





THE EVOLUTION OF SMART TRANSPORTATION INFRASTRUCTURE

To improve financial performance and stimulate investments, a risk-return perspective for all stakeholders can be instrumental

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Images Highways England; Daimler Motor Group

The global need for funding of transportation infrastructure is about US\$1.3tn annually until 2030. The annual funding gap in transportation infrastructure is about US\$300bn.

Today's funding gap provides opportunity for infrastructure investment

Fundraising activity of investors has picked up. Transportation infrastructure remains a top priority – but why? As with other infrastructure asset classes, transportation infrastructure offers long-term, stable (and maybe even regulated) attractive returns. To generate these, some requirements need to be in place...

- **Stable regulatory framework** – Clear regulation and a reliable legal framework are required to support the generation of returns over a longer period.
- **Proven operating model** – Future operating costs and investment costs should be known in advance, as they need to be factored into a pricing model. If assets are regulated, a broad range of balance sheet, and profit and loss items may also be subject to regulatory approval or agreement, with limitations for changes at a later stage.
- **Alignment of interest** – A retrospective change of regulation needs to be avoided. There are several examples where this has taken place. The consequence is a more difficult investment climate. Also, benefit-sharing schemes that incentivize value-adding behavior and limit downsides of parameters outside the influence of a contracting party, should be established.

Left: Connected and autonomous vehicle systems being tested today will require significant infrastructure investment in the future

FUNDING SOLUTIONS

Any uncertainty leads to an increased return expectation of investors or even a withdrawal of funds from investment opportunities. Unlike a liquid equity investment, for example, an infrastructure investment is illiquid and cannot be easily reversed. To move forward with investment opportunities, to satisfy investor expectations, and to keep social costs low, risks need to be controlled and managed as well as possible.

Smart transportation infrastructure – a bright future with new risks

Today's funding gap exists not because of, but despite, the availability of capital. Investors are challenged to identify high-quality projects that meet the above-mentioned criteria.

As smart transportation infrastructure evolves it will lead to more investment opportunities but, investing in these opportunities will be more difficult and complex (see table below) as value drivers of these projects are not entirely clear. Digital business models are new and potentially volatile, and operating models are not proven. Electronics and software could lead to new additional maintenance requirements and costs. Passenger safety increases, but the vulnerability of a complex



Image: Highways England

system potentially increases as well, so regulatory surprises cannot be ruled out. Unlike the regulation of mature industries, technical and legal regulatory changes are more likely to happen (in addition to changes in regulation of the revenue model).

Investors require certainty

Public budgets will not be able to finance the required transportation infrastructure development. The sector requires private funding to cope. The better each stakeholder contributes to managing risks and uncertainty, the more capital will be allocated to investment

Above: Costs to update road networks, such as for planned dynamic charging lanes for EVs, will be significant

opportunities to close the funding gap. As a result, governments will be enabled to foster economic growth and creation of public welfare. Engineering, procurement and construction (EPC) contractors can generate earnings. Private investors and sovereign wealth funds/asset managers can buy into investment opportunities. Infrastructure investors can better contribute to project excellence and profitability. From a public welfare perspective, this would be a win-win situation.

Contributions of key stakeholders

Each stakeholder in smart transportation infrastructure investments might want to be aware of the key risk-return management components across the asset lifecycle (see table above). Facilitating clarity, transparency and a better understanding of future value drivers and their volatility will help to better manage the asset through the asset lifecycle. Eliminating risk in the investment process would also increase project value. What might contributions of stakeholder groups be?

- **Governments and regulators** could provide regulatory stability, increase transparency on project developments, increase pre-investment project quality, establish incentive-compatible economic frameworks and centralize infrastructure investment competence.
- **EPC contractors** could configure projects with a lifecycle value (and not only cost) perspective, consider role after project finalization (e.g. servicing), tighten large project risk management to shorten timelines and increase stability of execution.

SMART INFRASTRUCTURE			
	Considerations for building transportation infrastructure	Value levers to control (selection)	Status
SMART road infrastructure 	More build-in electronics needed (e.g. sensors) to control traffic (requires soft- and hardware) – e.g. safety control, charging/energy supply, on-demand pricing	<ul style="list-style-type: none"> Standards and vulnerability Shorter lifetime of electronics compared to other types of infrastructure challenge the infrastructure investment rationale 	Concept
Charging stations 	Competing technology standards and still evolving battery technology and customer adoption	<ul style="list-style-type: none"> Connection to grid Charging tariff and metering/payment interface Different technology standards 	Implement
Flying cars infrastructure 	New infrastructure is needed – air traffic control system is being developed in parallel (NextGen); concept being pursued by several large firms (Uber, Airbus, FAA/NASA)	<ul style="list-style-type: none"> Evolution of air traffic control standards Realization of autonomous driving Level of decentralization of landing infrastructure and vehicle costs 	Planning/early adoption
SMART ships infrastructure 	Industrialization benefit driving evolution of standards (e.g. Galileo – navigation; IMO rules – legal framework) and asset characteristics are changing adding infrastructure-like characteristics	<ul style="list-style-type: none"> Market risk still relevant (exposure to be investigated) New types of risks, e.g. cyberpiracy, supply chain decentralization Evolution of legal framework 	Action

ASSET-LIFECYCLE RISK-RETURN MANAGEMENT, VALUE LEVERS			
Investment process	1. Portfolio structure and asset scouting	<ul style="list-style-type: none"> · Overall financial view – linkage of investment/project portfolio to relevant performance metrics, e.g. construction cost, IRR · Scouting action plan – clear objectives for project development · Priority setting – which initiatives/assets to prioritize 	BENEFITS Linkage between value drivers and management approach Better asset performance Increased bankability
	2. Pre-investment valuation	<ul style="list-style-type: none"> · Individual asset comparison against investment framework – filtering of pipeline against qualitative and quantitative criteria · Trade-offs set-up versus operating costs · Baseline for performance management – integration of strategic planning and risk management 	
	3. Operations	<ul style="list-style-type: none"> · Linkage of business case to operations – volatility view, e.g. linking operations and maintenance concepts to financial plan · Mitigation planning – actions linked to value drivers · Prioritization of maintenance activities – value to reduce unplanned downtime versus value of additional uptime (impacting top line) 	
	4. Reinvestment, closure, replacement	<ul style="list-style-type: none"> · Holistic asset management view – trade-off between individual (re-investments versus closure or replacement of asset/asset components) · Linkage to budgeting – operational data provided by operations to finance to improve budgeting of asset operations (link to key performance metrics) 	

- **Operators** could get more involved in the planning and configuration phase to contribute an operational value driver perspective, establish and challenge EPC contractors on lifecycle

- value perspective and assumptions.
- **Investors** could develop more intimate understanding of industrial rationales and differences in regulatory frameworks, and guide stakeholders



on key requirements relating to risk, cash flow structure, governance, etc, linked to target capital structure and holding period.

Stimulating smart investments

A better understanding of stakeholders and their respective requirements and contributions to project value and financial performance would help in the alignment process. Consequently, value creation would be easier and deal flow would increase. Developing an integrated volatility-based perspective across the asset lifecycle would help stakeholders to meet their targets and avoid downsides.

Establishing smart transportation infrastructure requires smart approaches in configuring, operating, and investing into assets. ❖

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