



Australian aggregate freight forecasts – 2022 update (Summary)

Summary

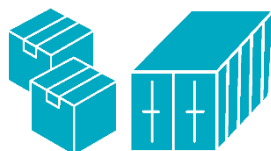
Freight transport plays a significant and wide-ranging role across Australia's economy, from the movement of Australia's major bulk export commodities to ports for export, to the transport of raw materials and semi-processed commodities for further processing and finished products for household consumption.

This information sheet provides a summary of BITRE's latest long-term freight forecasts, published in BITRE (2022a): *Australian aggregate freight forecasts – 2022 update*.

Total freight

Total freight to grow 26% to 2050

Total domestic freight task is projected to grow 26 per cent between 2020 and 2050.



Increasing from around 756 billion tkm^a in 2020 to 964 billion tkm by 2050.

a. tonne kilometre, equivalent to 1 tonne moved 1 kilometre.

Road freight

Road freight to increase 77% to 2050

Road freight is projected to grow 77 per cent between 2020 and 2050.



Interstate road freight is projected to grow 2.9% p.a. Capital city road freight is projected to grow 2.2% p.a.

Rail freight

Rail freight growth & bulk exports

Total rail freight is projected to grow by 6 per cent between 2020 and 2050.



Lower rail freight growth is largely due to slower projected growth in iron ore and coal exports.

Coastal freight

Coastal freight broadly unchanged

Coastal freight is projected to remain around 105 to 110 billion tkm per year to 2050.



Coastal freight is predominated by bulk commodity movements, e.g. bauxite, iron ore, crude oil and petroleum products.

Introduction

Freight transport plays a significant and wide-ranging role across Australia's economy, ranging from the movement of Australia's major bulk export commodities to ports for export, to the transport of raw materials and semi-processed commodities to businesses for further processing and finished products for household consumption. The importance and resilience of the Australian freight industry was demonstrated by the sector's strong performance throughout the COVID-19 pandemic, during which freight, and associated sectors, managed to maintain key supply chains and ensure availability of essential items throughout.

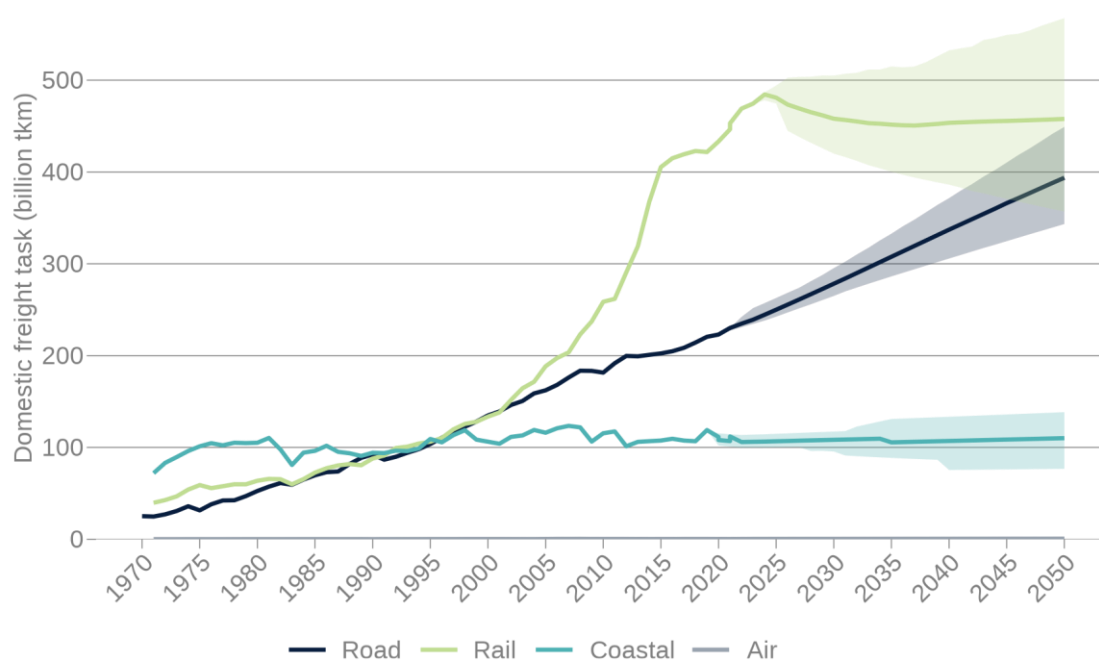
Equally important is the infrastructure that supports these freight movements. Ensuring the efficient and timely delivery of freight requires that infrastructure is adequate, fit-for-purpose which, in turn, requires appropriately timed and scoped infrastructure planning and investment.

