Australian Government | Infrastructure Australia

February 2025

Annual Performance Statement 2025

Acknowledgement of Country

Infrastructure Australia proudly acknowledges the Traditional Owners and Custodians of Australia, and their continuing connections to the land, waters, and communities. We pay our respects to them and to their Elders past and present. In preparing for the future of our infrastructure, we acknowledge the importance of looking beyond the immediate past to learn from Aboriginal and Torres Strait Islander peoples' unique history of land management and settlement, art, culture, and society that began over 65,000 years ago. As part of Infrastructure Australia's commitment to reconciliation, we will continue to develop strong, mutually beneficial relationships with Aboriginal and Torres Strait Islander partners who can help us to innovate and deliver better outcomes for Aboriginal and Torres Strait Islander communities, recognising their expertise in improving quality of life in their communities.

A note from the artist:

"Through sharing culture, we can create a sense of belonging, by connecting to the land we stand on. This connection of people and our communities is shown through connecting campfires. These being places we sit, yarn, and share knowledge. The Infrastructure Australia values - expressed by the colours blue, green, orange, purple and teal - weave through the artwork to represent the opportunities and benefits for our communities. Under this sits our rivers, lakes, oceans, and waterways. Water being the giver and supporter of life and flows through us all. I see the reconciliation journey as the water along the path to benefiting our people. Around our waterways I've shown our traditional infrastructure. Our connections and songlines. The systems set up by the First Peoples of this place that we aim to weave into the modern landscape."

Nani, by Kevin Wilson (Maduwongga, Wongutha).

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Introduction

Infrastructure Australia is the Australian Government's independent adviser on nationally significant infrastructure investment planning and prioritisation. Sectors within Infrastructure Australia's remit comprise transport, energy, communications, water, and social infrastructure.[1]

Purpose of this statement

This document delivers on the requirement in section 5DB of the *Infrastructure Australia Act 2008* (IA Act) that Infrastructure Australia must give to the Minister and table in both Houses of Parliament each financial year:

- an annual performance statement (*statement*) on the performance outcomes being achieved by states, territories and local government authorities in relation to the infrastructure investment program and existing project initiatives funded by the Commonwealth
- an annual budget statement to inform the Commonwealth's budget process on infrastructure investment.

The Annual Performance Statement 2025

This second edition of the Annual Performance Statement includes:

- analysis of the performance of the Australian Government's program of infrastructure investments
- discussion on the need for post completion reviews and the development of a post completion evaluation framework by Infrastructure Australia
- trends and insights identified through Infrastructure Australia's evaluation of infrastructure proposals
- infrastructure case studies to facilitate knowledge-sharing.

1 Social infrastructure is generally considered in the context of a broader infrastructure development proposal that includes integrated investments in other infrastructure and contained in place or region-based infrastructure planning.

Analysis of the Australian Government's program of infrastructure investments and existing project initiatives

Context

This statement reports on the performance outcomes being achieved by states, territories and local government authorities in relation to the infrastructure investment program and existing project initiatives funded by the Australian Government. It excludes analysis of Australian Government funding provided through grants and funding provided to other entities, including to private sector entities and Government Business Enterprises.

The Australian Government provides funding for state and territory infrastructure projects through two main mechanisms: grant programs and the Federal Financial Relations (FFR) system. The FFR facilitates about a quarter of all Australian Government expenditure via a range of funding agreements, known collectively as Federation Funding Agreements (FFA).[2]

Criteria used to identify projects

As Infrastructure Australia's remit is focused on nationally significant infrastructure, projects have been identified for analysis where:

- it forms part of the infrastructure sectoral FFA
- is an individual, nationally significant project (i.e., does not form part of a package and/or program)
- it includes an Australian Government funding contribution or commitment over $250 million
- is in the transport, energy, communications, water, or social infrastructure sectors
- has been or is expected to be evaluated by Infrastructure Australia.

Projects meeting the criteria above were identified in the infrastructure sectoral FFA from the following FFA schedules:

- Land Transport Infrastructure Projects (2024–2029)
- National Water Grid Fund
- Pilbara Ports Common User Upgrades
- Perth City Deal.

2 Significant Australian Government investment for communications and energy projects occurs outside of the FFR system, including through Government Business Enterprises such as the NBN Co.

Summary of projects analysed

This year's analysis is based on data provided on 69 transport infrastructure projects, two water infrastructure projects, and one social infrastructure project that meet the defined criteria.[3]

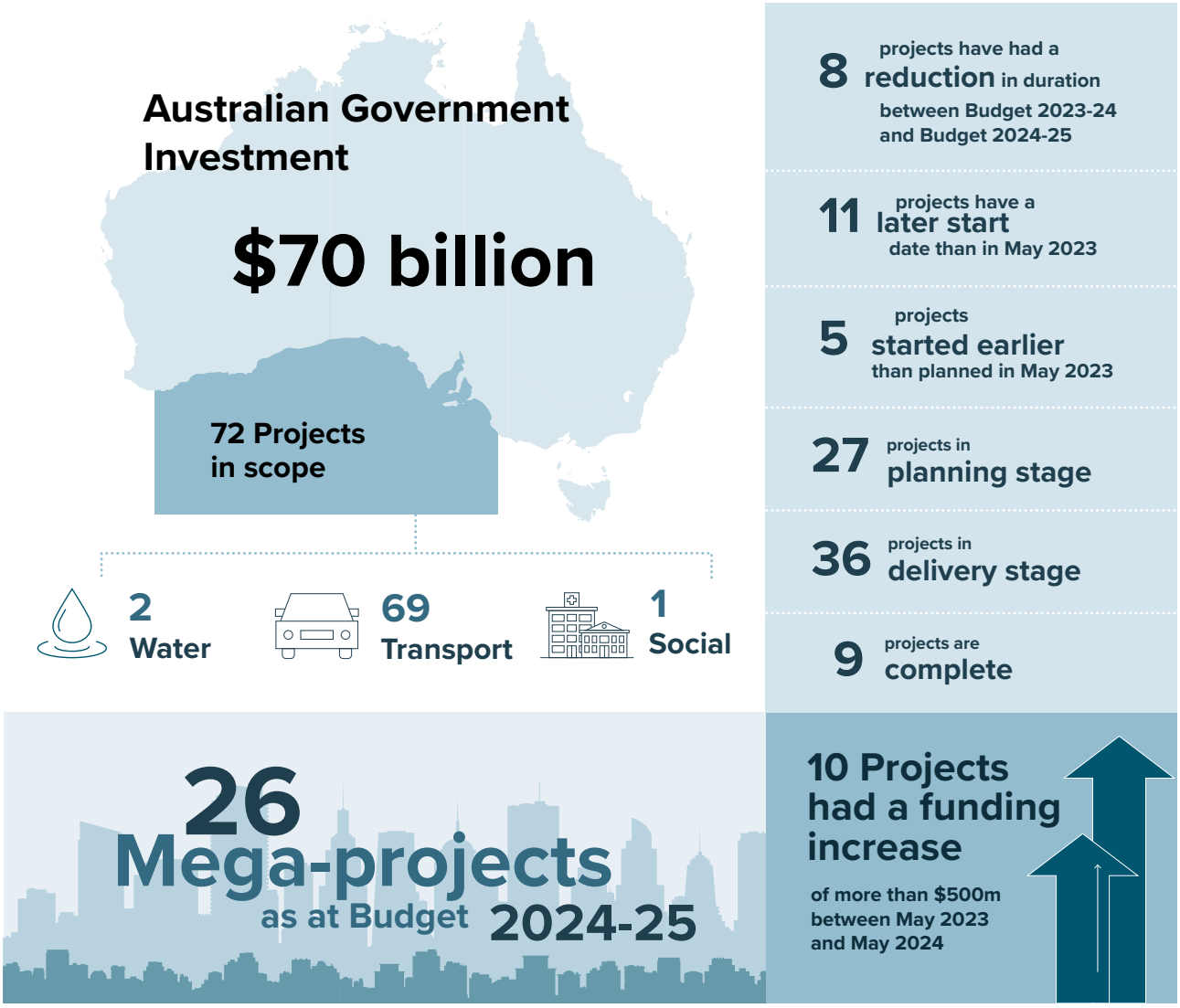
Using the selection of projects, Infrastructure Australia looked at:

- The attributes of the infrastructure investment, including sectors, project phases and the size of the Australian Government investment
- Changes in time and costs between the 2023-24 and 2024-25 Budgets.

Projects in the FFA Schedule for Land Transport Infrastructure Projects completed before May 2022 were excluded from analysis. In addition, not all of the 72 projects are included in the change in time and cost analysis. Some projects are excluded due to data availability at the time the analysis was conducted.

The following analysis relates to the applicable projects only and therefore provides an *indication* of the Australian Government's infrastructure investment. It does not look at or analyse delivery of the Australian Government's full program of infrastructure investments.

Figure 1: Performance outcomes analysis - summary of key findings



3 Project data was provided by the Department of Infrastructure, Transport, Regional Development, Communications and the Arts for transport and social infrastructure projects and by the Department of Climate Change, Energy, the Environment and Water for water infrastructure projects.

Performance outcomes analysis - key findings

Using data current at Budget 2024-25, road and rail infrastructure projects represent almost all of the Australian Government funding included in the analysis, with road and rail infrastructure investments accounting for 58% ($40.4 billion) and 40% ($27.9 billion), respectively.

Figure 2: Total projects by infrastructure sector

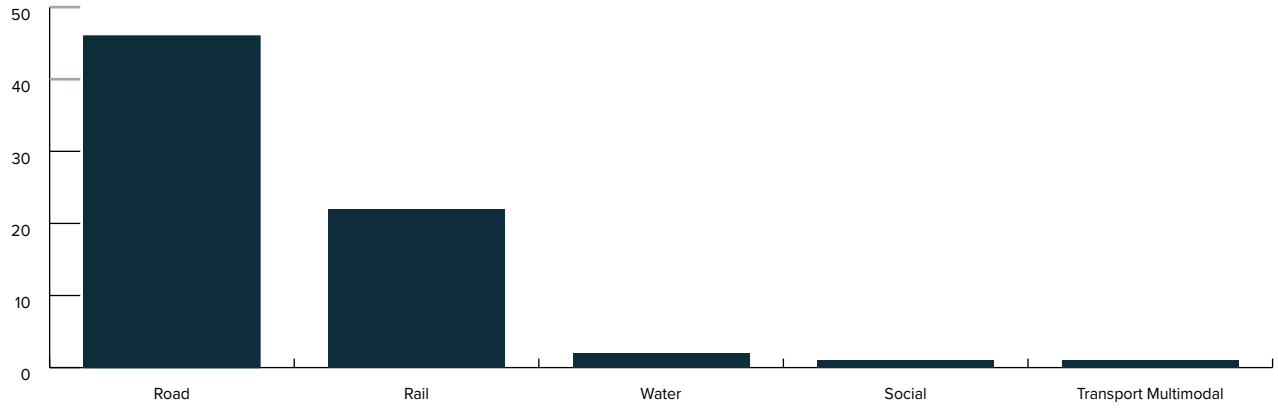
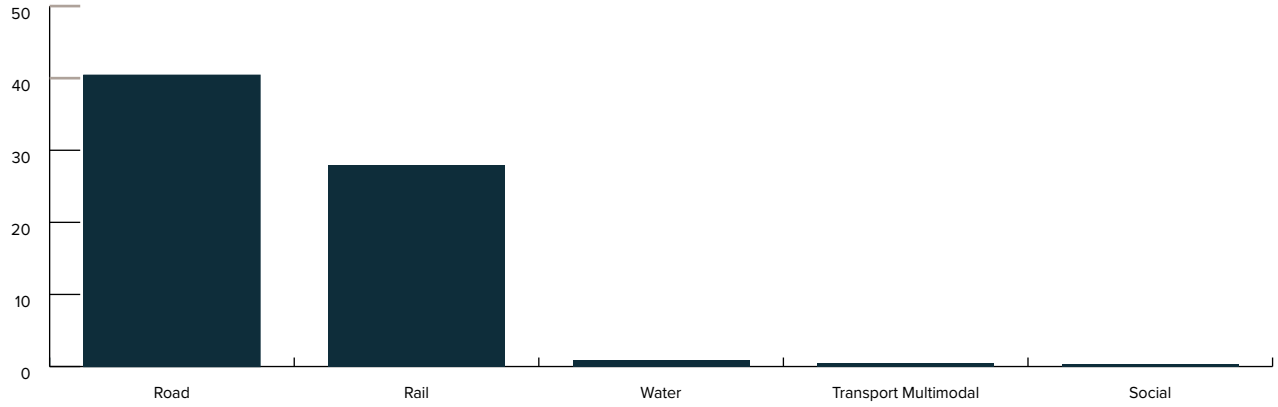


Figure 3: Total project value by sector ($)



The investment comprises 26 mega-projects (investments with a total project cost of at least $1 billion), which represents over a third (36%) of projects analysed. Of these, 15 mega-projects received an Australian Government contribution alone of at least $1 billion. Additionally, there are 6 (8%) projects close to this threshold, with a total project cost over $900 million. In comparison, there are 22 (31%) projects with a total project cost of $500 million or under.

Figure 4: Australian Government infrastructure investments by funding band

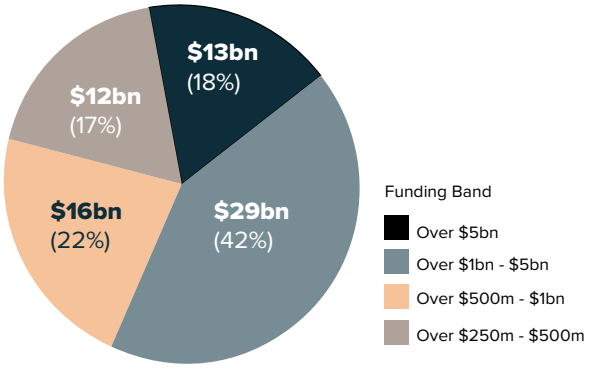


Figure 5 shows that most projects are in the planning or delivery phases: 27 (37.5%) are in planning, with 36 (50%) projects in delivery. 9 (12.5%) projects have completed since May 2022.

