgrades, vehicle inspection networks, and emergency response systems—demonstrating clear revenue potential and measurable safety outcomes.

Innovative financing models, including sustainability-linked or social bonds tied to road safety indicators; results-based public–private partnerships (PPPs); and blended finance instruments that de-risk private sector investment in the development and construction of road projects in LMICs.

Embedding safety in Environmental, Social and Governance (ESG) and sustainable infrastructure taxonomies, ensuring that transport investments account for safety alongside climate, resilience, and equity.

By linking safety performance to financing costs or investment returns, these frameworks can realign incentives across the public and private sectors—encouraging capital to flow toward transport infrastructure that combines efficiency with safety.

1.4
Aligning with Climate and Sustainability Finance Agendas

Safety is integral to achieving wider sustainability goals. Investments in reduced speed corridors, safer infrastructure, active mobility, and cleaner vehicles simultaneously reduce greenhouse gas emissions and crash-related congestion, improve air quality, and enhance the social equity of urban transport systems.

As recognised in *Life Support: Advancing the Global Agenda for Financing and Action on Road Safety*[iii], connecting road safety with climate and sustainable finance is an essential step in unlocking additional private investments. This convergence reframes road safety as an integral component of sustainable infrastructure.

iii https://www.fiafoundation.org/resources/life-support-advancing-the-global-agenda-for-financing-and-action-on-road-safety

Box 2

Partnership for Active Travel and Health (PATH)

PATH (Partnership for Active Travel and Health) is a coalition pushing governments and cities not only to *prioritise* walking and cycling, but also to mobilise more finance for active mobility. It frames safe, accessible walking and cycling as high-impact, low-cost climate and health investments, and presses for them to be explicitly funded in national transport, health and environment strategies, as well as in NDCs, climate finance proposals and Voluntary National Reviews. By doing so, PATH aims to shift public and international funding toward sidewalks, crossings, cycleways and safer streets—rather than just roads for motor vehicles—so that active travel's full potential for climate, health, economic and equity benefits is reflected in budgets and investment plans. The coalition brings together leading sustainable mobility organisations, coordinated by FIA Foundation, Walk21, the European Cyclists' Federation and UNEP, to advocate jointly for this financial and policy rebalancing in favour of active mobility.

1.5
Collective Call to Action

Mobilising private finance for safer roads requires a systemic shift:

Governments should embed safety into fiscal and regulatory frameworks, tenders, concession contracts, and investment appraisal standards.

Development finance institutions should scale up blended and results-based financing to promote the crowd-in in private capital.

Investors and asset managers should integrate safety into ESG disclosure and risk assessments, recognising that safer roads strengthen the financial and social performance of infrastructure portfolios.

Insurers should systematically reflect road safety performance in underwriting, pricing and coverage terms, using verified safety indicators to reward risk-reducing designs and safer operations.

If implemented effectively, these reforms will unlock a virtuous cycle in which safety investments deliver measurable impact, improved credit quality, and sustainable economic growth. As the world enters the decisive years toward 2030, positioning road safety as a financial imperative is among the most cost-effective strategies to advance the SDGs, support climate action, and secure safer journeys for all.

Box 3

Road Safety Foundational Work. Vision Zero and Safe System Approach

Vision Zero was first introduced in Sweden in 1997 as a groundbreaking national road-safety policy. It represented a paradigm shift from merely reducing crashes to an ethical vision in which no death or serious injury is acceptable within the transport system. Vision Zero reframed road safety as a societal and moral obligation, emphasising that human life and health must take precedence over mobility and convenience. It also shifted responsibility: system designers, policymakers, and engineers share accountability with road users for creating conditions that protect people from fatal outcomes.

Building on this foundation, the Safe System approach emerged in the early 2000s as the technical and operational framework to implement Vision Zero's ethical principles. While Vision Zero provides the "why" the Safe System provides the "how" Developed through international collaboration and refined in countries such as Australia, New Zealand, and the Netherlands, it was later endorsed by the OECD, WHO, and World Bank as a global model for road safety management.

The Safe System focuses on 5 interlinked pillars: safe roads and roadsides, safe speeds, safe vehicles, safe road users, and post-crash care. Achieving these, however, requires sustained and strategic investment. International frameworks, including the UN Global Plan for the Decade of Action for Road Safety 2021–2030[6], call for adequate, ring-fenced, and coordinated financing to implement Safe System–aligned programmes. Governments are encouraged to integrate road-safety funding into broader transport and infrastructure budgets, supported by mechanisms such as safety levies, dedicated funds, and outcome-based investment models.

In essence, Vision Zero defines the goal—zero deaths or serious injuries—while the Safe System provides the method and investment pathway to achieve it. Together, they demand not only political commitment but also sustained, evidence-based funding to create transport systems where no life is lost on the road.

Vision Zero and 5-Star Safe Systems[7]

5-Star users in 5-Star vehicles on 5-Star roads at Safe Speeds

Source: https://safesystemtool.itf-oecd.org/en/framework/moving-upward

6 https://www.who.int/publications/m/item/global-plan-for-the-decade-of-action-for-road-safety-2021-2030
7 https://safesystemtool.itf-oecd.org/en/

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Photo by Arga Aditya on Unsplash

Boosting Returns through Enhanced Road Safety

2.1
The Link between Road Safety and Investment Performance

Road infrastructure serves not only as a public good but can also present a sound investment opportunity when designed, constructed, and operated in accordance with strong safety standards. For private sector participants—such as toll road operators, public–private partnership (PPP) concessionaires, and long-term maintenance contractors—road safety performance can influence financial outcomes. Safer road networks tend to experience fewer traffic crashes, reduced operational disruptions, and lower insurance liabilities, while maintaining higher levels of user confidence. These factors can contribute to more stable and predictable revenue streams over the life of an asset.

Globally, evidence[8] shows that every dollar spent on road safety features—such as median barriers, improved drainage, intelligent traffic systems, and structured maintenance—can generate multiple dollars in averted crash-related costs. For a concessionaire or operator, these averted costs manifest as lower operating expenditures, reduced claims, and enhanced traffic throughput, all of which strengthen project cash flows. Moreover, safety-focused roads tend to maintain higher service quality, encouraging greater traffic volumes and sustained willingness to pay tolls.

From an investor's standpoint, road safety should not be considered a peripheral social good but a risk mitigation strategy with direct financial returns and competitive advantage. Projects with strong safety records are better positioned to attract financing, secure favourable insurance terms, and maintain compliance with environmental, social, and governance (ESG) frameworks increasingly demanded by institutional investors. Thus, embedding safety into road investments enhances not only public welfare but also the long-term profitability and resilience of infrastructure assets.

As shown in Box 4, while robust evidence exists on the *economic* returns of road safety investments, their *financial* value—measured through impacts on cost of capital, insurance, RoI or asset valuation—remains insufficiently quantified. Few PPPs or infrastructure funds explicitly account for safety as a financial risk or performance variable, underscoring the need for empirical research and standardised valuation methods which link safety outcomes to investor returns.

RoI Logic

Safety Investments → Fewer Incidents → Higher Availability → Protected Revenue and Margins

8 https://irap.org/safety-insights/investing-for-impact/

Photo by Jonathan Nackstrand for the New Yorker

Box 4

From Public Good to Investible Asset: What the Institute for Transportation and Development Project (ITDP) – World Bank ‘Case for Cycling’ Implies for Private Finance

The 2025 ITDP–World Bank Case for Cycling Infrastructure Investments report makes a compelling economic case for scaling up active mobility. It demonstrates that well-planned cycling networks deliver exceptionally high Economic Internal Rate of Return (EIRRs)—often between 40 and 90 percent—once health, safety, and climate co-benefits are accounted for. These figures confirm that cycling infrastructure is not just socially desirable, but economically superior to many conventional transport investments.

Although the report does not propose private-finance models, its findings have clear implications for mobilising capital beyond the public sector. By quantifying the economic and environmental value of cycling, *CyclingMAX*—the analytical tool at the heart of the study—creates a foundation for performance-linked and blended-finance mechanisms that could internalise these benefits. Future projects could translate verified outcomes such as crash reduction, emissions avoided, or increased cycling mode share into payment triggers or impact-linked returns.

The study also highlights that cycling infrastructure achieves its greatest impact when integrated into larger urban investment programmes—for example, multimodal corridors, station-area redevelopment, or climate-resilient road upgrades. This integration opens the door for private investors to participate through bundled public–private partnerships (PPPs), sustainability-linked bonds, or climate-aligned blended vehicles, where cycling forms a measurable performance component rather than a stand-alone asset.

In addition, future projects could translate verified outcomes such as crash reduction, emissions avoided, or increased cycling mode share into payment triggers or impact-linked returns. Such outcomes could underpin sustainability-linked bonds, outcome-based contracts, or impact investment funds where investor repayment or upside is tied to verified improvements in safety and climate metrics. Those verified outcomes would translate economic returns into financial returns hence enabling private sector participation.

In essence, The Case for Cycling reframes active mobility as a high-yield, low-risk public investment whose verified co-benefits could, with the right structuring, attract private capital seeking measurable social and climate impact. The next step lies in converting these quantified externalities into bankable financial flows—bridging the gap between economic value and investor returns.

Photo by Dmitrii for Unsplash

CASE STUDY

Photo from Safeway Concessions' Gallery

Safety Upgrades as Risk Management: Safeway Concessions, India

When Macquarie Asset Management acquired a bundle of nine national highway concessions from NHAI, they were combined under a platform called Safeway Concessions. Operating across multiple high-traffic corridors in India, the portfolio faced the challenge of maintaining roads in one of the world's most dangerous traffic environments. From the outset, the operator recognised that road safety was not only a social imperative but also a financial necessity.

Safeway Concessions invested in practical, targeted interventions: truck-mounted attenuators and shadow vehicles to protect maintenance crews, improved toll plaza barriers, clearer pedestrian walkways, and better signage and lighting. To strengthen operations further, in-vehicle monitoring systems with driver- and road-facing cameras were introduced, creating a culture of accountability and continuous improvement.

The results were twofold. For road users, these measures translated into fewer accidents and safer journeys. For investors, the benefits were just as clear: reduced liability exposure, lower operating disruptions, and a stronger reputation with regulators and lenders. In an environment where safety failures can rapidly erode public trust and financial stability, Macquarie demonstrated that embedding safety into road operations protects both lives and long-term returns.

Road Safety that Paid Off: Autopistas Del Café, Colombia

Stretching 266 km through Colombia's coffee region, **Autopistas del Café (AdC)** links Manizales, Pereira, and Armenia — a critical corridor for trade and tourism. But in early 2023, the sudden collapse of the *Puente El Alambrado* bridge disrupted traffic and exposed how fragile safety and reliability could be. Under Colombia's concession model, **safety equals profitability**: the National Infrastructure Agency (ANI) ties payments to service-quality and safety KPIs, with deductions for accidents or closures. For AdC, this meant every safety lapse carried a direct financial cost.

AdC treated safety as a Return on Investment (RoI) driver, not an expense:
Engineering fixes: Stabilised high-risk slopes (Corozal, Chinchiná) and expanded dual carriageways to reduce head-on collisions.

Lighting upgrade: Installed LED systems across key junctions — cutting energy use by 75% and improving nighttime visibility.

Wildlife & user programmes: "Pon tus ojos en la vida" reduced animal collisions; a new driver app improved assistance and real-time communication.

Rapid response: Strengthened emergency protocols and restored operations quickly after the Alambrado collapse.

The Results-

- Traffic resilience: Despite the bridge failure, the corridor handled 38.3 million vehicles (only a 2% YoY dip).
- No ANI penalties: Compliance with safety/service indicators preserved toll revenue.
- Lower opex: LED retrofits and fewer incidents cut maintenance and energy costs.
- ESG & reputation gains: Lower emissions and proactive safety culture improved stakeholder confidence.

CASE STUDY

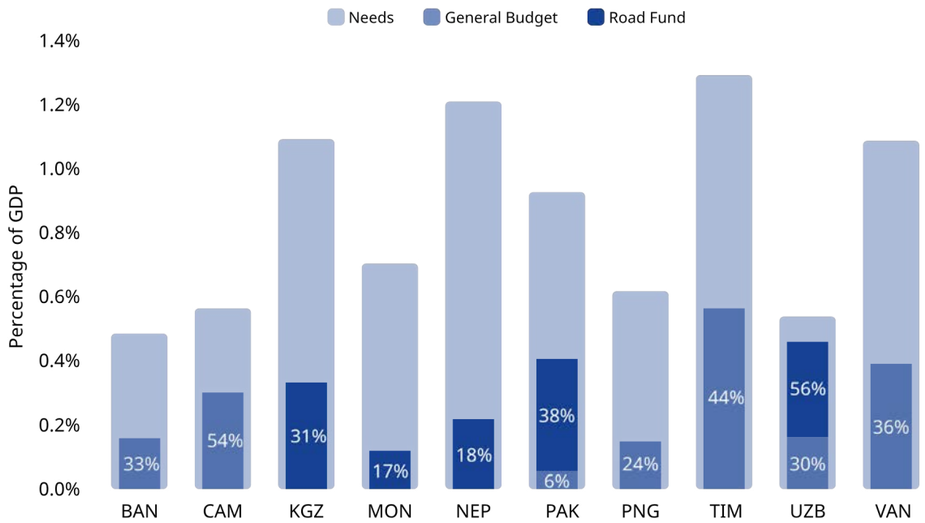
Photo from Odinsa's Gallery

2.2
Funding National Road Safety Programmes in LMICs

Low- and middle-income countries (LMICs) face a paradox: they carry over 90 percent of global road fatalities, yet they often have the least fiscal capacity to respond. The World Bank estimates that US$40-80 billion is needed annually to scale up road safety interventions in LMICs in the next decade. This figure reflects the financing gap for critical upgrades such as safer road design, protective infrastructure for pedestrians and cyclists, improved signage and lighting, and the integration of intelligent traffic management systems.

Figure 1

Funding from General Budget and Road Fund



BAN=Bangladesh, CAM=Cambodia, GDP=Gross Domestic Product, KGZ= Kyrgyz Republic, MON=Mongolia, NEP=Nepal, PAK=Pakistan, PNG=Papua New Guinea, TIM= Timor-Leste, UZB=Uzbekistan, VAN=Vanuatu

Adapted from Road Asset Management: Changing the paradigm for more efficient, safer and resilient transport, World Bank Group, 2025 for GIB.

The three programmes described in the following pages are examples of funding mechanisms used at the national level to implement safer roads[10].

10 Appendix B details a non-exhaustive list of national road safety programmes across LMICs

Box 5

iRAP Safety Insight Explorer

The iRAP Safety Insights Explore[9] presents the business case for meeting the United Nations Global Road Safety Performance Target ensuring at least 75% of travel is on 3-star or better roads for all road users by 2030. This analysis identified a total funding need in LMICs of US$660 billion over ten years with the potential to save over 280 million deaths and injuries over the life of the treatments with US$12 of benefits for every US$1 invested.

Traditional road budgets are usually stretched thin by urgent needs such as new construction and basic maintenance, leaving safety upgrades underfunded. As figure 1 shows general road investments and maintenance needs exceed available public resources. This figure compares road sector funding needs with actual allocations from general budgets and dedicated road funds across selected countries.

Despite its limited volume, the majority of road safety finance comes from domestic sources, particularly from road funds financed through fuel levies, tolls, and vehicle registration fees. Complementing this, multilateral development banks (MDBs) like the World Bank and Asian Development Bank inject billions into LMIC transport projects each year. Increasingly, they require that safety audits, Safe System principles, and measurable crash-reduction targets and Star Ratings be embedded in every road financed.

Beyond Development Financial Institutions (DFIs), LMICs also mobilise corridor-specific investments through Public-Private Partnerships (PPPs) and Performance-Based Contracts (PBCs), which tie payments to road condition and safety performance. At a smaller but catalytic scale, donor trust funds such as the Global Road Safety Facility, philanthropic initiatives like Bloomberg Philanthropies' city programmes, and emerging insurance-linked mechanisms add targeted funding for enforcement, data systems, and innovation.

Together, this set of mechanisms reflects a progressive shift in LMICs: from treating safety as an optional add-on, to making it a financed obligation of every new road project. While volumes vary, the most impactful strategies ensure that road safety is embedded in core infrastructure spending, not dependent on short-term campaigns.

9 https://irap.org/safety-insights-explorer/

Photo by Decry Yae on Unsplash

CASE STUDY

Photo by Mariana Ceratti from worldbank.org

Financing Safety through Systemic Reform: Building a Resilient Road Network, Brazil

Brazil's road network has long been the backbone of its economy—and one of its greatest safety challenges. For decades, rapid motorisation and uneven enforcement left thousands dead on the roads each year. Recognising that fragmented programmes couldn't solve a systemic problem, Brazil began weaving road safety directly into its infrastructure investment framework.

A key development occurred when the World Bank, in collaboration with Brazil's federal and state governments, introduced a financing model that incorporated road safety as a measurable performance outcome.

Through the Proactive, Safe, and Resilient Road Asset Management Program, Brazil secured a US $150 million World Bank loan[11] for the State of Bahia, marking the first phase of a 12-year, multi-phase effort to mainstream safety and climate resilience into road asset management. The programme blends Bank financing with federal and state co-funding, using performance-based maintenance contracts to reward contractors for fewer crashes and better upkeep.

Additional technical grants from the Global Road Safety Facility (GRSF) provide analytics, audits, and capacity building for state road agencies, ensuring that safety targets translate into measurable results. This layered financing structure—loans for infrastructure, grants for knowledge, and domestic budgets for continuity—allows Brazil to scale safety improvements beyond individual projects.

By aligning financial incentives with crash reduction, Brazil has shifted the logic of investment itself: safer roads are now a condition for funding, not an optional add-on. The approach has already inspired similar frameworks in other Latin American countries, proving that institutional reform, when financed strategically, can turn safety from a cost centre into a long-term value driver.

