



Economic valuation of the maritime, agribusiness, minerals, oil and gas industries

Department of Industry, Tourism, and Trade

2023

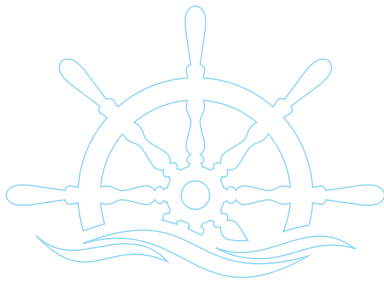
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Contents

Glossary	3
Executive summary	8
1 Introduction	14
1.1 Purpose of this report	14
1.2 Macroeconomic overview	14
1.3 Report structure	18
2 Current economic value	19
2.1 Maritime industry	19
2.2 Agribusiness industry	21
2.3 Minerals industry	24
2.4 Oil and gas industry	27
3 Opportunities and actions for industry growth	30
3.1 Maritime	31
3.2 Agribusiness	31
3.3 Minerals	33
3.4 Oil and gas	35
4 Industry barriers & pathways forward	37
4.1 Skills shortages	37
4.2 Regional connectivity	39
4.3 Market size and maturity	41
4.4 Climate change	42
4.5 Access to land and water	42
4.6 Regulation and business costs	43
5 Optimising economic potential	45
5.1 Maritime industry	47
5.2 Agribusiness industry	48
5.3 Minerals industry	49
5.4 Oil and gas industry	51
5.5 Downstream opportunities and crowding out	52
Appendix A Macroeconomic baseline	56
A.1. Expectations of future growth	56
Appendix B Economic contribution methodology	58
B.1. Economic contribution studies	58
B.2. Direct and indirect contribution	58
B.3. Limitations of economic contribution studies	59
B.4. Industry input-output analysis	59
Appendix C Economic impact methodology	62
C.1. Introduction	62
C.2. DAE-RGEM	62
C.3. Scenario development	64
Limitation of our work	66
General use restriction	66

Glossary

Acronym	Full name
ABS	Australian Bureau of Statistics
AEM	Access Economics Macroeconomic Model
ANZSIC	Australian and New Zealand Standard Industrial Classification
CAGR	Compound Annualised Growth Rate
CGE	Computable General Equilibrium
DAE-RIOM	Deloitte Access Economics Region Input-Output Model
DAE-RGEM	Deloitte Access Economics Regional General Equilibrium Model
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
FIFO	Fly-In-Fly-Out
FTE	Full Time Equivalents
GDP	Gross Domestic Product
GHG	Greenhouse gas
GOS	Gross Operating Surplus
GSP	Gross State Product
GVA	Gross Value Added
IO	Input-Output
LNG	Liquefied Natural Gas
NT	Norther Territory
PJ	Petajoules
TERC	Territory Economic Reconstruction Commission
TEU	Twenty-foot Equivalent Units



Maritime



Water transport support services



Marine equipment retailing



Ship building and repair services



Water transport



Boat building and repair services

2019-20



Maritime industry
\$184 million
direct value added

980
direct FTE



110,000
TEUs of bulk and containerised freight



NT economy

131k
jobs

\$26b
in GSP

246k
in population

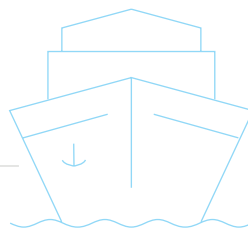
Provide more harbour services and decommissioning services to the oil and gas sector



Increase productivity and strengthen links between NT businesses and customers



Use additional capacity provided by the Darwin Ship Lift



2030-31



Maritime industry in the high growth scenario

\$347 million
direct value added

1,490
direct FTE



220,000 TEUs of bulk and containerised freight per year on average between 2022 and 2030-31

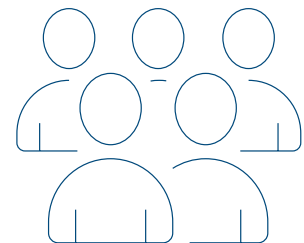


NT economy

168k
jobs

\$40b
in GSP

292k
in population



Prosperity in the maritime industry is shared by its upstream and downstream industries...



Maritime industry

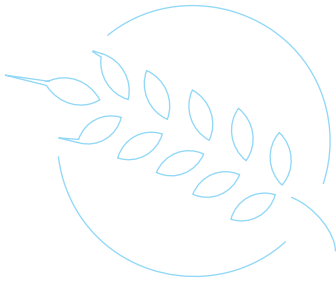
Upstream industries

- Construction services
- Finance
- Professional, scientific and technical services
- Real estate services



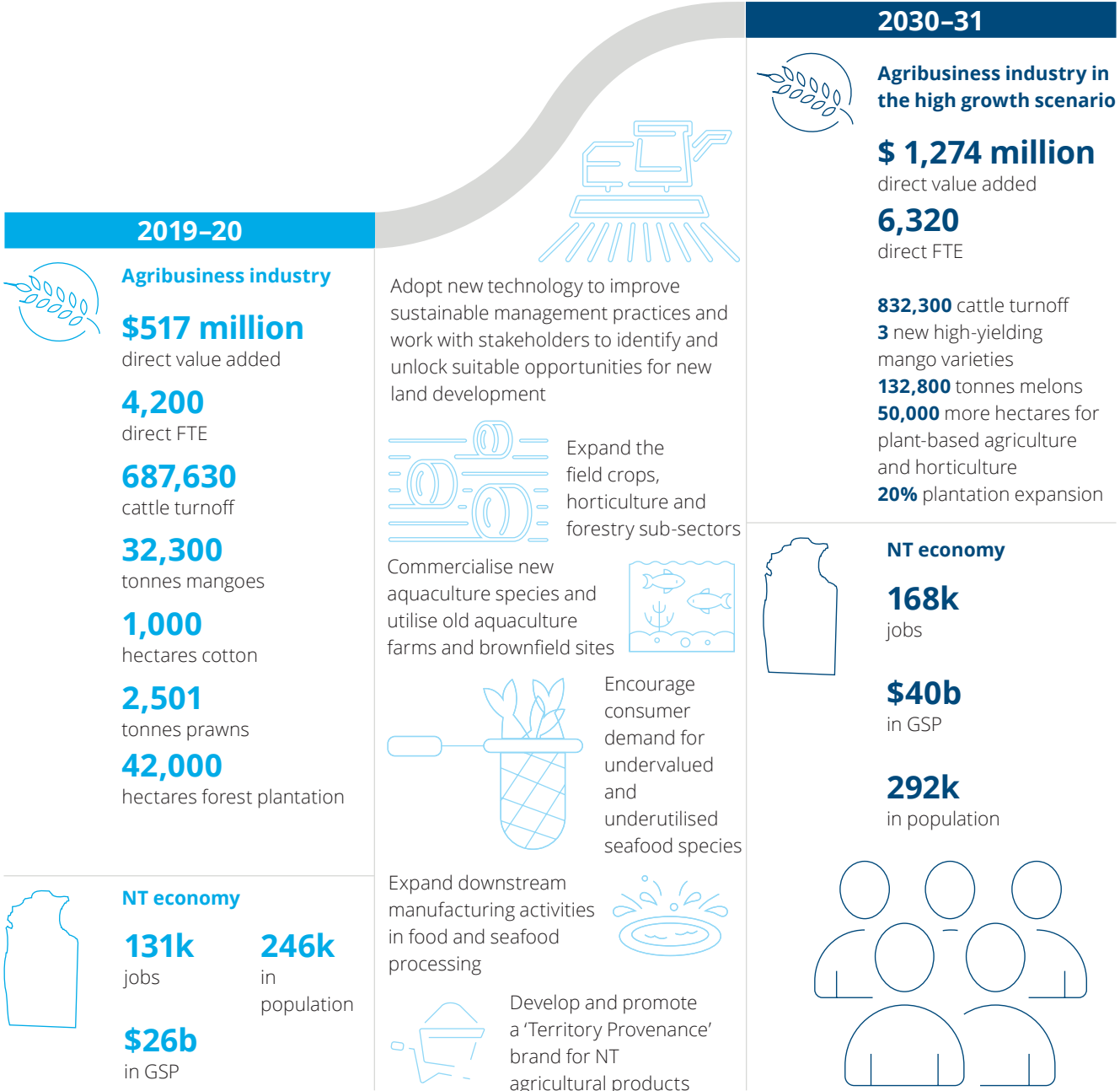
Downstream industries

- Tourism
- Recreational activities
- Wholesale and retail trade
- Agribusiness
- Minerals
- Oil and Gas



Agribusiness

- 
Horticulture
- 
Aquaculture
- 
Cattle production
- 
Fisheries
- 
Field crops



Prosperity in the agribusiness industry is shared by its upstream and downstream industries...



Minerals



Manganese



Zinc and lead



Bauxite



Gold



Mineral exploration

2019-20



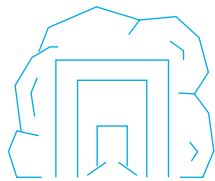
Minerals industry

\$1,409 million

direct value added

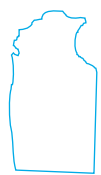
3,130

direct FTE



8

mines



NT economy

131k

jobs

\$26b

in GSP

246k

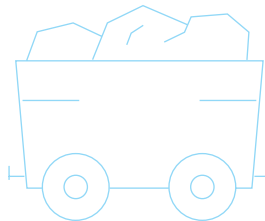
in population



Strengthen collaboration with Aboriginal communities



Capitalise on the increase in demand for critical minerals



Promote the NT's reputation as a reliable and ethical source of high-quality minerals



Expand downstream refining, processing and manufacturing activities

2030-31



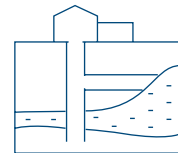
Minerals industry in the high growth scenario

\$2,461 million

direct value added

4,570

direct FTE



Up to

33 mines



NT economy

168k

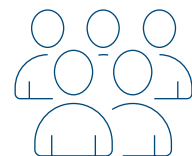
jobs

\$40b

in GSP

292k

in population



Prosperity in the minerals industry is shared by its upstream and downstream industries...



Minerals industry

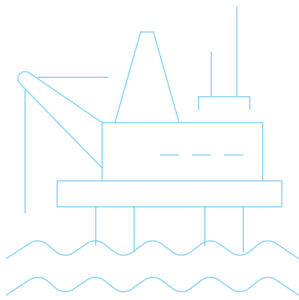
Upstream industries

- Mining equipment, technology and services (METS)
- Transport and logistics
- Construction services



Downstream industries

- Mineral and metal product manufacturing
- Cement and concrete manufacturing



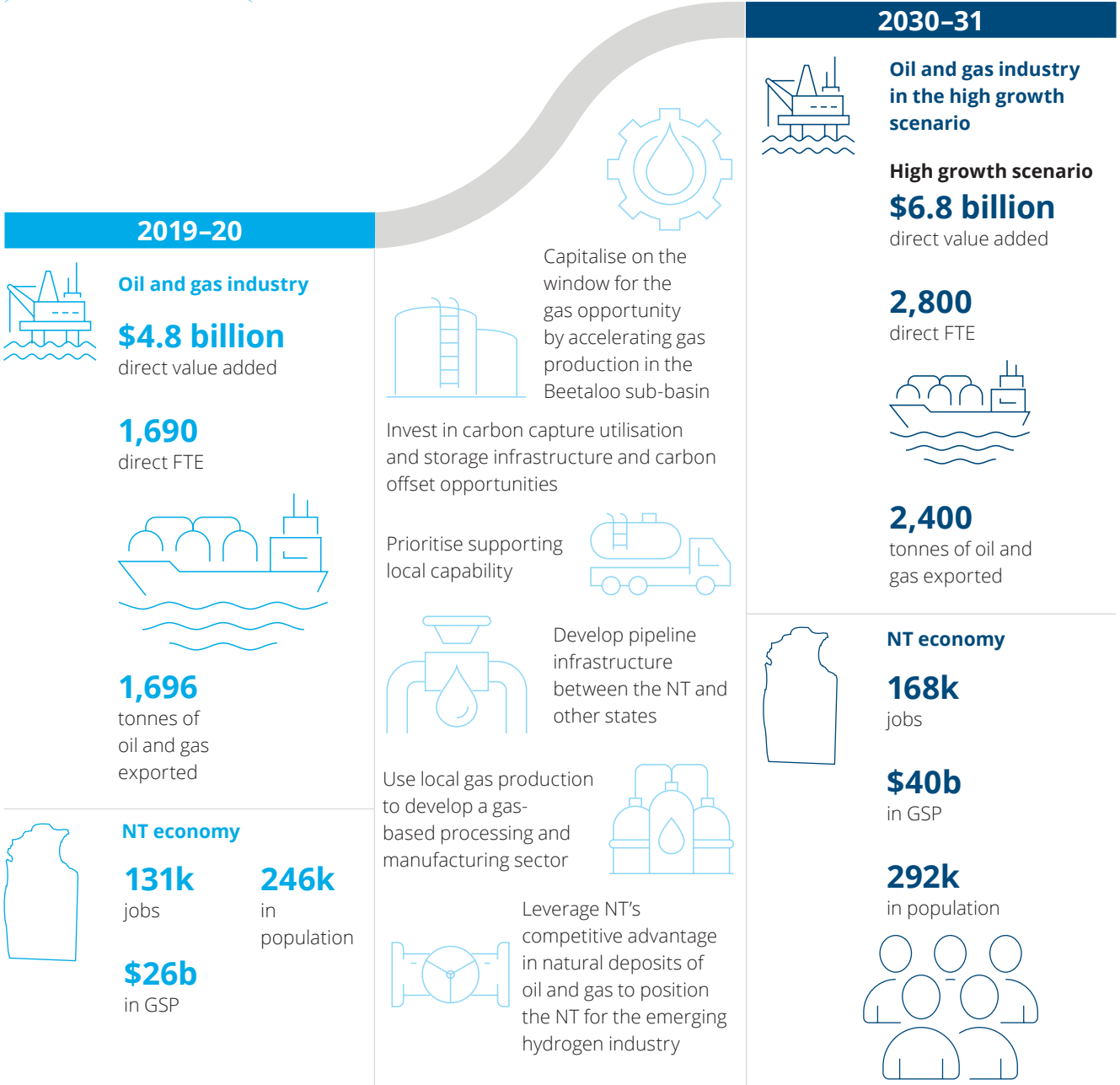
Oil and gas



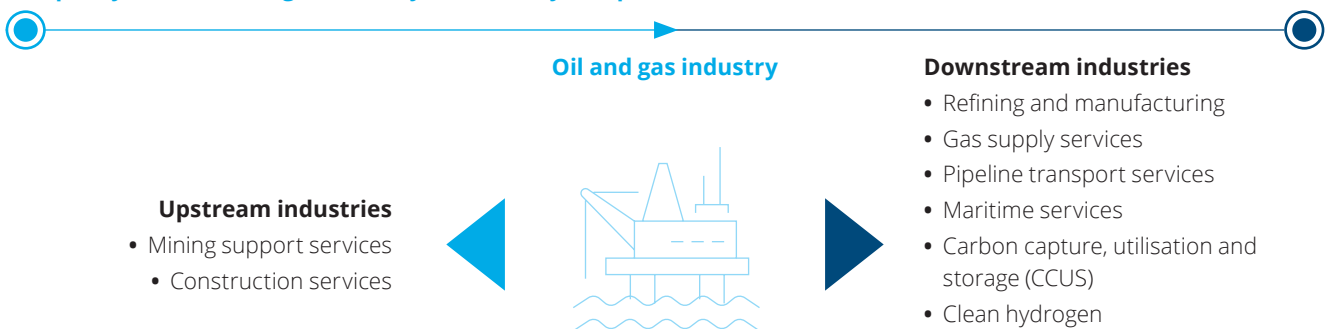
Oil and gas extraction



Oil and gas exploration



Prosperity in the oil and gas industry is shared by its upstream and downstream industries...