Figure 5: Number of projects by project phase

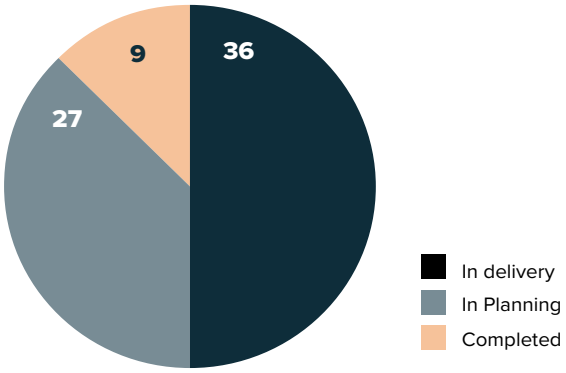
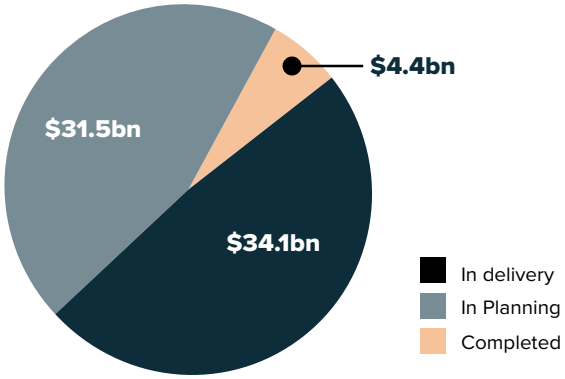


Figure 6: Australian Government contribution by project phase



Maintaining a balanced program, particularly for mega-projects, is important to provide a sustainable pipeline of investment for industry that is deliverable and provides a realistic funding profile for governments.

Changes between Budget 2023–24 and Budget 2024–25

Start dates have changed for more than a quarter of projects (27%) since Budget 2023–24, with 11 projects starting later and 5 starting earlier.

Expected project duration has increased for 26 projects (44%), with just over half of these (15 projects) expecting an increase of up to 25%. Six projects anticipate an increase of over 50%, with half of these (3 projects) expecting an increase in duration over 75%.

Expected duration has decreased for 14% of projects (8), with the vast majority (88%) experiencing a decrease of up to 25%.

Figure 7: Changes in start date

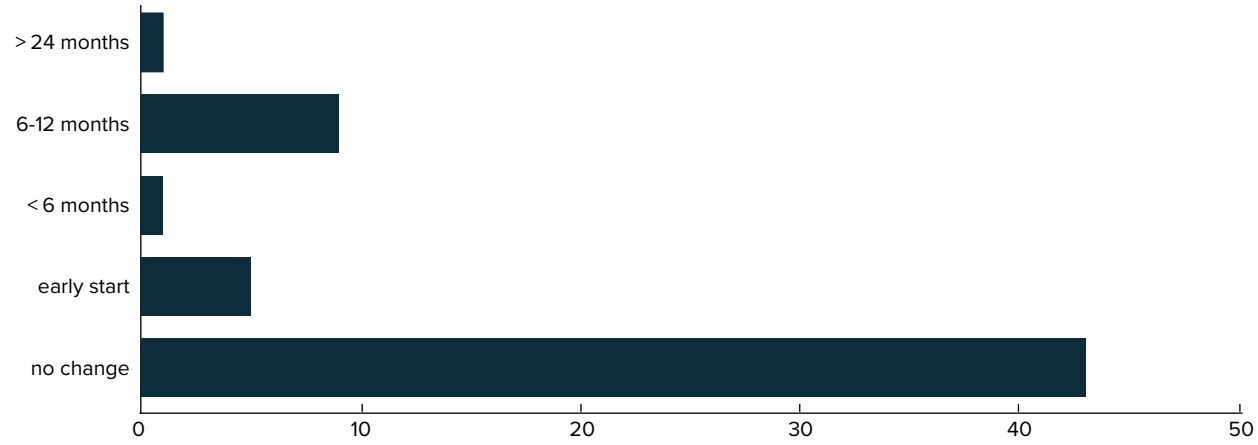


Figure 8: Changes in expected project duration

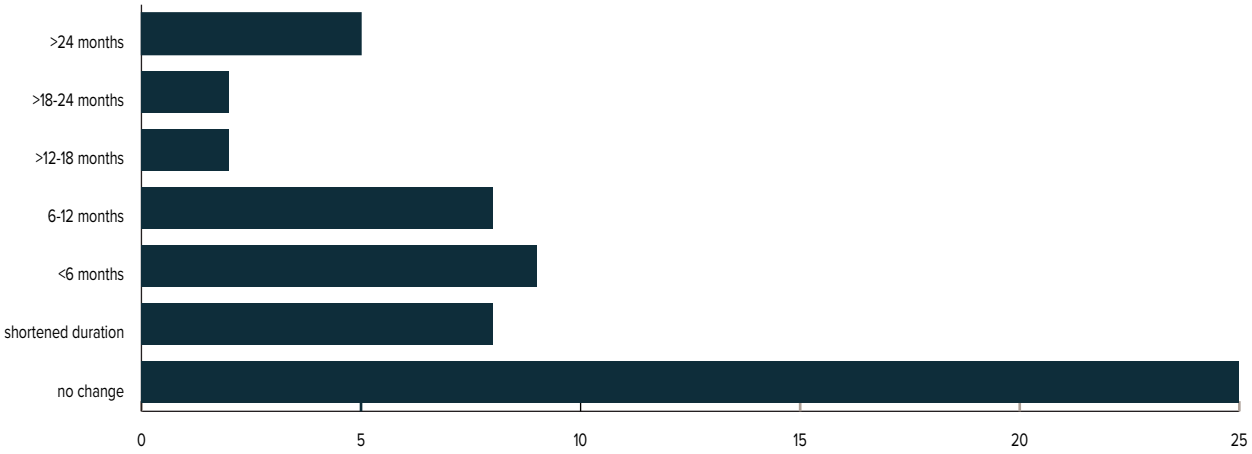
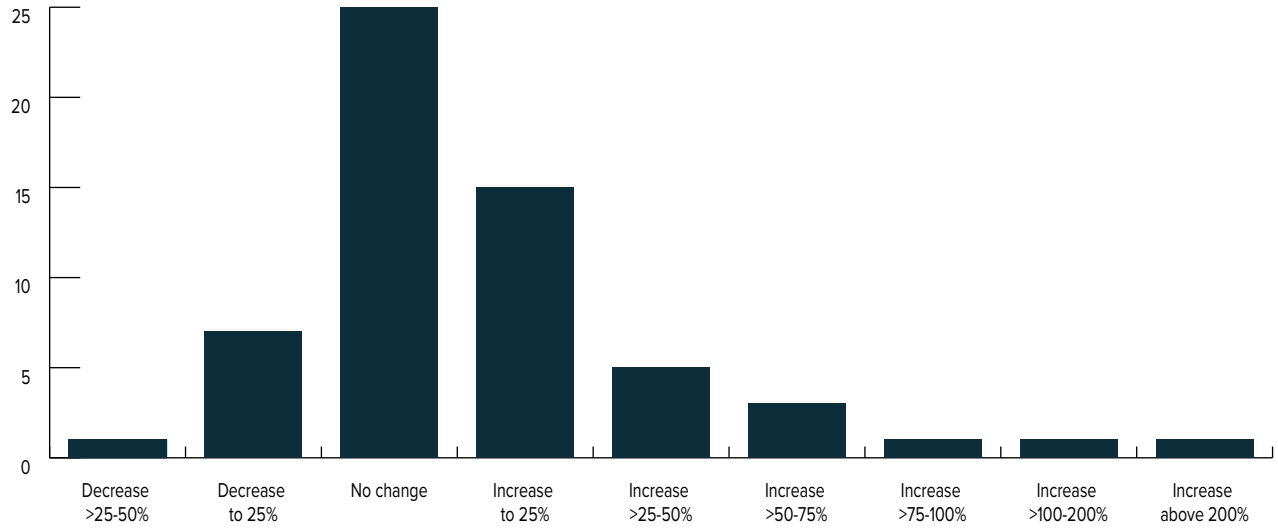


Figure 9: Distribution of projects by % change in duration



The total Australian Government investment for projects with extended duration is $22 billion. Increases in duration occurred mostly in road projects (18) as opposed to rail projects (8) and typically resulted in a later expected completion date for the project, rather than the project starting later. Duration of road projects have on average increased 17%, which is more than the 11% average increase of rail projects.