11 World Bank. (2024). Brazil Proactive, Safe and Resilient Road Asset Management Programme – State of Bahia, Project Appraisal Document (P180555). Washington, DC: World Bank.

A Model of Sustainable Road Safety: Ghana Road Fund (GRF), Ghana

Ghana's Road Fund stands out in Africa as a successful example of how sustainable funding mechanisms can directly contribute to road safety improvement. Established by Act 536 of 1997, the Ghana Road Fund (GRF) was designed to ensure stable financing for road maintenance and related safety activities. Managed by a multi-stakeholder board, the Fund draws revenue mainly from fuel levies, vehicle registration, road tolls, and international transit fees—creating a dependable source of funding insulated from budget fluctuations.

A key innovation in Ghana's approach is the integration of road safety financing into the broader maintenance ecosystem. Following the National Road Safety Authority Act of 2019, the GRF now allocates 2.5% of its revenue directly to the National Road Safety Authority (NRSA), complemented by contributions from the Driver and Vehicle Licensing Authority (DVLA) and motor insurance premiums. This ensures that as road activity and vehicle ownership grow, safety funding grows proportionally—a model of sustainable, performance-based financing.

The results have been encouraging. Ghana's road fatality rate stands at 7.7 deaths per 100,000 people, well below the African average of 26.6, reflecting the impact of consistent safety investment, awareness programmes, and data-driven interventions. Safety indicators are now embedded in Performance-Based Contracts (PBCs) for road maintenance, ensuring that contractors are accountable for maintaining safe conditions alongside road quality.

This linkage of funding, accountability, and performance has led to better-maintained roads, improved user behaviour, and a measurable decline in fatalities. Ghana's experience demonstrates how a dedicated road fund, aligned with national safety goals, can transform the road network into a safer, more reliable asset—serving as a replicable model for other African nations.

CASE STUDY

Photo from Ghana's Highways Authority

Photo by Sazzad Aryan on Unsplash

IDA's Pilot Investments: Funding Safety Improvements in High-Risk Corridors, Bangladesh

A total investment of US$510 million—including US$358 million from the International Development Association (IDA) and US $150 million in Government of Bangladesh (GoB) co-funding—was allocated to multi-sector road safety pilots. The IDA, which is the World Bank's concessional arm providing low-interest or grant financing to the world's poorest countries, supported a comprehensive programme combining engineering, enforcement, trauma response, and public awareness initiatives.

The upgraded road sections now feature median barriers, improved signage, enhanced lighting, and speed-management systems. The World Bank estimates that these interventions could yield a 30 percent[12] reduction in crashes.

A complementary US $69.4 million technical-assistance component supported the strengthening institutional capacity through data system reforms, the creation of a National Road Safety Authority, and training for the Roads and Highways Department (RHD) and police units. These measures are expected to improve operational efficiency in maintenance and enforcement, reducing costs per kilometre over time by enabling better data, planning, and coordination.

Further investments in civil works and safety equipment—including LED lighting, pedestrian facilities, enforcement vehicles, and ambulances—enhanced corridor reliability and travel times. These improvements are expected to lower vehicle operating costs and travel times along the Dhaka–Sylhet and Gazipur–Elenga routes, improving logistics performance and reliability for freight and passenger movements.

12 World Bank, Bangladesh Road Safety Project (P173019): Project Appraisal Document (PAD4485) and Implementation Status & Results Report

CASE STUDY

Photo by Tarura from thebizlens.co.tz

Financing for People-Centred Road Design: Roads to Inclusion and Socio-Economic Opportunities (RISE), Tanzania

The Roads to Inclusion and Socio-Economic Opportunities (RISE) project in Tanzania has adopted a 'People-Centred Design' (PCD) approach, ensuring that vulnerable road users are fully considered in the design and construction of roads.

This US$350m+ project involves the upgrading of rural roads—including both regional roads and district roads—and the institutional strengthening of the country's roads agencies, TARURA and TANROADS. The majority of the finance for the project is provided by the World Bank.

The PCD approach was developed and piloted during the RISE project preparation phase, before the full World Bank loan had been approved. This allowed for this innovative approach to improve road safety to be built into the main project from the start, with an established methodology, trained government officials and consultants, and—most importantly—with budget allocated for the necessary additional consultations and infrastructure.

The PCD approach has resulted in the roads built under RISE having a higher number of infrastructure features targeted at improving the safety of vulnerable road users than would normally be seen on a typical project in Tanzania. These features include traffic calming measures in villages and around schools, market places and health centres, safe crossing places, footpaths and appropriate signage. And crucially, these facilities are in the correct locations and have the buy-in of the local communities, thanks to the extensive community consultations that take place throughout the RISE design process

To date, the cost per kilometre of road development on the RISE project has been approximately US$600,000. This compares to around US$500,000 per kilometre on other MDB-financed projects, which do not have a specific focus on vulnerable road user safety, being undertaken in Tanzania at around the same time. Of course, this extra cost on the RISE project is not solely attributable to implementation of the PCD approach—there are many factors that influence cost—but PCD is a part of it.

Despite the extra costs incurred in implementing the PCD approach, the roads agencies are committed to continuing with it. As the approach is mainstreamed on other projects, it is expected that the additional cost per kilometre will reduce - and more lives will be saved.

The RISE project also benefited from some pro bono design assistance from the Safe Schools Africa programme, coordinated by the Amend NGO—with specialist safety engineers supporting the roads agencies and their consultants, funded by the FIA Foundation.

2.3
Best Practices on Managing Transportation Asset Portfolios

Using blended finance to mobilise sustainable infrastructure investment: Projects from PIDG

The Private Infrastructure Development Group (PIDG) is an innovative infrastructure developer and impact investor with the purpose of accelerating sustainable infrastructure throughout South and South-East Asia and sub-Saharan Africa.

PIDG recognises that infrastructure quality and safety are mutually reinforcing. Safer roads reduce operational and social risks, improve project bankability and strengthen long-term investment performance. PIDG uses blended finance and expertise to mobilise sustainable infrastructure investment that delivers both financial viability and development impact as well as raising standards in infrastructure development and building local capacity. Through its Impact Management System, PIDG is able to systematically integrate road safety requirements into project design, and road safety indicators into project monitoring. Using blended finance PIDG provides support throughout the project life cycle and across the capital structure, using concessional capital, guarantees and long-term debt to enable private investment in high-impact, resilient projects. PIDG measures project impact across four dimensions, people, planet, wider economy and market development, with safety as a central principle, reducing loss of life, improving wellbeing, minimising operational disruption and supporting sustainable outcomes.

PIDG-supported projects provide evidence of how applying an impact framework with integrated safety planning can align investment and safety outcomes, as illustrated by projects such as:

Dakar Bus Rapid Transit, Senegal

In Senegal, the Dakar Bus Rapid Transit (BRT)[13] project, embedded road safety measures into both design and operations. PIDG provided debt financing and a viability gap funding grant to launch Africa's first fully electric public bus network in the city of Dakar. The project includes a fleet of 121 buses operating across 13 municipalities, which will initially carry 250,000 passengers (rising to 300,000) daily between the suburbs and city, supporting economic growth and job creation.

The project lenders have included specific financing for the development of a drainage system as part of the BRT infrastructure which, adapted to account for changing flood risks provides both climate resilience and a safer road. The bus system will reduce commuting time by 50 minutes each day for 250,000-300,000 passengers leading to significant road safety risk reduction, life improvements and greater economic productivity. A safer corridor

13 https://documents.worldbank.org/en/publication/documents-reports/documentdetail/810361495936883655/senegal-dakar-bus-rapid-transit-pilot-project

Photo from Constructioneviewonline's Gallery

is expected to yield higher RoIs by reducing crash-related costs, minimising operational disruptions, and sustaining traffic volumes which underpin long-term revenue stability.

Beitbridge Border Post, Zimbabwe

In Zimbabwe, the Beitbridge Border Post modernisation combined infrastructure improvements with digital systems which have resulted in reduced processing times, reduced congestion, considerably reduced road journey times and reduced road safety risk. PIDG invested senior and junior debt to fund the Beitbridge Border Post to stimulate trade in the Southern African Development Community.

The border post, which is a major point of entry and exit between Zimbabwe and South Africa, had inadequate infrastructure and facilities leading to significant congestion delays in the movement of people and goods. Beitbridge is one of Africa's busiest border crossings, seeing more than 13,000 travellers and more than 400 buses and 750 trucks crossing daily. The project was the first public private partnership (PPP) investment in this asset type in the region. Non-commercial drivers now cross the border in an average of three hours, and commercial drivers now face a median crossing time of 14 hours. This is a significant reduction compared to an average of 35-65 hours previously spent crossing the border.

Photo by Matteo Bellia on Unsplash

Dalmore Capital is a UK-based fund manager specialising in the acquisition, management, and long-term ownership of infrastructure assets for institutional investors.

Among its portfolio are several UK road and bridge Public-Private Partnership (PPP) projects. These involve the design, upgrade, operation, and lifecycle maintenance of critical transport infrastructure, delivered under long-term contracts with public sector authorities. Performance, availability, and safety are central contractual obligations in these agreements.

The role of road safety in PPP performance: Dalmore's experience

By aligning safety with long-term asset stewardship, Dalmore ensures its UK road PPP investments remain resilient, efficient, and financially sustainable.

In UK road PPPs, road safety—both for users and road workers—is not always directly linked to financial outcomes from the asset manager and investor's perspective. This is the case if the Operations and Maintenance (O&M) gets subcontracted. While portfolio companies monitor key metrics such as crash frequency rates and incidents involving fatalities or serious injuries, safety performance may not immediately affect financial returns at the fund level. However, the indirect impact of safety performance can be significant and measurable, leading to benefits associated with:

- Reduced lifecycle maintenance and operational expenditure (OPEX).
- Improved contractual compliance and fewer financial deductions.
- Enhanced reputation and stakeholder confidence.
- More favourable insurance terms.

These benefits underscore the importance of embedding safety into operational KPIs, contractor performance frameworks, and risk management strategies.

Financial materiality of safety for subcontractors: the benefits of lifecycle maintenance contracts

Dalmore's road PPPs are delivered through lifecycle maintenance contracts, where subcontractors bear direct responsibility for maintaining asset condition and meeting performance standards throughout the concession period. Within this model, road safety is financially material for subcontractors, with clear and tangible implications:

Fewer safety incidents reduce the need for reactive maintenance, emergency interventions, and unplanned works—lowering direct costs and improving operational efficiency.

Strong safety practices help preserve asset integrity, particularly in complex structures like bridges and tunnels, reducing long-term maintenance liabilities.

Meeting contractual KPIs—such as road worker safety and defect response times—avoids financial deductions, penalties, and reputational risk.

When safety performance falls short, public sector clients or Special Purpose Vehicle (SPV) boards may impose enhanced monitoring, reporting, and oversight requirements, which increase OPEX. These costs are typically borne by subcontractors and can materially affect their margins and profitability. In addition, safety incidents can trigger:

- Regulatory scrutiny from bodies such as the Health and Safety Executive in the UK (HSE).
- Reputational damage, especially when incidents attract media attention or public concern.
- Operational disruptions, including temporary road closures, increased insurance requirements, and contractual disputes.

Given these risks, subcontractors have a strong financial incentive (and sometime a legal obligation) to invest in robust safety management systems, workforce training, and proactive risk mitigation strategies.

2.4
Road Safety Business Models and Outcome-Based Funding

Where public – private partnerships are possible, the World Bank has identified 8 types of business models associated with road safety[14], which are described in the figure below.

Figure 2

Business Models around Road Safety

	Intervention	Potential for Road Safety Impact	Potential Revenue Streams
P1. Vehicle inspection and certification	Developing or upgrading a **vehicle inspection centre network**	Unsafe vehicles which are not road worthy are a major cause of RTIs in LMICs. Modern vehicle inspection systems reduce vehicle failure rates, which can reduce road deaths up to 40%.	• User fees and infringement fines • Auto-companies (% of incremental sales) • Insurance companies (% of their premiums) • Infrastructure companies (toll revenue)
P2. Commercial vehicle fleet upgrade	**Upgrading commercial fleet** to vehicles that adhere with international roadworthy standards	Research in LMICs shows vehicle defects cause up to 5% of crashes. This is most concerning with regards to commercial vehicles, which often being heavier and travelling longer distances, can result in more serious and fatal collisions.	• Lease payments from fleet operators and end customer fees • Auto-companies (% of incremental sales) • Infrastructure companies (toll revenue contributions)
P3. New road concessions with road safety requirements	Designing new road projects adhering to **iRAP 3-star or better rating**	In LMICS 55% of roads are below an iRAP 3-star rating for vehicle occupants. Each incremental improvement in star rating can reduce the rate of car crash fatalities and serious injuries by between 43% and 75%.	• Direct or shadow tolls or availability payments • Infringement fines (if legally permitted) • Public healthcare budgets • Insurance companies (% of their premiums)
P4. Upgrade of highway protective infrastructure	Upgrading highway infrastructure for **protective infrastructure**, such as guard rails, crash cushions, and dividers	Well-designed infrastructure treatments can lead to a reduction of road crash fatalities by up to 90%, and investment into such treatments have an average benefit-cost ratio of more than 15:1 in LMICs countries.	• Increase in direct or shadow tolls, or availability payments • Infringement fines (if legally permitted) • Public healthcare budgets • Insurance companies (% of their premiums)
P5. Speed management & automated enforcement	Upgrading roads with **speed reducing infrastructure and installing automated speed enforcement devices** on high-speeding networks	Reducing road users' average speed by as little as 5% can reduce the number of fatal road traffic crashes by 30%.	• Infringement fines • Insurance companies (% of their premiums)
P6. Road safety upgrades for protection of vulnerable road users	**Upgrading roads for vulnerable users** to an **iRAP 3- star or better rating**	65% of traffic deaths are vulnerable road users, and in LMICS 84.8% of roads are below 3-star rating for pedestrians. Improving protective infrastructure on the 10% highest risk road could save 3.6 million deaths and 40 million serious injuries over 20 years.	• Public healthcare budgets • Insurance companies (% of their premiums) • Toll revenue contributions from concessionaires
P7. Emergency medical services	Develop or upgrade **emergency medical services** for road crash victims	Implementing well-designed pre-hospital care can reduce the risk of death in injured patients by 25%.	• Public healthcare budgets • Insurance companies (% of their premiums) • Toll revenue contributions (infrastructure companies/ concessionaires) • Healthcare funders
P8. Regionalisation of specialist trauma centres	Building a **network of trauma centres** for post-crash care	Even if crash rates stayed the same in LMICs, but fatality rates from severe injury were dropped to the level of high-income countries, up to 500,000 road traffic fatalities could be avoided each year.	• Public healthcare budgets • Toll revenue contributions (infrastructure companies/ concessionaires Insurance companies (% of their premiums) • Healthcare funders

Adapted from Saving lives through private investments in road safety, World Bank Group, 2022 for Global Infrastructure Basel Foundation (GIB)

14 Saving lives through private investments in road safety, World Bank Group, 2022

Four of these measures relate to investments in road infrastructure, including improvements in road design, the retrofitting of protective infrastructure and the implementation of speed control systems. If implemented, these measures are expected to reduce crashes by 50% and fatalities by up to 90%, thus generating socio-economic benefits estimated at 1-3% of GDP.

The World Bank document refers to four main funding sources: road users' fee(s), a tax on the insurance premium charged by vehicle insurers, availability payments, and the reallocation of health budgets. The first two imply that road safety investments would be paid for by users.

Other mechanisms that link payments with safety KPIs could be developed, such as:

For new road infrastructure, and assuming the private sector is responsible for the design, construction, financing and operation of a road (e.g. through Built-Operate-Transfer (BOT) PPP scheme): upfront payment by the private sector investor(s) (based on safety standards prescribed in the concession agreement) with an adjustment to an availability fee and/or a rebate on the taxes paid by the concessionaire upon the project achieving pre-defined road safety KPIs (e.g. based on outcomes such as infrastructure STAR Ratings or the number of car crashes and/or fatalities).

For existing road infrastructure, whether publicly or privately managed: creation of a trust fund to pay for safety improvements, funded by a tax on insurance premiums with the percentage of the tax adjusted from time to time to reflect improvements in pre-defined safety KPIs. This would provide an incentive for insurers to adjust the premium they charge their customers based on individual safety KPIs, thus creating a 'safety price signal'. These payment mechanisms could be combined with other funding sources.

Such mechanisms are based on the concept of Performance-Based Contracts as summarised by the World Bank in the figures below.[15]

Figure 3

Performance-Based Contracts

Contracts based on levels of service (Performance Based Contracts or PBCs) optimise the use of public resources.
The first PBCs were conceived in the 1990s in Canada and New Zealand to respond to inefficiencies in road asset management. They have been since then tested (and improved) in various developing countries.
Basic concept: Delegate the management of road assets to the private sector through long-term contracts linked to performance, in lieu of traditional service contracts paid by inputs service and works at defined unit prices.