Long-term forecasts of the likely future size and scope of the freight task help inform development of long-term infrastructure plans and investment priorities. This information sheet provides a summary of long-term projections of likely growth in the national freight task, by major transport mode—road, rail, sea and air—out to 2050. More detailed information, including projection assumptions and high-growth and low-growth scenario results, are available in BITRE (2022a): *Australian aggregate freight forecasts – 2022 update*.

Projected future freight task

The total domestic freight task is projected to grow more slowly over the next 30 years in comparison to recent decades, increasing by approximately 26 per cent between 2019–20 and 2049–50, from around 765 billion tonne kilometres in 2019–20 to around 964 billion tonne kilometres in 2049–50 (see Figure 1).

Figure 1: Actual and projected future freight task, by major transport mode, 1970–2050



Source: BITRE estimates.

On an annualised basis, the freight task is projected to grow by an average annual rate of around 0.9 per cent per annum between 2020 and 2050. This compares to higher historical growth rate over the last 30 years of 3.7 per cent per annum.

The slower projected overall growth is primarily due to projected slower projected future growth in domestic movements of bulk iron ore and coal export freight, which together currently account for around 89 per cent of total domestic rail freight, and approximately 50 per cent of all domestic freight.

- Total road freight is projected to grow by around 77 per cent between 2020 and 2050 to around 394 billion tonne kilometres by 2050—an annual average rate of growth of 1.9 per cent per annum. This compares to a higher historical growth rate over the last 30 years of 3.3 per cent per annum.
- Total rail freight is projected to grow by around 5.7 per cent between 2020 and 2050, to around 460 billion tonne kilometres in 2050 (an average annual rate of growth of approximately 0.18 per cent per annum). This compares to a higher historical growth rate over the last 30 years of 5.6 per cent per annum.
- Domestic coastal shipping activity is projected to remain more or less around current levels, around 120 billion tonne kilometres, out to 2050.
- Air freight activity is projected to grow by around 103 per cent between 2020 and 2050 from around 290 million tonne kilometres in 2020 to around 589 million tonne kilometres in 2050.

Table 1 Projected future freight task, by major transport mode, 2020-2050

Year	Mode				Total
	Road	Rail	Coastal	Air	
	(billion tonne kilometres)				
2020	222.9	433.2	111.4	0.3	767.9
2025	250.0	480.9	106.7	0.4	838.0
2030	278.3	458.0	108.3	0.4	845.0
2035	307.7	451.6	105.5	0.5	865.2
2040	337.2	453.5	107.0	0.5	898.2
2045	366.1	455.6	108.6	0.5	930.8
2050	393.7	457.8	110.1	0.6	962.2

Source: BITRE estimates.