Conversely, when considering total project costs, rail projects have on average increased 37%, which is more than double the average road project cost increase of 15%.

31 (47%) projects had a change in Australian Government funding between Budget 2023-24 and Budget 2024-25, with 33 (50%) having an increase in total project cost over the same period. 10 (15%) projects had a total project cost increase over $500 million in the year.

Figure 10: value of cost changes – Australian Government funding

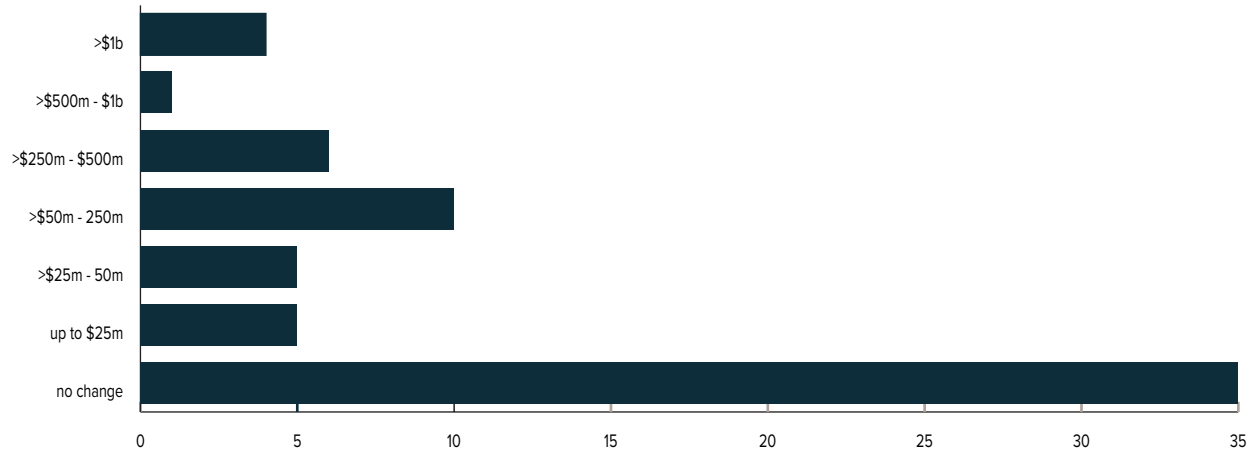
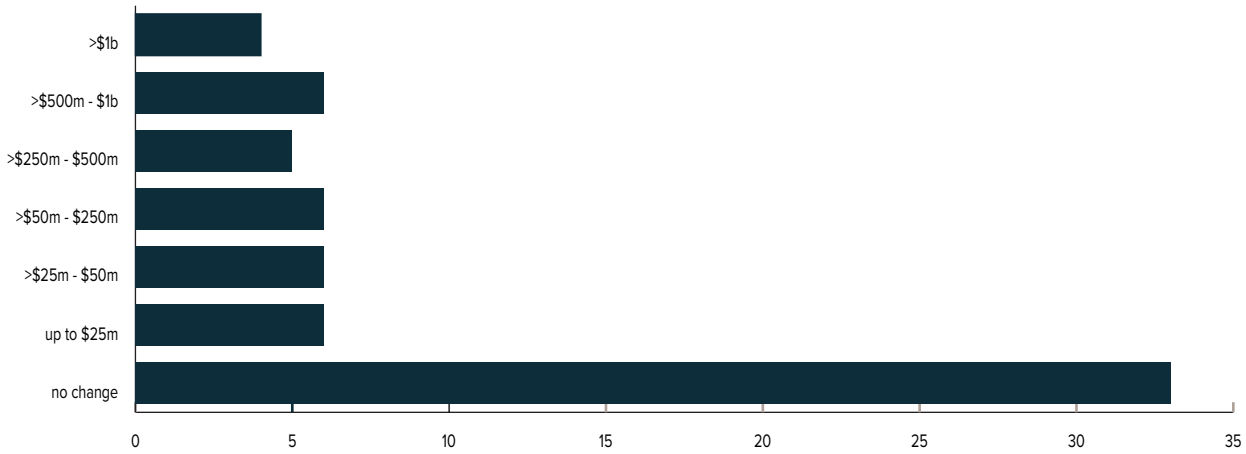
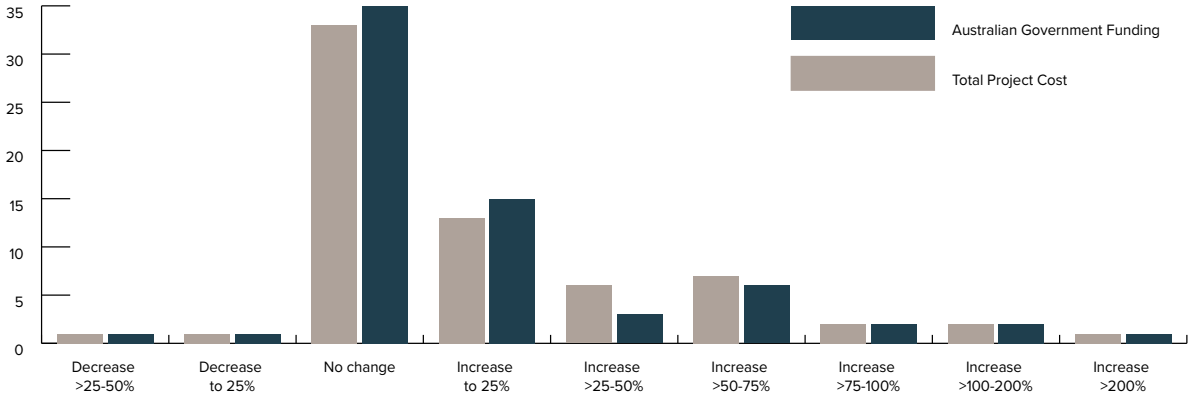


Figure 11: value of cost changes - total project cost



Of the projects analysed that had a change in total project cost, 19 (29%) had an increase of up to 50%, with 12 (18%) projects experiencing an increase of over 50%. 2 (3%) projects experienced reductions in total project cost.

Figure 12: distribution of changes in total project cost and Australian Government funding



The changes in total project cost resulted in similar changes to the Australian Government funding contributions, with 18 (27%) projects having an increase of up to 50%, and 11 (17%) projects experiencing an increase of over 50%. Two (3%) projects experienced reductions in Australian Government funding.