Executive summary

Achieving the ambition of growing a \$40 billion economy with 168,000 jobs by 2030 requires reaching for bold new economic opportunities, while also overcoming a range of long-standing challenges facing the Northern Territory (NT).

Following some years of slower economic growth relative to other states across Australia, and fresh challenges brought about by the COVID-19 pandemic, the NT Government is focussed on identifying priorities for economic growth.

The NT has what it takes to become a thriving economy: world-class mineral deposits, prospective gas reserves, a strong agricultural sector, emerging information technology capabilities and strategic advantages as a location for trade and defence.

But there are headwinds that may constrain future economic development, including a relatively small population and a narrow economic base, in addition to short-term challenges from high inflation and rising interest rates.

The Territory Economic Reconstruction Commission (TERC) Final Report identified the maritime, agribusiness, minerals, and oil and gas industries among the sectors with the greatest growth opportunities and importance for the NT's future economic prosperity.

This is an ambitious vision for an economy that is not only \$40 billion in size, but also more diverse and sustainable, with more jobs and a larger population.¹

The \$40 billion target was ambitious enough when set in 2019, requiring 4.1 per cent growth a year. Modest growth during COVID-19 means the climb to that target has become steeper, now the NT must now grow by 4.3 per cent a year. Even more must be done over the next 8 years. A critical part will be lifting productivity—modelling for this project suggests annual capital productivity growth must lift from an average of 0.04 per cent (between 2018 and 2021)² to at least 0.15 per cent on average between 2023 and 2031 to deliver the target. But the dividend will be significant, with employees estimated to earn an extra 5 per cent more in real wages on average, relative to the baseline over the period if the target is achieved. GSP per capita in the baseline scenario reaches \$121,400 by 2031 and \$138,700 in the high growth scenario.

In this context, the Department of Industry, Tourism and Trade (the Department) engaged Deloitte Access Economics to assess the current contribution of these industries and the priority actions needed to contribute to a \$40 billion economy by 2030. This report estimates the current value of the maritime, agribusiness, minerals, and oil and gas industries in 2019-20 (the most recent year for which data is readily available for analysis), as well as the potential contribution of these industries towards the 2030-31 goal. This report sets out some of the key opportunities and barriers to growth within the maritime, agribusiness, minerals, and oil and gas industries, and identifies priority actions for industry and government in the NT to capitalise on opportunities over the decade.

Contribution to the NT economy

The NT maritime, agribusiness, minerals, and oil and gas industries contribute significantly to the NT economy. In 2019-20, these four industries contributed \$7.0 billion in direct value added and supported over 11,000 jobs. This contribution is equivalent to 26 per cent of the NT's Gross State Product (GSP) and 8 per cent of total employment (Table i). When also taking into account the indirect economic contribution (from suppliers in upstream industries), the four industries' total contribution rises to almost \$10 billion and almost 30,000 jobs.

Table i Contribution of the maritime, agribusiness, minerals, and oil and gas industries in 2019-20

Industry	Key economic activities	Direct value added (\$m)	Direct employment (jobs)
Maritime	The maritime industry comprises of water transport support services—primarily through operations at the Port of Darwin—and a range of other sub-industries, including marine equipment retailing, water transport services, ship building and repair services, and boat building and repair services.	184	1,080
Agribusiness	The agribusiness industry is diverse, including activities related to cattle production, horticulture, fisheries, aquaculture, forestry and logging.	517	4,650
Minerals	The NT has access to a rich array of natural resources, and has historically provided significant value through manganese, gold, zinc and lead, bauxite and uranium oxide production, alongside a host of other minerals contributing to the broader industry.	1,409	3,470
Oil and gas	The oil and gas industry is defined to include exploration and appraisal activities as well as oil and gas extraction.	4,847	1,870
Total		6,956	11,070

Source: Deloitte Access Economics

Opportunities and actions for industry growth

There are sizable growth opportunities for the NT maritime, agribusiness, minerals, and oil and gas industries over the next decade. Even in the business-as-usual scenario, industries will experience the same enablers and barriers as they did in the past and will undertake investments and activities that they have committed. For instance, the maritime industry will continue benefiting from the broader economic growth in the NT and the demand for trade. The minerals industry will be boosted by production from the new Finiss Lithium Project. The agribusiness industry will continue benefiting from general population growth in Australia and the demand for food.

Deloitte has synthesised information from research, industry, stakeholder engagement and government representatives to identify the **top 22 actions** across the four industries of focus that could help NT reach its economic potential.

Table ii Opportunities and actions for industry growth

Industry	Opportunities and actions
Maritime	<ul style="list-style-type: none"> • Leverage the Darwin Ship Lift to capture a greater share of regional and national maritime repair and maintenance work • Continue to grow local capacity to support the Navy’s Regional Maintenance Centre and defence sustainment • Establish Darwin as a key maintenance hub for vessels operating in the Indo-Pacific region with purpose-built berths • Provide services to the oil and gas sector, including harbour services, decommissioning services and support local energy and infrastructure projects through provision of key imported inputs • Take advantage of NT’s productivity to Asia and deep water port to help Australian businesses to reduce freight times and increase productivity
Agribusiness	<ul style="list-style-type: none"> • Improve productivity for the cattle industry (through intensification) by adopting new technology and improving sustainable management practices for land assets • Work with stakeholders to identify and unlock suitable opportunities for new land development • Expand the field crops, horticulture and forestry sub-sectors by using new varieties, exploring new market windows and increasing productivity of the production process • Commercialise new aquaculture species and utilise old aquaculture farms and brownfield sites to increase production and attract new investment • Encourage consumer demand for undervalued and underutilised seafood species • Improve storage facilities and expand downstream manufacturing activities in food and seafood processing to build on the success of primary activities and increase value added to the NT economy • Develop and promote a ‘Territory Provenance’ brand for NT agricultural products that places emphasis on sustainability and Aboriginal products
Minerals	<ul style="list-style-type: none"> • Capitalise on the increase in demand for critical minerals by increasing exploration and production activities (including opening new mines) • Strengthen collaboration with Aboriginal communities to harness Aboriginal expertise in mine rehabilitation • Promote the NT’s reputation as a reliable and ethical source of high-quality minerals • Expand downstream refining, processing and manufacturing activities to increase the value added to the NT economy
Oil and gas	<ul style="list-style-type: none"> • Capitalise on the window for the gas opportunity by accelerating gas production in the Beetaloo sub-basin • Invest in carbon capture utilisation and storage infrastructure, carbon offset opportunities, and waste treatment facilities to enable the NT to meet the growing demand for low carbon energy and minimise impacts on the environment • Extend the value chain to deliver economic growth and more jobs to the NT by using local gas production to develop a gas-based processing and manufacturing sector • Develop pipeline infrastructure so that gas production in the NT can further contribute to Australia’s energy security • Prioritise supporting local capability to retain the economic benefits of the oil and gas industry in the NT • Leverage NT’s competitive advantage in natural deposits of oil and gas to position the NT for the emerging hydrogen industry

Source: Deloitte Access Economics

Barriers to growth

The report identifies six key barriers to achieving the NT Government’s economic ambition: skills shortages, access to land and water, lack of regional connectivity, limited market size and maturity, challenges associated with climate

change, and complex regulations. Skills shortages and the combination of regulation and access to land and water are most frequently mentioned as the most significant challenges to industry growth.

A skilled workforce will enable NT industries to undertake future opportunities. In the high growth scenario, employment will need to grow to over 168,000 jobs by 2030-31. To support this growth, the NT workforce will need to expand in size. Strengthening local training, actively recruiting labour nationally and internationally, and improving housing and liveability are measures that the NT can do to promote population growth. Additionally, education and training services need to be directed to areas of high employment growth so that the local workforce has the skills required to capitalise on opportunities from the maritime, agribusiness, minerals, and oil and gas industries.

Throughout consultation, stakeholders highlighted that **access to land and water resources** often presents a barrier, or causes delay to industry activity. Stakeholders described that the gaining access to land and water can be a prolonged process with uncertain outcomes—which can increase the risk and cost of investment decisions. Undertaking strategic reviews of land access, considering directly entering into Land Use Agreements with owners, and sub-leasing this land to investors are measures that the NT can do to help reduce risks associated with investing in the NT.

Stakeholders suggested the **lack of enabling infrastructure—including both digital and transportation infrastructure** as a barrier to economic activity and liveability. The NT could propose alternative measures for encouraging higher federal infrastructure investment. It could also maximise funding for NT investments through the Northern Australia Infrastructure Facility and encourage investment in mobile telecommunications.

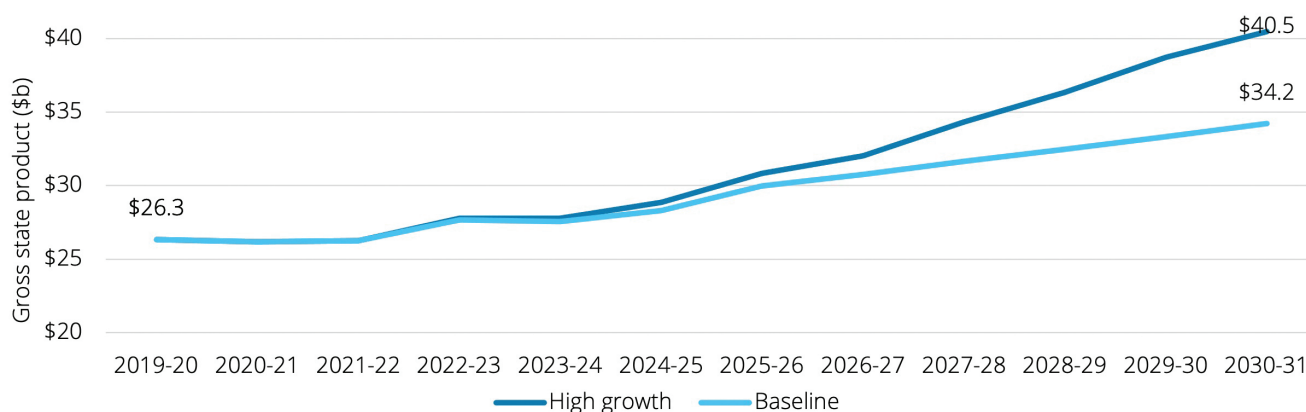
Limited NT market size and industry maturity was identified as a barrier to growth. Due to its size, the NT is often not supported by a local ecosystem of suppliers. A lack of economies of scale may also prevent businesses from achieving the size required to efficiently undertake downstream processing or manufacturing activities. To develop stronger supply chains and networks, the NT should better identify existing supply and capabilities in the NT and set up Supply Advocate to strengthen the industry ecosystem.

Climate change will have significant impacts on economic activities in the NT, including lowering agricultural productivity, damaging infrastructure, and impacting demand for emission intensive products. It is imperative for the NT Government and industries, including the maritime, agribusiness, minerals, and oil and gas industries, to account for climate risks when making investment and operation decisions.

Finally, there is scope for the NT to improve the transparency and efficiency of **regulatory processes** in order to reduce the regulatory costs imposed upon local industry. This can be achieved through a range of means, including by making regulation easier to understand for small businesses and learning from other jurisdictions.

Economic potential for the NT economy
If the NT Government and industries can overcome barriers to growth and capitalise on significant development opportunities, the **NT economy could grow to \$40.5 billion and generate over 168,000 jobs by 2030-31**. This high growth trajectory suggests that the four industries could lead to an additional \$6.2 billion contributed to the economy, above the baseline growth that the NT economy is expected to achieve.

Chart i Actual and forecast GSP, NT, 2019-20 to 2030-31 (\$b)



Source: Deloitte Access Economics

The most significant contributor to closing the gap is the growth from the oil and gas sector. In the high growth scenario, the oil and gas sector successfully capitalises on the window of opportunity for gas production. The Beetaloo basin comes into production after 2024 and the demand for gas is strengthened by downstream manufacturing opportunities from investments in the Middle Arm sustainable development precinct. In this scenario, the oil and gas industry in the NT **could reach \$6.8 billion in value added and 2,800 FTEs (3,110 jobs) by 2030-31.**

The minerals sector also plays an important role in achieving a \$40 billion economy target. As global demand for minerals increases, the NT is well placed to become a major exporter of critical minerals to foreign markets. With the approval process gaining efficiency, 22 mines will begin operation at a faster pace, increasing the diversity of the NT minerals industry to include production of new minerals such as lithium, magnesite, vanadium, and rare earths. By 2030, this rich pool of resources could enable the minerals industry to **contribute \$2.5 billion and 4,570 FTEs (5,070 jobs) by 2030-31.**

The agribusiness industry also drives significant growth for the NT economy. By capitalising on a range of opportunities including the adoption of new technologies, improving sustainable management practices, investing in the management of natural resources, developing new products and investing in downstream industries, there is scope for the agribusiness industry to achieve growth. These opportunities could lead the agribusiness industry to **grow to \$1.3 billion and 6,320 FTEs (7,010 jobs) by 2030-31.** This equates to around \$2.3 billion in gross value production terms. In practical terms, this growth would see:

- Cattle turn-off increasing from 687,630 in 2019-20 to over 832,300 by 2030-31 with a higher value added
- Area under cotton cultivation growing from 1,000 hectares in 2019-20 to 30,000 hectares in 2030-31.
- Additional 50,000 hectares for plant-based agriculture and horticulture across the top end.

There are opportunities for the maritime industry to grow through Darwin's proximity to rapidly growing international trade markets, the development of the Darwin Ship Lift facility, and the flow-on benefits from other resource industries (i.e., agribusiness, minerals and oil and gas). In this way, growth in other industries enable growth in maritime. Modelling suggests that the maritime industry could expand to **\$347 million and 1,490 FTEs (1,650 jobs) by 2030-31.** However, the maritime industry's importance to the future of the NT economy is not captured by the direct value added and jobs figures alone as it is also a critical enabler for much of the export opportunity identified in this report. Without appropriate growth in the maritime sector, the overall target of \$40 billion is not achievable.