Understanding Australia's freight task

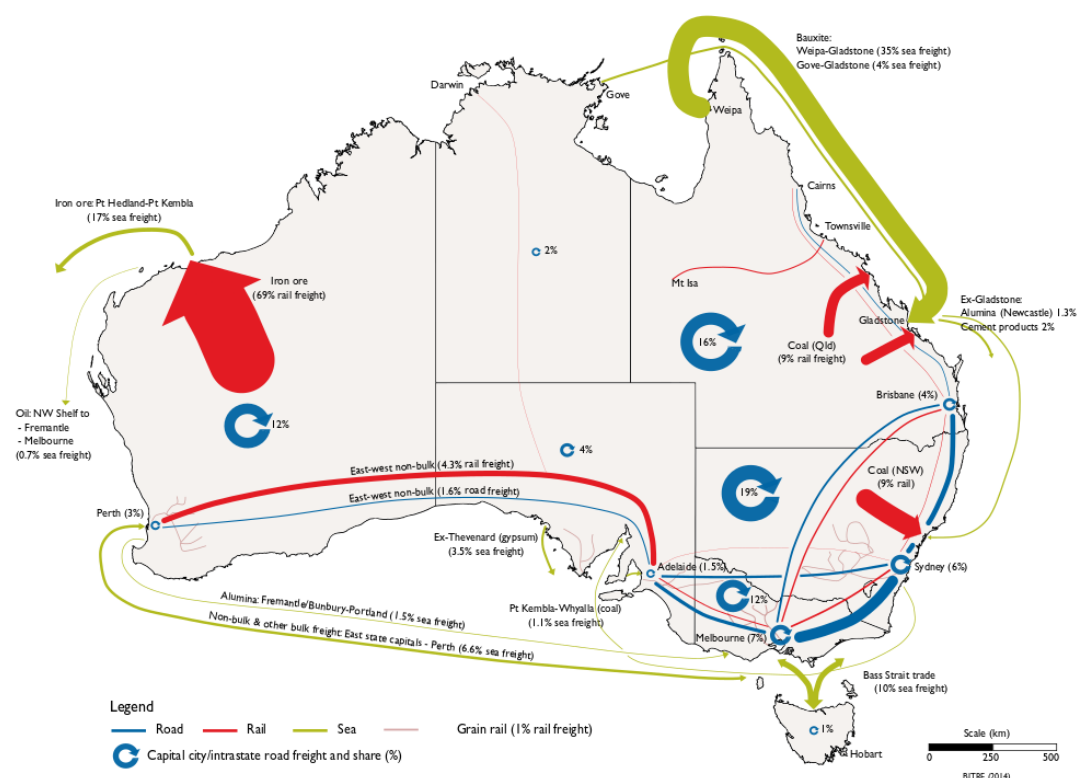
Australia's freight task is diverse and encompasses the movement of bulk export commodities, such as iron ore, coal, liquefied natural gas (LNG) and grains, the transport of imported motor vehicles, machinery and other manufactured goods, and the transport of finished products for household consumption through distribution centres to retail outlets. Figure 2 shows a stylised view of the major freight flows in Australia, and illustrates the nature and significance of Australia's freight task and the role of each transport mode.

Road is the predominant mode of transport for urban, inter-urban and regional freight, and part of most import supply chains. Even major mineral resource industries, that rely on rail or coastal shipping for transport of their outputs, are dependent on road freight to transport machinery, capital equipment and other supplies to mine sites. The only segments of the domestic freight task where road freight plays only a minor role are in Australia's large bulk mineral transport supply chains—i.e. iron ore, coal, bauxite/aluminium and crude oil and condensate—where rail and coastal shipping predominate.

Rail and sea transport, by contrast, typically service a more limited set of commodities and markets, which include several of Australia's major export commodity supply chains. Rail, for example, is essential to Australian iron ore and coal export supply chains—transport of these two commodities alone accounts for approximately 89 per cent of total Australian rail freight volumes. Coastal shipping carries significant volumes of bauxite, alumina, crude oil/condensate and refined petroleum to domestic locations for further processing and/or refining, and is practically the only option for transport for goods moving between Tasmania and the mainland.

Air freight is more suited to low density and/or high value commodities, such as newspapers, parcels, perishable/short-lived products, precious metals and gemstones, and generally accounts for less than 0.1 per cent of total domestic freight volumes.