Pros	Challenges
Improved Quality and Consistency Roads consistently in good condition, reduction of operating cost of vehicles and traffic accidents	**Long Term Contracts Obligations and Budget Predictability** Budget planning required to bear the costs of long- term contractual obligations
Cost Reduction PBCs reduce management and operating costs by 20% to 40% in the highway life cycle	**A Cultural change** Technical teams from road agencies and contractors must adapt to a different model of management
Predictability of Network Management The adoption of long-term PBCs allows the road agency to optimise road asset management	

Adapted from Road Asset Management: Changing the paradigm for more efficient, safer and resilient transport, World Bank Group, 2025 for Global Infrastructure Basel Foundation (GIB)

Figure 4

Immediate Impacts of PBC Contracts on Road Asset Management

Results observed after the first generations of PBC contracts in Brazil

Economic and Management Indicator	Traditional Contracts	PBC World Bank - 1st Generation
Total cost 5-year cycle (resp 10 years)	100%	80% (60%)
Years without maintenance	2.7	0
Final Value Two Contracts (R+M)	Equal to or greater than estimated	14.5% lower than estimated
Programme Management	Complex: multiple annual contracts	Simple: Multi-year contracts
Contract management	Complex: multi-parameter measurements	Simple: Easy Measurement Indicators
Technical Indicator	**Conventional Maintenance**	**PBC World Bank - 1st Generation**
International Roughness Index (m/km)	3.09	3.03
Planning and Bidding	Requires phased planning	Continuous bidding
Extension of Contract	Short and limited	4x longer than non-Conventional model

Adapted from Road Asset Management: Changing the paradigm for more efficient, safer and resilient transport, World Bank Group, 2025 for Global Infrastructure Basel Foundation (GIB)

The WB study shows a reduction in the death rate of 25% in Brazil between 2011 and 2023 following the introduction of a "road asset management system" based on Performance-Based Contracts.

15 Road Asset Management: Changing the paradigm for more efficient, safer and resilient transport, World Bank Group, 2025

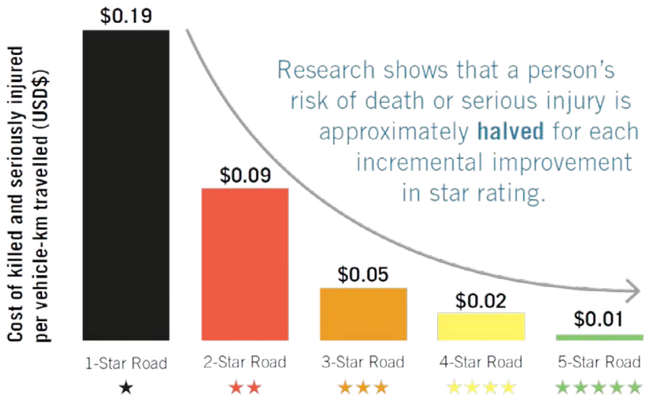
Box 6

Designing and Monitoring the Implementation of Road Safety Criteria

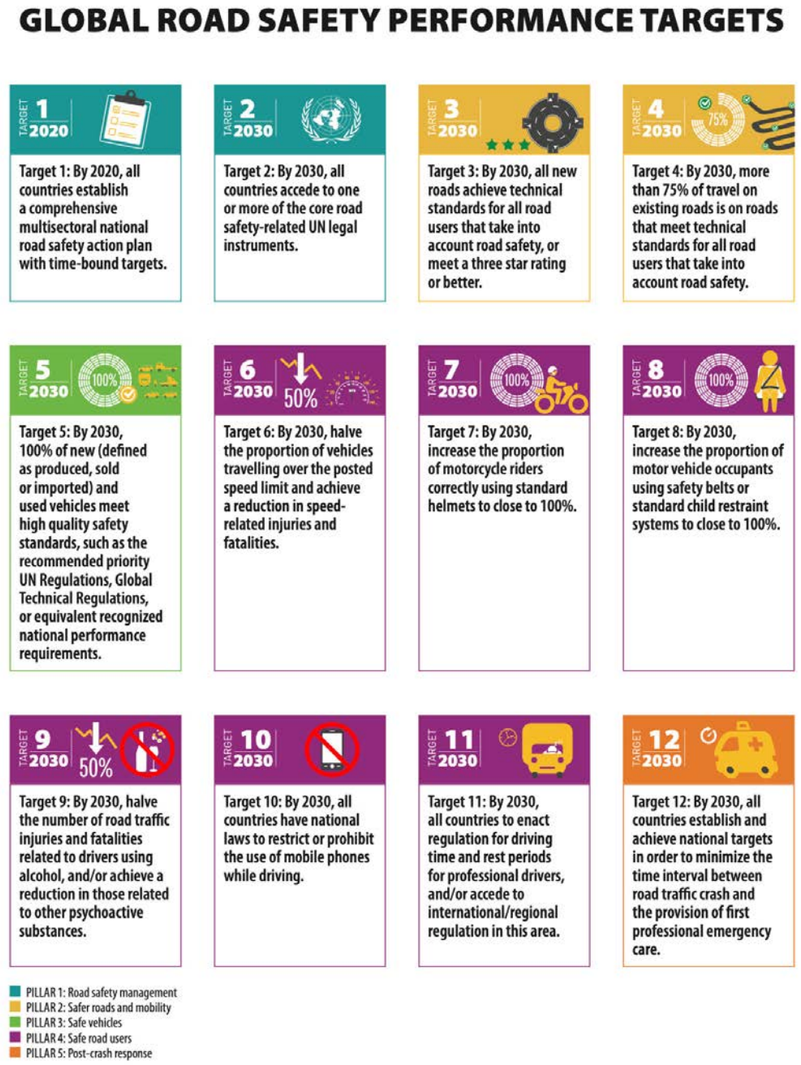
Quantifying and allocating the benefits of road safety improvements is a key component of the design, financing and implementation of a road safety policy. It includes the definition of safety objectives and KPIs (and their translation into economic variables such as the value of averted vehicles crashes, injuries and fatalities, the averted cost of traffic disruption and road repairs etc.), an allocation of responsibilities among different public and private sector stakeholders; and the implementation of incentive schemes to reward stakeholders for achieving pre-defined safety KPIs.

At the global level the UN Member States agreed the the Global Road Safety Performance Targets[16] provide a useful template for priority areas of road safety impact and associated KPIs.

In regard to Targets 3 and 4, the iRAP Star Rating measures the in-built safety of road infrastructure. A 1-star road is the least safe and a 5-star road is the safest. The crash costs per kilometre travelled are approximately halved for each incremental improvement in Star Rating.[17] These financial benefit streams can therefore be measured and the cash flows built into the structuring of financial mechanisms that can be modelled and deployed within performance based contracts and PPPs.



Source: https://www.unescap.org/sites/default/files/Article%203%20-%20Star%20Ratings%20for%20life-saving%20road%20improvements%20in%20India.pdf



Following the request of the United Nations General Assembly, on November 22, 2017 Member States reached consensus on 12 global road safety performance targets. For more information: http://www.who.int/violence_injury_prevention/road_traffic/road-safety-targets/en/

Source: https://cdn.who.int/media/docs/default-source/documents/health-topics/road-traffic-injuries/12globalroadsafetytargets.pdf

16 https://cdn.who.int/media/docs/default-source/documents/health-topics/road-traffic-injuries/12globalroadsafetytargets.pdf
17 OECD. 2016. Zero Road Deaths and Serious Injuries. Paris.

Photo by Huy Phan on Unsplash

A well-designed road, built to withstand extreme weather events is a safety improvement that also provides a sustainability benefit of the road. Design criteria that consider wider paved areas, sidewalks, surface run off and effective drainage, provide both a safer road and a more climate resilient and more sustainable road.

In addition to road design criteria, driver behaviour in managing road safety is very important. This can be through the direct upskilling of drivers with defensive driver training, the use of journey management procedures to control routes, night driving and fatigue management, for example, and the introduction of in-vehicle monitoring systems to monitor and enforce good behaviour patterns. Investors play an important role in implementing behaviour management requirements in all development projects and specifically in road investments. ESG safeguarding extends into the operational phase of a project and road safety requirements will fall under IFC Performance Standard 4 “community health, safety and security”, for example.

Road safety audits and Star Ratings are essential to understanding the detailed design of the road within the local context. A baseline of road fatalities should be gathered from local police agencies, for example, in order to better understand the operational performance of the road over time. Repeat road safety audits and Star Ratings should also be carried out to monitor community safety and identify any black spots that may not have previously been identified, and required modifications should be implemented.

Fatalities should not be the only metric considered in the socioeconomic benefits of safer roads. The case for building a road is to enable trade to move freely and the positive impact on people’s lives through increased mobility, access to market, and reduced journey times. Safety features enable a road to operate at the intended capacity and thus deliver these intended outcomes. Not considering safety reduces the operational efficiency of the road, causes delays, congestion and extended journey times which will all have a negative socio-economic outcome. Reduced journey times can be translated into economic value. Crashes result in a strain on a country’s emergency and medical services which again all have an economic value to a sovereign state or any regional public body.

2.5 The Role of Insurance

Insurers play a critical role in risk allocation for road infrastructure, both by absorbing specific risks and by sending price signals which can influence behaviour. For private road operators, insurance typically covers business interruption (e.g. climate events or external disruptions affecting access) and third-party/public liability, including crashes where the operator is legally responsible due to design or maintenance failures—often as required by concession contracts and lenders. However, insurers rarely structure or price products to directly reflect overall road-safety performance (e.g. aggregate crash outcomes) beyond this liability lens, unless such linkages are explicitly mandated by the conceding authority. Similarly, vehicle insurance terms only partially reflect road safety, mainly via premium adjustments based on driver behaviour rather than the safety performance of specific corridors or assets.

Yet insurance could play a much stronger role in reinforcing public policy and contractual arrangements that promote safer roads. In principle, insurance terms (capacity, excess, premiums) should operate as a transmission channel to reward safer design, maintenance, and operations: safer roads and driving habits reduce claims and should help maintain affordable coverage. The challenge is to move from a backward-looking approach—where terms are adjusted only after losses occur—to one that anticipates and prices the benefits of proactive safety investments. This requires defining robust, credible metrics for safety performance at asset and network level, and systematically sharing data between authorities, operators, and insurers so that incremental investments in safety and maintenance can be recognised and reflected in insurance structures and costs.

Some examples of how insurers are increasingly leveraging data and technology to optimise operations and more accurately price risk, can be found in the table below:

Table 1

Insurance Levers to Enhance Road Safety

Lever	Description	Example
1. Telematics-based incentives	Link premiums to real-time driving behavior (speed, braking, night driving).	“Pay-How-You-Drive” programmes by AXA, Acko, and State Farm.
2. Insurance-led risk maps	Use claims data to identify crash-prone zones and co-fund blackspot improvements with cities.	Allianz partnered with Munich city to fund safer intersections, Ageas funded iRAP crash risk mapping in the UK.[18]
3. ESG-linked insurance	Offer lower premiums to logistics fleets meeting safety or emissions standards.	Zurich’s “Fleet Risk Reduction Programme.”
4. Safety investment funds	Dedicate % of motor insurance pool to prevention and safer infrastructure.	France’s “Fonds de Sécurité Routière.” TAC’s Top 20 Safer Roads Investment Plan.[19]
5. Public-private safety bonds	Invest in “Road Safety Impact Bonds,” which earn returns if fatalities fall.	Outcome-based Road Safety Impact Bond with motor insurers as co-investors or outcome payers when crash reductions are verified.
6. Joint crash data platforms	Pool data with police and hospitals for better analytics.	Sweden’s STRADA system (Shared Traffic Accident Database).

18 https://www.ageas.co.uk/solved/your-car/dangerous-roads-map/
19 https://irap.org/2025/10/victorias-top-20-programme-slashes-injury-burden/

CASE STUDY

Photo by Safeway Concessions on LinkedIn

Insurance Company led Investment: Transport Accident Commission (TAC), Australia

The Transport Accident Commission (TAC) in Victoria, Australia is a monopoly no-fault third-party insurance company which invests in road trauma prevention in addition to providing support for claimants. The TAC funded an AUD$560 million programme of infrastructure upgrades which lifted Star Ratings from 2.9 stars to 4.5 stars and resulted in a 77% reduction in fatalities and 74% fewer hospital bed days. The scale of investment reflects both their financial and social business case and imperative to reduce road trauma.[20]

20 https://storymaps.arcgis.com/collections/98420a25d82542f1b2a9922925972c28?item=8 (Austroads, 2025)

Box 7

New economic model for road management: SmartVision and Stan The App

SmartVision and Stan The App, developed by Metricell[21], represent a new economic model for road management—one where data prevents damage, and insight replaces insurance cost. Through AI-powered inspections and crowdsourced defect reports, the platforms have captured 25 million images across 15% of the UK road network and are now deployed in eight countries including Ghana and Mexico. By applying a new UK government standard (PAS 2161), SmartVision provides a nationally recognised health score for every road segment, while Stan's 25,000 volunteer users deliver continuous ground truth. Together, they enable local authorities to cut third-party claims by 20–50%, lower repair unit costs by 30–40%, and reduce long-term insurance exposure. Predictive budgeting tools convert defect data into financial forecasts—estimating the funds required to fix all roads and the likely value of future claims. The result is a measurable, scalable system where councils and insurers can quantify the return on every pound spent, transforming reactive road maintenance into a proactive investment strategy.

21 https://www.metricell.com/

Photo by Eric Barbeau on Unsplash

Photo by Tunafish on Unpslash

2.6
Investment Mechanisms and Expected Returns

Investment mechanisms to crowd-in private sector capital to finance road safety improvements can be summarised through five main funding structures, as presented in the aforementioned World Bank study[22]. Most of these structures rely on debt instruments issued by a sovereign or sub-sovereign entity, a project Special Purpose Vehicle or a corporate. The debt instruments are either a bond or a (series of) project / corporate loans, with various sustainability features attached to them. They are bought by institutional investors in the fixed-income capital markets or funded by commercial lenders. Many structures typically incorporate a blended finance component involving concessional or grant funding from Development Finance Institutions or philanthropic institutions to reduce the overall cost of credit.

Figure 5

Road Safety Financial Mechanisms

Business Models	Description & Instruments	Financing	Blended Finance Instruments
Financing a sub-national entity	A **subnational entity issues debt** (straight debt, Social or Sustainibility-linked), with all or some proceeds used for road safety projects.	Sub-national financing	Viability gap funding Outcome funding Guarantee
Financing new PPPs	**New PPPs** (either road concessions or non- road, such as vehicle inspection centres) with road safety components **receive financing** to incorporate **road safety upgrades** (straight debt, Social or Sustainability-linked)	Upfront Project Financing	Viability gap funding Outcome funding Guarantee
Additional debt to existing PPPs	**Existing PPPs** (either road or non-road) issue additional or **subordinated debt to fund road safety improvements** against additional remuneration / extended concession terms by government	Additional Project Financing	Outcome funding Guarantee
Corporate financing	Private entity with **relevant transport investments (roads, equipment)** issues debt to finance **road safety actions at the corporate level associated with its sustainability strategy and with outcomes measured via KPIs**	Corporate Financing	Outcome funding Guarantee
Outcome funding	Donors provide **results-based funding** for road safety projects that have high impact health outcomes but **lack financial return**	Impact bond or none	Outcome funding (required)

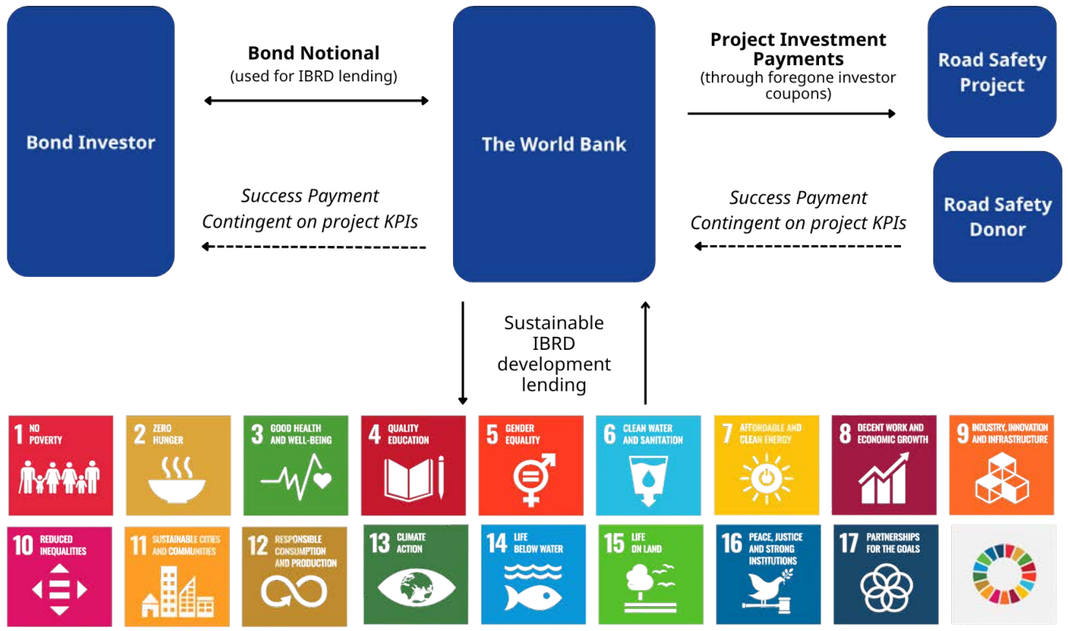
Adapted from Saving lives through private investments in road safety 2022, WBG for Global Infrastructure Basel Foundation

Public Borrower *Private Borrower* *Public or Private*

22 Saving lives through private investments in road safety, World Bank Group, 2022

Figure 6

Indicative Outcome Bond Structure for a Road Safety Project



Adapted from Financing Road Safety – Catalysing the Sustainable Finance Market to Bridge the Gap, World Bank Group, 2025 for Global Infrastructure Basel Foundation (GIB)

The outcome funding structures provide an interesting addition to traditional road financing schemes.

The World Bank has issued three Sustainable Development Bonds with road safety features in recent years[23]. The basic principle of these bonds is that investors forgo their coupon payments in exchange for a return that is linked to the achievement of specific outcomes (e.g. road safety improvements). The return could be greater than the cumulative amount of foregone coupons and is typically funded by a third-party donor.