Premature announcements of infrastructure projects, when the planning, design, and risks are not sufficiently mature, can lead to cost and time increases. As outlined in a range of reports[4], there is evidence that major infrastructure projects, irrespective of their types, sectors and locations, often experience cost increases and delivery delays. The impact of project design and development maturity on the certainty of the cost and schedule needs to be considered when making future infrastructure investments, including their public announcement, at the individual and portfolio level.

4 See Infrastructure Australia's National Study of Infrastructure Risk, 2021 Australian Infrastructure Plan and the Grattan Institute's ***The Rise of Megaprojects***.

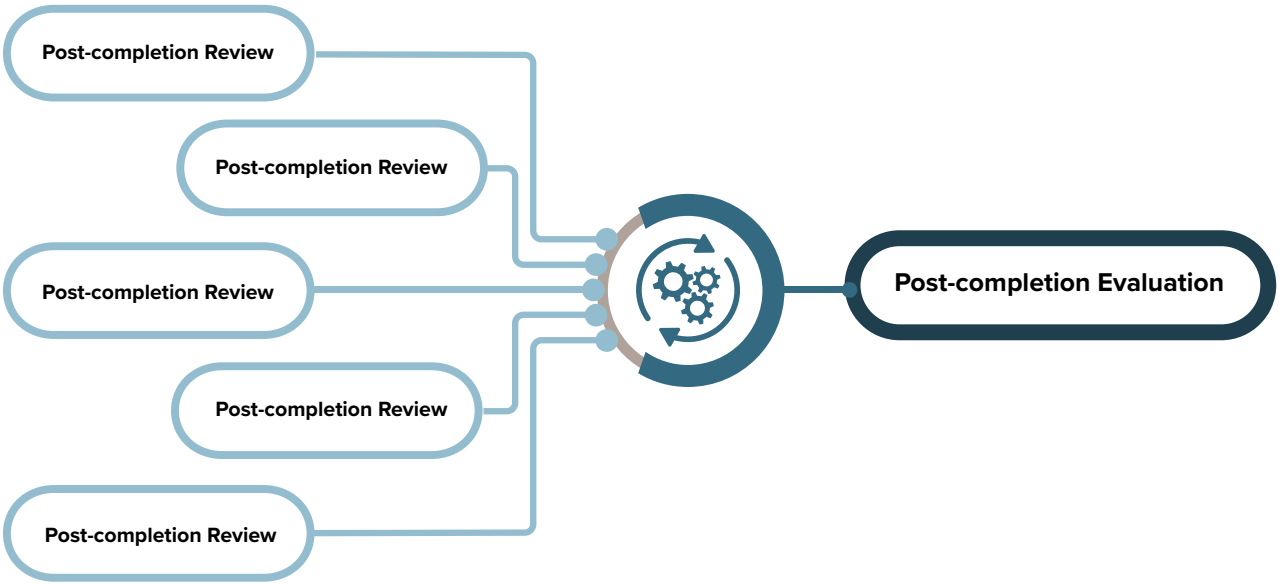
Future performance statements

This is the first year that the statement has included year-on-year analysis and will provide a baseline for future years. As the dataset grows, future statements will be able to incorporate additional analysis

Post completion reviews: developing a framework for post completion evaluations

Post completion reviews provide governments, communities and industry with important lessons to inform future infrastructure development and delivery practices. Reviews are developed by assessing the planning, delivery and outcomes of projects to determine whether objectives and/or forecasted benefits and costs have been realised. Where relevant, post completion reviews explore the reasons for any differences in expected and actual outcomes.

Combining and analysing multiple post completion reviews – an activity known as post completion evaluation – can also yield appropriate lessons to repeat or avoid. Assessing project outcomes at this aggregate level draws learnings from a range of project types, infrastructure sectors, and geographies.



The Australian Government recognises the importance of post completion evaluations by acknowledging the need for greater evidence on whether or not projects are achieving intended outcomes[1]. Additionally, new requirements for post completion reporting have been agreed between the Australian Government and state and territory governments, through the FFA Schedule on Land Transport Infrastructure Projects (2024–2029). As the mechanism that facilitates Australian Government investment through its Infrastructure Investment Program, the FFA Schedule strengthens requirements for states and territories to provide post completion data to enable post completion evaluations and future benefits realisation analyses of projects.

High quality data is critical to post completion reviews, however the requisite data can be difficult to obtain if not planned for upfront. Project data can be scattered across multiple systems, among multiple delivery contractors and government departments, and compiled in inconsistent formats, making it challenging to access and consolidate. Additionally, resource constraints may impact the availability of personnel, expertise, and budgets to effectively collect, manage, and analyse large volumes of project data, particularly for historical activity. Furthermore, even when project data can be compiled, confidentiality obligations and sensitivity mean the information cannot be shared, even if there is appetite to do so.

To overcome these challenges, the requirements for data organisation, capture, storage and sharing should be established during business case development. This will ensure the necessary data is available to compare the forecasts made in the business case with the delivered key performance indicators and project metrics to determine how well the project met its goals and targets.

Important data streams to capture include[2]:

- lifecycle costs of the new or upgraded asset, including capital, operational, maintenance, and planned periodic refurbishment costs
- demand levels for the new infrastructure or asset
- key benefit metrics such as vehicle travel time, train service frequency, dam release volumes, and internet upload/download speeds.

Moving forward, Infrastructure Australia will work with the Australian, state and territory governments to access post completion data to conduct analysis of whether an Australian Government's infrastructure investment is achieving its intended impact.

To guide analysis, Infrastructure Australia is developing a framework for post completion evaluation. These aggregated evaluations will enable insights and learnings to be developed and shared while simultaneously reducing the potential for negative outcomes to be attributed to a specific project or stakeholder.

The objective of the post completion evaluation framework is to provide a structured and transparent approach to the evaluation of completed infrastructure projects, which informs our advice to the Australian Government and drives system-wide improvements for future project development, assessment, and delivery.

Infrastructure Australia's Statement of Expectations from the Australian Government sets out the expectation that Infrastructure Australia will undertake a post completion review of a selection of significant, completed infrastructure projects each year. This is an important new role to help drive nation-wide learning from the investments made to date. Over the next twelve months, Infrastructure Australia will engage with stakeholders to consult on the framework's development.

The introduction of new reporting requirements for land transport infrastructure projects in the Infrastructure Investment Program, coupled with the development of a post completion evaluation framework, marks a significant shift in the role of post-completion reporting and evaluation throughout the lifecycle of new projects in the Infrastructure Investment Program. This change represents a more comprehensive approach to assessing and learning from completed infrastructure projects, which will be reflected on in future editions of this statement.

TREND

Trends and insights

Early engagement and cross-government collaboration is supporting a harmonised approach to infrastructure planning

Despite widespread recognition of its benefits, the integration of infrastructure and land use planning remains a persistent challenge across governments. A lack of coordination, conflicting priorities and fragmented decision-making responsibilities can limit governments' ability to deliver optimal community outcomes. Cross-government collaboration and early engagement can significantly contribute to overcoming these challenges by improving the quality and efficiency of planning, decision-making and delivery of major infrastructure projects. Engagement between the Australian, state and territory governments will ideally begin at the earliest stages of project scoping and continue throughout project planning to enable collaborative and effective development and review processes.