Figure 2: Stylised map of Australian freight flows, 2015–16



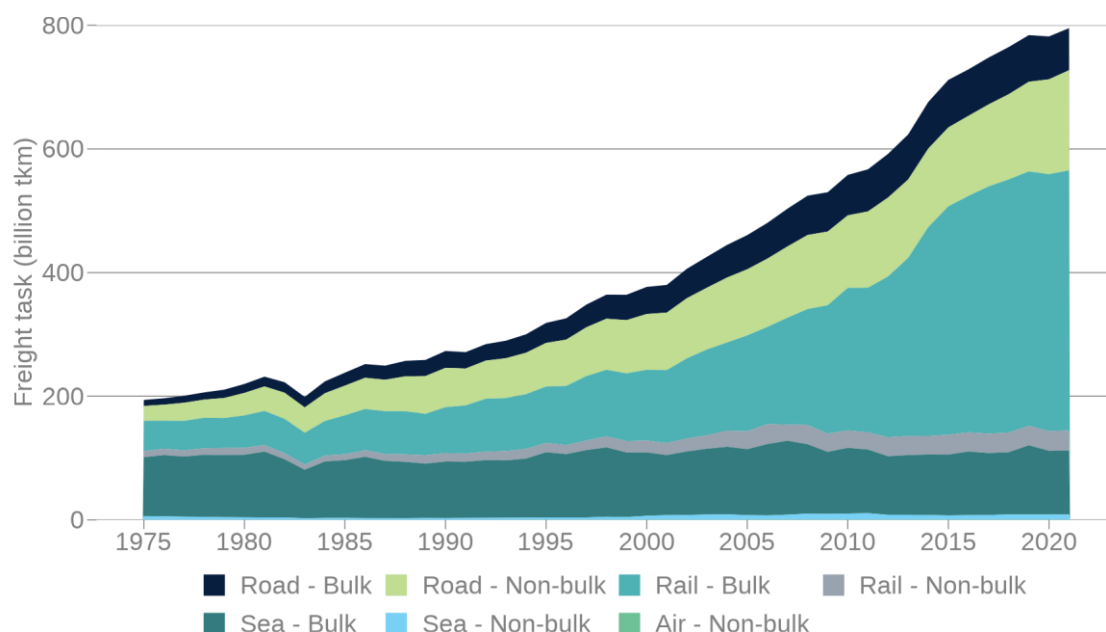
Source: BITRE estimates.

Historical freight task trends

The Australian freight task has grown more than four-fold over the five decades to 2020, from around 127 billion tonne kilometres in 1970–71 to nearly 800 billion tonne kilometres in 2019–20—an average rate of growth of over 3.6 per cent per annum. Over that period:

- Road freight has increased eight-fold, from around 26 billion tonne kilometres in 1970–71 to around 223 billion tonne kilometres in 2019–20.
- Rail freight has increased more than ten-fold, from around 40 billion tonne kilometres in 1970–71 to nearly 450 billion tonne kilometres in 2019–20, propelled by the significant recent bulk freight growth (iron ore and coal exports).
- Coastal shipping volumes grew approximately 50 per cent over a similar period, from around 72 billion tonne kilometres in 1970–71 to around 120 billion tonne kilometres in 2018–19.
- Air freight, which is several orders of magnitude smaller than other modes, has grown from around 90 million tonne kilometres in 1970–71 to around 295 million tonne kilometres in 2019–20.

Figure 3 shows the growth in Australia's freight task by transport mode and, and illustrates the growth in the bulk rail freight task over the last 20 years, driven largely by coal and iron ore exports.

Figure 3: Australian freight task, by mode and bulk/non-bulk, 1974-75 – 2020-21

Source: BITRE estimates.

Projected future freight task

BITRE's headline freight forecast figures imply a slowing in national freight growth. However, the diverse range and scope of Australian freight movements dictates that there are multiple factors go into BITRE's freight projections. It is important to understand the drivers of this overall change. The major drivers for the overall freight forecasts include:

Continuing road freight growth

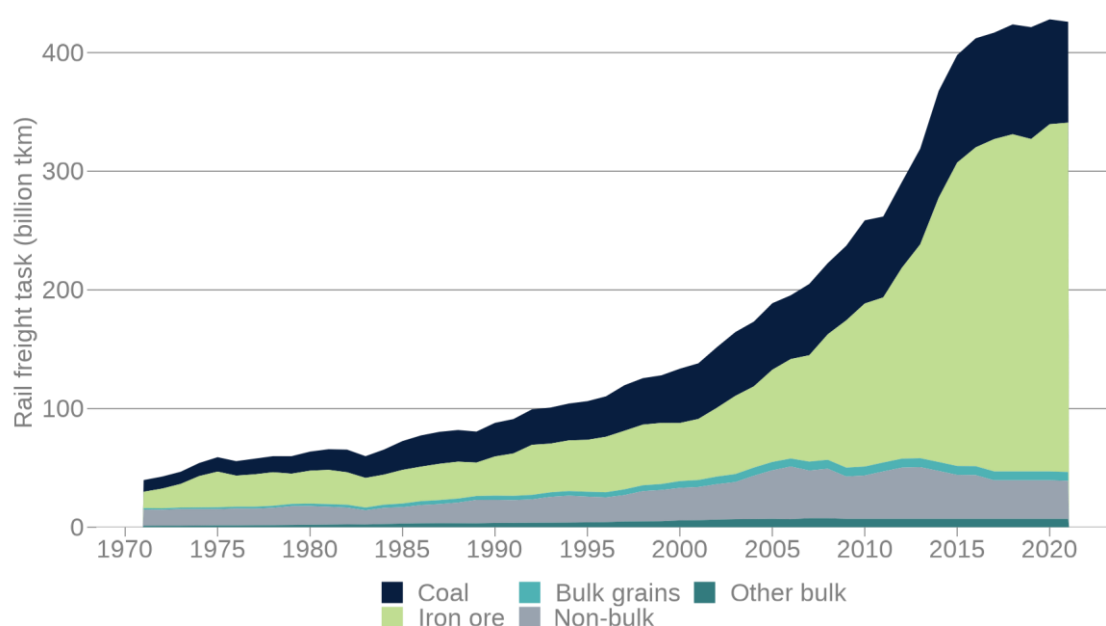
Road transport activity grew significantly through the three-and-a-half decades to 2007, a period which coincided with significant expansion of the road network and a series of economic reforms that contributed to the growth in road freight either directly or indirectly, via reduced the barriers and lower freight costs. As a result, road freight grew seven-fold between 1970 and 2007, and eight-fold between 1970 and 2020.