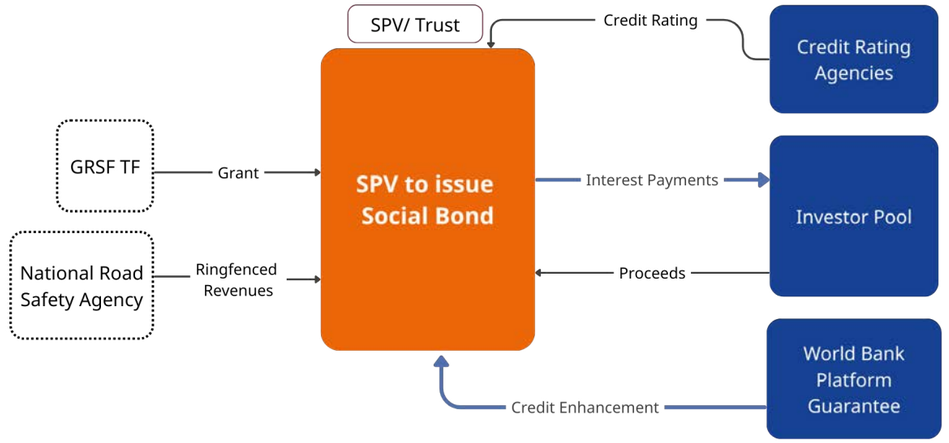
These bonds could also be issued by a road agency, with a sovereign guarantee that could be credit enhanced by the World Bank Group and/or private sector guarantors[24].

Another innovative structure corresponds to revenue bonds, where a road agency raises a securitised (sustainability or social) bond through an SPV, where debt service is secured by a portion of the agency revenues, as shown in Figure 7. The World Bank GRSF is uniquely placed to channel private sector funding to improve the debt capacity of the entity, with donor support, and alongside other generic World Bank Group credit enhancing instruments.

23 Financing Road Safety – Catalysing the Sustainable Finance Market to Bridge the Gap, World Bank Group, 2025
24 An example of a private guarantor is https://guarantee.dev
25 Convergence, The State of Blended Finance 2023

Figure 7

Road Safety Securitised Notes



Adapted from Financing Road Safety – Catalysing the Sustainable Finance Market to Bridge the Gap, World Bank Group, 2025 for Global Infrastructure Basel Foundation (GIB)

PIDG's blended finance approach (delivered through the Emerging Africa & Asia Infrastructure Fund (EAAIF), GuarantCo, InfraCo and supported by PIDG Technical Assistance) demonstrates how concessional capital, development equity, long-term debt and guarantees can reduce risk in infrastructure projects, transforming them into commercially viable, investment-ready and sustainable assets that attract private investment towards safety-enhancing infrastructure, whilst maintaining financial sustainability.

While these funding structures can help catalyse incremental investments from the private sector and channel funds to road safety through various risk layering mechanisms, it is important to note that there is no explicit financial return on investment in road safety as long as direct net operating cashflows are not affected by safety improvements. In addition, the pricing of outcome or revenue bonds will be largely driven by the country's sovereign rating or the rating of the corporate entity issuing such financing.

The World Bank emphasises the need for donors to be mobilised as part of blended finance structures to monetise the benefits of road safety improvements.

Blended finance has strong potential to unlock more capital for safe, sustainable mobility—especially where modest public or concessional risk-sharing can crowd in commercial investors to BRT, safe-corridor and resilience projects—but in practice it is still used far less than it could be because of structural barriers on both the supply and demand side. These include weak project preparation and fragmented pipelines, high transaction and structuring costs relative to deal size, limited standardisation of instruments and KPIs, and difficulties in scaling from pilots to portfolios, all of which constrain investor appetite and replication[25]. The opportunity now is to tackle exactly these bottlenecks—by improving project preparation, aggregating and standardising deals, and clarifying revenue and risk-sharing models—so that blended finance can move from one-off demonstrations to a more routine tool in the sustainable mobility toolbox, rather than being treated as a silver bullet that will solve the financing gap on its own.

Box 8

Results-Based Financing for Road Safety Platform

The success of impact investment and outcome or results-based financing and the associated mobilisation of the investors and investible projects will require coordination and collaboration across sectors, entities and enabling mechanisms. Such an initiative would aim to establish the systems needed for ensuring global consistency and investor confidence.

The functions of the platform would therefore include:

- Engagement to establish road safety as an investment asset class
- Defining and refining consistent global road safety metrics for results-based financing
- Coordinated monitoring and performance tracking of investments
- Independent evaluation and verification of road safety metrics used by investors
- Collation of a pipeline of investible projects with quantified impact
- Building and supporting a network of investors
- Building and supporting the ecosystem of stakeholders

A partnership to achieve this will need to focus on the structured engagement of different stakeholders in project generation and financing, measurement of performance in a transparent and consistent manner, systemic data analysis, refinement of investment models and the scaling and replication of what works globally. With a well-established industry of road safety stakeholders, and a range of existing impact investment initiatives underway it is essential that the partnership is anchored within the existing ecosystem that supports investments in low, middle and high-income countries.

The ultimate design of the platform will require consultation with the key stakeholders to ensure alignment with existing initiatives and viability of the governance and reporting arrangements. With individual funds being established by a range of entities it is important to note that the platform will not be directly involved in funding and deal creation, with that function remaining with the relevant individual partners. Alternatively, it may be sufficient to establish a recognised, consistent and credible methodology for assessing and reporting on the value of investments for improving road safety. The methodology could then be used by any institution or consultancy to declare the social value of projects in a transparent manner, without control by a centralised platform.

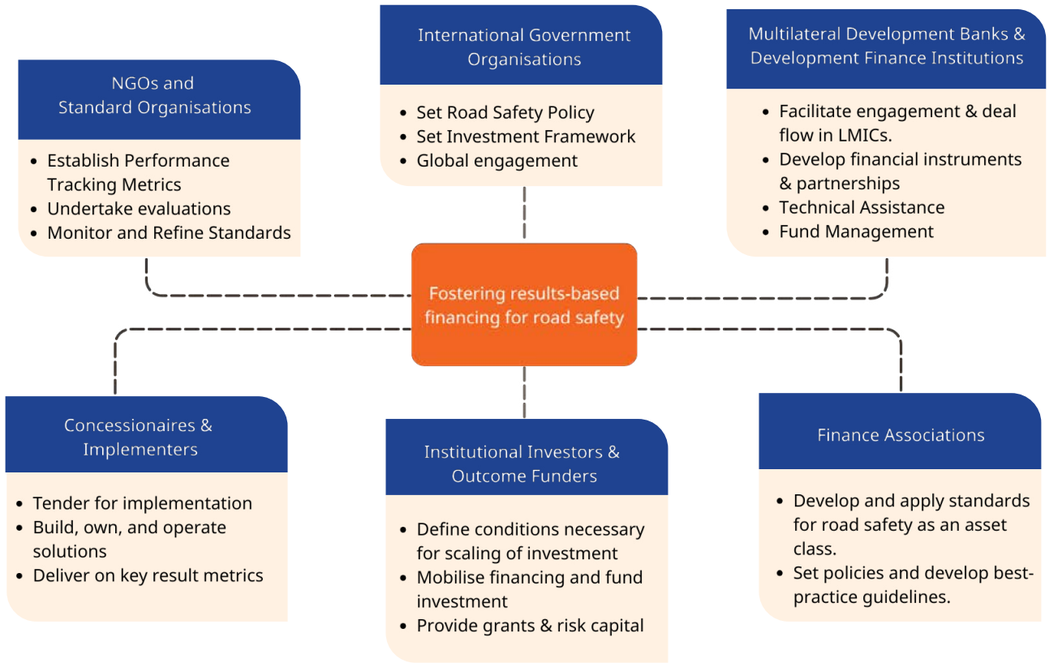


Photo by Ryoji Iwata on Unpslash

Modelling safer transport assets – investment archetypes

Private investment in transport infrastructure is typically structured through **project finance**, with capital raised on a limited or non-recourse basis against the projected cash flows of a specific asset. Under this approach, lenders and investors focus on the resilience and predictability of those cash flows: revenue volatility, operating risk, exposure to extreme events, and the strength of contractual incentives and covenants. Safety performance is therefore not only a social or regulatory concern, but a determinant of default risk, refinancing potential, and long-term asset value.

The financial implications of investing in road safety have been explored through the development of two preliminary financial models[26] for an integrated Bus Rapid Transit (BRT) system and a toll road. In each case, the model tests how a defined package of safety measures—such as safer access, improved road design, enhanced incident management and better monitoring—translates into incremental cash flows.

The results, presented in the following assessments, are directional but informative. They show that, under conservative assumptions, targeted safety investments can generate positive financial returns through increased or protected revenues, reduced operating and claims costs, and, in some cases, improved financing terms. Realising these benefits in practice depends on effective implementation: safety measures, performance indicators, and contractual incentives must be structured so that the incremental value created flows back to the project and its stakeholders.

26 Models can be shared upon request

CASE STUDY

Photo by Unsonique for Wikimedia

Unlocking Metro Demand Through Access Investments: The Tianjin Experience, China

The Tianjin Urban Transport Improvement Project shows how targeted investments in access infrastructure can unlock the full demand potential of an existing metro system and dramatically raise ridership.

By 2015, Tianjin had already built an extensive metro network but was experiencing disappointing usage due to weak last-mile connectivity, unsafe walking conditions, and insufficient cycling facilities around stations. In response, the city—supported by the World Bank and national funding—implemented a coordinated package of interventions focused on station areas and access routes to deliver 3-star or better journeys for at least 90% of roads. These included 126 km of new or improved cycle lanes, redesigned approaches to 96 metro stations, integrated bus–metro–bike transfer areas, upgraded lighting and crossings, expanded sidewalks, new public squares and parks, and safer, traffic-calmed streets[27].

These investments were explicitly designed to make reaching the metro safer, quicker, and more attractive, particularly for short trips that previously defaulted to private cars or informal modes. The impact on ridership was substantial. In the city centre, metro patronage increased by up to 85% relative to 2015 levels. The project's ridership target was initially 85,000 daily trips and later revised to 95,000 as measures progressed; by completion in 2022, daily trips exceeded 175,000—almost double the revised goal.

This surge in demand directly strengthened the financial performance of the metro system: higher fare revenues, better utilisation of sunk capital, and a stronger case for further network expansion and complementary transit-oriented development. Tianjin's experience demonstrates that strategic investments in access and the public realm around stations are not cosmetic add-ons; they are revenue-critical components that convert underused infrastructure into a high-performing, commercially and socially viable mass transit system.

27 https://irap.org/2024/01/tianjin-china-receives-2024-sustainable-transport-award/

Investment Archetype 1
Integrated Bus Rapid Transit Systems

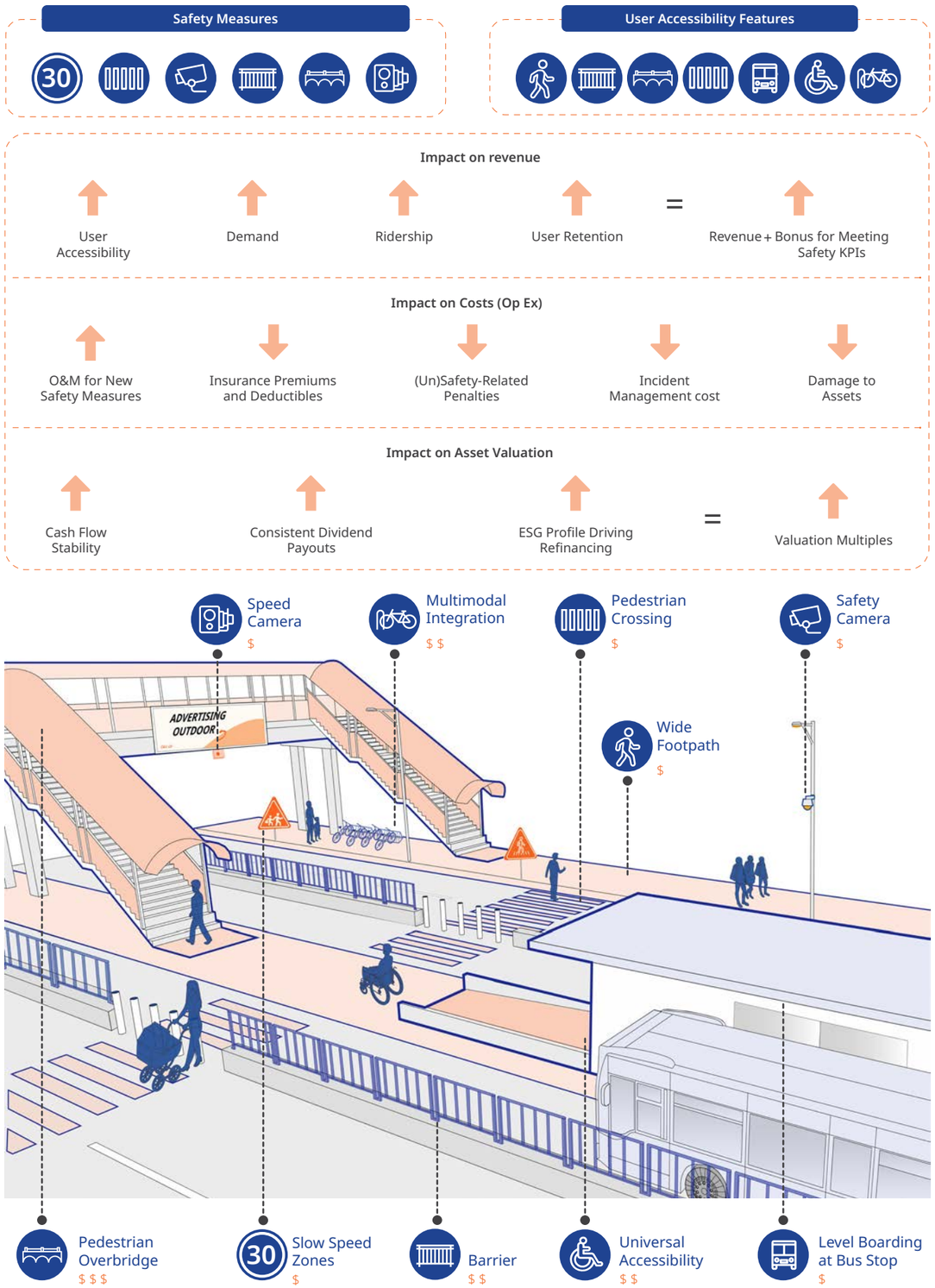
Safety is a cash engine when it's designed into stations and the first/last mile. In BRT systems, modest, audited improvements to access safety—protected crossings, lighting, sidewalks, universal design—translate into three predictable return channels. First, they lift demand: safer, easier approaches reduce perceived and actual risk, trimming access time and attracting riders who currently avoid the system. Even conservative uplifts (e.g., +2.5–7% ridership) compound yearly, turning small percentage gains into meaningful farebox revenue. Second, they protect operations: fewer crashes and conflicts around stations mean fewer disruption minutes, lower incident management costs, and less asset damage—showing up as avoided OPEX and steadier headways which preserve reliability (and therefore demand). Third, they improve risk pricing: documented casualty reductions and stronger incident response support insurance savings, unlock performance bonuses/avoided deductions where SLAs exist, and can trigger margin step-downs in sustainability-linked finance where available.

Around those core channels sit ancillary levers. Safer, more welcoming stations raise commercial revenues (advertising, retail tenancy, data services). Targeted safety retrofits often defer larger capital expenditures by solving specific hazards rather than rebuilding whole segments; they also reduce future renewal pressure. Where public programmes or donors pay for outcomes, verified safety KPIs can release grants/VGF tranches. All of this depends on basic MRV: a simple KPI frame (exposure-adjusted incident rates, response times, station-area audits, Star Rating targets), independent verification, and transparent reporting so financiers can underwrite the gains.

Typical modeling assumptions stay deliberately modest: baseline daily ridership and fares; a 12–36-month ramp; access-safety capital expenditures sized to quick wins at priority stations; uplift bands centred on low single digits; and small but real operational expenditure/insurance deltas. Scenarios then show how these levers stack—farebox uplift plus avoided disruptions and incentives—into NPV, IRR, and payback which is credible for both public sponsors and private investors. The message is simple: safer access makes BRT more used, more reliable, and cheaper to insure, which is why it deserves to sit inside the RoI.

Graphic 1

Integrated Bus Rapid Transit Systems



$ Low Cost Interventions *$ $ Medium Cost Interventions* *$ $ $ High Cost Interventions*

Photo from Meridiam's Gallery

Modelling a safer BRT corridor in West Africa

The initial financial model developed[28] treats safer first/last-mile works (crossings, lighting, sidewalks, universal access) as a targeted capital programme that lifts demand and protects operations. A baseline of 100,000 daily riders, 360 operating days, and a blended average fare ≈ €0.67 (from 400/500 FCFA zonal fares with a 40% inter-zone share at 655.96 FCFA/€) is assumed. Uplift from access-safety is tested in three bands or scenarios—+2.5% / +4% / +7%—against a €3.0m CAPEX, €0.2m/year incremental O&M, 2% annual ridership growth, 2% fare indexation, a 10-year horizon, and an 8% discount rate. Cash flows capture only the incremental effects (extra farebox minus added O&M), with standard finance metrics (NPV, IRR, payback) computed directly in the workbook.

What the model shows is:

Scenario	Growth Rate	Year-1 Incremental EBITDA	NPV	IRR[29]
Low case	+2.5%	≈ €0.40m	≈ €0.4 m (not justified without grants or co-benefits)	10.68%
Central case	+4%	≈ €0.77m (growing with demand and indexation)	≈ €3.2 m	26.59%
High case	+7%	≈ €1.49m	≈ €8.9 m	53.13%

The conclusion: even low-single-digit ridership uplifts can finance a focused access-safety package—provided verification is credible and O&M is contained.

Refer to Appendix D for more details.

28 Please refer to Appendix D for more information on the model results. Figures used in the model assumptions are estimates and they might differ from actuals.