Infrastructure Australia notes an increasing trend for cross-government engagement and collaboration between the Australian Government and state and territory governments, as demonstrated in proposals submitted to Infrastructure Australia. Since 2021, Infrastructure Australia has engaged early with both the states and territories and relevant Australian Government departments on over 85% of business case evaluations. There are also significant infrastructure projects underway demonstrating this, such as the Western Sydney Aerotropolis, where the different levels of government working together is critical to success.

Early engagement allows Infrastructure Australia to provide project specific advice on the Infrastructure Australia Assessment Framework (IAAF) requirements. This ensures that proposals seeking more than $250 million in Australian Government funding are following best practice. Upfront involvement also increases our understanding of a proposal's complexities, reducing the need for additional information requests and creating a more transparent and streamlined evaluation process.

Engaging early and fostering collaboration among all levels of government is essential for overcoming the complex challenges that span across different jurisdictions in large infrastructure projects. Prioritising cross-government collaboration by engaging early will lead to a more harmonised approach to infrastructure planning and delivery.

TREND

An increasingly complex future requires more rigorous and transparent land use modelling and demand forecasting techniques

Land use models and demand forecasts are fundamental in infrastructure planning processes to quantify future needs and guide investment decisions. Infrastructure projects' costs and benefits are closely tied to expected service and usage levels, as future demand forms the basis of economic appraisals.

Increasing the rigour and transparency of land use modelling and demand forecasting techniques is essential for developing a robust understanding of the potential impacts of infrastructure projects. Infrastructure Australia's review of businesses cases has shown that the application of these techniques within the transport sector requires further improvement to account for future uncertainties.

Traditional transport planning approaches are being challenged by changing travel patterns and emerging uncertainties such as rapidly evolving technology and a changing climate. In response, new methods have gained traction, evident by the increasing adoption of movement and place frameworks across jurisdictions that focus on shaping desired futures through stakeholder engagement and multi-modal planning.[5] However, validating long-term visions against uncertain futures remains complex, necessitating more rigorous and transparent forecasting techniques.

In recent times, land use and transport integration models have been playing an increasing role in planning and assessment of both transport and land use, with at least one jurisdiction having developed a land use and transport integration model as part of an integrated planning framework.[3] Infrastructure Australia acknowledges that these emerging models can provide valuable insights into the impacts of infrastructure strategies and proposals, however, it is important to recognise the 'black box' nature and limitations of these tools. For example, land use and transport integration models have a methodology which can be reviewed, however, their modelling assumptions and outputs can be difficult to interpret. While useful to support decision-making, all inputs and assumptions should be clearly defined and outputs should not be solely relied upon as definitive predictors of the future.

Refer to Infrastructure Australia's Guide to risk and uncertainty analysis for guidance on planning infrastructure for an uncertain future.

5 Movement and Place is a cross-disciplinary, place-based approach to planning, designing, delivering and operating transport networks adopted by transport agencies across the majority of Australian jurisdictions.

TREND

A growing commitment to sustainability and decarbonisation outcomes is expected to improve proposal development

Meeting Australia's net zero targets is a substantial challenge that requires a coordinated approach across infrastructure sectors. Infrastructure Australia's *Annual Performance Statement 2024* identified inconsistent assessment of sustainability and resilience in businesses cases and the need for governments to consistently and rigorously integrate decarbonisation into infrastructure planning as part of business-as-usual processes. Encouragingly, sustainability and decarbonisation are coming into focus across jurisdictions, indicating that all levels of government are responding to the net zero challenge.

In 2023, the Infrastructure and Transport Minister's Meeting agreed to establish the Infrastructure Decarbonisation Working Group to improve national coordination and help oversee a new transport decarbonisation work plan and shared principles for national transport decarbonisation. To date, the Working Group has overseen a number of nationally consistent decarbonisation policies for transport infrastructure, such as development of national carbon values.

Additionally, the Australian Government and state and territory governments have contributed many examples of policies, advice and thought leadership over the last 12 months, which strengthen how the infrastructure sector will support to net zero targets.

Report – *Embodied Carbon Projections for Australian Infrastructure and Buildings*

Description – Infrastructure Australia's *Embodied Carbon Projections for Australian Infrastructure and Buildings* report forms part of our broader advice to support the Australian Government's decarbonisation priorities and objectives.

Using data sourced from Infrastructure Australia's Market Capacity program, this report quantifies a baseline of the upfront embodied carbon in Australia's built environment. Infrastructure Australia puts forward six recommendations for the Australian Government to consider in its work towards the reduction of embodied carbon from infrastructure and buildings.

Report – *Transport and Infrastructure Net Zero Consultation Roadmap*

Description – The forthcoming Transport and Infrastructure Net Zero Roadmap and Action Plan will represent the net zero sectoral plan for the transport and transport infrastructure sectors, and provide a clear strategy for reducing transport emissions. The Consultation Roadmap — the first of two development stages — sets out potential pathways for transport and transport infrastructure to contribute to net zero by 2050.

Report – *Victorian Infrastructure Delivery Authority (VIDA) Transport Infrastructure Decarbonisation Strategy 2024*

Description – VIDA's Transport Decarbonisation Strategy sets out commitments within two distinct streams:

1. Decarbonisation of corporate operations
2. Decarbonisation of transport projects in accordance with the Climate Change Act and net zero 2045 ambitions.

VIDA's transport projects have been implementing a range of opportunities to reduce their carbon footprint, recognising significant reductions can be achieved where the contractual mechanisms, supports and incentives are in place. The Transport Decarbonisation Strategy sets out three key mechanisms.

1. The Recycled First Policy, introduced in 2020, has resulted in a substantial increase in the volumes of recycled content in road and rail projects, and a lowering of emissions (since recycled materials tend to emit less carbon than their virgin counterparts).
2. The use of recycled and lower carbon materials and solutions in transport projects.

3. The use of solar and battery systems to power site compounds and other static plant such as light towers, noting that fully electrified plant and equipment options are still limited and lead times may lengthen as global demand intensifies.

Report – *TfNSW Sustainable Infrastructure Program*

Description – The Sustainable Infrastructure Program is a four-year program created to streamline and drive decarbonisation and circularity on transport infrastructure projects. Aligning with Transport for NSW's (TfNSW) Net Zero and Climate Change Policy, the Program is a pathway for TfNSW and industry to collectively deliver on infrastructure-related net zero targets and transition to a circular asset model.

The objective of the program is to streamline and simplify decarbonisation and circular economy for TfNSW project teams and industry partners by:

- embracing digitisation to update systems and processes to capture carbon reduction measures
- establishing clear and consistent approaches to deliver carbon reduction targets informing decision-making by linking decarbonisation and circular economy outcomes.

Report – *NSW Decarbonising Infrastructure Delivery Policy and Embodied Carbon Measurement for Infrastructure*

Description – This policy applies to all NSW Government building projects valued over $50 million and linear infrastructure projects valued over $100 million. The policy will ensure that upfront carbon — the emissions generated during the production of materials and the construction of infrastructure--is considered consistently on NSW Government projects.