Table iii Summary of industry outputs, 2019-20 and 2020-31

Industry	Output	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
Maritime	GVA (\$m)	184	283	4.0%	347	6.0%
	Employment (FTEs)	980	1,170	1.6%	1,490	3.9%
	Employment (headcount)	1,080	1,520	1.6%	1,660	3.9%
	Bulk and containerised freight (TEU container equivalent)	110,000	Up to 220,000 TEUs of bulk and containerised freight in the high growth scenario in 2030-31			
Agribusiness	GVA (A \$m)	517	682	2.60%	1,274	8.60%
	Employment (FTEs)	4,200	3,950	-0.50%	6,320	3.80%
	Employment (Headcount)	4,650	4,380	-0.50%	7,010	3.80%
	Cattle turnoff (heads)	687,630	Approximately 832,300 with a higher quality in the high growth scenario in 2030-31			
	Cotton (hectares)	1,000	Over 30,000 hectares in the high growth scenario in 2030-31			
	Mangoes (tonnes)	32,300	3 new high-yielding mango varieties in the high growth scenario in 2030-31			
	Forestry (hectares)	42,000	20% plantation expansion in the high growth scenario in 2030-31			
Minerals	GVA (A \$m)	1,409	1,511	0.6%	2,461	5.2%
	Employment (FTEs)	3,130	3,360	0.7%	4,570	3.5%
	Employment (headcount)	3,470	3,730	0.7%	5,070	3.5%
	Total mines in operation	8 mines ³	11 mines		Up to 33 mines	
Oil and gas	GVA (A \$m)	4,847	5,168	0.6%	6,829	3.2%
	Employment (FTEs)	1,690	1,900	1.1%	2,800	4.7%
	Employment (headcount)	1,870	2,110	1.1%	3,110	4.7%
	Oil and gas exports (tonnes)	1,696	1,800		2,400	

Source: Deloitte Access Economics

Of course, the maritime, agribusiness, minerals, and oil and gas industries will not grow in isolation. **Approximately half of the estimated growth in the NT economy is estimated to be contributed through sectoral spillovers—efficiency gains in the upstream and downstream industries dependent upon the maritime, agribusiness, minerals and oil and gas industries.**

Nevertheless, offsetting the spillover effects, 'crowding out' will divert some resources in the broader NT economy away from other economic activities towards these four industries. This puts the NT at risk of reducing its industry diversity and being exposed to a boom-and-bust cycle. This is particularly relevant given the significant role of the minerals and oil and gas industries in the high-growth scenario, both of which are industries that require significant construction and infrastructure investments and are dependent upon global demand. Higher industry productivity is critical to achieving all the disparate industry opportunities at once.

The NT Government can improve the sustainability of growth—and spread social benefits more widely—by maximising the downstream manufacturing and services opportunities from growing the agribusiness, minerals and oil and gas services.

Of course, the NT's economic journey does not end in 2030. By maximising downstream opportunities, building industry capabilities, growing the local workforce and sharing the benefits of economic growth, the NT will be able to achieve its economic aspirations for 2040 and beyond.

Deloitte Access Economics

1 Introduction

Achieving the ambition of a \$40 billion economy by 2030 requires reaching for bold new economic opportunities, while also overcoming a range of long-standing challenges facing the Northern Territory (NT).

Following years of slow economic growth relative to other states across Australia and fresh challenges brought about by the COVID-19 pandemic, the NT Government is focussed on identifying priority opportunities for economic growth.

The Territory Economic Reconstruction Commission (TERC) was set the task of creating a plan to grow a \$40 billion economy in the NT by 2030—an ambitious target, requiring rapid annual growth of around four per cent from 2020.

This is an ambitious vision for an economy that is not only \$40 billion in size, but also more diverse and sustainable, with more jobs and a larger population.

The NT has what it takes to become a thriving economy: world-class mineral deposits, prospective gas reserves, a strong agricultural sector, and strategic advantages as a location for trade and defence.

But there are headwinds that may constrain future economic development: including long-term constraints from declining population growth and a narrow economic base, in addition to short-term challenges from high inflation and rising interest rates.

The Territory Economic Reconstruction Commission (TERC) Final Report identified the maritime, agribusiness, minerals, and oil and gas industries among the sectors with the greatest growth opportunities and importance for the NT's future economic prosperity.

1.1 Purpose of this report

In this context, Deloitte Access Economics was engaged by the Department of Industry, Tourism and Trade (the Department) to measure the current value of the maritime, agribusiness, minerals, and oil and gas industries in 2019-20, as well as the potential contribution of these industries towards the \$40 billion goal by 2030-31. The potential future value of the industries is assessed against two growth scenarios, modelling the potential value of baseline growth and high growth within each industry.

This report also sets out some of the key opportunities and barriers to growth within the maritime, agribusiness, minerals and oil and gas industries, and identifies priority actions for industry and government in the NT to capitalise on opportunities over the decade.

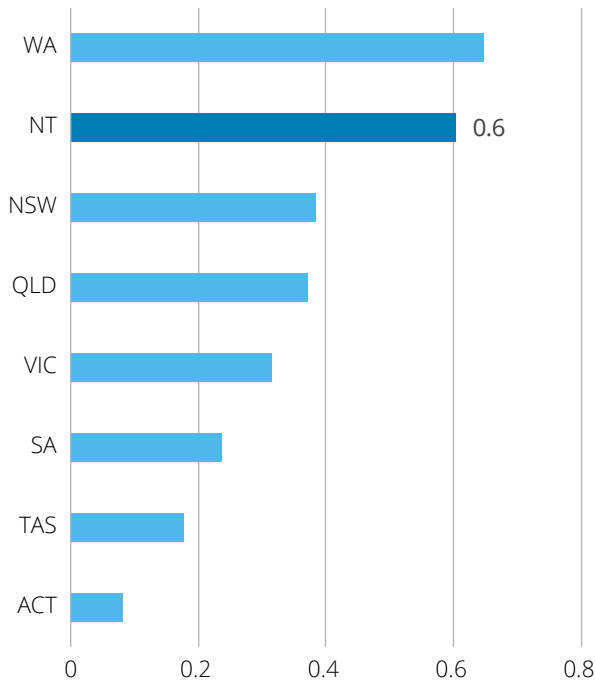
By developing a shared understanding of the potential for each industry to contribute towards sustainable economic growth, this report can support conversations between industries and governments about strategies to harness opportunities and overcome barriers to facilitate industry growth. Estimating the economic value of industries can also help to establish benchmarks or targets for growth to measure progress towards industry targets over time.

1.2 Macroeconomic overview

The performance of the minerals, agribusiness, maritime, and oil and gas industries are heavily influenced by broader macroeconomic factors in the NT, Australia and globally.

The NT has the smallest economy of all Australian states and territories, and one of the most exposed to global trade conditions. The value of trade (exports plus imports) as a proportion of gross state product (GSP) is relatively high compared to other states and territories, ranking only behind Western Australia (Chart 1.1). Combined with the small population base in the NT, and low levels of industry and business demand, the performance of the NT economy is highly exposed to the timing of major projects as well as external trends. Thus, annual growth in GSP is more volatile than national Gross Domestic Product (GDP) (Chart 1.2).

Chart 1.1: Trade openness, 2020-21



Source: Australian Bureau of Statistics; Deloitte Access Economics

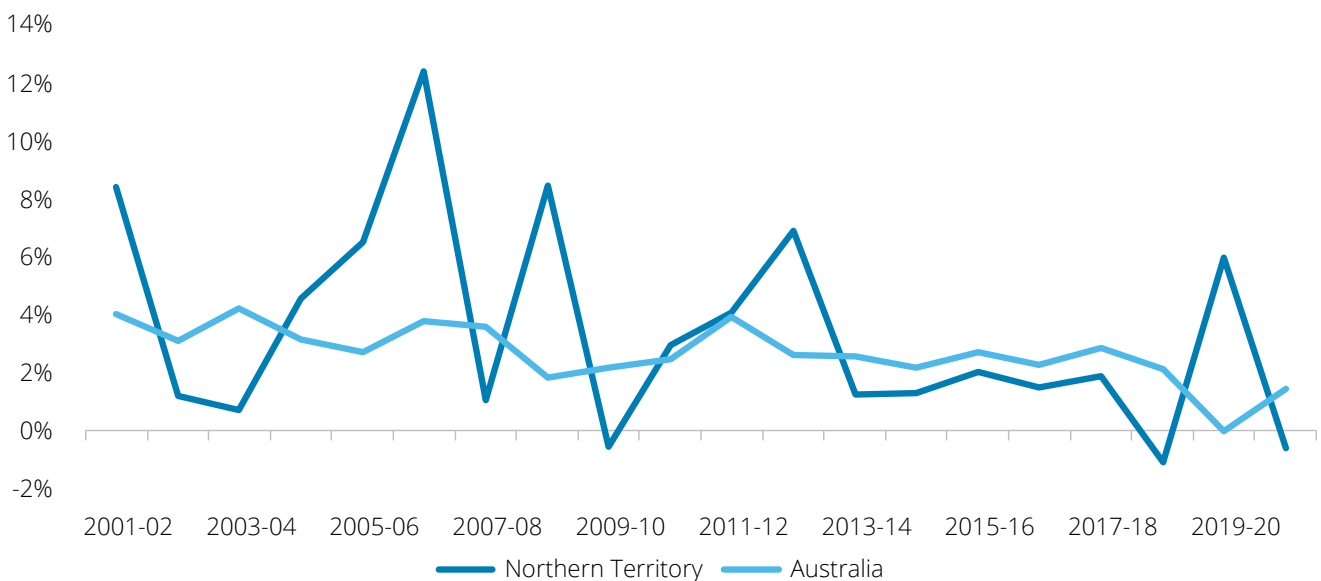
The most recent downward trend in GSP in the NT has been largely driven by a significant decline in the oil and gas sector. This downturn was largely a result of reduced demand during the pandemic, leading to lower volumes and prices of oil and gas, as well as an absence of new project development.

Reduced growth in recent years has increased the annual level of growth required to reach the Territory's goal of a \$40 billion economy by 2030-31. Previously, the NT's target would have been achieved with an average annual growth of 4.1 per cent between 2018-19 to 2030-31. However, as of 2020-21 (the latest GSP figures available from the ABS), average annual growth of 4.3 per cent is now required from 2020-21 to 2030-31 to achieve a \$40 billion economy.

In 2019-20, more than a quarter (27.8 per cent) of economic output in the NT was derived from mining and energy. This included the extraction, production and export of minerals such as manganese, gold, bauxite, liquefied natural gas (LNG) and petroleum, alongside other mineral commodities.

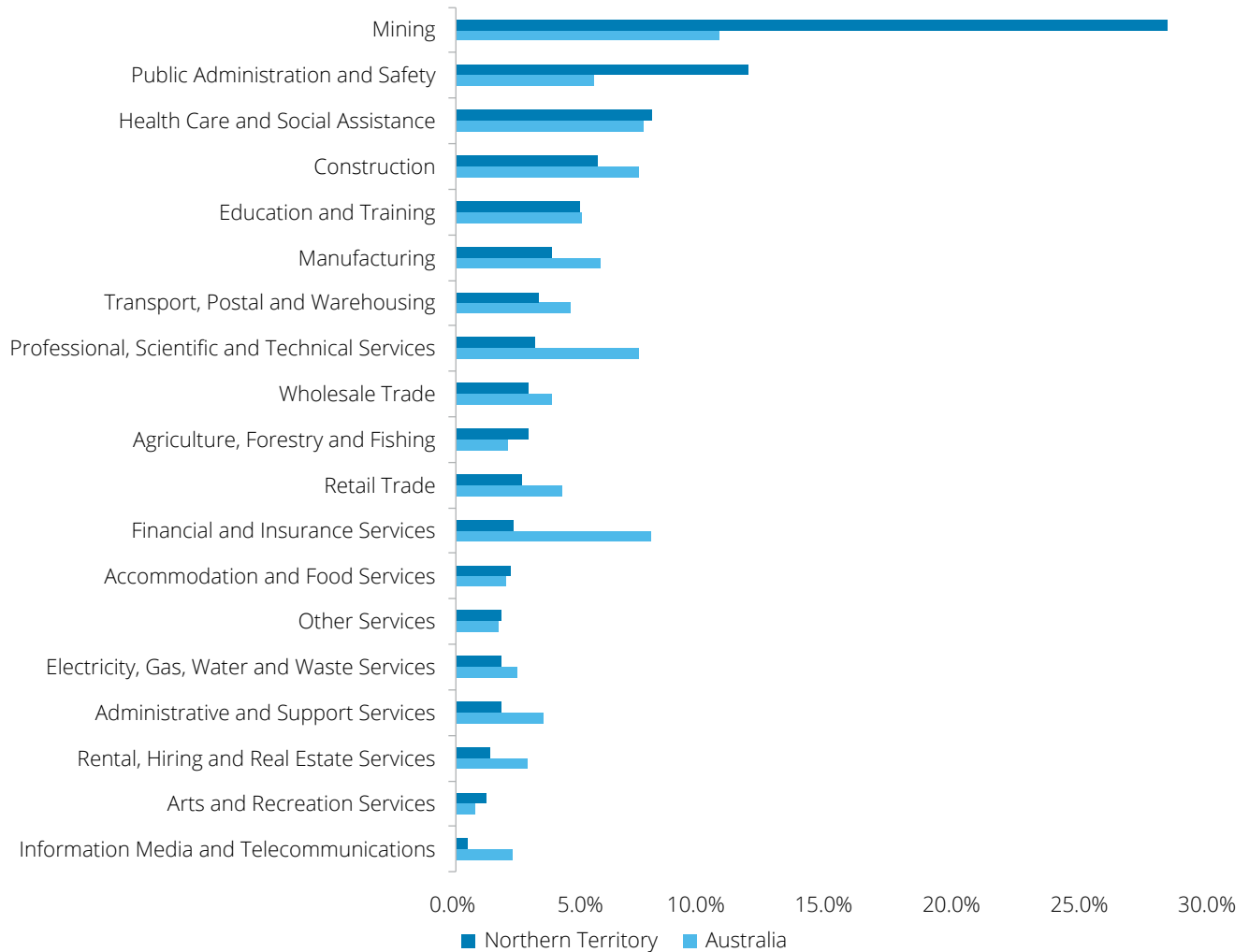
The second largest contributor to economic output in the NT is the public administration and safety sector—representing the NT and Federal Government and including public services such as defence (Chart 1.3). We have included 2019-20 as a more representative year for the NT economy because 2020-21 is more affected by one-off COVID-19 impacts.

Chart 1.2: Annual growth, gross state/domestic product, 2001-02 to 2020-21



Source: Australian Bureau of Statistics; Deloitte Access Economics

Chart 1.3: Industry share of total gross value added, NT and Australia, 2019-20



Source: Australian Bureau of Statistics; Deloitte Access Economics
 Note: Ownership of dwellings, taxes less subsidies and statistical discrepancy omitted from chart.

Economic growth within the NT is also impacted by investment cycles and the timing of major projects. Much of the fluctuation in economic activity over the past decade has been attributable to the offshore Ichthys gas field and construction of a production plant in Darwin, costing US\$45 billion to develop.