29 NPV and IRR are based on project cashflows.

Investment Archetype 2
2.1 Toll Roads

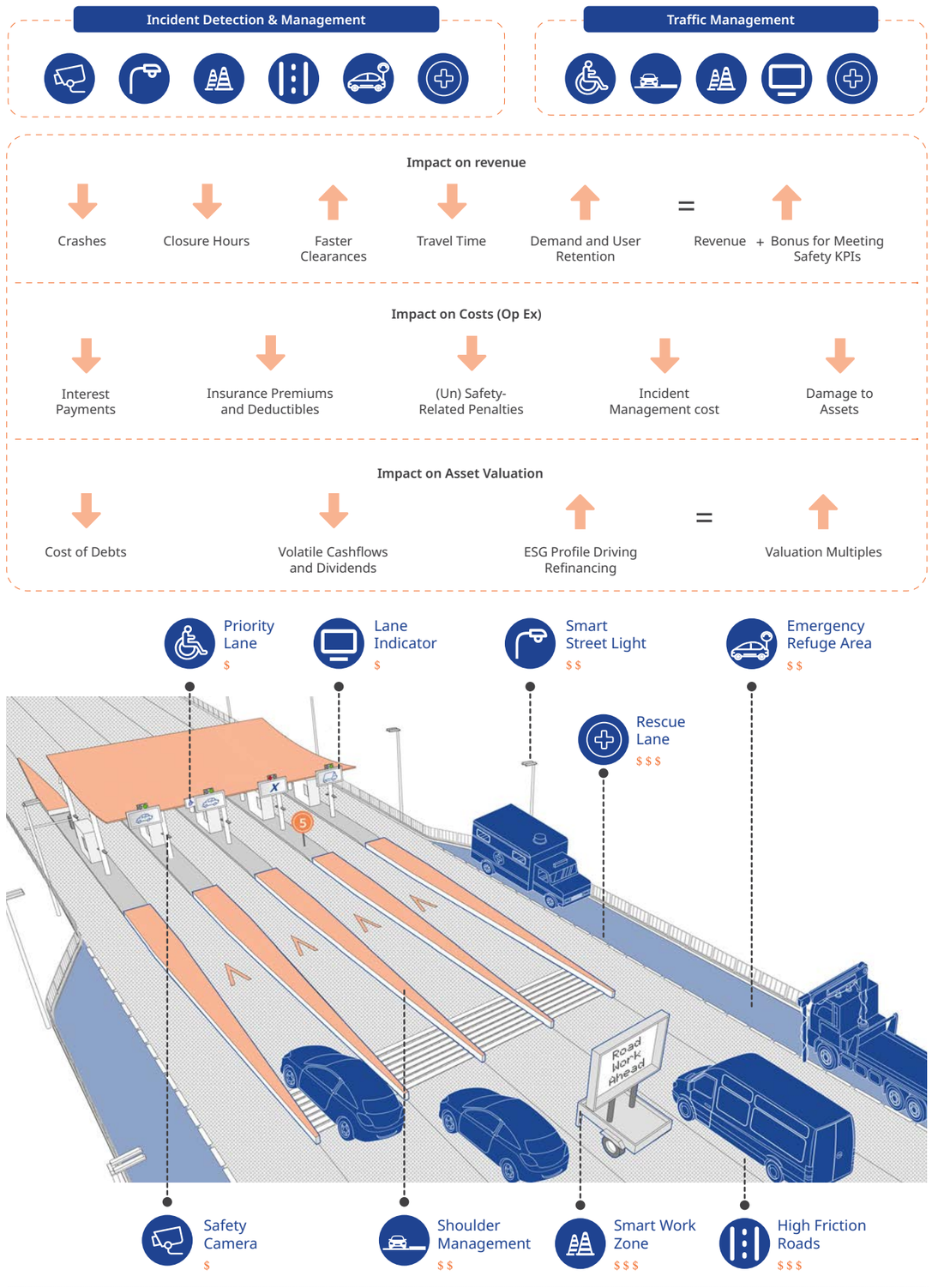
On tolled corridors, well-targeted safety upgrades—median protection, roadside hazard reduction, high-friction surfaces, lighting, refuge/shoulder management, smart work zones, incident detection and rapid response—translate into three predictable return channels. First, revenue protection and uplift: fewer crashes and faster clearance mean fewer closure hours and more reliable travel times, which both preserve toll collection and nudge discretionary demand (especially HGVs). Even modest effects (e.g., +0–3% traffic plus avoided closure hours) add up over the year to meaningful gross toll revenue. Second, cost reduction: safer operations cut crash repairs, third-party claims, lane-closure penalties, and traffic-management overtime—showing up as avoided OPEX and steadier operating margins. Third, better risk pricing: audited safety performance can lower insurance premiums/deductibles, reduce non-compliance deductions under PPP SLAs, and support margin step-downs or improved refinancing terms as risk stabilises.

Around those core channels sit ancillary levers. A safer, more reliable corridor supports dynamic pricing and product mix (e.g., HGV loyalty, time-of-day offers), improves reputation and stakeholder goodwill (smoother approvals for variations), and can defer larger capex by fixing specific black spots instead of rebuilding long sections—also easing future renewals pressure. Where public programmes or lenders reward outcomes, verified safety KPIs can unlock bonuses or credit enhancements. All of this rests on clear MRV: a compact KPI frame (crash rate per 100M VKT, incident clearance times, lane-availability compliance, Star Ratings, work-zone audits), independent verification, and transparent reporting so financiers can underwrite the gains.

The case study modelling below starts with prudent inputs. Current AADT and car/HGV split, the toll schedule and indexation rules, expected traffic growth, and today's unplanned-closure hours. Layer a phased Safety Investment Plan (a reliability-first bundle, then a fuller package), keep demand uplift in the low single digits, and apply modest reductions to claims, insurance, and SLA deductions. Run scenarios that combine preserved/added revenue with avoided costs and any financing gains (e.g., margin step-downs). The result is a transparent view of NPV, IRR, and payback that both the grantor and the concessionaire can stand behind. In short: safer tollways keep lanes earning, cut liabilities, and lower the price of risk—making safety a core driver of returns, not an afterthought.

Graphic 2

Toll Roads



$ Low Cost Interventions *$ $ Medium Cost Interventions* *$ $ $ High Cost Interventions*

ARCHETYPE 2

Photo from Equity Pandit's Gallery

Financial Modelling of a high capacity toll road in India[30]

The model treats enhanced safety on a busy Indian tollway—incident detection, high-friction surfaces, improved shoulders/refuges, safer work zones, median barriers, and lighting—as a targeted capital programme that protects toll revenue, reduces losses, and modestly improves demand and credit quality.

Parameter	Value
AADT (Average Annual Daily Traffic)	60,000
Heavy Commercial Vehicles (HCVs)	30%
Operating Days	365
Average Toll - Cars	INR 250
Average Toll - HGVs	INR 800
Annual Escalation (Traffic & Tariffs)	3% per year
Unplanned Closures	150 hours/year
Crash-Related Repairs & Third-Party Costs	INR 60m/year
Insurance Premia	INR 35m/year
Performance-Related Deductions/Penalties	INR 10m/year
Analysis Horizon	10 years
Discount Rate	10%
Outstanding Debt	INR 20bn

30 This is based on a high capacity generic Indian toll road.

Two safety scenarios are tested-

Scenario	**Reliability-first package** (ITS + HFST + shoulders/refuges + work-zone controls)	**Full package** (Adds median barriers, lighting, speed management)
CAPEX	INR 300m	INR 800m
Incremental O&M	INR 15m/year	INR 40m/year
Closure Hours Reduction	35% fewer	60% fewer
Claims Reduction	20% lower	40% lower
Insurance Cost Reduction	5% lower	10% lower
Penalties Reduction	25% fewer	50% fewer
Traffic Uplift	None	+1%
Debt outstanding (average)	-	INR 20bn debt if audited KPIs met
Margin Step-Down	-	15 bps
Year-1 Incremental Cash Flow	INR 56m (rising with growth/indexation)	INR 207m
NPV	≈ INR 143m	≈ INR 812m
IRR	19.19%	28.29%

Cash flows capture only the incremental effects (revenue preserved/added plus savings on claims, insurance and penalties, minus added O&M and upfront CAPEX, plus any interest savings). Standard metrics (NPV, IRR, payback) are computed on this incremental basis.

Conclusion: For a busy Indian toll corridor, these assumptions are conservative yet plausible. The results indicate that a focused reliability-first programme is financially defensible, while a comprehensive package combining physical safety upgrades, robust MRV, and KPI-linked financing can generate compelling returns—driven mainly by higher effective availability, lower asset damage costs, and modest improvements in risk pricing.

Refer to Appendix E for more details

CASE STUDY

Photo from Odinsa's Gallery

Results-Based Road Safety: Piracicaba-Panorama (PiPa) Concession, Brazil

Commissioned by the Sao Paulo State Government, the Piracicaba-Panorama ("PiPa") concession in Brazil was one of the first PPPs that included results-based 3-star or better targets for road safety. The competitive tender was led by the IFC, Brazil's National Bank for Economic and Social Development, and the Inter-American Development Bank and won by a consortium of institutional investors, Patria Investments and GIC (the Singapore Sovereign Fund).

By raising infrastructure safety standards to the Global Road Safety Performance Target of 3, 4 or 5-star standard as defined, the investments included in the 30-year concession contract will save approximately 34,000 fatalities and serious injuries. The concession contract also includes innovative bonus schemes (see below) based on exceeding Star Rating targets that incentivise improved road safety outcomes.

2.2 Availability Payment Roads

Building on the toll-road model, an availability-payment (AP) road applies the same safety levers but routes value through a different cash register. On tollways, safety is monetised chiefly via preserved tollable hours (fewer closures), modest demand uplift, and reductions in claims and insurance. In AP contracts, revenue is not traffic-driven; it is dictated by the payment formula. Accordingly, safety is modeled as payment adjustments: fewer deductions and, where applicable, bonuses for meeting safety-linked KPIs.

In practice, the "revenue protection/uplift" block becomes an Availability Adjustment line: base payment × (bonuses – deductions). Closure minutes remain critical because lane-availability KPIs translate avoided downtime directly into deduction avoidance. Likewise, incident detection and clearance, work-zone compliance, lighting/ITS uptime, and similar requirements carry dead-bands, caps, and floors that bound cash effects; non-compliance points and cure periods govern downside.

Other channels remain: lower crash repairs, lower insurance premiums/deductibles, and potential margin step-downs or improved refinancing terms where audited KPIs de-risk credit. Traffic volumes primarily serve to normalise exposure (e.g., crash rate per VKT), not to forecast income. Sensitivities therefore shift from demand elasticity and HGV mix to deduction rates, KPI thresholds, and incident frequencies. The overall structure—CAPEX > verified performance > cash effects > NPV/IRR—stays intact, but transmission channels correspond to changes in payments made by the conceding authority rather than through tolls that are directly collected by the operator.

Box 9

Promoting safe roads through the FAST-Infra Label

The FAST-Infra Label is a globally applicable labelling system designed to identify and promote sustainable infrastructure projects. This tool, conceived and led by industry leaders to accelerate the sustainable transition in infrastructure, is designed to mobilise private capital by contributing to the transformation of sustainable infrastructure into a deep and liquid asset class. By aligning data across the capital stack, this credible, globally applicable label provides a common language for sustainable and resilient infrastructure: facilitating due diligence, reducing transaction time, and mitigating environmental, governance, resilience and social-related risks.

The Label also enables project developers and investors to show the positive impact of the projects through the claim of positive contributions, for instance increased road safety in the Health and Safety criterion. The Label's power lies in the clarity it offers; as Meridiam's CEO stated, "By making investors' exposure to environmental and social risks, but also opportunities and positive impact more transparent, FAST-Infra Label will also help to attract a broader range of asset owners to this market." Investors can create "FAST-Infra-themed funds" by requiring projects from different sectors and geographies to get the FAST-Infra Label verified. Ultimately this makes critical sustainable investments, like road safety more accessible and attractive to a broader pool of capital.

Photo from Fast-Infra Group's Gallery

3

Driving Positive Outcomes through Legal Provisions for Sustainable Road Development

Photo by James Hunt on Unsp

Capital follows contracts. Public-Private Partnerships (PPPs)[31] which clearly allocate risk, define returns and ensure accountability have proven effective in driving both financial returns[32] and sustainability outcomes.

Embedding sustainability and safety principles within the legal and contractual framework of a road PPP, rather than treating them as parallel objectives, creates enforceable obligations and measurable results across the entire project lifecycle.

In operational terms, embedding sustainability and safety objectives within PPP frameworks can lead to measurable improvements in the following areas:
Attracting private capital - offering better risk-adjusted financial returns, from deeper pools of lower-cost private capital, supporting construction on time and on budget.
Delivery of quality projects with positive outcomes - towards sustainability and safety objectives; reduced environmental and social impacts with enhanced climate resilience; measured, reported, and legally enforceable.
Consultation of community stakeholders- including considerations for mobility, accessibility, and public health and safety.
Compliance with evolving regulations- avoiding legal penalties and reputational damage.

Integrating legal mechanisms for sustainability and safety enables continuous enforcement, monitoring and accountability across the whole value chain from planning, to construction, operation, and decommissioning.

While specific data is not available, empirical evidence indicates that English law is the most common legal framework for international infrastructure contracts, especially in Public-Private Partnerships (PPPs).[33]

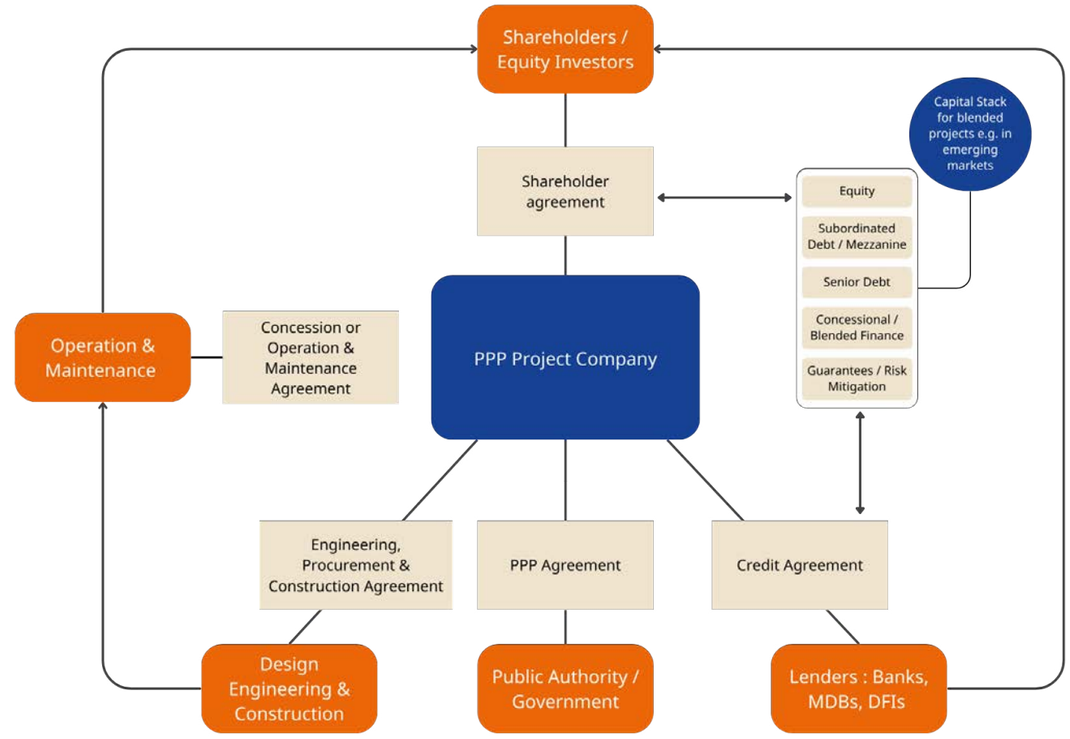
3.1
Key Parties in the Public-Private Partnership Structure and Associated Legal Documents

Building infrastructure is inherently complex and demands close collaboration among multi-disciplinary teams—including local governments, regulators, design engineers, asset managers, safety and sustainability specialists, investors, local communities, and legal advisers. Each interface between these parties involves considerations of risk allocation, performance incentives, and accountability. Increasingly, safety is being embedded as a core requirement—not just a compliance issue but a shared responsibility—within the legal, financial, and contractual frameworks of projects. Integrating safety and sustainability factors across all project stages and stakeholder interfaces is now essential for achieving resilient, high-performing infrastructure outcomes.

Whether a road development is the core project activity, or ancillary to a wider, bigger project, in a typical PPP road infrastructure project, structuring a robust legal framework is essential to define roles, allocate risks, and ensure project sustainability and bankability. Whilst not comprehensive, some of the key legal agreements and their relations between parties are shown schematically in Figure 8 and are outlined in Table 2 on the following pages with some examples of common sustainability requirements also listed.

Figure 8

Involved Parties in a PPP and their Legal Contracts



Adapted from Pinset Masons for Global Infrastructure Basel Foundation (GIB)

31 "Public-Private Partnership" has been used here as a generic term to include any project with a blend of both public support (policy, fiscal and/ or ownership), with private investment / ownership, where a private entity is granted the right to operate and maintain a public asset, often used in transport and utilities and using long-term contract structures. Other structures may include Private Finance Initiative (PFI), Concession Agreements; Build-Operate-Transfer (BOT); Design-Build-Finance-Operate (DBFO); Build-Own-Operate (BOO); Joint Ventures (JVs).
32 Best Practices in Funding and Financing of Road Infrastructure - Collection of Case Studies, 2022, PIARC, World Road Association
33 A 2024 Law Society of England and Wales study found that English law and London dominate global infrastructure dispute resolution, particularly in construction arbitration and commercial litigation.