While these examples represent encouraging signs of progress, success relies on consistent and rigorous integration of sustainability and decarbonisation strategies into infrastructure planning and operations across all sectors. For example, when preparing business cases, proponents should explicitly address decarbonisation considerations to align with relevant government policies and commitments. This includes:

- **outlining how options analysis** has considered climate change, such as alignment to emissions targets, resilience outcomes, and so on
- **quantifying, monetising and reporting on emissions** from materials, construction processes and asset operation
- **providing a carbon management or sustainability reporting plan** that proposes the method for measuring and reporting construction and operation emissions.

Given the extent of thought leadership, policies, and advice emerging from all levels of government, proponents are strongly encouraged to incorporate comprehensive decarbonisation analysis into their business cases. By integrating sustainability and decarbonisation assessments as standard practice, proponents can enhance project viability and play a crucial role in the nation's coordinated effort to address climate challenges. Embracing this shift towards rigorous decarbonisation planning will benefit individual projects and all infrastructure sectors.

Our *Guide to assessing greenhouse gas emissions* provides guidance on considering the impact of greenhouse gas emissions in business cases.

TREND

Greater value of infrastructure investment can be achieved by increasing rigour of cost estimates

The capital investment of infrastructure projects and the ongoing operating and maintenance costs of delivered assets play a fundamental role in determining their social, economic and environmental value. Developing cost estimates for large infrastructure projects is challenging due to their complex nature, long planning and construction timelines, and the various external factors that can impact costs.

The 2023 review of the Australian Government's $120 billion Infrastructure Investment Program identified $32.8 billion in known cost pressures.[4] The Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) provides Cost Estimation Guidance, outlining the principles proponents are expected to follow in preparing cost estimates for proposals seeking Australian Government funding for the Infrastructure Investment Program. State and territory jurisdictions also produce detailed cost estimation guidance.

A review of business cases submitted to Infrastructure Australia indicate that increasing the rigour of cost estimation during project development would increase confidence in decision-making and maximise value for the Australian community.

Insufficient understanding of site conditions, particularly due to inadequate geotechnical and subsurface investigations, is a major contributor to cost overruns in infrastructure projects.[5] Conducting insufficient or poor-quality geotechnical, groundwater or topographical surveys prior to construction can lead to unexpected discoveries during site establishment and excavation that require additional engineering solutions and/or extra works that create delays. Undertaking comprehensive site investigations and planning can help mitigate these types of cost overruns.

Another factor that contributes to cost overruns is optimism bias. Optimism bias leads to overestimating positive outcomes and underestimating negative ones. In infrastructure development, where multiple complex processes occur simultaneously, each requiring independent decisions, even small instances of optimism bias can accumulate. The layered decision-making in large-scale projects can amplify this impact, as each planning and estimation stage can introduce its own positive skew. This cumulative effect often results in underestimated costs and overestimated benefits.

While there are challenges associated with cost estimations for large infrastructure projects, the importance of robust cost estimation cannot be overstated, as it forms the foundation for sound decision-making. To maximise the value of Australian Government infrastructure investments, funding commitments should not be finalised until a robust cost estimate has been developed. Announcing and committing to projects and/or costs before essential information is understood can create challenges associated with expectations that are based on inaccurate and/or incorrect time and scope, and budget allocation efficiency.

Infrastructure Australia recognises and supports the consideration of the timing of public project announcement, as occurs in several jurisdictions, and sufficient prior undertaking of investigative works.[6,7]

Before an infrastructure funding commitment is announced, the cost estimate should be informed by appropriately detailed site investigations and be based on a level of design commensurate with the size and development stage of the project.

The cost estimate should include all costs likely to be in incurred over the lifecycle of the project. This includes all capital, operational and maintenance costs, as well as project specific costs. Project specific costs can include the costs of environmental offsets and those associated with the interface with and integration of the project with existing infrastructure and other infrastructure projects in delivery. It should also account for risk by using a probabilistic estimation method to

determine the contingency allowance. Finally, appropriately justified escalation rates should be applied, and the estimate be peer reviewed by a reputable, independent reviewer.

This approach ensures that public resources are allocated efficiently and effectively, promoting transparency and accountability in infrastructure planning and delivery.

Refer to the Australian Transport Assessment and Planning Guideline's cost estimation guidance and DITRDCA's Cost Estimation Guidance notes for further information on developing robust cost estimates.

TREND

Opportunities exist to improve options identification and analysis

Options identification and analysis is an important step in infrastructure development, and involves full exploration of all possible options before progressing those with greatest potential for achieving project objectives and maximising social benefits for Australians.

To identify a shortlist of options, the IAAF requires a structured analysis and filtering process to determine the costs and merits of each identified option. The approach should be appropriate to the proposal under consideration and the level of rigour should increase as the number of viable options reduces.

Analysis of business cases submitted to Infrastructure Australia indicates that while the options identification and analysis undertaken is generally appropriate, there are opportunities to improve how options align to the strategic objectives of the proposal and how options can be packaged to achieve more efficient and effective outcomes.

During the options analysis stage of infrastructure development, there are also significant opportunities to achieve a material impact in the reduction in greenhouse gas emissions through development of lower carbon options. These options could include incorporating demand management strategies that reduce the need for new infrastructure, employing low-carbon materials and construction methods, reducing the amount of land clearing and incorporating green infrastructure elements that act as carbon sinks (e.g. urban forests and wetlands).

A review of business cases submitted to Infrastructure Australia indicates a need to refine how dismissed options can be retrieved and combined to form composite options for subsequent assessments. In the case of non-capital options, or options addressing a small number of objectives, it could be feasible to merge these with other options to collectively address the issue and achieve outcomes comparable to higher-cost individual options.

Generally, the process of developing and analysing options is iterative. Option packages should be identified and evaluated as distinct alternatives to ensure potential synergies (where delivering the package of options has a greater impact than delivering each individual option independently) and economies of scope and scale are thoroughly considered. Although options are likely to evolve during the analysis and filtering process, significant changes eventuating during the planning stages should be documented and justified. Where multiple major interventions are packaged together into a program, a programmatic approach to project development should be adopted. Our *Guide to program appraisal* provides guidance on how options should be grouped into a program if they address a common problem or realise a common opportunity, and if they can be delivered in a coordinated manner to obtain benefits not available from delivering them individually.

To achieve a more robust and structured options analysis, there should be a focus on enhancing the strategic alignment of options during their development and optimising how they are packaged in the filtering and analysis process. This approach will ensure that all viable alternatives are thoroughly examined, reducing the risk of subjective decision-making and provide a strong justification for committing to a particular solution. This not only improves the quality of decision-making but also strengthens the overall business case, boosting stakeholder confidence, increasing value for money and enhancing the likelihood of project success.

Infrastructure case studies

Victoria's Level Crossing Removal Program – Program Alliance Framework

Rail level crossings present significant safety and economic impacts in both urban and regional areas. Level crossings introduce a 'conflict point' between rail and road traffic, which creates safety and road network efficiency issues by increasing traffic congestion and reducing the reliability of transport networks. They also create an access constraint for pedestrians and cyclists.

The Victorian Government, through the Level Crossing Removal Project (LXRP), is delivering 110 level crossing removals across metropolitan Melbourne. Major construction commenced in 2015 and all 110 committed level crossing removals and associated rail improvements, including an additional 11 level crossing closures, are planned to be completed by 2030. To overcome the challenges of coordinating a large interrelated program of physically independent projects across a broad geographical area within 'live' brownfield rail corridors, LXRP implemented an innovative Program Alliance Framework.