Road freight activity is closely tied to domestic economic activity. BITRE's national road freight forecasting model links future road activity to expected future population growth, per capita income levels and road freight costs. Australia's population is projected to grow from around 25.7 million persons in 2020 to around 35.3 million persons by 2050, under the central forecast scenario (CfP 2021, ABS 2017 and BITRE estimates). Per capita income levels are assumed to grow by around 0.9 per cent per annum between 2020 and 2050.

Under these assumptions, total national road freight is projected to grow by around 77 per cent between 2020 and 2050, from around 337.2 billion tonne kilometres in 2020 to around 393.7 billion tonne kilometres in 2050. While slower than historical experience, this growth will entail more trucks, drivers and truck kilometres across the Australian road system.

Rail freight near peak

Australia is the largest exporting country of iron ore and one of two largest coal exporting countries in the world. These two commodities are predominantly mined inland and transported by rail to nearby ports for export. Over the last two decades, growth in coal and particularly iron ore exports, have contributed most significantly to growth in total domestic rail freight volumes, such that in 2020 iron ore and coal accounted for 89 per cent of domestic rail freight (see Figure 4). Other rail freight traffic, which include interstate non-bulk freight, grains, steel and other bulk freight, account for the remaining 11 per cent of total rail freight.

Figure 4: Australian rail freight task, by major commodity group, 1971–2020

Source: BITRE estimates.

Consequently, forecast aggregate rail freight activity is heavily influenced by the outlook of iron ore and coal exports, which principally depends on future global demand for those commodities.

BITRE's forecasts of future Australian iron ore and coal rail freight volumes are based a combination of short, medium and long-term outlooks of Australian production and global demand produced by the Australian government (e.g. the Office of the Chief Economist, Department of Industry, Science and Resources), international agencies (e.g. the International Energy Agency, US Energy Information Administration), and industry specialists. Several scenarios are considered to capture the range of potential future outcomes.

Under the central iron ore scenario, world steel production is projected to grow by 34 per cent between 2020 and 2050, with incremental efficiency improvements in steel manufacture and increased 'light-weighting' of steel products expected to be a focus of the steel industry. Consequently, Australia's iron ore rail volumes are projected to increase by 31 per cent between 2020 and 2050 to 385 billion tonne kilometres in 2050.

Under the central coal growth scenario, world coal demand is projected to decline 24 per cent between 2020 and 2050, in response to global carbon mitigation efforts in power generation (thermal coal) and steel production (metallurgical coal). Under this scenario, Australian coal exports are projected to remain around 380 to 390 million tonnes to 2025, but then decline between to around 270 million tonnes a year by 2050. Consequently, domestic coal rail freight volumes are projected to decline from around 93 billion tonne kilometres in 2025 to around 64 billion tonne kilometres by 2050.