Table 2

Contractual Arrangements in PPPs

Document	Stakeholders	Key Terms	Sustainability & Safety Considerations
Project Agreement (sometime termed "Concession Agreement" or "PPP Agreement")	Public authority & private partner	Scope of work (design, build, finance, operate, maintain) Duration of the concession Performance standards Payment mechanisms (e.g., availability payments, toll revenues) Termination clauses and remedies	Obligations of the project company (or special purpose vehicle) to enable the underlying asset to meet the sustainability and safety requirements of the project during its lifecycle, including any external audits.
Shareholders Agreement, (SHA)	Consortium shareholders:	Equity contributions Decision-making processes Exit strategies Dispute resolution	Sustainability-linked covenants and / or reporting requirements, especially when labelled as sustainable finance, and / or development finance (MDB and / or DFI finance) is involved (see also Financing Agreements); plus director's duties and expectations of the board in relation to sustainability standards and associated monitoring. Investors will conduct their own specialist due diligence against sustainability policies and minimum performance standards.[34] It is typical to include an action plan as a schedule to the SHA, to close any gaps. The action plan may be subject to monitoring by the project company board and could be aligned with the Credit Agreement requirement (below). The SHA may also include requirements such as formal "condition precedent" and / or "condition subsequent".[35]
Credit Agreements (CA)	Debt provided by banks, MDBs / DFIs to the project	Security Agreements Repayments Intercreditor Agreements to coordinate among lenders	Sustainability-linked covenants and / or reporting requirements, especially when labelled as sustainable finance, and / or development finance (MDB and / or DFI finance) is involved (see also Financing Agreements). As with SHA, lenders will conduct their own specialist due diligence and may include requirements as formal condition precedents and / or condition subsequent.

34 Based on a full life cycle of the project and subject to a detailed environmental and social impact assessment which would typically include scoping against international good practice eg IFC Performance Standards (or equivalent internationally recognised framework).
35 Condition Precedent is a condition that must be fulfilled before a party's obligation under a contract becomes effective. If the condition isn't met, the contract or specific obligation doesn't commence; Condition Subsequent is a condition that, if it occurs after the contract has taken effect, can terminate an existing obligation or contract.

Document	Stakeholders	Key Terms	Sustainability & Safety Considerations
Engineering, Procurement, and Construction (EPC) agreement (sometimes known as a Construction Agreement)[36]	The project parties and the main construction contractor	Design and construction obligations Timelines and penalties Quality and safety standards	Detailed and specific environmental and social, health and safety (labour and community) security and human rights requirements of the contractor, sub-contractors and supply chain.[37] Milestone payments linked to meeting sustainability standards (including human rights), and mechanisms to allow the project company shareholders to inspect and audit activities, operations and in the supply chain. Mechanisms for both escalation of non-compliance, and remediation measures are also common for potential environmental and human rights breaches including within the supply chain. Shareholders' due diligence and reporting obligations (see also SHA) are also passed down to contractors to enable the project (and in turn shareholders' and debt financiers') to demonstrate compliance and alignment with sustainability standards and law. Contractors are typically required to develop and implement environmental and social management systems associated with the asset, and are required to have national road safety audits, and / or meet an iRAP star rating and / or standards such as the FAST-Infra Label and be capable of demonstrating good practice governance structures.[38] iRAP provides a number of tools which can be used to establish a minimum iRAP Star Rating (e.g., 3-star or better), which can be independently validated, and included as part of the EPC Contract. Other criteria relating to climate adaptation and resilience can also be included as a requirement of the EPC contract, and be externally validated.[39]
Operation and Maintenance (O&M) Agreement (sometimes known as a "Concession Agreement")[40]	The project parties and the main O&M contractor	Maintenance schedules Performance benchmarks Lifecycle cost and revenue management	As with the EPC agreement, the O&M agreement typically includes environmental and social, health and safety (labour and community) security and human rights requirements of the operator, minimum standards and safeguards for sustainability standards (including human rights), and mechanisms to allow the project company shareholders to inspect and audit activities, operations and supply chains. There are typically mechanisms for both escalation of non-compliance, and remediation. Measures are also common for potential environmental and human rights breaches including within the supply chain. Shareholders' due diligence and reporting obligations are also passed down to operators to enable the project (and in turn shareholders' and debt financiers') to demonstrate ongoing compliance and alignment with sustainability standards and law. As with EPC, operators are typically required to maintain environmental and social management systems associated with the asset, to demonstrate community health and safety risk management through road safety audits and / or standards such as the iRAP star rating and the FAST-Infra Label. This can be in the form of an "upgrade and maintenance clause" where, for example, using periodic road safety audits and safety assessments, (as rated by an independent assessor using iRAP), the O&M contractor is required to implement upgrades to the road if ratings fall below agreed thresholds.

36 For more detail on EPC contractor procurement see section below.
37 Based on a full life cycle of the project and subject to a detailed environmental and social impact assessment which would typically include scoping against international good practice eg IFC Performance Standards (or equivalent internationally recognised framework).
38 Be cautious of performance related incentive mechanisms for contractors, unless tried and tested elsewhere, as these can drive perverse incentives and unintended consequences for the project.
39 FAST-Infra Label, Adaptation & Resilience dimension, the Label assesses how infrastructure projects are designed to: Withstand climate-related risks such as flooding, heatwaves, and extreme weather; Integrate climate adaptation strategies into planning, construction, and operation; Enhance long-term resilience of assets and communities served by the infrastructure.
40 For more detail on O&M contractor procurement, see section below.

3.2
Integrating Sustainability and Road Safety into Project Procurement

The public procurement authority should ensure sustainability standards and requirements are considered from the early stages of the project development and contractor procurement process. It is noted that Sustainable Development Goals Target (SDG 12.7.1) promotes "public procurement practices that are sustainable, in accordance with national policies and priorities".[41]

United Nations Environment Programme (UNEP) collects data from national governments on the status of their sustainable public procurement policies and action plans on a biennial basis. Hence governments are incentivised to integrate sustainability into major projects.

There is a growing alignment of interest in safe and sustainable outcomes through public procurement, as both development finance institutions and private investors increasingly seek to allocate capital to resilient, safety-enhanced infrastructure assets offering risk-adjusted financial returns. While a universal legal definition of a "sustainable asset" does not yet exist and varies by region, the integration of safety and sustainability criteria in procurement is critical to achieving beneficial and lasting outcomes.

On the risk side, both safety and climate resilience should be considered throughout a project's entire lifecycle—as part of asset valuation models for capital and operational expenditures, cashflows, and revenue projections, as well as within risk mitigation measures such as insurance. Safety performance and climate resilience are essential dimensions of sustainability and must be factored into all assessments of a road project's long-term viability.

For road projects, iRAP has a host of tools which can be used to help build in safety into design and route planning and can be considered by public procurement authorities to establish minimum safety ratings, measure the reduction in road trauma and associated benefits of investments and other features for contractors to bid against. This suite includes iRAP "Star Ratings for Designs" (a package of tools, knowledge products, support and other initiatives so that roads are built safe, right from the start), and Safer Road Investment Plans that optimise the deaths and injuries saved per dollar invested.[42] A range of case studies are now available that demonstrate the use of the iRAP tools at policy, programme and project level.[43]

Under the iRAP scheme, road safety audits are also required to understand the specific local context of the road.

Faced with this multi-dimensional complexity, integration of sustainability and road safety considerations within the procurement stage is therefore essential. Public procurement authorities have several routes, as highlighted below, which are of relevance for EPC and O&M contracting in particular.

Making safety a core dimension of sustainable PPP procurement

The public procurement authority can develop tailored PPP procurement policies that prioritise safety performance and address the specific features of each project and the desired outcomes. These policies should integrate safety considerations—such as safe design and Star Rating standards, lifecycle risk management, and supply chain safety compliance—alongside broader environmental and social objectives:

- Consider focus on environmental and social outcomes with reference to sector standards (e.g. iRAP standard and tools, and sustainability labels used by capital providers such as FAST-Infra).
- Ensure that the whole project lifecycle is considered (including decommissioning) and the whole project supply chain, beyond the main Tier 1 contractor, and is aligned with legal pass down requirements included.
- Align with international sustainable finance requirements and minimum environmental and social safeguards.[44]
- Reference use of ISO 20400, the international Sustainable Procurement Standard, where applicable.
- Ensure legal enforcement of policies, where applicable.

41 SDG - 12.7 target and indicator on Sustainable Public Procurement implementation | UNEP - UN Environment Programme
42 https://irap.org/rap-tools/
43 https://irap.org/tag/impact-investment/

44 Based on a full life cycle of the project and subject to a detailed environmental and social impact assessment which would typically include international good practice eg IFC Performance Standards (or equivalent internationally recognised framework).

CASE STUDY

Photo from Britannica's Gallery.

Improving Highway Safety: A Public Private Partnership Approach, Panama

Context. Panama's East Pan-American Highway PPP was structured as a performance-based contract to rehabilitate, improve, and maintain a key corridor. Safety was not a side goal; it was written in as a contractual outcome.[45]

Intervention. Two levers made safety binding. First, the contract set a clear outcome target: the corridor must achieve an iRAP[46] Star Rating of 3 stars or better at the start of the Operation & Maintenance (O&M) stage. Second, the payment mechanism tied a semi-annual availability/ performance component to measurable service levels. Safety-related indicators—covering roadside protection, signage and delineation, lighting functionality, incident response times, work-zone management, and black-spot treatments—sit inside the deduction regime. Missed targets trigger payment reductions until resolved; serious or persistent breaches can escalate to default remedies.

Implementation. The iRAP target pulled safety decisions forward into design. The concessionaire had to commission risk-based surveys and prioritise high-severity segments, trading off options (e.g., shoulder width versus barrier type) using crash savings, not just unit costs. During O&M, the performance framework required routine surveys, defect logs, and response-time reporting. This gave the authority objective levers to enforce outcomes rather than inputs.

Results. The structure sharpened incentives: safety improvements directly protected the concessionaire's cash flow, while poor performance immediately reduced it. Aligning payments to risk reduction encouraged cost-effective treatments—audio-tactile line marking, hazard removal, targeted intersection channelisation, and consistent delineation—selected for their impact on fatal and serious-injury crash risk. The visibility of the star-rating target also made communication with stakeholders simpler and more credible.

Lessons. (1) Specify a clear safety outcome (iRAP ≥3-star) and measure it. (2) Anchor payments to verifiable indicators with transparent deduction rules. (3) Require independent assessments and periodic re-ratings to prevent performance drift. (4) Maintain an escalation path for serious or repeated breaches.

Replicability. This model is transferable to other corridors and PPP types, provided baseline surveys, funding for periodic re-ratings, a credible auditor, and transparent public reporting are in place.

45 https://irap.org/2023/11/panama-includes-3-star-or-better-star-rating-targets-in-ppp-contract-for-east-pan-american-highway/
46 iRAP 2023 news item on East Pan-American Highway PPP

Standardising road safety in Requests for Proposals (RfP)

The public procurement authority can draft and issue standard form contracts within RfPs for contractors to bid against with project-specific sustainability criteria embedded or added within a schedule. By issuing these standard contracts, a common, comparable, and consistent baseline is established, for bidders to prepare and submit bids:

- Consider good practice listed in RfP documents, and reference standard project contracts (e.g. from FIDIC) from other regions / jurisdictions as good practice (noting contract terms should be pragmatic, aligned with market best practice and not over-engineered / over-ambitious).[47]
- Additional road safety and sustainability criteria (including requirements around iRAP and the FAST-Infra Label, for example) can be added as a schedule to the main contract and scoring criteria can be weighted for assessment. The Star Rating can be used as part of competitive tendering where the higher Star Rating performance and associated reduce road trauma and costs can be directly integrated into assessment criteria.
- Consider where sustainability issues interface with force majeure, change in law, KPIs, milestone payments, performance bonuses, and liquidated damages for non-compliance etc.
- In particular, be cautious on the use of performance-related incentive mechanisms for contractors, unless tried and tested elsewhere, as these can drive perverse incentives and unintended consequences for project outcomes.

Appendix A provides an exhaustive list of safety clauses embedded in PPP agreements across countries. Typical financial incentives used entail adjustments on the annual availability payment based on an externally verified safety performance of the asset.

Bid assessment using scorecards. Counterparty due diligence

To support transparency and comparability, the public procurement authority can evaluate prospective contractors against alignment with policy and project-specific sustainability criteria, using a standard scorecard informed by:

- The RfP response
- Completed due diligence questionnaires interviews
- Public disclosures

Negotiations with preferred bidder without losing sustainability / finance provisions

Once a preferred bidder or consortium is selected, the public procurement authority can:

- Ensure that sustainability and safety provisions do not get lost in the negotiations.
- Ensure all project parties are aligned around key sustainable outcomes and core financing requirements (noting there will be certain trade-offs and operational dependencies).
- Ensure the contract structure is financeable / bankable and aligned with lender and equity requirements, (see “Investor Due Diligence” on the following pages).

47 https://www.fidic.org/ The International Federation of Consulting Engineers, has developed a suite of widely cited international standard forms of contract for use on national and international construction projects. These documents cover a range of issues including risk management, project sustainability management, environment, integrity management, dispute resolution techniques and insurance and a number of guides for quality-based selection, procurement and tendering procedures

3.3 Investor Due Diligence

Private investors, MDBs and DFIs conducting due diligence for PPP road projects typically assess a wide range of factors across financial, legal, technical, socio-political and sustainability dimensions. This paper focuses on those safety requirements which may help to positively differentiate a sustainable infrastructure project and to attract capital seeking such sustainable assets for investment.

Table 3

Non-Exhaustive List of Sustainability and Safety Considerations for Pre-Operational Road Projects for Due Diligence

Topic	Due Diligence Considerations
Asset Valuation	Stress-test financial model including: climate resilience over whole asset life (CAPEX,OPEX,etc); revenue from road tolls / demand; risk mitigation.
Feasibility and design	Road infrastructure / monitoring of EPC / construction / operational activities.
Planning, consent, permits	Including Environmental and Social Impact Assessment (ESIA) and associated conditions. Compliance with national and international standards (e.g. IFC Performance Standards etc.), including prior and informed community consultation, resettlement and indigenous rights.
Political risk / Counterparty	Stability, regulatory changes, governance, rule of law, and government commitment.
Asset certification	Alignment with global good practice for asset certification / labels e.g.: • FAST-Infra Label • iRAP Star Rating (e.g. >3 star)
Sustainable finance	Alignment with sustainable finance / “sustainable asset” class considerations: • Taxonomies. safety outcomes (e.g., reduced fatalities or serious injuries) can be recognised as social impact indicators under the “S” in ESG. • Disclosures required by key parties including the project company safety risk assessments, crash data, and mitigation measures as part of environmental and social (E&S) reporting. • Due diligence in the supply chain including environmental and human rights risk controls / mitigation, audit rights, escalation / remedy mechanisms / occupational and user safety risk.

Topic	Due Diligence Considerations
Construction phase	EPC contractors' activities and performance: • Contractors' governance, capacity and capability. • Supply of construction materials and sustainability standards / benchmarks used. • Key Performance Indicators (GHG, energy, waste, water, materials, health and safety record etc.). • Incidents / Reporting. • Policies, Processes, Manuals. • Risk Management and Mitigation. • Site Audits / Assurance. • Review of public domain events / incidents. • Opportunities to enhance performance.
Stakeholder Engagement	Counterparties, statutory consultees, regulators, government, local authority, NGOs, local communities etc.
Legal Documentation	Consideration of above items and review of overall PPP structure, mechanisms, and clauses integrated into proposed docs e.g. Project Agreement; Shareholders Agreement (including rights as shareholders); EPC Agreement; Operations & Maintenance Agreement, Credit Agreement, etc. (see "Key Parties in the Public-Private Partnership structure and associated legal documents" section above)

3.4 Monitoring, Reporting and Verification (MRV)

Major infrastructure projects require MRV across their lifecycle using structured frameworks and tools that ensure compliance with legal obligations, and support reporting of performance to project stakeholders. For road projects, the iRAP suite of tools provide world-class benchmarks and industry standard practice for road safety, which can be included as a formal condition referenced within legal documents (see mechanisms above).

Together with IFC, iRAP has developed sample Safety Key Performance Indicator (KPI) dashboards that support project- and concession-level monitoring as well as portfolio-level reporting. These dashboards can be tailored to specific reporting needs while using the same global standards (e.g. Star Rating for Schools).[48]

MRV is typically conducted by an independent MRV Auditor, who may also be responsible for conducting audits of the overall sustainability action plan and other environmental, social and safety monitoring and reporting obligations.

48 https://starratingforschools.org/safe-schools-tracker/ and https://irap.org/interactive-reports/

Photo by Huy Phan on Unsplash

CASE STUDY

Photo from Lima Municipality's Gallery

A Lifecycle Approach to Safe Transport Investments: The case of the Private Infrastructure Development Group (PIDG)

PIDG operate over the life cycle of an infrastructure project and across the capital structure to de-risk infrastructure projects and thereby catalyse private sector involvement. The financial and non-financial additionality of the investment and the expected impact of the investment are systematically assessed, and reviewed regularly.

PIDG's approach to impact is two-fold: to drive and demonstrate positive impact on people and planet and to identify, manage and mitigate ESG risks. PIDG has developed a comprehensive set of Health, Safety, Environmental and Social HSES policies which, aligned to the IFC Performance Standards, set out PIDG requirements for the management of HSES risks and impacts across the PIDG portfolio. HSES considerations are fully embedded in PIDG's two stage approval process for each new proposed investment. Each new investment is screened for HSES risks and impacts. Targeted due diligence then assesses the potential for the project to align with PIDG HSES policies. PIDG has set minimum road safety requirements for all projects and carries out enhanced due diligence against these requirements where road safety is identified as a high risk. This process enables the inclusion of defined road safety requirements, and specifically iRAP 3 star rating, into new investment considerations.

During due diligence, any gaps that are identified in road safety requirements are included in an Environmental and Social Action Plan (ESAP) which forms part of the contractual conditions with the investee. Actions may include both safety design and road safety performance requirements and may stipulate specific contractor procurement and management conditions.