The Alliance Framework is a collaborative, performance-based delivery model involving five program alliances competing for work packages over a period of up to 10 years, subject to performance. It emphasises high performance across various delivery criteria such as safety, on time performance, disruption management and sustainability, offering ongoing work allocations for alliances who can consistently deliver across these metrics. The framework is built on transparency, trust, and teamwork, and incorporates a gainshare/painshare mechanism based on cost performance and includes commercial incentives for non-price outcomes.

The Alliance Framework has realised numerous benefits for infrastructure delivery that otherwise would be difficult to achieve with traditional delivery approaches.

Collaborative development phase enables time and cost savings

- Scope and solutions are developed in conjunction with the alliances, including the ultimate asset owner, encouraging collaborative ownership and accountability for investigations, the inclusion of innovation from other packages of work and lower risk provisions, resulting in higher quality submissions at approximately half the time and cost of other procurement models.

Project delivery schedule certainty improves resource allocation and community satisfaction.

- Delivery schedule certainty and speed to the market enables efficient coordination and allocation of resources, labour and materials across the Program Alliances, contributing to cost certainty for the Victorian Government.[6] Confidence in transport network disruption timing supports project accountability with the community, improving stakeholder acceptance and management during delivery.

Repeat nature of design solutions enable productivity gains through economies of scale

- The repeat nature of works enables standardisation of design solutions across the program, creating efficiencies in component manufacturing, construction methodologies and reuse of specialised machinery between projects.

Long-term pipeline of work incentivises collaboration and information sharing

- Ongoing allocations of work packages provide continuity and repetition for Program Alliances, reducing the incentive to withhold ideas or information and encouraging value for money solution sharing across the program.

The LXRP Program Alliance Framework is an example of how collaborative project delivery models can be used to manage complex inter-related infrastructure programs, leading to improved productivity and community outcomes.

This type of project governance and delivery could be applicable on other types of government-led programs, such as multi-section road corridor upgrades or maintenance programs.

More information on the Level Crossing Removal Project is available on the LXRP website.

6 While cost certainty has been achieved, Infrastructure Australia has not verified if the Program Alliance achieves better value for money compared to traditional approaches.

New Fitzroy River Bridge rebuild – Western Australia

The New Fitzroy River Bridge project in Western Australia's Kimberley region demonstrates innovative infrastructure development in response to natural disasters.

In December 2022 and January 2023, ex-tropical cyclone Ellie caused severe flooding, significantly damaging the existing Fitzroy River Bridge – a vital crossing on the Great Northern Highway, which stretches more than 3,000 km across Western Australia to the Northern Territory border. This damage cut off access to Aboriginal communities, the East Kimberley, and the Northern Territory, necessitating urgent action. The bridge's reconstruction was jointly funded by the Australian and Western Australian governments through the Disaster Recovery Funding Arrangements.

Led by Main Roads Western Australia, the project aimed to construct a new two-lane bridge with improved resilience and capacity. The project team employed several techniques to accelerate the project's delivery and achieve an unprecedented speed of bridge rebuild in WA. This was made possible by: fast-tracking the approvals and procurement process; significantly reduced time for contract award to establish the Fitzroy Bridge Alliance; and close collaboration with suppliers and contractors to ensure critical components such as bridge beams, bearings and concrete were made available at the time they were required and installed in an efficient, but safe manner.

As a result of the challenging site conditions and compressed delivery timeline associated with seasonal flooding, an incremental bridge launching construction methodology was adopted. This method involved assembling the bridge structure on the riverbank and gradually extending it across piled foundations in the riverbed. By allowing simultaneous offsite fabrication and onsite construction, this approach significantly accelerated the project timeline. During construction, temporary low-level crossings maintained the essential road connections, supporting critical freight transport and the tourism industry.

Completed six months ahead of schedule, the new bridge is substantially stronger than the original bridge, increasing its resilience against future flood events. The rapid restoration of the bridge helped mitigate long-term impacts on businesses and communities that rely on the road network for travel and goods delivery. The project also delivered significant social benefits, employing over 240 locals, with 25% of total construction hours attributed to Aboriginal people. Additionally, 26 Aboriginal-owned businesses were awarded contracts associated with the project. With the bridge now open, Main Roads WA and the Fitzroy Bridge Alliance are working with other state government agencies to identify ongoing business and employment opportunities for locals who have developed skills and business capacity as a result of the bridge build.

While the New Fitzroy River Bridge rebuild is unique in its circumstances, it demonstrates how collaborative approaches and efficient construction methodologies can rapidly deliver critical infrastructure in challenging environments and create capability for future infrastructure delivery. As Australian infrastructure is exposed to increasingly severe weather events, the Fitzroy River Bridge rebuild provides useful lessons for swiftly reinstating damaged critical infrastructure across the country.

More information on the New Fitzroy River Bridge can be found on the Main Roads WA website.

Decarbonising rail freight supply chains

Rail freight is a cornerstone of Australia's economy and supply chains, offering an operationally cost-effective and relatively environmentally friendly method for transporting large volumes of goods across long distances.[8]

Despite rail freight emitting up to 16 times less greenhouse gases compared to road freight operations,[9] the industry faces significant decarbonisation challenges. 90% of heavy haul operations currently rely on diesel locomotives, contributing to the rail freight sector accounting for 4% of Australia's transport emissions and 0.8% of national emissions.[10] The long lifespan of existing diesel locomotives and the need for extensive infrastructure upgrades for electrification or charging pose substantial barriers to decarbonisation.

To address these challenges, the Australian Renewable Energy Agency (ARENA) has invested in a groundbreaking project led by Aurizon, Australia's largest rail freight hauler. The project aims to develop, test, and trial a 1.8 MWh battery electric tender (BET) on one of Aurizon's operational haulage routes. The trial seeks to demonstrate the potential for this technology in enabling fuel switching, when coupled with a diesel locomotive, and in its end state, as a range extender for battery electric locomotives. The project is currently in the design phase, with trial operations set to commence in early 2026.

With over 600 locomotives in operation, transporting 250 million tonnes of commodities annually, and with approximately 5,000km of rail network infrastructure under management, Aurizon is well-positioned to drive significant change in the industry. The BET project is part of Aurizon's broader strategy to inform fleet investment decisions and drive industry-wide innovation in zero-emissions technologies.

Early insights from the trial highlight several key challenges. Charging infrastructure poses a significant hurdle, with limited high-voltage grid connections in their operations and potential capacity constraints as more industries transition to electric operations. Standardisation of charging systems is crucial for enabling interoperability across mixed fleet operations, which will be essential for broader industry adoption. Market readiness is another challenge, given the limited availability of off-the-shelf zero-emission rail decarbonisation products suited to Australian conditions.

Government support has proven critical in these early stages of development. The success of this initiative could have far-reaching implications for the rail industry and Australia's broader decarbonisation efforts. It could help establish a pathway for economic viability of zero-emission rail technologies, increase renewable energy use in the transport sector, significantly reduce carbon emissions from rail freight, and potentially transfer technology to other heavy transport sectors.

More information on the battery-electric tender trial is available on ARENA and Aurizon's websites.

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