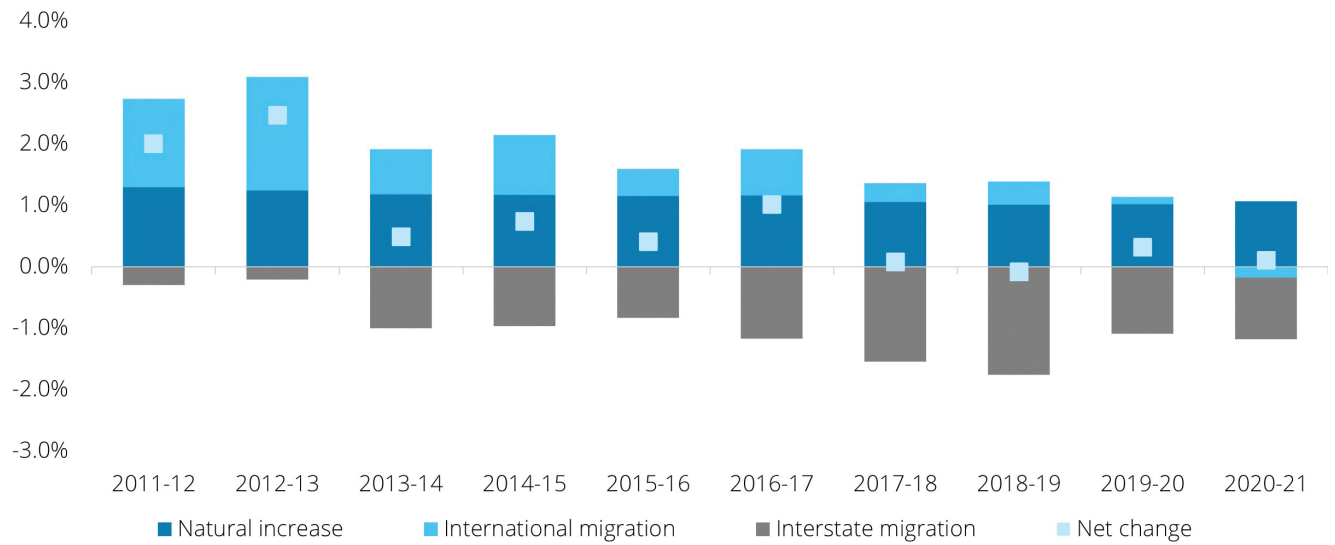
Major projects such as the Ichthys gas field support the NT economy through attracting direct investment, as well as generating activity in supporting industries such as construction. Ichthys also attracted an influx of workers to the NT economy, leading to flow-on economic benefits through additional demand for goods and services across a broad range of service and support industries such as retail and accommodation.

However, as major projects finish and construction phases wind down, this influx in activity and employment also tends to fall away. Without a sustained pipeline of activity, many of the workers attracted to the NT leave to find employment opportunities interstate. Many workers in the NT operate on a fly-in fly-out (FIFO) basis—with FIFO workers representing an estimated 6.3 per cent of the NT workforce in August 2021.⁴ This outflow of workers has flow-on impacts, reducing the level of demand for consumer goods and services, and leading to a decline in industry and business demand overall.

This lack of a local population base leaves the NT particularly exposed to the booms and busts of international trade markets, the cyclical nature of major project investments and the inflows and outflows of temporary workers.

The NT's population has been stagnant over the past four years. Chart 1.4 highlights that the lift from natural increase is offset by negative interstate migration. International migration has been notably small, partly because of COVID-19.

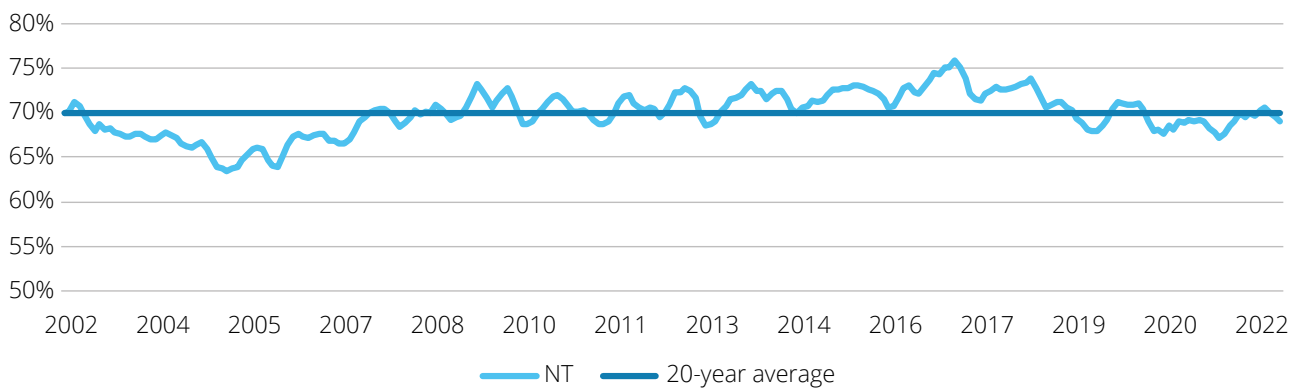
Chart 1.4: Drivers of NT population growth, financial year



Source: ABS, Deloitte Access Economics

In the NT’s case, population inflows and outflows are driven in large part by the timeline of big projects—when they begin, there is a population inflow of working-age people, and when they end, there is a population outflow of working age people. This means that, during the height of projects in the NT, the employment to population ratio tend to move above the historical average, while the opposite is true when projects end and there are less opportunities. This is apparent when considering the time period when the Ichthys LNG project was undergoing development compared to the present (see Chart 1.5).

Chart 1.5: Employment to population ratio (25 to 54 years), NT and Australia, 12-month rolling average



Source: ABS, Deloitte Access Economics

Unemployment in the NT has averaged 3.9 per cent between January and August 2022, in line with the national average.⁵ Given the low unemployment rate and higher economic activity target, boosting both NT population growth and participation (which is already relatively high compared to the rest of the country) is critical to achieving faster economic growth.

In front of the NT’s economic goals are a number of hurdles –a relatively small population base and an economy influenced by fluctuations from project-based work. In moving towards the \$40 billion target by 2030-31 there is also an opportunity for the NT to build capacity and reduce the influence of the boom and bust cycle. The NT can build itself into a larger and more sustainable economy. There are many opportunities to capitalise on, especially in the maritime, agribusiness, minerals and oil and gas industries.

1.3 Report structure

The remainder of this report is set out as follows:

- Chapter 2 discusses the current economic value of the maritime, agribusiness, minerals and oil and gas industries in 2019-20, and drivers of industry performance
- Chapter 3 discusses key opportunities for industry growth, identified through stakeholder consultation and desktop research
- Chapter 4 discusses important challenges that industries face in capitalising on opportunities and achieve growth through to 2030-31
- Chapter 5 presents results on the potential future value of each industry over the next decade, under two potential scenarios for baseline and high growth.
- Additional details on the methodology are outlined in the Appendices.

2 Current economic value

This Chapter discusses the economic contribution of the maritime, agribusiness, minerals and oil and gas industries in terms of value added and employment in 2019-20. This financial year was selected as it had the most data readily available for analysis at time of publication.

The direct value added of an industry can be thought of as the 'slice' of the NT economy attributable to that industry—avoiding double-counting activities across industries. Notably, value added is a different measure of economic contribution compared to value of production as it excludes intermediate inputs and government tax and subsidisation. Employment is measured in full-time equivalent (FTE) terms and is a way of estimating of the number of jobs supported by an industry.

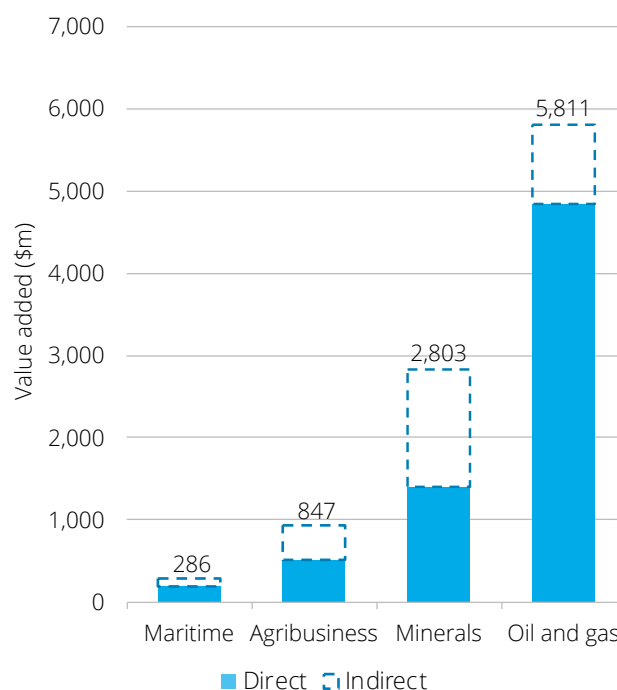
Both value added and employment are measured in direct and indirect terms:

- Direct value added and employment refer to the value added and employment generated within a given industry. Consequently, direct value added is the figure which should be used to assess the significance of an industry to the NT's gross territory product—for example, the amount of value added and employment directly attributable to the exploration, extraction, and production of minerals within the NT minerals industry.
- Indirect value added and employment refer to the upstream economic activities which are induced by activity within a given industry. For example, the opening of new mines induces economic activity in the construction industry in the NT, generating indirect value added and employment in turn.

Further detail on the approach to economic contribution modelling undertaken in this analysis is outlined in Appendix B.

A summary of the value added contributed by the maritime, agribusiness, minerals and oil and gas industries can be found in Chart 2.1.

Chart 2.1: Value added by industry, 2019-20



Source: Deloitte Access Economics

2.1 Maritime industry

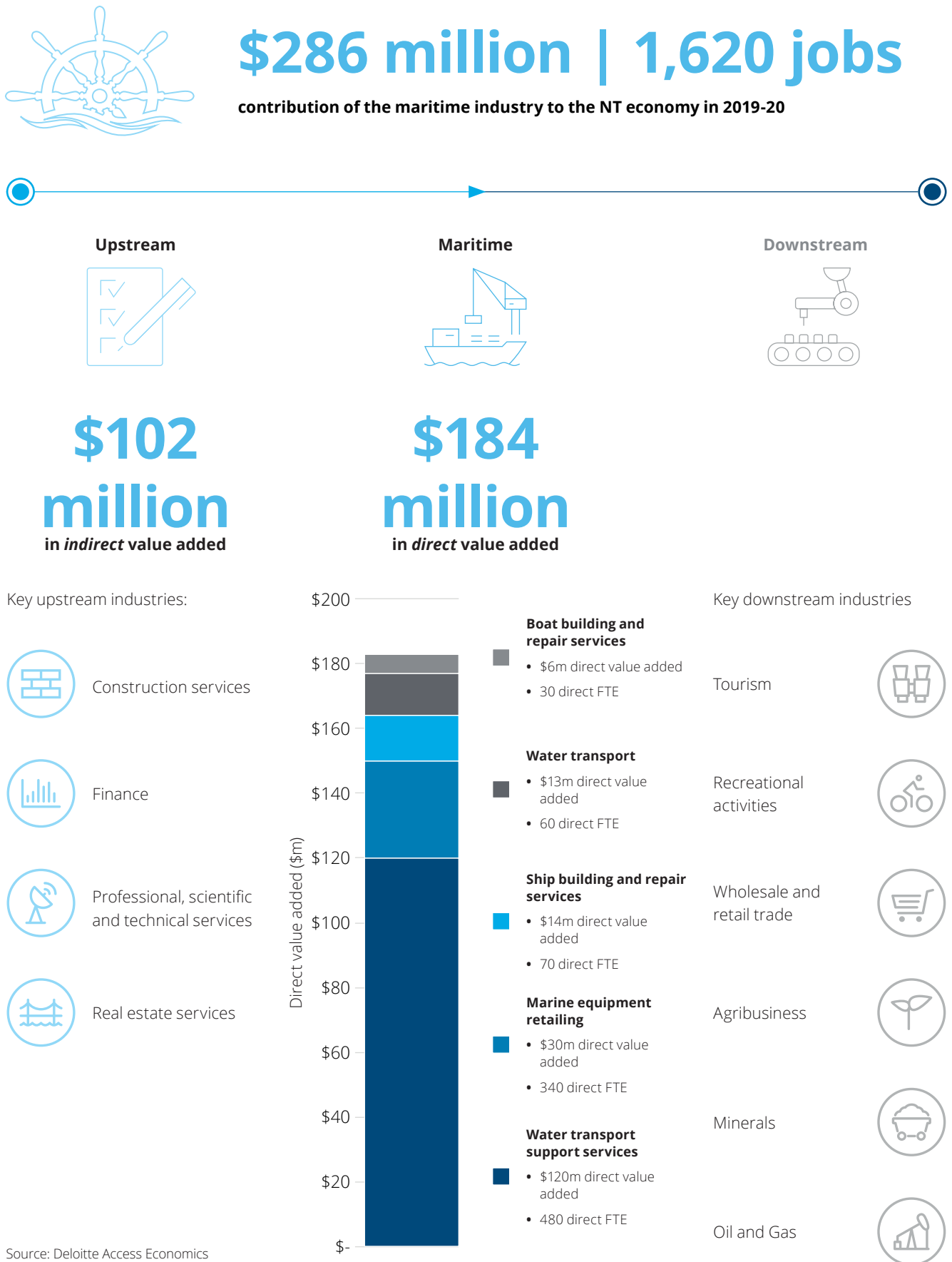
For the purpose of this report, the maritime industry includes activities such as ship building and repair services, water transport (freight and passenger services), boat building and repair services, maritime equipment retailing, and water transport services (such as stevedoring, towage services, and port and terminal operations) (Figure 2.1).ⁱ

As a key facilitator of trade, growth in the NT maritime industry is largely dependent upon growth in the industries which it services, such as the agribusiness, minerals, and oil and gas industries. This is demonstrated by the composition of export products from the Port of Darwin. Between 2012-13 to 2020-21, the vast majority (76.8 per cent) of goods exports from the port were dry bulk, including raw materials such as manganese.⁶ Over the same period, livestock represented an average of 12.2 per cent of goods exports—representing an average of approximately 391,800 head of cattle.⁷

When the NT's resource industries prosper, the maritime industry can prosper too. On the other hand, this dependence imposes a significant constraint upon the growth potential of the industry, which is limited in its capacity to create local demand for its services.

ⁱ Tourism, water recreational activities, and international trade are key downstream activities which are enabled by the maritime industry, but not captured within the estimates presented within this analysis.

Figure 2.1: The maritime industry's contribution to the NT economy in 2019-20ⁱⁱ



Source: Deloitte Access Economics

ii There is insufficient data available at the NT level to estimate the size of the Maritime industry using territory-level data. Consequently, national-level data has been utilised alongside labour force data to estimate output at the territory level.

In 2019-20, the maritime industry is estimated to have contributed \$286 million to the NT economy.ⁱⁱⁱ Of this, \$184 million was direct value added by the industry, while the remaining \$102 million was generated through upstream industries. This suggests that the industry contributed approximately 1.1 per cent of total GSP in the year through total value added.⁸

The industry also directly supported approximately **980 FTE workers**, many in roles such as marine transport professionals, freight handlers, distribution and procurement roles, as well as mechanical and machinery-based positions. Indirectly, the industry created an additional 640 FTEs in upstream industries, supporting a total of 1,620 FTEs, or approximately 1.4 per cent of total employment in the NT.

Maritime sub-industries

The direct value added in the maritime industry is primarily comprised of water transport support services which generated \$120 million in 2019-20, or approximately 65 per cent of direct value added for the maritime industry. The industry also generated the most direct employment, approximately 480 direct FTEs. This represents the activity associated with port and water transport terminal operations in the territory, including the Port of Darwin.

The marine equipment retailing sub-industry is the next largest to water transport, providing products and services which support activity in the water transport industry as well as recreational water-based activity in the NT.⁹ Ship building and repair services also have a small presence in the NT, although the industry faces fierce competition from Singapore's industry which is both more mature and has a larger capacity for lifting and maintenance, enabling it to attract more business from ships which are also active in NT waters.¹⁰ Water transport and boat building and repair services also have minor presences in the broader maritime sector. Notably, further marine activity will occur in the NT through recreational boating, fishing and other water-based activities, however these activities are outside the scope of the maritime industry.