Interstate non-bulk rail freight, defined in BITRE (2022a) to include non-bulk rail freight moved between Australian capital cities and regional intermodal hubs (e.g. Albury–Wodonga, Parkes, Kalgoorlie, etc.), is the third largest domestic rail freight task. Domestic interstate non-bulk rail freight has increased from around 4.7 billion tonne kilometres in 1971–72 to around 24.0 billion tonne kilometres in 2019–20 (an average annual rate of growth of 3.3 per cent per annum). In forecasting interstate non-bulk rail freight, BITRE splits interstate non-bulk rail freight into two components:

- i) East–West non-bulk rail freight—i.e. comprising rail freight between New South Wales, Victoria and South Australia to/from South Australia and Western Australia.
- ii) North–South and other non-bulk rail freight—i.e. NSW–Vic–Qld and other non-bulk rail.

East–West non-bulk rail freight forecasts are based on projections of future Western Australian economic activity (measured via gross state product). Under the central forecast scenario, East–West non-bulk rail freight is projected to increase by 68 per cent (2.2 per cent per annum) between 2020 and 2050, to around 32.5 billion tonne kilometres by 2050.

North–South and other non-bulk rail freight forecasts are based on projected future economic growth in New South Wales, Victoria and Queensland, and under the central forecast scenario, absent any other changes, this task is projected to grow by around 2.4 per cent per annum between 2020 and 2050.

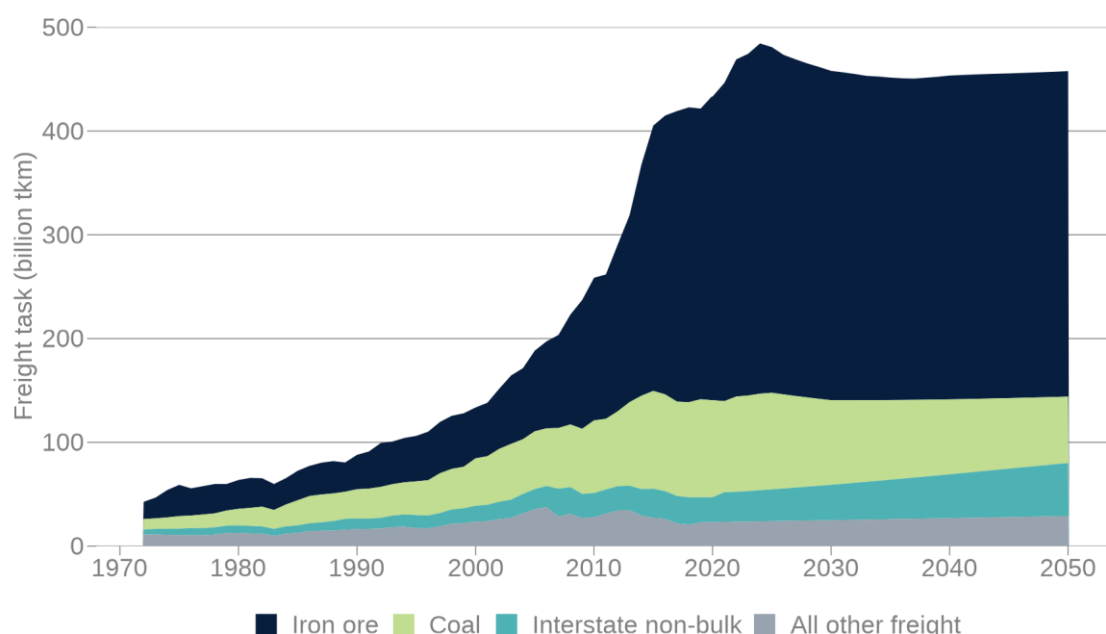
The Australian Government is also funding construction of missing rail network segments that will join to form a new 1700-kilometre inland rail link between Melbourne and Brisbane, via regional Victoria, New South Wales and southern Queensland. The inland rail link is expected to be operational by 2027. Factoring in the impact on rail freight volumes estimated in the Inland Rail Business Case (ARTC 2015), North–South and other non-bulk rail freight is projected to increase by around 3 per cent per annum between 2020 and 2050, to around 17 billion tonne kilometres by 2049–50.

The remaining rail freight commodity tasks are combined and forecast based on assumptions about likely future commodity production and rail freight growth. The two largest components of this task are bulk grain and steel freight movements for which the growth assumptions are:

- Grain freight volumes are assumed to grow by an average 1.25 per cent per annum under the central forecast scenario, which is slightly below the rate of growth in grain production over the last four decades. Grain rail volumes can vary significantly from year to year, depending primarily on prevailing growing conditions. Climate change appears to pose the most significant risk to future Australian grain output and grain rail freight volumes.
- Steel and other bulk commodity rail freight is assumed to grow by 0.75 per cent per annum under the central scenario, again broadly in line with long-term historical growth rates.