Performance metrics are also agreed as part of the contractual conditions. The project is then entered into the PIDG HSES risk and performance register and monitored over the life of the investment. Monitoring visits are undertaken at agreed intervals either by a lender's technical advisor or the PIDG HSES team. The project metrics are reported annually in a monitoring report. PIDG actively promotes safer roads, reduces the risk of traffic incidents, and fosters a culture of safety across its projects and workforce. The road safety requirements are a critical aspect of the PIDG Life-Saving Rules (LSRs), which are mandatory to all projects.

A key aspect of PIDG HSES risk management framework is incident reporting and lessons learnt dissemination. During both the construction and operation phase of a project, road traffic accidents are tracked and reported as one of the key lagging indicators. All work relating serious road traffic accidents are reported on a monthly basis to PIDG Board and Owners.

Incidents investigation reports are required, from which lessons learnt reports are compiled. These are anonymised and shared across the portfolio to seek to prevent the reoccurrence of incidents. Using the PIDG project database, road traffic accident data can be analysed and interrogated for continual improvement.

PIDG has developed, in collaboration with British International Investment (BII), a good practice note to provide practical recommendations and good practices for organisations in emerging markets across various aspects of road safety management. These include establishing a strong corporate road safety culture, understanding risk assessments, implementing procedures around vehicle and driver selection and monitoring and reporting on incidents. PIDG seek to raise the capacity of their private clients to implement better road safety practices and to improve monitoring on road safety through the distribution of and training in, this guidance. PIDG has also sought to raise design standards through partnering with iRAP at PIDG Institute Impact training events.

Road safety risk is not confined to the boundary of a road project but is a salient risk across the countries in which PIDG operates. PIDG has therefore also been collaborating with iRAP at a country level to bring the road sector, investors, and government together to consider road safety and how to implement iRAP. PIDG sees this engagement as an important opportunity to support the improvement of the wider road safety ecosystem.

Box 10

Good Practice Resource

FAST-Infra Label is a globally applicable labelling system designed to identify and promote sustainable infrastructure projects. It aims to unlock private financing by providing a credible, consistent, and transparent framework for evaluating sustainability performance.[49]

The International Road Assessment Programme (iRAP) offers a globally recognised methodology for assessing and improving road infrastructure safety. Its tools, such as Star Ratings, Investment Plans and Risk Maps, help governments and developers identify high-risk roads and prioritise upgrades.[50]

World Bank's Public-Private Partnership Resource Centre has developed a set of sector-aligned Climate Toolkits which includes road projects.[51] The toolkit contains three modules covering the major climate entry points i.e., i) alignment with climate policies; ii) incorporation of climate considerations in the project selection; and iii) appraisal of climate effects in the project's economics and financing, followed by iv) climate-related key performance indicators (KPIs) applicable to road projects. It is noted that the toolkit is designed to be a complementary tool and is useful for due diligence activities and to demonstrate alignment with good practice.

The Chancery Lane Project is a collaborative initiative of legal professionals working to embed climate-conscious clauses into legal contracts to help tackle climate change and accelerate the transition to a net zero economy, (noting it is focused on UK use).[52]

NEC Option X29: The NEC (New Engineering Contract) contract suite is a family of standard contracts developed by the Institution of Civil Engineers (ICE) in the UK. It's widely used for construction, engineering, and infrastructure projects, both in the UK and internationally for all main and subcontract forms. It is designed to help NEC users in their drive towards achieving net zero greenhouse gas emissions and other related climate change and biodiversity targets.[53]

FIDIC: The International Federation of Consulting Engineers, standard contract suite. FIDIC also publishes business practice documents such as policy statements, position papers, guidelines, training manuals and training resource kits in the areas of management systems (quality management, risk management, business integrity management, environment management, sustainability) and business processes (consultant selection, quality based selection, tendering, procurement, insurance, liability, technology transfer, capacity building).[54]

ISO 20400:2017 Sustainable Procurement Guidance provides guidance to organisations, independent of their activity or size, on integrating sustainability within procurement. It is intended for stakeholders involved in, or impacted by, procurement decisions and processes.[55]

Safe Schools Africa is a partnership that offers direct technical assistance to roads project teams in Africa to provide the capacity to design and build roads that are safe and inclusive for the most vulnerable road users - child pedestrians - and so are safe for all.

49 https://www.fastinfralabel.org/
50 https://irap.org/
51 Climate Toolkits, For Infrastructure PPPs, Road sector, World Bank, 2023, https://ppp.worldbank.org/library/climate-toolkits-roads;
52 https://chancerylaneproject.org/clauses/

53 https://www.neccontract.com/resources/x29-climate-change-working-group
54 https://fidic.org/bookshop/about-bookshop/which-fidic-contract-should-I-use
55 https://www.iso.org/standard/63026.html

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4

Conclusion and Recommendations

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This report has shown that safer roads are not only a moral and social imperative, but a material driver of cash flows, resilience and long-term value in transport infrastructure. By linking safety to asset performance, contractual incentives and financing terms, the analysis demonstrates that targeted safety and access investments can protect and enhance returns in both toll-road and mass-transit systems, particularly when they improve connectivity for vulnerable road users and first/last-mile access to high-capacity public transport.

To realise this potential at scale, the agenda now needs to shift from “whether” to invest in safety to “how” to embed it systematically in investment decisions, legal frameworks and financial products. The Call to Action that follows therefore distinguishes between: (i) a core set of levers for infrastructure investors and financiers; and (ii) supporting and enabling actions from governments, MDBs and DFIs, insurers, philanthropies and technical partners, without which investor-led initiatives will not reach scale, durability, or impact.

4.1 Priority Actions for Infrastructure Investors and Financiers

Private investors can no longer sit on the sidelines while strained public budgets and MDB finance struggle to keep pace with the demand for safe, sustainable transport. Every unsafe road and underperforming corridor is not just a social failure; it’s a missed opportunity to create resilient, long-term, risk-adjusted returns. The challenge now is to move beyond a model that relies primarily on public money and concessional loans, and instead scale private-based approaches that use limited public funds as a lever—not the main engine—for investment. By stepping up with capital, innovation and performance-driven business models, the private sector can help turn safer, cleaner transport projects into a mainstream asset class, delivering both measurable impact and strong financial performance.

As a critical next step beyond this report, leading investors and financiers should be convened at the earliest opportunity to explore how the models, as outlined above, for long-term risk-adjusted returns in road safety can be actioned. A useful starting point would be via the network of private investors, their government and MDB/DFI partners provided by the FAST-Infra label.

The matrix that follows summarises the key levers available to investors and financiers to achieve this. It brings together practical actions across governance, due diligence, contracts, performance incentives, digital tools and financing structures, with a focus on measures that are directly within the control or strong influence of equity investors, lenders and asset managers. Rather than repeating long-standing government-focused recommendations, it concentrates on actions that can be embedded in investment processes, legal agreements and financial products.

Taken together, these actions offer a roadmap for integrating safety into mainstream infrastructure finance in ways that are commercially viable, replicable and scalable. Readers are encouraged to use the matrix as a reference for identifying which levers are most relevant to their own portfolios and mandates, and for designing concrete implementation plans with partners and clients.

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Table 4

Call to Action for Infrastructure Stakeholders: Infrastructure Investors (Debt/Equity)

Levers				Expected Impact
Policy and Governance	**Data**	**Innovation**	**Financing**	
P1.1 Integrate road safety metrics into screening, due diligence and public ESG disclosure (Star Ratings, crash trends, availability).	D1.1 Develop innovative business models that monetise traffic and safety data, creating additional revenue streams.	I1.1 Use HSES systems, telematics, journey management and people-centred design to actively manage operational risk, reduce crashes and downtime, and demonstrate verifiable safety performance.	F1.1 Co-finance corridor and first/last-mile safety measures that boost demand and protect availability.	
P1.2 Use FAST-Infra Label, Star Ratings or other credible standards to certify the safety and sustainability performance of assets.	D1.2 Use asset-level crash, flow and claims data to produce portfolio-level road-safety ESG reporting, and share aggregated data with national observatories and MDB partners.	I1.2 Pilot and scale digital tools (e.g. real-time incident detection, analytics dashboards) that reduce closures, optimise maintenance and improve safety-linked financial performance.	F1.2 Structure sustainability- or safety-linked loans/bonds where margins depend on KPIs.	
P1.3 Require binding safety covenants in shareholder, finance and O&M/EPC contracts.	–	–	–	• Fewer closures, claims and penalties; more resilient cash flows. • Lower OPEX and insurance costs; better refinancing terms and valuations. Higher ridership and willingness to pay on safer, more reliable corridors.
P1.4 Align internal KPIs and incentives with PPP/PBC payment and penalty regimes.	–	–	–	
P1.5: Take a portfolio level safety risk assessment.	–	–	–	
P1.6: Incorporate 3-star-or-better road and station-access criteria into investment committee approvals and stewardship with operators.	–	–	–	

Photo by Dev Mallangada on Unsplash

Photo by Dmitrii on Unsplash

4.2
Supporting and Enabling Actions from Other Stakeholders

To unlock meaningful private investment in safer, more sustainable transport, governments, MDBs and DFIs need to pivot from being primary financiers to powerful enablers. Their first task is to put in place clear, stable legal and regulatory frameworks that protect users, uphold safety standards and give investors confidence in long-term contracts and tariffs. Second, PPPs and other contracts must hard-wire safety into the deal—linking payments, bonuses and penalties to measurable road safety outcomes along entire corridors, not just construction milestones. Third, public institutions should deploy effective de-risking tools—such as guarantees, first-loss tranches, viability gap funding and blended finance structures—alongside strong project preparation and transparent data on safety performance, so that pipelines are bankable and impact is visible. By combining these levers, the public sector can shift its role from "payer of last resort" to "catalyst of private capital," crowding in investors to scale safer, greener transport networks.

Insurers and philanthropic organisations also have significant untapped potential to help close the safety investment gap and accelerate progress towards the Decade of Action objectives. Insurance actors are uniquely placed to "move the needle" by embedding road safety into underwriting, pricing and risk assessment, and by signalling—through premiums and coverage terms—that safer infrastructure and operations are lower-risk, more efficient assets. While such approaches are emerging, they are not yet deployed at the scale their impact would warrant, representing a major opportunity for constructive collaboration with governments, MDBs and operators. In parallel, philanthropic organisations can deploy flexible, concessional capital to fund project preparation, pilots, safety ratings, data systems and capacity-building—critical but often underfunded functions that make pipelines bankable. By taking early or first-loss positions, backing proof-of-concept projects and supporting independent monitoring and transparency, philanthropies can magnify the impact of limited public and donor resources and help crowd in both insurance and commercial finance into safer, more sustainable transport networks.

The second matrix therefore sets out a focused set of supporting measures for these stakeholders. It highlights how public authorities can embed safety into planning, regulation and contracting; how MDBs and DFIs can mainstream safety in pipelines, appraisal and blended finance; how insurers can bring risk and claims data, underwriting practices and capital into the discussion; and how philanthropies and technical partners can provide the evidence, capacity and early-stage support needed to test and scale new approaches.

Table 5

Call to Action for Infrastructure Stakeholders: Enablers of Private Investments

	Levers				Expected Impact
	Policy and Governance	**Data**	**Innovation**	**Financing**	
Public Government and Agencies	P2.1 Mandate safety KPIs (crashes, fatalities/serious injuries, Star Ratings) in all major road and mass-transit projects.	D2.1 Set up and maintain a national road-safety observatory combining crash, exposure, health and insurance data, with regular public reporting to guide safety investments.	I2.1 Use PPP and public-works procurement to pilot and then standardise innovative Safe System designs (e.g. iRAP Star Ratings in designs, people-centred station-area upgrades, active-mobility safety treatments).	F2.1 Build pipelines of bankable safety investments (corridor upgrades, safe access to BRT/metro).	• Predictable, scaled funding for safety. • Fewer deaths and injuries, lower health and productivity losses. • Higher-performing, climate-resilient road and transit networks that attract private capital. • Enable asset operators to make additional investments in accessibility and/or safety through unsolicited proposals and other flexible contractual arrangements.
	P2.2 Create an enabling legal framework for motor and liability insurance that supports mandatory coverage, risk-based pricing, and earmarked safety investments (e.g. through insurance-premium levies and trust funds).	D2.2 Work with MDBs/DFIs, investors, operators, insurers, NGOs and communities on data sharing protocols.	I2.2 Launch and co-fund pilot 'safe corridor / safe access' packages in priority BRT, metro and highway projects, with structured MRV to demonstrate and scale successful models.	F2.2 Earmark stable domestic funding (road funds, levies) for safety.	
	P2.3 PPPs and performance-based contracts with Safety Investment Plans (SIPs) and bonus/penalty regimes linked to verified safety outcomes.	D2.3 Publish transparent crash statistics and Star Rating maps in open formats, and include them in regular investor and public reporting.		F2.3 Develop and pilot results-based programmes (e.g. 'Payment for Verified Safety Outcomes') where disbursements to agencies or cities depend on crash reduction and Star Rating improvements.	
	P2.4 Embed safety in ESG and green/ sustainability frameworks and appraisal rules.	D2.4 Apply robust methodologies to quantify and value road-safety benefits in project appraisal and economic analysis.		F2.4 Adopt regulated frameworks for unsolicited proposals and PPP variations so investors can co-finance off-corridor, last-mile and station-area safety/access improvements.	
	P2.5 Include safe walking/cycling packages in NDCs, climate finance proposals and national transport budgets.[56]				

56 For more on this see Partnership for Active Travel and Health https://pathforwalkingcycling.com

Table 5

Call to Action for Infrastructure Stakeholders: Enablers of Private Investments

	Levers				Expected Impact
	Policy and Governance	**Data**	**Innovation**	**Financing**	
MDBs and DFIs	P3.1 Integrate safety early in project design, not as a late "component".	D3.1 Partner with governments, investors, insurers, data providers and NGOs around data sharing.	I3.1 Champion innovation through dedicated funding windows to scale technologies and business models that reduce accidents.	F3.1 Link pricing, disbursement or guarantees to verified safety outcomes.	• Larger, better-targeted flows of capital into safety-enhancing projects. • Lower fragmentation and transaction costs. • Stronger portfolios: fewer losses, higher developmental impact.
	P3.2 Make safety KPIs and Star Ratings core to results frameworks and legal agreements.	D3.2 Require standardised MRV frameworks (including crash, exposure and Star Ratings) in MDB-financed projects, with data shared in usable formats with national observatories and investors. Co-funding of these systems.	I3.2 Use project-preparation facilities and knowledge programmes to codify and mainstream proven road-safety business models (e.g. BRT access packages, toll-road SIPs) into standard toolkits and legal templates.	F3.2 Scale blended finance and results-based financing (e.g. "payment for verified safety outcomes").	
	P3.3 Build long-term institutional capacity in client countries.			F3.3 Align sovereign and private-sector operations so that equity, debt and guarantee products consistently embed road-safety KPIs, iRAP-aligned standards and sustainability labels (e.g. FAST-Infra Label).	
	P3.4 Support the creation of robust national accident data repositories.			F3.4: Co-create and anchor a global road-safety RBF platform to set metrics, accredit verifiers, aggregate pipelines and coordinate investors and insurers.	
	P3.5 Harmonise standards (iRAP, FAST-Infra Label, IFC PS4) and coordinate across MDBs so that borrowers receive non duplicative and consistent requests.				
	P3.6 Take a systemic view of safety impacts across portfolios (e.g. metro vs. road; mining logistics vs. community roads) and align investments to maximise overall safety outcomes, not just asset-by-asset compliance.				

Table 5

Call to Action for Infrastructure Stakeholders: Enablers of Private Investments

	Levers				Expected Impact
	Policy and Governance	**Data**	**Innovation**	**Financing**	
Insurers	P4.1 Coordinate with regulators, MDBs, and others to establish implementable regulatory frameworks, standards, and instruments.	D4.1 Provide high-quality claims and risk data to national observatories and MRV systems.	I4.1 Build APIs, data-trusts and dashboards for governments, road agencies and investors.	F4.1 Allocate part of premium pools and analytics capacity to preventive safety investments.	• Reduced frequency and severity of claims. • Stronger financial case for upstream safety investments. • Better targeting of infrastructure spending and enforcement, based on evidence.
	P4.2 Expand motor and liability insurance coverage (including compulsory third-party) and shift to safety-linked underwriting (premia reflecting safety performance).	D4.2 Digitise and standardise claims and incident reporting so data can feed enforcement, enable prompt payouts, and support black-spot remediation and MRV systems in near real time.	I4.2 Develop usage-based and behaviour-linked insurance products and risk maps to reward safer driving and operations.	F4.2 Provide capital and structuring support for safety outcome bonds and other insurance-linked instruments tied to verified crash reductions.	
	P4.3 Design road agency & operator third party liability cover linked to investments in road safety.				
Philanthropies	P5.1 Provide specialist TA on safe system, equity, first/last-mile safety, and relevant topics for safe and sustainable roads and mobility.	D5.1 Support independent data collection, evaluation and public reporting.	I5.1 Provide risk-tolerant funding for pilot projects, safe-to-fail experiments and new digital tools (e.g. MRV platforms, telematics-enabled safety programmes) and ensure results are openly shared.	F5.1 Fund blended finance structures and test high-impact models (e.g. safe schools, people-centred design, vulnerable-user protection) that can be scaled.	• Proven, replicable solutions that governments and financiers can mainstream. • Stronger local ownership and sustained political commitment to safety. • Greater public pressure and transparency on safety performance.
	P5.2 Advocate for safety in national development, climate and sustainable-finance agendas.	D5.2 Fund independent verification, evaluation and learning for results-based safety-finance instruments and platforms.		F5.2 Support pilots for active mobility safety.	
	P5.3 Use grants to fund TA facilities embedded in government and MDB programmes.				
	P5.4 Collaborate with iRAP, FAST-Infra Label and research institutions to codify “what works”.				