Maritime upstream and downstream industries

The maritime industry relies on a range of upstream industries to support its operations. Based on the aggregate expenditure profile of the maritime industry, the largest industry is support services within the maritime industry itself. This includes, for example, stevedore services and Port of Darwin operations—both classified under the water transport support services sub-industry, each are directly dependent on the other to provide services.

Beyond this, the maritime industry, particularly water transport and water transport support services, utilise support services such as accounting, engineering and legal support in order to run their operations, as well as the support of employment, travel agency and other administrative services to match skill gaps and connect tourists to their services. Further, the maritime industry depends on finance, auxiliary finance and insurance services.

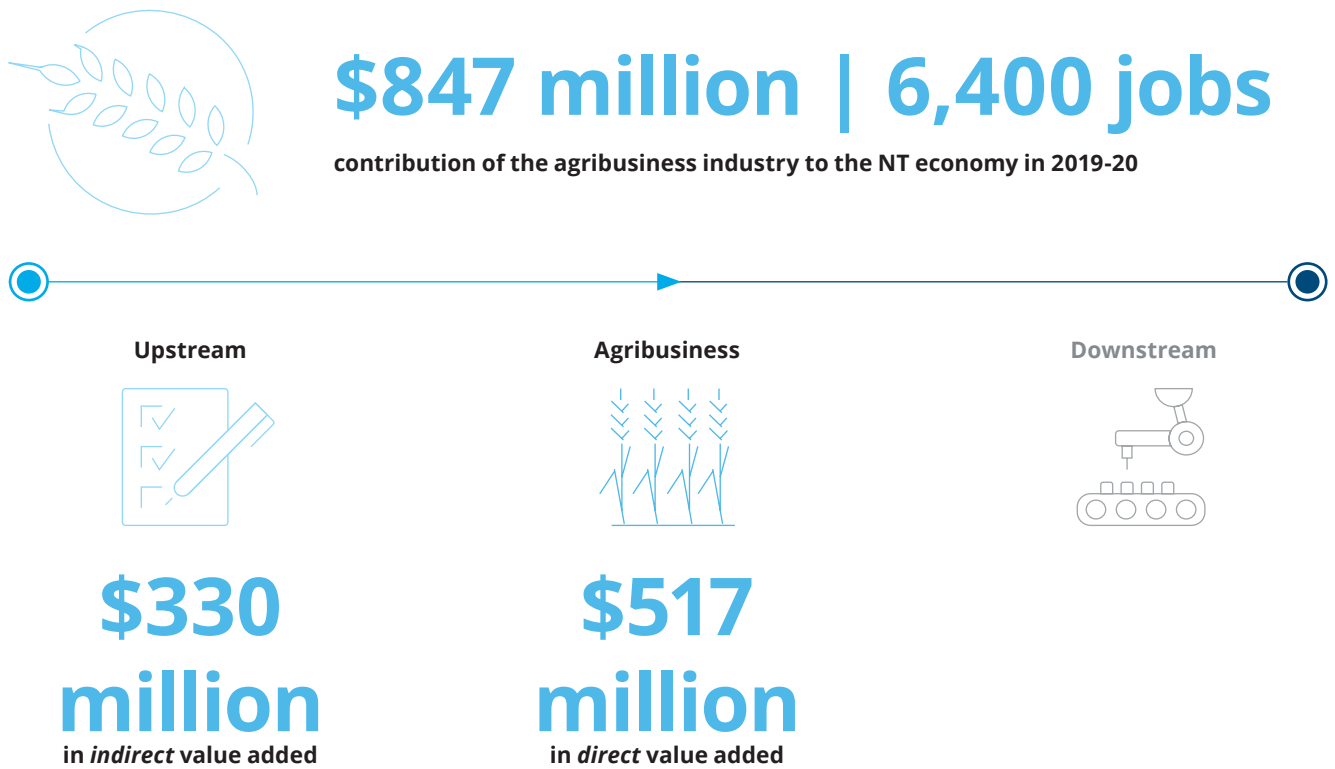
The maritime industry enables other, downstream industries that transport goods interstate or overseas such as agribusiness, minerals and oil and gas. Service-based industries such as tourism and recreational activities are also downstream, with the maritime industry supporting activities undertaken in water-based environments in the NT. If the maritime industry is capacity constrained, high-cost or inefficient, it affects the competitiveness of other NT industries, so it plays an important strategic role in an exporting economy like the NT.

2.2 Agribusiness industry

For the purpose of this report, the agribusiness industry includes the agricultural production of aquaculture, fisheries, forestry and logging, horticulture, grains and other crops, cattle and buffalo, other livestock, and wild harvest (including hunting and trapping, and bush foods) (Figure 2.2).

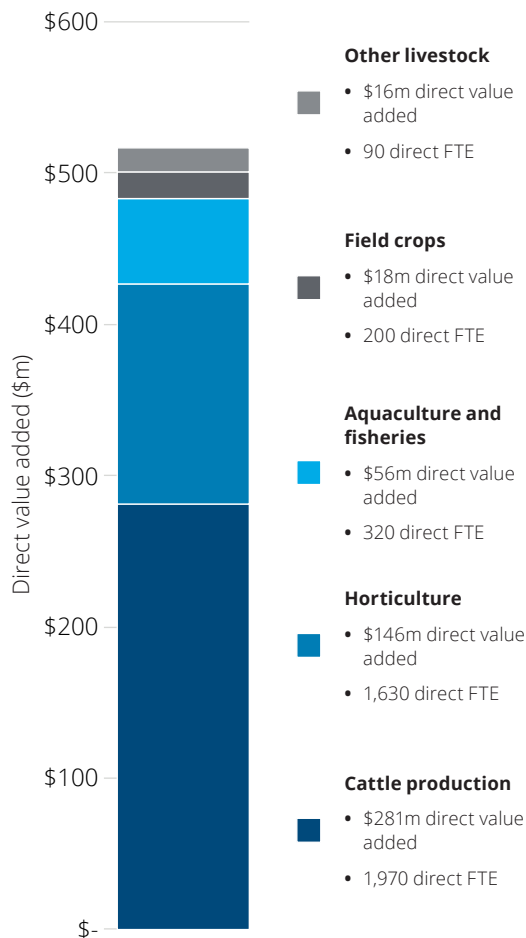
ⁱⁱⁱ In consultation with NT Government

Figure 2.2: The agribusiness industry's contribution to the NT economy in 2019-20







Key upstream industries:

-  Agribusiness sub-industries
-  Agriculture, forestry and fishing support services
-  Environmental management



Key downstream industries

- Food and beverage manufacturing 
- Textile and clothing manufacturing 
- Sawmill and other wood product manufacturing 
- Education and research 

In 2019-20, the agribusiness industry contributed \$847 million in total value added, contributing 3.2 per cent of GSP in the NT.¹¹ \$517 million of this value added was directly contributed by the agribusiness sub-industries, while the remaining \$330 million was generated by upstream industry activity.^{1v}

The 6,400 total FTE workers supported by the agribusiness industry comprised approximately 5.5 per cent of the total employment in the NT in 2019-20.¹² The majority of these workers represent the direct contribution (4,200 FTEs), while the remaining 2,200 contributed indirectly.

Box 1: Value added versus gross value of production

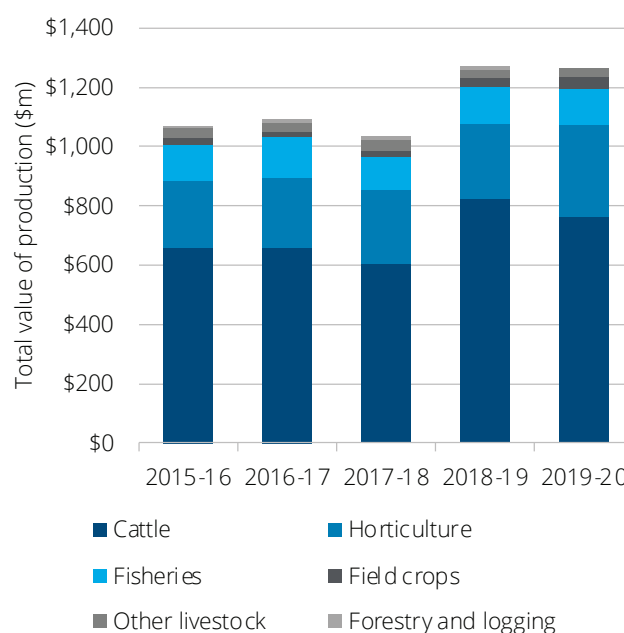
Value added is a different measure to gross value of production (GVP) as it excludes intermediary inputs and some government taxes to measure the 'slice' of the economy attributable to an industry. Thus, value added estimates, by definition, are smaller than GVP estimates. In 2019-20, the NT agribusiness sector was approximately \$1.3 billion in GVP and \$517 million in value added. Further details on value added are provided in Appendix B.

Agribusiness sub-industries

Beef cattle production is the largest economic contributor to the agribusiness sector, contributing \$281 million in direct value added and 1,970 in direct FTEs in 2019-20. In recent years, approximately half to two thirds of cattle production value has been generated through interstate trade, with the vast majority of the remaining value of production generated through live exports, mostly to Indonesia.¹³ A small amount of value is generated through purchases by a local abattoir in the NT.¹⁴ Notably, cattle production contributed less in 2019-20 than 2018-19 due to dry conditions leading producers to move stock to Queensland or reduce stock.¹⁵ Across all agribusiness industries, biosecurity risks exist both with interstate and international export, and complex processes are in place to manage these. Biosecurity resourcing has recently increased in the NT due to increased vulnerability with outbreaks of foot and mouth, and lumpy skin disease overseas.

Cattle production has been increasing over time, though with a degree of variability year-to-year according to market and climate variabilities.¹⁶ The share of agribusiness production value attributable to cattle has fluctuated consistently around 60 per cent of total industry production since 2015-16, demonstrating its ongoing importance to the agribusiness industry (Chart 2.2).

Chart 2.2: Production shares and value of the NT agribusiness industry



Source: Deloitte Access Economics; NT Department of Industry, Tourism and Trade

The **horticulture** sub-industry is the second largest contributor to the agribusiness sector, comprising fruit (primarily mangos and melons), vegetables and flower nursery production and generating an average of approximately 22 per cent of agribusiness production value since 2015-16. Together, these agricultural commodities contributed \$146 million in direct value added and 1,630 FTEs in 2019-20. Much of this value was generated through interstate trade, both for domestic consumption and international trade.¹⁷ This contribution has been growing in recent years, driven particularly by mango and melon production, though with comparatively small drawbacks in flower nursery and table grape production.¹⁸

^{1v} It is worth noting that this estimation is less than the value added for the Agriculture, Forestry and Fishing ANZSIC Division A industry. This is due to the definition of NT agribusiness industry excluding Agriculture, Forestry and Fishing Support Services (ANZSIC Sub-division 05), as well as the bottom-up approach taken for this analysis. Further explanation is available in Appendix B.

The **field crops** industry was exclusively an input into cattle production in 2019-20, though production of other crops such as maize, sesame and soybeans have also historically existed in the NT.¹⁹ Further, cotton production has begun to occur in the NT.²⁰ In 2019-20, the entirety of field crop production was cattle feed, contributing \$18 million in direct value added and 200 direct FTEs.

Commercial fishing and aquaculture are also significant components of the NT agribusiness industry. Production is split approximately evenly across fish, northern prawns and aquaculture and, over time, these ratios have remained reasonable constant; however, their share of agribusiness industry production value has fluctuated between approximately 10 to 13 per cent since 2015-16. Together, these sub-industries contributed \$56 million in direct value added and 320 in direct FTEs.

Other livestock has also generated a small amount of value over time, contributing approximately three per cent of industry production value over the last five years. Within other livestock types, buffalo production has historically displayed a degree of variability, while crocodile production value has remained reasonably constant.²¹ Together with a small number of other livestock, \$16 million in value added and 90 FTEs were created in 2019-20 by these components of the agribusiness industry.

Finally, the agribusiness sector includes the NT's **forestry and logging** sub-industry, and this final sub-industry has historically generated approximately one per cent of industry production value since 2015-16. However, in 2019-20, no production was recorded in the industry, leading to data limitations which prevented the value added being calculated for 2019-20—notably, this value would have been generated exclusively through wages. Employment is expected to be generated by the sub-industry, for example through Acacia plantations on the Tiwi islands and Indian Sandalwood and African mahogany in the Douglas-Daly and Katherine regions.²² These forests are anticipated to be worth millions of dollars when harvested.²³

Agribusiness upstream and downstream industries
Beyond the direct components of the agribusiness industry, sub-industries are heavily dependent upon **agribusiness support services**—including activities such as fruit picking and pest control. Sub-industries within the sector are also heavily dependent upon other sub-industries within the sector—for example, the production of cattle feed is a direct input into cattle production.

Beyond this interconnection, the agribusiness industry is also dependent upon **financial and insurance services** and **professional, scientific and technical services to support** investments, day-to-day operations, and support in improving the efficiency of operations through variations in practices and investment decisions. Finally, wholesale trade is a key input for the industry, providing access to more affordable production products at lower costs.

The agribusiness industry feeds into downstream manufacturing industries, including food and beverage and textile and clothing manufacturing. The forestry and logging sub-industry also operates as a direct input into sawmill and other wood product manufacturing. Additionally, the industry's animal and plant production outputs also support research and education as a direct downstream industry. In this way, agribusiness creates more economic opportunities than those measured purely by direct value added.