The combined impact of these assumptions is shown in Figure 5. Under the central scenario the total domestic rail freight task is projected to grow by around 5.7 per cent between 2020 and 2050. Iron ore freight volumes are projected to increase by 7 per cent, but coal rail freight volumes decline by 32 per cent. Interstate rail freight and other rail freight, which account for the majority of freight on the interstate rail network, are projected to grow approximately 110 per cent and 25 per cent, respectively, between 2020 and 2050.

Figure 5: Australian rail freight task forecasts, by major commodity group, 1971–2050



Source: BITRE estimates.

Coastal freight relatively stable

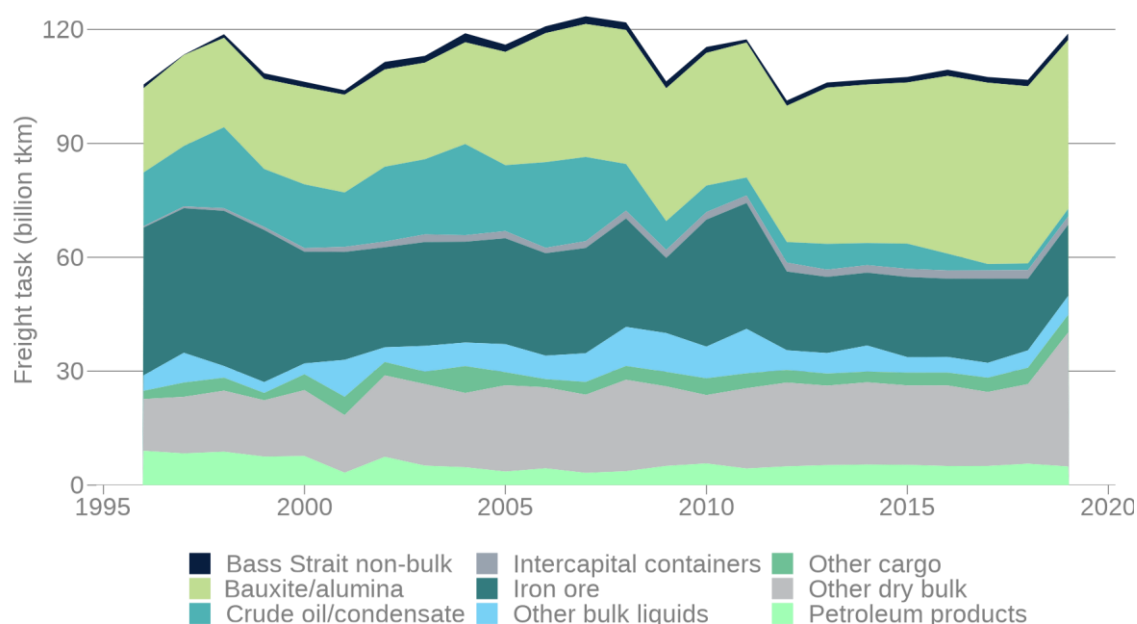
Australian coastal shipping, like rail, is integral to the production supply chains of several major Australian bulk export commodities, transporting products from place of primary production or extraction to domestic locations for further processing. Key industry supply chains that rely on coastal shipping include the domestic aluminium, steel and petroleum industries. Coastal shipping is also the main mode of freight transport between Tasmania and the mainland and also carries small volumes of freight between capital cities.

BITRE's coastal shipping freight forecasts are based on separate scenario-based forecasts for each of nine major commodity and/or markets segments that rely on Australian coastal shipping. Figure 6 illustrates the size of the coastal freight task across each of the nine commodity/market segments, and highlights the significance of the bauxite and alumina, iron ore and other dry bulk coastal shipping tasks, which together accounted for around 83 per cent of total coastal freight tonne kilometres in 2019.

Bauxite/alumina and iron ore coastal freight movements are part of domestic production supply chains and the central scenario forecasts assume little change in operations over the forecast period. The intercapital container and Bass Strait coastal shipping task forecasts are based on modelled relationships between freight and economic growth across Australia and Tasmania, respectively. Inter-capital container coastal freight is projected to grow by around 0.9 per cent per annum and Bass Strait freight by around 0.5 per cent per annum between 2020 and 2050. The other coastal freight tasks are assumed to grow at historical trend growth rates.