References

1. World Bank. (2005). Performance-based contracting for preservation and improvement of road assets: An output- and performance-based road contract (OPRC).

2. Ministerio de Transporte y Obras Públicas (MTOP). (2019). Programa de participación público-privada para carreteras nacionales. Montevideo: MTOP, Gobierno de Uruguay.

3. International Transport Forum (ITF). (2022). Safer Roads for all: Road safety in low and middle income countries.

4. Global Road Safety Facility (GRSF) and World Bank. (2024). Embedding road safety in transport lending operations.

5. PIDG GPN. (2021). Managing road safety in emerging markets.

6. MDB Road Safety Working Group. (2023). MDB Road Safety Financing in LMICs 2018-2022.

7. WB. (2022). Saving Lives through private investments.

8. FIA Foundation and Child Health Initiative. (2025). Life Support – Advancing the global agenda for financing and action on road safety.

9. Global Road Safety Facility. (2024). Business Plan FY2024-2027.

10. ITDP- World Bank. (2025). The Case for Cycling Infrastructure Investments.

11. PPIAF/GIH. (2025). Improving the accessibility and availability of key market data.

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Appendix A

Safety Clauses in PPP Contracts

Country	Project/ Model	Clause/ Mechanism	Performance Metric	Financial Effect	Verification/ Governance
United Kingdom	A13 Thames Gateway DBFO (TfL)	Schedule 9 – Part 6: Safety Performance Adjustment	"Safety Performance Adjustment" formula comparing accidents and road safety performance	Monthly payment adjusted up or down (±%)	Data reported by Operator, verified by Authority
Spain	Standard DBFO Concession KPIs (FHWA case study)	Accident rate KPI ("Bonificación por Seguridad Vial")	Change in accident rate vs. previous year	±5% of annual service payment	Calculated annually, audited by grantor
Chile	Highway Concessions Bases de Licitación (e.g., Ruta 5, Ruta 68)	Premio por Seguridad Vial en el Tramo Concesionado	Accident-rate improvement and safety initiatives	Tariff adjustment or direct bonus in payment certificate	Verified by Ministry of Public Works (MOP) via safety stats
Brazil	PiPa (Piracicaba–Panorama) Toll Road	Road Safety Investment Plan (Plano de Segurança Viária)	Completion of safety works; accident trends	Mandatory investment or deductions if not met	Regulated by ARTESP via performance audits
Colombia	4G Concession Contract (ANI)	Programas de Seguridad Vial	Execution of safety campaigns, accident reduction	Monetary bonuses for compliance; penalties for failures	Monitored by ANI & Interventor
Peru	Autopista del Sol (Puente Pte.–Trujillo–Sullana)	Obligaciones sobre seguridad vial y señalización	Non-compliance with safety and signage standards	Payment deduction or performance bond drawdown	Verified by Supervisor de Concesión
USA	FHWA P3 Case Study (Managed Lanes / Toll Roads)	Safety Performance Adjustment Formula	Annual change in accident rate ($A = N \times 10^8 / (L \times 365 \times AADT)$)	±5% of annual service payment	Authority monitors; independent safety data
USA	Colorado US-36 & I-25 Managed Lanes	Health & Safety Requirements – §17.3	Breach of safety obligations	Deduction / cure notice / potential termination	HPTE oversight; performance audits
India	Model Concession Agreement (BOT / HAM)	Schedule-L – Safety Requirements	Non-compliance: safety audits, signage, incident response	Monetary damages; payment deductions	Independent Engineer & Authority verify
India	NHAI / MoRTH executed BOT-Toll projects	Clause 17.6 – Damages for default + Schedule-L	Failure to maintain required safety standards	Deduction from payments or invocation of performance security	Verified by Independent Engineer
Singapore	Kallang–Paya Lebar Expressway PPP (Guidance only)	Safety Performance KPI (availability deduction)	Lane closures / incidents due to unsafe operations	Deduction in monthly availability payment	LTA monitoring
Australia	Sydney M2 & EastLink (availability PPPs)	Health, Safety and Environment (HSE) Performance KPI	Traffic incidents attributable to operator; accident response time	Deduction from availability payment	State transport agency audits

Penalty *Bonus* *Bonus and Penalty*

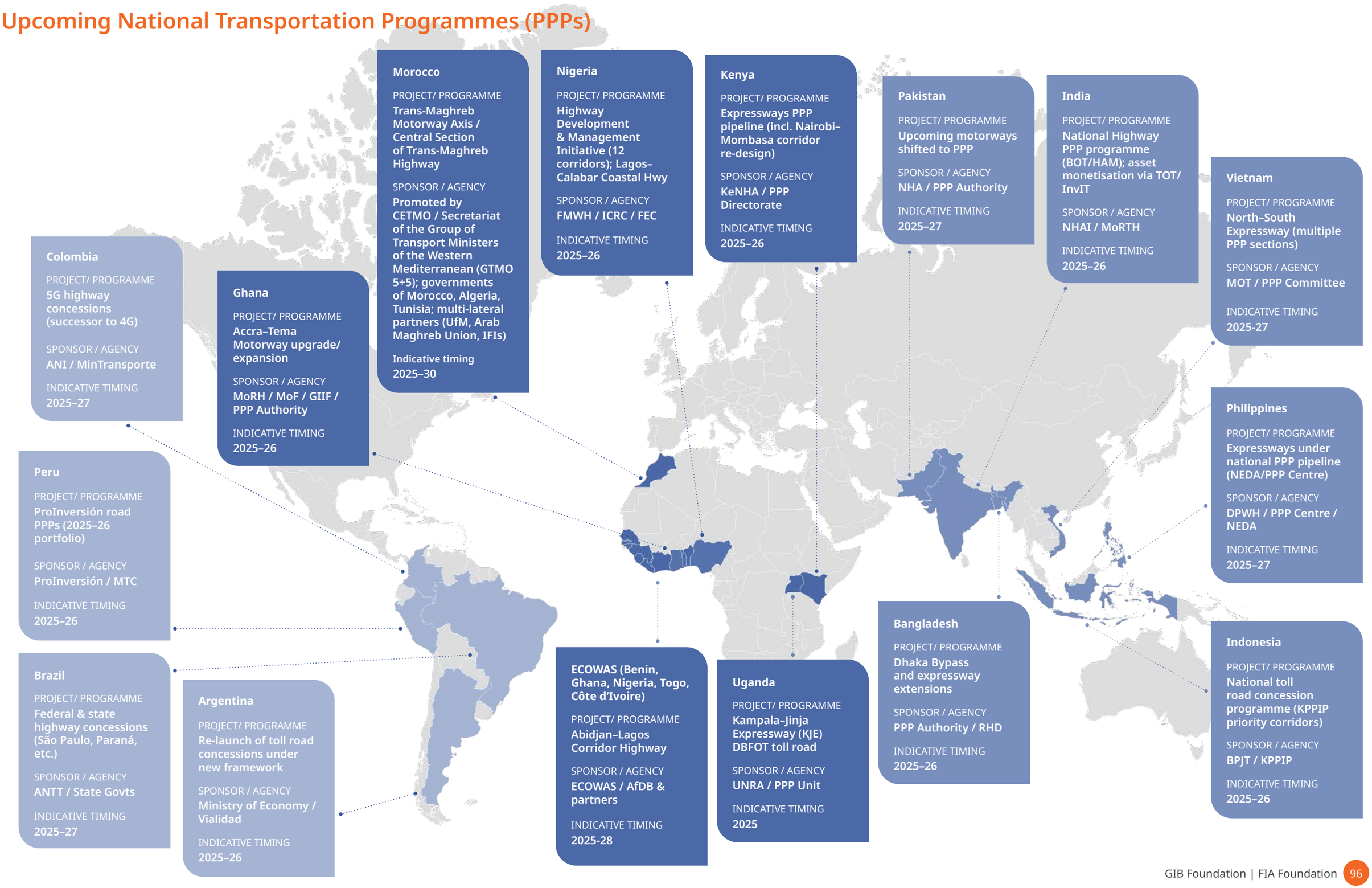
Appendix B

LMIC National Road Safety Programmes

Country	Mechanism	Legal/Official Basis (brief)	Primary Funding Source	What it funds
Africa				
Ghana	Annual allocation incl. share of Ghana Road Fund to NRSA	Ghana Road Fund Act; NRSA Act & annual budgets	Fuel levy & road-user charges via Road Fund; general budget	Lead-agency programmes, campaigns, enforcement support (varies by year)
Kenya	National Road Transport and Safety Fund (NTSA)	NTSA Act & subsidiary regulations	Parliamentary appropriations, levies/fees, grants	Education, audits, enforcement & implementation
Morocco	Fonds spécial routier (FSR); FGAC (victim compensation)	Finance laws; 1984 Dahir for FGAC	Fuel-tax streams (FSR); insurer/sector contributions (FGAC)	Road works/maintenance (FSR); post-crash compensation (FGAC)
Rwanda	Special Guarantee Fund (victim compensation)	Law establishing SGF; insurance sector regulations	Insurance-sector contributions	Post-crash victim compensation; some prevention-linked initiatives
Tanzania	Road Safety Fund via Roads Fund Board	Roads Fund Act; National Road Safety Policy	Fuel levy & road-user charges pooled in Roads Fund	Road safety initiatives within the roads sector
Uganda	Uganda Road Fund (with safety spending lines)	Uganda Road Fund Act, 2008	Fuel levy, transit fees, tolls	Maintenance-focused; includes safety components
LAC				
Argentina	ANSV funded by 1% levy on motor-insurance premiums	Law 26.363; implementing regulations	Insurance-premium earmark	National safety programmes (education, enforcement, systems)
Brazil	FUNSET – National Traffic Safety & Education Fund	Brazilian Traffic Code, Art. 320 §1º	5% of traffic fines (monthly)	Education, enforcement & engineering measures
Colombia	National Road Safety Fund (Fondo Nacional de Seguridad Vial)	Decrees/resolutions; 3% of SOAT premiums	3% of mandatory traffic-injury insurance (SOAT)	Lead-agency operations & national safety actions
Asia				
Bangladesh	Programme financed from general revenues + projects	Sector budgets; World Bank/partner project docs	General budget; external project financing	Engineering, enforcement & capacity under projects
Cambodia	NRSC programme via budget + partners	Government decisions; partner MOUs	General budget; development partners	Policy coordination, campaigns, enforcement support
India	National Road Safety Fund (NRSF)	Government policy & budget notifications	Earmarked share of fuel cess	National safety measures (engineering, enforcement, awareness)
Nepal	Proposed Road Safety Fund; donor-supported activities	Draft/proposals; UNRSF-supported initiatives	Proposed levies; current donor/budget support	Treatment support & prevention (proposed); pilots ongoing
Pakistan	National Road Safety Strategy (no dedicated fund)	Strategy 2018–2030; sector budgets	General budget; development partners	Programmatic actions via projects/agencies
Philippines	MVUC Road Board abolished; now budgetary allocations	RA 11239 (2019) abolishing Road Board	General budget (formerly MVUC earmark)	DPWH/DOTr safety-related works via regular budgets
Sri Lanka	National Council for Road Safety (NCRS) Fund	Gazette notifications establishing 1% levy	1% of motor-insurance premiums	Safety programmes & victim support
Vietnam	NTSC programme financed via state budget	State budget law; 2024 road traffic legal updates	General budget (no dedicated levy)	Lead-agency coordination & safety actions

Appendix C

Upcoming National Transportation Programmes (PPPs)



Colombia

PROJECT/ PROGRAMME
5G highway concessions (successor to 4G)

SPONSOR / AGENCY
ANI / MinTransporte

INDICATIVE TIMING
2025–27

Peru

PROJECT/ PROGRAMME
ProInversión road PPPs (2025–26 portfolio)

SPONSOR / AGENCY
ProInversión / MTC

INDICATIVE TIMING
2025–26

Brazil

PROJECT/ PROGRAMME
Federal & state highway concessions (São Paulo, Paraná, etc.)

SPONSOR / AGENCY
ANTT / State Govts

INDICATIVE TIMING
2025–27

Ghana

PROJECT/ PROGRAMME
Accra–Tema Motorway upgrade/ expansion

SPONSOR / AGENCY
MoRH / MoF / GIIF / PPP Authority

INDICATIVE TIMING
2025–26

Argentina

PROJECT/ PROGRAMME
Re-launch of toll road concessions under new framework

SPONSOR / AGENCY
Ministry of Economy / Vialidad

INDICATIVE TIMING
2025–26

Morocco

PROJECT/ PROGRAMME
Trans-Maghreb Motorway Axis / Central Section of Trans-Maghreb Highway

SPONSOR / AGENCY
Promoted by CETMO / Secretariat of the Group of Transport Ministers of the Western Mediterranean (GTMO 5+5); governments of Morocco, Algeria, Tunisia; multi-lateral partners (UfM, Arab Maghreb Union, IFIs)

Indicative timing
2025–30

Nigeria

PROJECT/ PROGRAMME
Highway Development & Management Initiative (12 corridors); Lagos–Calabar Coastal Hwy

SPONSOR / AGENCY
FMWH / ICRC / FEC

INDICATIVE TIMING
2025–26

ECOWAS (Benin, Ghana, Nigeria, Togo, Côte d'Ivoire)

PROJECT/ PROGRAMME
Abidjan–Lagos Corridor Highway

SPONSOR / AGENCY
ECOWAS / AfDB & partners

INDICATIVE TIMING
2025-28

Kenya

PROJECT/ PROGRAMME
Expressways PPP pipeline (incl. Nairobi–Mombasa corridor re-design)

SPONSOR / AGENCY
KeNHA / PPP Directorate

INDICATIVE TIMING
2025–26

Uganda

PROJECT/ PROGRAMME
Kampala–Jinja Expressway (KJE) DBFOT toll road

SPONSOR / AGENCY
UNRA / PPP Unit

INDICATIVE TIMING
2025

Pakistan

PROJECT/ PROGRAMME
Upcoming motorways shifted to PPP

SPONSOR / AGENCY
NHA / PPP Authority

INDICATIVE TIMING
2025–27

Bangladesh

PROJECT/ PROGRAMME
Dhaka Bypass and expressway extensions

SPONSOR / AGENCY
PPP Authority / RHD

INDICATIVE TIMING
2025–26

India

PROJECT/ PROGRAMME
National Highway PPP programme (BOT/HAM); asset monetisation via TOT/ InvIT

SPONSOR / AGENCY
NHAI / MoRTH

INDICATIVE TIMING
2025–26

Vietnam

PROJECT/ PROGRAMME
North–South Expressway (multiple PPP sections)

SPONSOR / AGENCY
MOT / PPP Committee

INDICATIVE TIMING
2025-27

Philippines

PROJECT/ PROGRAMME
Expressways under national PPP pipeline (NEDA/PPP Centre)

SPONSOR / AGENCY
DPWH / PPP Centre / NEDA

INDICATIVE TIMING
2025–27

Indonesia

PROJECT/ PROGRAMME
National toll road concession programme (KPPIP priority corridors)

SPONSOR / AGENCY
BPJT / KPPIP

INDICATIVE TIMING
2025–26

Appendix D

Preliminary Financial Model of Safer BRT Corridor in West Africa

BRT Access Safety RoI Model - Assumptions

Parameter	Value
Currency (display only)	EUR
Baseline daily ridership	100’000
Operating days per year	360
Fare (Zone 1, FCFA)	400.00
Fare (Zone 2, FCFA)	500.00
Share of inter-zone trips (0-1)	40.00%
FX: FCFA per EUR	655.96
Average fare per ride (EUR)	0.67
Annual ridership growth	2.00%
Fare escalation (annual)	0.02
Ridership uplift - Low	2.50%
Ridership uplift - Central	4.00%
Ridership uplift - High	7.00%
Safety access CAPEX (Year 0)	3'000'000.00
Incremental O&M per year	2'000'000.00
Project evaluation horizon (years)	10
Discount rate	8.00%
Outcome grant (Year 1, optional)	0
Other benefits (annual, optional)	0.00

Summary (NPV, IRR)				
Scenario	**NPV**	**IRR**	**Discount rate**	**Horizon (years)**
Low	410’085.11	10.68%	8%	10
Central	3’261’345.94	26.59%	8%	10
High	8’963’867.60	53.13%	8%	10

Appendix E

Preliminary Financial Model of a High Capacity Indian Toll Road

Assumptions - Busy Indian Tollway

Parameter	Value
Currency	INR
AADT (vehicles/day)	60'000
HCV share (0-1)	30.00%
Operating days/year	365
Avg toll - Cars (Year 1)	250
Avg toll - HCV (Year 1)	800
Traffic growth (annual)	3.00%
Toll indexation (annual)	3.00%
Baseline unplanned closure hours/year	150
Baseline claims & repairs (per year)	60’000’000
Baseline insurance premium (per year)	35’000’000
Baseline penalties/SLA deductions (per year)	10’000’000
Safety CAPEX - Reliability-first (Year 0)	300’000’000
Safety CAPEX - Full package (Year 0)	800’000’000
Incremental O&M - Reliability-first (per year)	15'000'000
Incremental O&M - Full package (per year)	40'000'000
Closure reduction - Reliability-first	35.00%
Closure reduction - Full package	60.00%
Claims reduction - Reliability-first	20.00%
Claims reduction - Full package	40.00%
Insurance reduction - Reliability-first	5.00%
Insurance reduction - Full package	10.00%
Penalties reduction - Reliability-first	25.00%
Penalties reduction - Full package	50.00%
Demand uplift - Reliability-first	0.00%
Demand uplift - Full package	1.00%
Debt outstanding (average)	20’000’000’000
Margin step-down - Full package (bps)	15
Discount rate	10.00%
Horizon (years)	10

Summary - Incremental Safety RoI (vs Baseline)				
Scenario	**NPV**	**IRR**	**Discount Rate**	**Horizon (years)**
Reliability first	143’397’152	19.19%	10%	10
Full package	812’219’242	28.29%	10%	10

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