2.3 Minerals industry

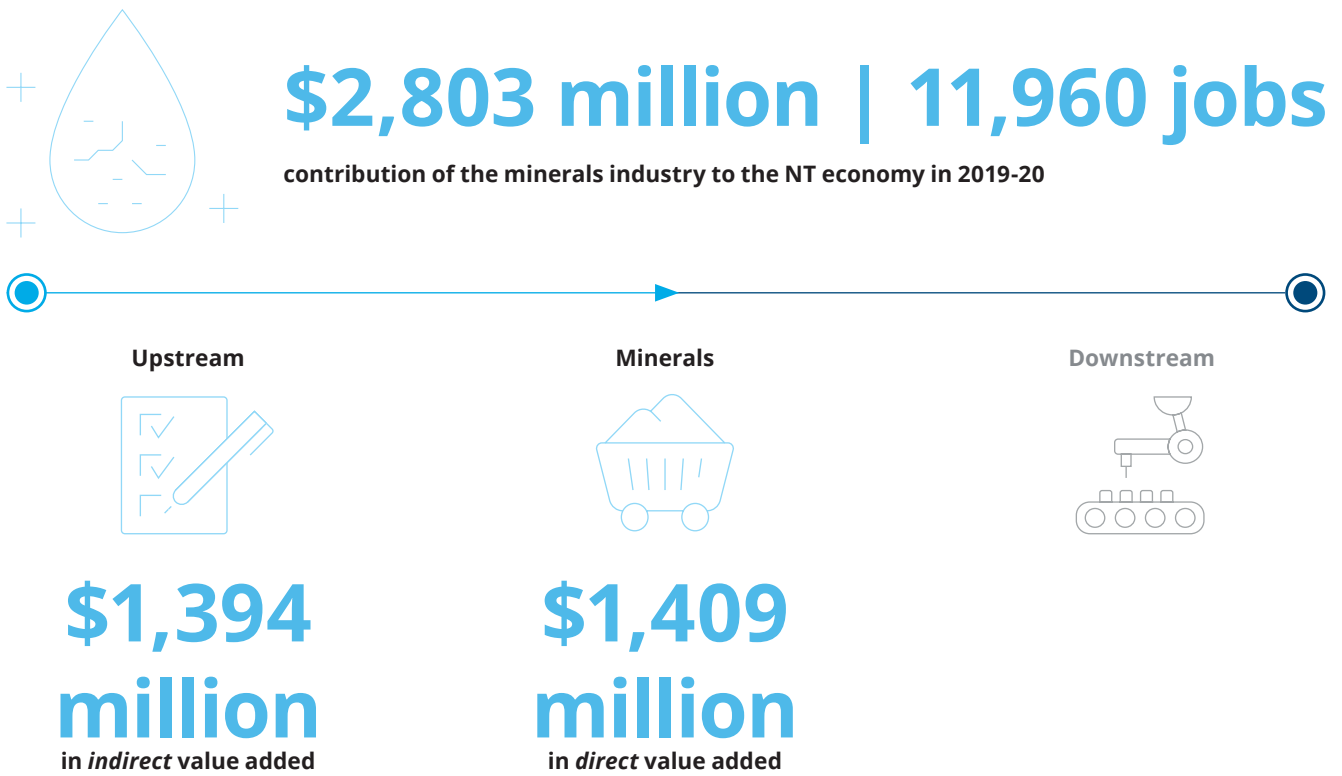
For the purpose of this report, the minerals industry includes the exploration and extraction of minerals such as manganese, gold ore, zinc and lead concentrates, bauxite, mineral sands, other non-metallic minerals, iron ore, and non-ferrous metals. Key upstream services supporting the industry, such as mining equipment, technology and services (METs), and transport and logistics, are not captured in the estimates within this analysis.

Internationally, the minerals industry is currently undergoing significant change in demand structures as countries around the world begin to implement substantive decarbonisation policies. This is expected to increase demand for some of the minerals currently extracted from the NT, such as manganese and zinc—as well as other critical mineral resources deposited in the NT, but not currently extracted, such as lithium and rare earths. These critical minerals are likely to face increased demand for use in renewable energy generation.

The NT Government is providing guidance where possible to support exploration and extraction of these types of resources, such as through the NT's Critical Minerals Plan.²⁴ The potential opportunity in critical minerals is further discussed in Chapter 3.

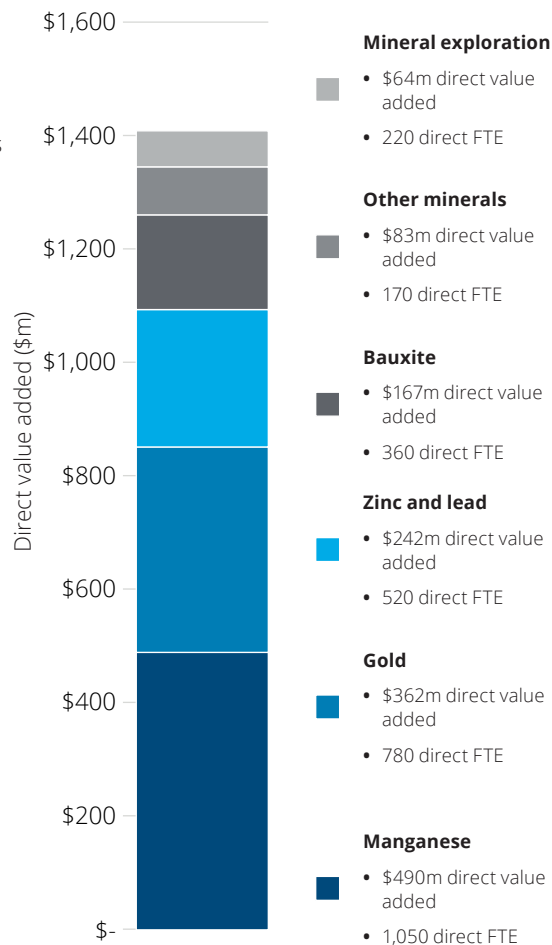
In 2019-20, the minerals industry in the NT generated \$2.8 billion in total value added—\$1.4 billion directly, and \$1.4 billion indirectly. In the same period, the industry created 3,130 direct FTEs and 8,830 indirect FTEs, or 11,960 FTEs in total (Figure 2.3).

Figure 2.3: The minerals industry's contribution to the NT economy in 2019-20



Key upstream industries:

- Mining equipment, technology and services (METs)
- Transport and logistics
- Construction services



Key downstream industries:

- Mineral and metal product manufacturing
- Cement and concrete manufacturing

Source: Deloitte Access Economics

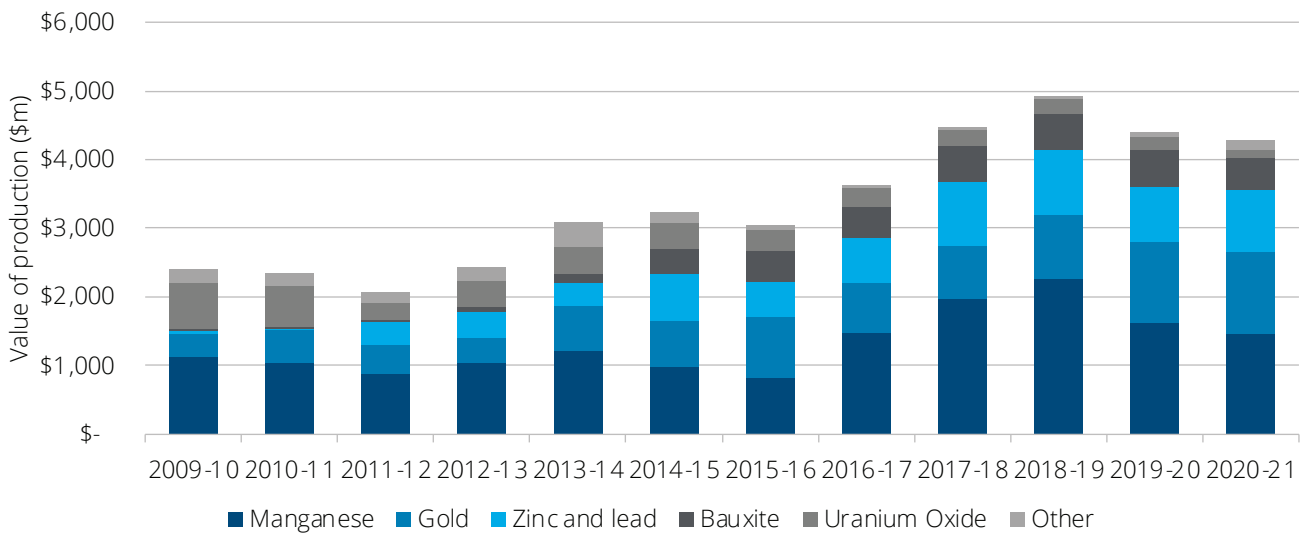
In recent years, the contribution of the minerals industry has been dominated by five key minerals: manganese, gold, zinc, lead, bauxite and uranium oxide. In total, this means the minerals industry contributed approximately 10.6 per cent to GSP, and 10.2 per cent to employment in the NT.

This is reflective of historic trends in exploration and production: since 2009-10, these resources have contributed between 80 to 90 per cent of all mineral production value in the NT, illustrated in Chart 2.3.²⁵

Minerals sub-industries

Of these minerals, **manganese** has consistently held the largest share in terms of production value over time (Chart 2.3) and in 2019-20 it directly contributed \$490 million in value added and 1,050 in FTEs. Notably, this mineral has also historically been the largest dry bulk export through the Port of Darwin—consequently, the production of manganese has historically driven activity and growth in the maritime industry.

Chart 2.3: Production shares and value of NT minerals

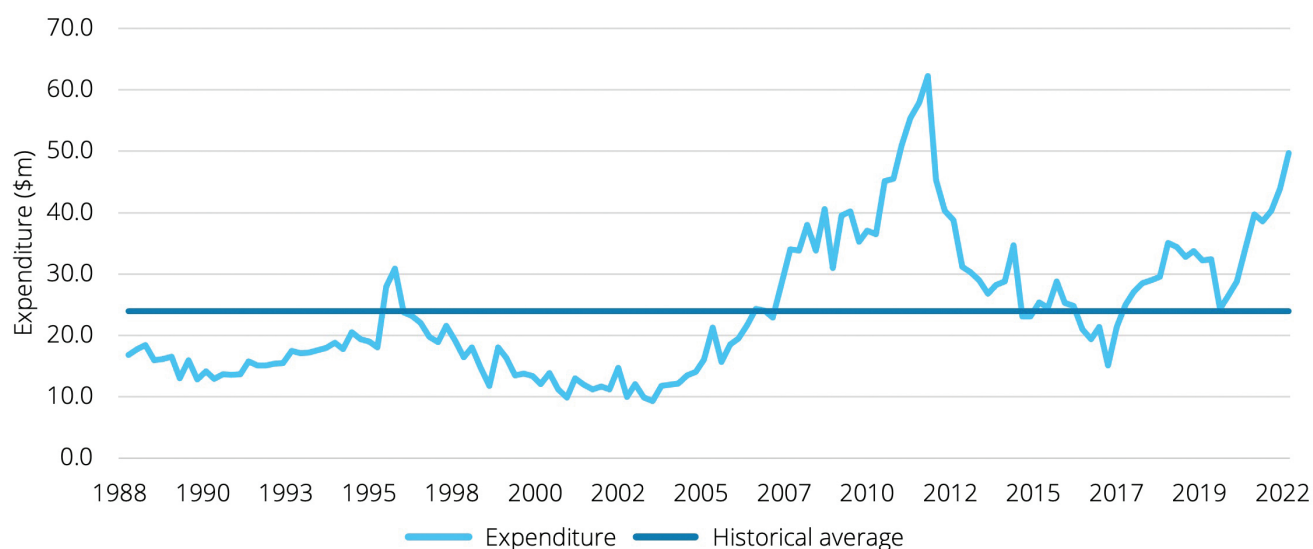


Source: Deloitte Access Economics; NT Department of Industry, Tourism and Trade

In 2019-20, **gold** was the next largest contributor to the NT minerals sector, with \$362 million in direct value added and 780 FTEs. Further, zinc and lead contributed \$242 million in direct value added and 520 direct FTEs, while bauxite directly contributed \$167 million in value added and 360 FTEs. Minerals sands and other non-metallic minerals are small by comparison, contributing a combined \$21 million in direct value added and 80 FTEs.

While **mineral exploration** only contributed a small amount to the minerals sector in 2019-20, it is a key input for understanding the future expected growth in mineral production. Since 2017, quarterly expenditure on mineral exploration in the state has doubled and continues to exhibit an upwards trajectory, with quarterly expenditure exceeding historical averages and approaching levels not seen since the Australian mining boom (Chart 2.4).²⁶

Going forward, the profile of minerals production and export from the NT is expected to substantially change over time. In particular, **uranium oxide**, once the second largest mineral by share of production value in the NT, has now ceased production with the closure of the Ranger mine in 2021 and is not anticipated to restart production. Given that extraction of this mineral contributed \$62 million in direct value added and 130 direct FTEs, this is anticipated to lead to a short-term decline in industry output.

Chart 2.4: NT mineral exploration expenditure, quarterly

Source: Deloitte Access Economics; ABS

Note: Average expenditure is based upon data available from September 1988 onwards

Minerals upstream and downstream industries

The minerals sector drives significant demand in upstream industries based in the NT. It relies most significantly on mining support services and other repair and maintenance services. These include activities like directional drilling and draining and pumping services as well as machinery repair and maintenance services, all of which support mining operations.

Notably, construction is also a major upstream beneficiary, and this is because before a mine can begin production, the infrastructure itself needs to be established. Consequently, the establishment of a mining site is often preceded by significant value added and employment through construction rather than mining. During construction and production phases, engineering services are required to ensure a site can operate efficiently and safely. Notably, the transport industry is also upstream to the minerals industry—particularly the rail transport sub-industry which is important for transferring mineral outputs.

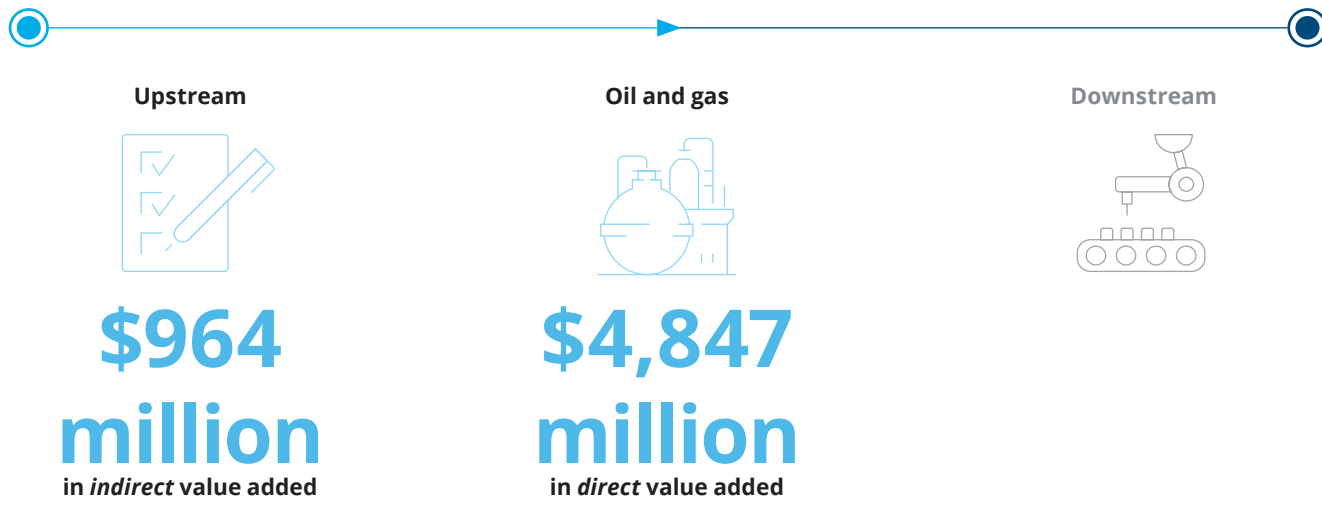
Additionally, while mineral and metal product manufacturing as well as cement and concrete manufacturing are downstream industries to the minerals industry, there is limited activity in the NT at this time. This is identified as an opportunity later in this report.