Overall, the coastal shipping freight task is projected to remain more or less around 105 to 110 billion tonne kilometres per annum under the central scenario between 2020 and 2050.

Figure 6: Australian coastal freight task, by major commodity group, 1995–96 to 2019–20



Source: BITRE estimates.

Air freight – small but growing

Domestic air freight is carried in the cargo holds of passenger aircraft and by a small fleet of dedicated freight aircraft. Air freight is predominated by high-value, low-density freight, such as mail, small parcels and high value perishables, however, publicly available data provide little information about the mix of commodities carried by domestic aviation. Air freight (measured in tonne kilometres) accounts for less than 0.1 per cent of all domestic freight.

Domestic air freight has grown by around 1.8 per cent per annum since 1984–85 to around 290 million tonne kilometres in 2019–20. BITRE's air freight forecasts are based on a model of air freight and domestic

economic activity. Under the central forecast scenario, air freight is projected to increase by around 3.0 per cent per annum to around 589 million tonne kilometres by 2050.

Concluding remarks

BITRE (2022a) presents updated forecasts of Australia's total freight task, by major transport mode, and updates the forecasts published in BITRE (2019). It is part of BITRE's revamped suite of freight forecast products, which aim to provide regularly updated long-term forecasts of total. A companion report, BITRE (2022b), provides forecasts of capital city, interstate and intrastate road freight to 2040.

In developing the forecasts, BITRE has drawn on historical trend information and reputable assumptions and projections of likely future economic growth, population growth and the domestic and world market outlooks for particular commodities that are significant within Australia's domestic freight task.

The central scenario forecasts presented in this summary are BITRE's *best* estimates of likely future growth in domestic freight. However, recognising the uncertainty inherent in predicting the future, the forecasts include a range of alternative scenarios. BITRE (2022a) provides more detailed descriptions of the methods, sources and key assumptions used to derive the forecasts presented in this report, and BITRE's alternative scenario forecasts.

Appendix A Freight modelling methodology

BITRE's 2022 domestic freight projections are based on mode-specific models that are summarised in Table A.1. BITRE (2022a) provides more detailed descriptions of the methods, sources and key assumptions used to derive the forecasts presented in this report.

Table A.1 Summary of BITRE's domestic freight modelling methodology

Mode	Methodology	Description
Road	Single-equation econometric model	Models the national road freight task (measured in tonne kilometres) based on future domestic economic activity, road freight transport costs and population growth assumptions. Does not produce commodity specific forecasts or bulk vs non-bulk estimates.
Rail	Based on separate forecasts for each major rail component: <ul style="list-style-type: none"> iron ore thermal coal metallurgical coal interstate non-bulk freight all other rail freight. 	Results from the separate rail models are summed to derive overall rail forecasts. Export freight forecasts (coal and iron ore) are based on separately published scenarios of future overseas demand for these commodities. These assumptions factor in global efforts to transition from high-carbon to low-carbon energy sources. Forecasts for other rail freight—principally interstate non-bulk and finished steel product freight used domestically—are based largely on forecasts of domestic economic conditions, domestic supply chains, and population growth. The model produces commodity-specific forecasts for each major rail component (e.g. iron ore).
Coastal shipping	Based on separate forecasts for commodities and markets that rely on Australian coastal shipping. This includes: <ul style="list-style-type: none"> bauxite and alumina iron ore other dry bulk products crude oil petroleum products other bulk liquids intercapital container freight Bass Strait non-bulk freight other coastal freight not specified. 	Results from these separate models are summed to derive overall coastal freight forecasts. The coastal shipping forecasts utilise a scenario-based approach, to capture the range of potential future outcomes, particularly for those commodities that are sensitive to overseas economic conditions and the relative competitiveness of Australian industry. Both intercapital container and Bass Strait non-bulk freight are modelled as functions of economic activity—national domestic output for intercapital freight and Tasmanian gross state product (GSP) for Bass Strait freight—and domestic freight shipping costs.
Airfreight	BITRE's aggregate domestic air freight forecasts are based on econometric models relating to quarterly historical air freight volumes and domestic economic activity.	Does not produce commodity specific forecasts due to lack of available data.

Source: BITRE.

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