2.4 Oil and gas industry

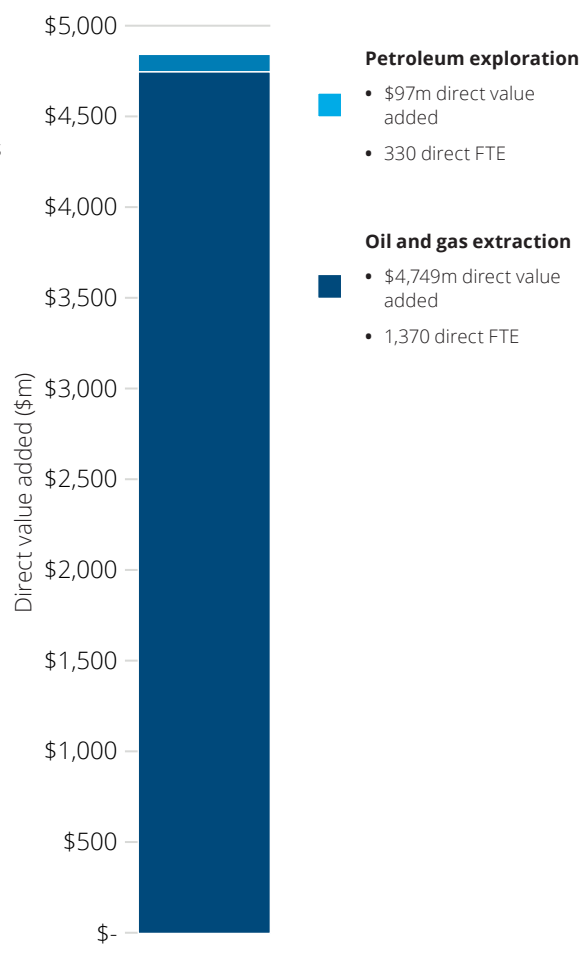
For the purpose of this report, the oil and gas industry includes exploration and appraisal activities as well as oil and gas extraction.^v Other downstream activities such as pipeline transport services, processing and manufacturing, and carbon capture, utilisation and storage are not directly captured in this analysis although they play an important role in the NT economy. Together with the minerals industry, the broader resource extraction sector is the largest in the NT in GSP terms.²⁷

^v LNG manufacturing is considered a downstream component of the industry, as described in figure 2.4. Gross value of production for exported LNG in 2020 could approximate almost \$10.5 billion. For further information, see: NT Department of Treasury and Finance (2022). Northern Territory Economy: International Trade.

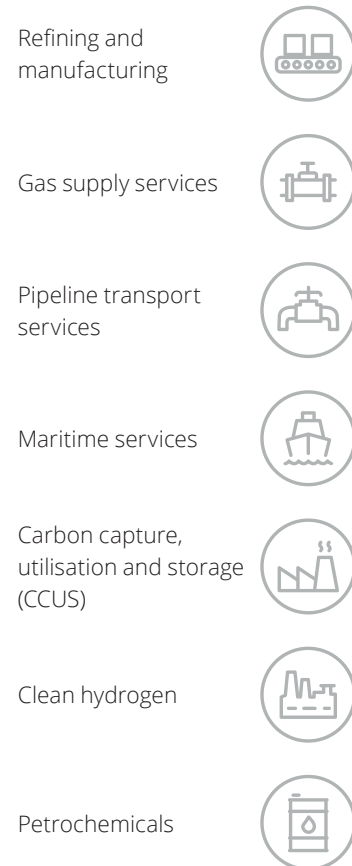
Figure 2.4: The oil and gas industry's contribution to the NT economy in 2019-20



Key upstream industries:



Key downstream industries



Source: Deloitte Access Economics

In 2019-20, the oil and gas industry contributed a \$4.8 billion in direct value added and 1,690 direct FTEs to the NT economy (Figure 2.4).^{vi} Indirectly, a further

\$964 million value added was generated and 4,670 FTEs were employed—a total contribution of \$5.8 billion in value added and 6,360 FTEs, representing 22.1 per cent of GSP and 5.4 per cent of employment in 2019-20. While \$97 million in value added and 330 FTEs were created directly through the oil and gas exploration sub-industry, the vast majority of the sector's contribution is generated by the oil and gas extraction sub-industry which reached \$4.7 billion in value added and 1,370 FTEs in 2019-20 directly.

The oil and gas industry also creates value added and jobs indirectly (i.e., in supplier firms), including in construction and repair services, transport and rental and hiring services. Notably, the indirect impacts are smaller for 2019-20 than they are likely to have been in the early 2010s when construction on Ichthys was at its peak. It also supports activity downstream—discussed in more detail in Chapter 4.

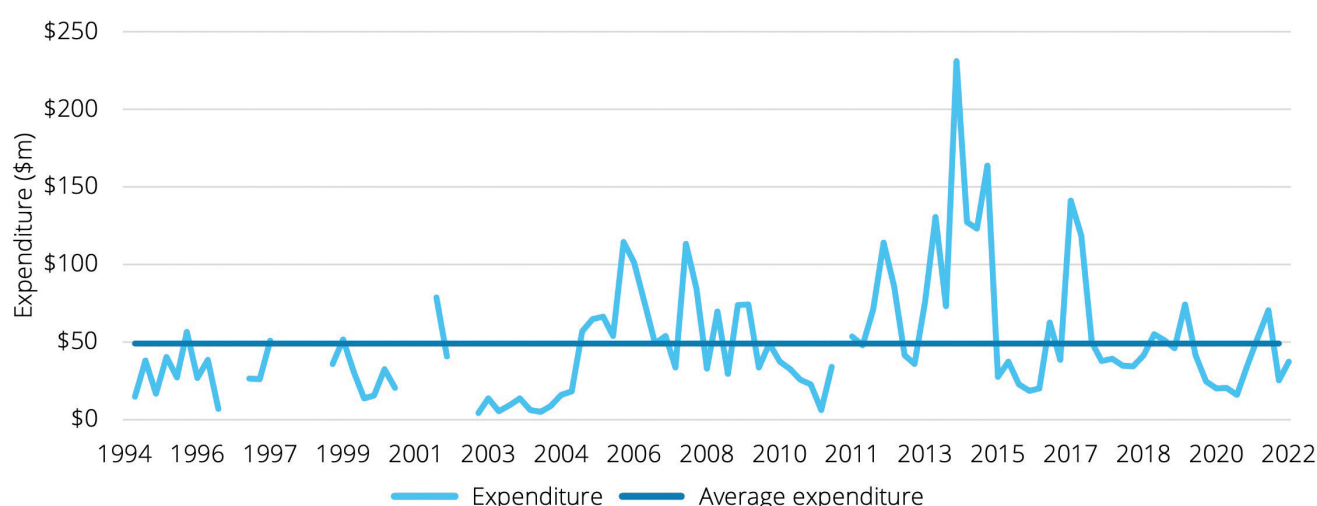
Oil and gas are primary energy inputs for countries across the globe, and while demand for hydrocarbon-based energy may begin to decline as the world decarbonises, it remains an essential, inelastic good in the global economy.

This has been underscored by the recent increases in international oil and gas prices driven by factors such as the European energy crisis and the Russia-Ukraine war, and the impact that these shocks have on supply within domestic markets.^{28,29}

The major driver of the NT oil and gas industry is production from the onshore Amadeus basin in Central Australia and offshore fields such as the Bayu-Undan, Ichthys and Blacktip fields.³⁰ The onshore Ichthys LNG plant is one of the most recent major oil and gas investments undertaken in the NT and had only recently begun production in October 2018, suggesting value added is likely to be larger in 2021-22 than was estimated in 2019-20 for this analysis.

Oil and gas exploration reached a thirty-year high from 2013-14 to 2014-15, corresponding with additional exploration during the construction of Ichthys which began construction in 2012.³¹ Since then, quarterly oil and gas exploration expenditure has broadly reflected historical averages (Chart 2.5).

Chart 2.5: NT oil and gas exploration expenditure, quarterly



Source: Deloitte Access Economics; ABS

Note: Average expenditure is based upon data available from September 1994 onwards

^{vi} It is worth noting that this estimated value added by the NT minerals and oil and gas industries sum to less than the total sum of the Mining ANZSIC Division B industry. This is due to the definition of NT minerals and oil and gas industries exclude Other Mining Support Services (ANZSIC Class 109), as well as the bottom-up approach taken for this analysis. Further explanation is available in Appendix B.

3 Opportunities and actions for industry growth

There are sizable growth opportunities for the NT maritime, agribusiness, minerals and oil and gas industries over the next decade. Realising the potential for each industry will require business and government in the NT to work together to capitalise on opportunities—and take action to grow a diverse and sustainable economy.

This chapter discusses key growth opportunities for the maritime, agribusiness, minerals and oil and gas industries over the next decade. We identify the key actions that need to be taken to maximise these opportunities and help reach the NT’s economic ambitions. The next chapter takes a different lens, focussing instead on barriers and what can be done to overcome them.

The opportunities discussed in this chapter were identified through a review of what has already been canvassed in existing strategies and reports, raised through stakeholder engagement and put in the context of national and international economic trends. Opportunities are grouped under the common themes in Table 3.1.

Table 3.1: Summary of opportunities for the maritime, agribusiness, minerals, and oil and gas industries

	Maritime	Agribusiness	Minerals	Oil and gas
Scaling traditional activities	<ul style="list-style-type: none"> • Servicing oil and gas industry • Coastal and international shipping 	<ul style="list-style-type: none"> • Leveraging technology to increase productivity in cattle raising and horticulture • Targeting new market windows for horticulture products 	<ul style="list-style-type: none"> • Providing new long-term mineral and exploration leases 	<ul style="list-style-type: none"> • Accelerating assessment and production from the Beetaloo sub-basin
New products and emerging industries	<ul style="list-style-type: none"> • Expanding home-basing and homeporting services (e.g., for defence sustainment, cruise) 	<ul style="list-style-type: none"> • Growing emerging crops such as cotton and tropical fruits • Monetising agricultural waste through production of biofuels 	<ul style="list-style-type: none"> • Expand production and processing of critical minerals • Invest in mine rehabilitation activities 	<ul style="list-style-type: none"> • Decarbonisation and alternative energy sources
Extending the value chain	<ul style="list-style-type: none"> • Target opportunities to export products made in other states 	<ul style="list-style-type: none"> • Investing in food processing and manufacturing activities in the fisheries, aquaculture and cattle industry • Developing a brand for NT agricultural products 	<ul style="list-style-type: none"> • Investing in local processing capability 	<ul style="list-style-type: none"> • Providing inputs to downstream manufacturing activities
Expanding existing markets	<ul style="list-style-type: none"> • Capitalising on Darwin location to service super yachts operating in the Indo-Pacific region 	<ul style="list-style-type: none"> • Promoting NT brand in the interstate and South East Asian markets 	<ul style="list-style-type: none"> • Promoting the NT value proposition as a sustainable, ethical and secure source of minerals • Develop trade relationships with North America, Europe, Japan and Korea 	<ul style="list-style-type: none"> • Expand the gas export hub to meet international demand

3.1 Maritime

The maritime industry connects the NT with the rest of Australia, the Indo-Pacific region and the rest of the world. By playing an indispensable role in the transportation of goods and people, the maritime industry is an enabler for the economic development of the NT.

In the *International engagement strategy 2022 to 2026*, the NT Government aims to export 15 per cent more goods than the baseline forecast by 2026.³² Compared to other modes of transport (such as land or air), coastal and international shipping can be a competitive option for transporting non-time sensitive and large throughput loads such as grains, minerals and oil and gas. These sectors have been the backbone of the NT economy and were identified in the TERC report as priority sectors for the NT in the next decade. Thus, **the growth in the agribusiness, minerals, and oil and gas industries will continue to be a key driver of the maritime industry in the next decade.**

The opportunity for the maritime sector extends beyond opportunities for shipping. With the investment in the Darwin Ship Lift facility and Marine Industry Park, Darwin has the potential to become a centre for marine services, servicing Defence and the Australian Border Force, along with private and commercial vessels.³³

Providing services to the defence sector was highlighted by industry stakeholders as a key opportunity for the maritime sector during consultations with industry stakeholders. The development of the Marine Industry Park will enable the NT maritime sector to expand its services for the defence sector. The development of the Navy's Regional Maintenance Centre will increase the volume of naval sustainment work over time and provide greater consistency of work to local businesses. This development will also enable the defence sector to support a larger workforce in Darwin, providing opportunities for local businesses to service the additional population.

Providing services to the oil and gas sector was also highlighted by industry stakeholders as an important opportunity for the maritime sector. Port of Darwin is already a key supply and services hub for offshore oil and gas fields in the NT. Further growth in offshore extraction activity, or onshore development enabled by Middle Arm or East Arm, would represent a growth opportunity for working boats servicing the harbour. Interface services at ports in the NT may also be suited to providing decommissioning services for the offshore oil and gas industry. It is estimated that the future pipeline of decommissioning work in Australia is valued at more than \$50 billion.³⁴

Lastly, as Australia's most northern port, Port of Darwin is positioned within the proximity of high volumes of vessel traffic through neighbouring international markets. In the twelve months to March 2020, over 7,500 vessels were operating within 850 nautical miles of Darwin.³⁵ This may represent an opportunity for the Port of Darwin to **service additional vessels operating in the Indo-Pacific region, including cruise ships and private vessels.** Growing the home-base and homeporting services at the Port of Darwin would represent a growth opportunity for port interface services and working boats servicing the harbour.

Key actions

- Leverage the Darwin Ship Lift to capture a greater share of regional and national maritime repair and maintenance work
- Continue to grow local capacity to support the Navy's Regional Maintenance Centre and defence sustainment
- Establish Darwin as a key maintenance hub for vessels operating in the Indo-Pacific region with purpose-built berths
- Provide services to the oil and gas sector, including harbour services, decommissioning services and support local energy and infrastructure projects through provision of key imported inputs
- Take advantage of NT's productivity to Asia and deep water port to help Australian businesses to reduce freight times and increase productivity.

3.2 Agribusiness

Agribusiness is a diverse industry, including cattle production, field crops, horticulture, fisheries, aquaculture and forestry. There are opportunities for the agribusiness industry in all of its sub-industries.

Cattle production has been the largest sub-industry of the agribusiness industry in the NT. In 2019-20, the GVP of cattle production was estimated at \$765 million, and cattle production contributed over half of the direct value added of the agribusiness industry. Growing cattle production is therefore important to the overall performance of the agribusiness industry. Industry stakeholders expect cattle production to double by 2030.³⁶ Contributing to this growth will be further intensification of cattle production by adopting new technology, improving sustainable management practices and investing in the management of natural resources. Overcoming overarching barriers, such as uncertainties in land and water tenure and regional connectivity, would further help the industry to achieve this growth.

For the **horticulture, field crops, and forestry sub-industries**, the key opportunity is in the development of new crops. These include irrigated and dry land cotton (a productive complement to the cattle industry in the NT), dry season vegetables, other fodder crops, and African and Australian mahogany (Table 3.2). Additionally, the tropical climate in the NT provides opportunities for agribusiness industry to target new market window. For instance, NT mangoes enter harvesting season the earliest of anywhere in Australia, producing the first mangoes of the Australian harvest season while also being attractive to foreign markets due to the NT operating counter-cyclically to northern hemisphere producers.³⁷ There are also opportunities for further intensification in the horticulture, field crops, and forestry sub-industries through adoption of new technologies which could lead to productivity gains by enabling new solutions to management, monitoring and operation.³⁸

Table 3.2: Potential crop developments in the NT

Irrigated cropping	Dry land cropping	Horticulture	Forestry
<ul style="list-style-type: none"> • Seed crops • Cotton • Other fodder crops • Grains • Peanuts • Rice • Industrial hemp 	<ul style="list-style-type: none"> • Cotton • Sorghum • Rice • Maize • Sesame • Mung beans • Soybeans • Jarrah grass • Cavalcade hay • Fodder crops 	<ul style="list-style-type: none"> • Dry season vegetables • Asian vegetables • Mangos • Melons and pumpkins • Bananas • Citrus • Potatoes, onions and garlic • Asparagus • Other tropical fruits such as dragonfruit, jackfruit and rambutan • Ginger 	<ul style="list-style-type: none"> • African and Australian Mahogany • Acacia • Sandalwood • Other hardwoods

Source: NT Farmers; Deloitte Access Economics

In **aquaculture**, stakeholders highlighted the potential for commercialising new varieties of fish (such as Blacklip Rock Oysters, Black Jewfish and Sea Cucumbers), as well as the potential for seaweed and other tropical species such as tropical rock lobsters, prawns and corals. Growth opportunities through farm expansion were also noted, alongside the potential to use brown field sites and aquaculture farms no longer operational to fast-track these opportunities. Beyond these more standard opportunities, scope was also identified for greater involvement of Aboriginal communities through a range of business models, as well as to implement the benefits of circular economy principles to maximise efficiencies (e.g. through utilisation of waste products and multi-trophic farming systems).

In wildcaught **fisheries**, stakeholders identified growth opportunities in investing in seafood processing facilities and investigating product development and waste utilisation, as well as in identifying new markets for fisheries products. Further scope was also identified to increase consumer interest in undervalued and underutilised species, as well as to further include the Aboriginal population in the industry through employment and partnerships.

Beyond opportunities that are specific to sub-industries, there are opportunities that cut across sub-industries.

Identifying options for **local processing or manufacturing activities** is key for growth in the scale of the agribusiness industry in the NT. This could include abattoirs and meat processing facilities, or food drying and packing facilities, which could support primary producers in increasing their local market, bringing the purchaser closer to them. However, the low existing processing base increases the challenges associated with this opportunity.

Industry stakeholders also highlighted the importance of improving access to land for the agribusiness sector, suggesting that improving access to land will attract new investments and enable new developments. Improving access to land has the potential to benefit several agribusiness sub-industries and their downstream processing and manufacturing activities. A clear and efficient land administration process in partnership with Traditional Owners will help grow the agribusiness industry, promoting regional economies and jobs.

Drawing on Aboriginal knowledge will provide critical opportunities for growth in the NT across all industries, including agribusiness. Applying Aboriginal knowledge to fire management is an example of NT's success stories. Fire management practices in Northern Australia have drawn in significant Aboriginal knowledge from Indigenous community-based ranger groups over the past two decades. This knowledge transfer—using “cool” (low intensity) burning early in the dry season to create firebreaks—has been successful for biodiversity conservation, resulting in fewer out-of-control fires that impact pastoral areas.³⁹ The reduction of area burnt in the late dry season, when there is risk of out-of-control bushfires, has been from 115,000 square kilometres in years 2000-2006, down to 88,000 square kilometres in the years 2013-2019.⁴⁰ The reduction in emissions created by this type of burning also earns carbon credits.⁴¹ In the context of climate change the growing importance of emission abatement, there is an opportunity for NT to draw on Aboriginal knowledge for carbon abatement projects to create an Aboriginal carbon industry that supports healthy country and better livelihoods for Aboriginal people.

The bush food opportunity

Aboriginal practice can help achieve sustainable commercialisation. Bush foods represent a potential opportunity to grow expertise right through the agribusiness supply chain. There are bush foods already being commercialised in a way that draws in Aboriginal knowledge led by Aboriginal expertise, including Kakadu Kitchen in Murudjurl, with aspirations to open an alcohol-free distillery at Cooinda. These examples have flow-on benefits including building tourism around bush foods. In addition, Aboriginal alliances can ensure that shared knowledge is being ethically sourced, managed and paid for—supporting such alliances maximises sustainability and a shared way forward. For example, NAAKPA, the Northern Australia Aboriginal Kakadu Plum Alliance provides certainty to a specific commodity, supporting the ethical supply chain of the Kakadu Plum.

Stakeholders also raised the production of **biofuels** as a potential opportunity in the NT, from the production of biomass from agricultural and forestry wastes. Such options for monetising agricultural waste can also help to reduce risks for businesses in expanding existing activities. The increased focus on global energy security and affordability may open the opportunity to recommence the production of biofuels in the NT, since the closure of the NT Biofuels plant in Darwin in 2015.

The TERC final report highlighted the opportunity to maximise the use of product branding in market development for agribusiness products. Consumer perceptions of the remote and unspoilt environment can be used to promote **'Territory Provenance'** in markets in Australia and overseas. For example, characteristics of Territory Provenance could include use of product branding to **showcase regions of origin, premium bush food products, and seasonal products** with low impact, sustainable supply chains.

Key actions

- Improve productivity for the cattle industry (through intensification) by adopting new technology and improving sustainable management practices for land assets
- Work with stakeholders to identify and unlock suitable opportunities for new land development
- Expand the field crops, horticulture and forestry sub-sectors by using new varieties, exploring new market windows and increasing productivity of the production process
- Commercialise new aquaculture species and utilise old aquaculture farms and brownfield sites to increase production and attract new investment
- Encourage consumer demand for undervalued and underutilised seafood species
- Expand downstream manufacturing activities in food and seafood processing to build on the success of primary activities and increase value added to the NT economy
- Develop and promote a 'Territory Provenance' brand for NT agricultural products that places emphasis on sustainability and Aboriginal products

3.3 Minerals

The minerals industry has long been a major contributor to the NT economy. However, with a number of mines approaching closure in the decade to 2030, growing the minerals industry will require new opportunities such as the opening of new long-life mines, or expansion into additional stages of production such as local processing or manufacturing.

Production and processing of **critical minerals** represents a major opportunity in the NT. The Australian Government's Critical Minerals Strategy sets out vision for Australia as a "global critical minerals powerhouse" by 2030 and identifies 26 resource commodities as critical minerals. The NT is endowed with globally significant reserves of some of these critical minerals, including cobalt, lithium, manganese, tungsten, vanadium (Table 3.3): Globally, demand for critical minerals is expected to increase, including for applications in manufacturing advanced technologies and low-emission technologies such as solar plants, wind farms, electric vehicles and battery storage. In addition to critical minerals, other minerals such as phosphates, gold and iron also represent opportunities for the NT minerals industry.

Stakeholders highlighted the value of developing **local minerals processing opportunities** in the NT. This includes Arafura Resources' Nolans project for processing rare earth elements, TNG's Mt Peake project for processing vanadium and titanium, Verdant Minerals' Ammaroo project and Minemakers' Wonarah project for processing of phosphate. Recommendations in the TERC final report included establishing a fund to support studies into manufacturing opportunities, including into minerals processing. Opportunities may exist in critical minerals processing, or minerals processing and manufacturing enabled by access to affordable hydrogen energy in the Middle Arm sustainable development precinct.

Table 3.3: NT resources on Australia's critical minerals list^{vii}

Critical mineral	US list	EU list	Japan list	India list	Resources in the NT
Cobalt	Yes	Yes	Yes	Yes	Known cobalt resources in NT projects: <ul style="list-style-type: none"> • Browns • Stanton • Basil • Rover 1 • Exploration results at Hermitage
Lithium	Yes	Yes	Yes	Yes	Emerging lithium production in the NT: <ul style="list-style-type: none"> • Finnis in construction and continued exploration (Core Lithium)
Magnesium	Yes	Yes	Yes	No	Known high-grade magnesite deposits in the NT: <ul style="list-style-type: none"> • Winchester • Huandot
Manganese	Yes	No	Yes	No	The largest contributor to mineral production value in the NT, with the Territory hosting the world's largest manganese mine. Potential sources include: <ul style="list-style-type: none"> • Groote Eylandt • Bootu Creek
Rare-earth elements	Yes	Yes	Yes	Yes	Rare earths resources in the NT (e.g. fluorapatite, allanite, monazite): <ul style="list-style-type: none"> • Nolans (Arafura Resources) • Charley Creek (Crossland)
Tungsten	Yes	Yes	Yes	No	Several tungsten fields and existing production in the NT: <ul style="list-style-type: none"> • Molyhil • Samarkand • White Violet
Vanadium	Yes	Yes	Yes	Yes	Vanadium resources and exploration in the NT: <ul style="list-style-type: none"> • Mount Peake • Bigryli • Jervois Vanadium
Titanium	Yes	Yes	No	No	Titanium resources and exploration in the NT: <ul style="list-style-type: none"> • Mount Peake

Source: Geoscience Australia;⁴² Resourcing the NT⁴³; Deloitte Access Economics

vii Critical minerals are metallic or non-metallic elements which are regarded as both essential for modern technologies, economies, or national security, and which have risks of disruption in supply chains.

Mine rehabilitation was highlighted by stakeholders as a significant opportunity for the NT. In this area, there are **opportunities to draw upon Aboriginal knowledge** to grow the minerals industry in the NT. For example, as part of the rehabilitation work at the former Ranger uranium mine, Energy Resources of Australia has partnered with Kakadu Native Plants Pty Ltd to support the ethical collection of seeds from Kakadu National Park to rehabilitate the land. This opportunity is supporting a local Aboriginal business, owned by a local Traditional Owner who is passionate about the rehabilitation of the area, and providing significant guidance to the project.

Another example of drawing on Aboriginal knowledge is the establishment of the *First Nations Seed Bank* to provide community seed-banking expertise to Aboriginal communities in the Barkly region. Further opportunities for rehabilitation could provide mutual benefits for both the mining industry and Aboriginal communities. On one hand, the rehabilitation could benefit from significant knowledge and horticultural resources provided by Aboriginal community. On the other hand, mine rehabilitation is an opportunity for Aboriginal communities in the NT to share economic, social and cultural benefits through knowledge and expertise.⁴⁴

Stakeholders highlighted the potential opportunity in better defining and promoting the value of **sustainable, ethical and secure minerals supply chains** in the NT. The stress to global supply chains through the COVID-19 pandemic has demonstrated the value of reliable and resilient supply chains. Risks to mineral supply chains include issues that could limit supply, such as where production or processing is dominated by a small number of jurisdictions, or where production is vulnerable to political instability, civil unrest, mine accidents or natural disasters, or geological scarcity.⁴⁵ This presents an opportunity for the minerals industry in the NT to position itself as a reliable and ethical source of high quality minerals.

For example, this could include:

- Articulating the value of ethical, sustainable supply chains for extractive materials sourced from the NT (enabling buyers to avoid the black market in extractive materials)
- Identifying and targeting new export markets historically reliant on a small number of jurisdictions, such as in Europe or Asia. The formation of the international Minerals Security Partnership to “catalyse public and private investment for mining, processing and recycling projects that adhere to the highest ESG standards” points to the role for NT in meeting the global demand for minerals sourced from sustainable and secure supply chains.^{46, viii}

Key actions

- Capitalise on the increase in demand for critical minerals by increasing exploration and production activities (including opening new mines)
- Strengthen collaboration with Aboriginal communities to harness Aboriginal expertise in mine rehabilitation
- Promote the NT’s reputation as a reliable and ethical source of high-quality minerals
- Expand downstream refining, processing and manufacturing activities to increase the value added to the NT economy.

3.4 Oil and gas

Growing the oil and gas industry represents a significant opportunity for economic growth in the NT in the coming decades. There is also the prospect of higher utilisation of existing resources and **increased local involvement in service and supply** to support this growth. This growth comes with risks, which must be managed in the pursuit of a diverse and sustainable economy.

The NT is already a globally significant LNG export hub, with existing production from the Bayu-Undan and Ichthys fields and supporting supply bases and logistical support for Shell’s Prelude in Western Australia. Three LNG trains in Darwin—two at Ichthys LNG and one at Darwin LNG—have a combined production capacity of 12.6 million tonnes per annum.⁴⁷

Discoveries from exploration in the onshore Beetaloo sub-basin support the potential for the expansion of additional **large-scale gas production** in the NT. Encompassing over 25,000 square kilometres of geologically continuous unconventional shales, the NT Government and Australian Governments are accelerating efforts to find companies with the expertise and willingness to bring the resource into production by 2025.⁴⁸ However, the viability of extracting the resource is still undergoing feasibility assessment.⁴⁹

Development of the Beetaloo sub-basin may align with national priorities in supporting Australia’s **energy security, affordability, and transition** to Net Zero by 2050. In the short- to medium-term, gas has the potential to be an important source of energy for the NT and its trading partners. Gas is a cleaner alternative to coal power generation, so can be used as a ‘bridge fuel’ until renewable energy sources are scaled up and firmed through storage.⁵⁰ When combined with carbon capture and sequestration, it can also be used to produce blue hydrogen, providing a low-carbon solution for energy-intensive activities such as air, marine and water transport or for energy exports.

viii Including Australia, the US, Canada, Finland, France, Germany, Japan, Republic of Korea, Sweden, UK and the European Commission.

Within the NT, access to a local source of affordable energy could also help to power a **local gas-based processing and manufacturing sector**. The Middle Arm sustainable development precinct, located next to the Ichthys onshore processing facility, is intended to be a sustainable development precinct for low emission petrochemicals and renewable hydrogen production, as well as carbon capture storage, and minerals processing activities. This also represents future opportunities for the growth of local manufacturing, service and supply industry.

Additional production at the Beetaloo sub-basin could therefore represent a major opportunity for the NT economy. In the short term, this opportunity includes generating additional employment and expenditure in the NT through the construction activity and investment required to initially develop the resource. Depending on how the gas is used, and the prices which can be achieved, the resource could also support economic opportunity through:

- Expanding liquefied natural gas exports from the NT
- Creating a new source of supply for Australia's East Coast gas market
- Supporting access to affordable energy for a local gas-based processing and manufacturing sector in the NT.

At the same time, there are risks that the industry must address in order to contribute to growing a sustainable and diverse economy. This includes abating the emissions which contribute to climate change, strengthening the resident workforce, and promoting stable growth throughout the investment cycle.

There are also risks in the price which can be expected for LNG exports from the NT over the period to 2050, due to the varied role of LNG in energy transition planning across major international economies (Table 3.4). Along with sustainability, energy affordability and security needs will be major drivers of government decisions throughout the next decades.

As shown in Chapter 4, harnessing opportunities from the oil and gas industry could bring significant activity to the NT and contribute to the goal of growing a \$40 billion economy by 2030. However, the long-term role of natural gas over the decades to 2050 is less clear, as Australia and other trading partners approach Net Zero targets.

Table 3.4: Approach to LNG of major economies

Country	Approach to LNG towards 2050
Japan	Reducing LNG share of energy mix from 37 per cent in 2018-19, to 20 per cent by 2030. ⁵¹
China	Increasing LNG share of energy mix from 8.7 per cent in 2020 to 12 per cent in 2030. ⁵²
Taiwan	Increasing LNG share of energy mix from 36 per cent to 50 per cent by 2025. ⁵³
Republic of Korea	Varying roles under three potential roadmaps. ⁵⁴
United States	Reducing LNG share of energy mix from 37 per cent in 2021 to 34 per cent in 2050. ⁵⁵

Source: Department of Foreign Affairs and Trade; Reserve Bank of Australia
Note: Includes all goods exported from the NT (gas cannot be disaggregated as a confidential item).

Key actions

- Capitalise on the window for the gas opportunity by accelerating gas production in the Beetaloo sub-basin
- Invest in carbon capture utilisation and storage infrastructure and carbon offset opportunities to enable the NT to meet the growing demand for low carbon energy, both domestically and internationally
- Extend the value chain to deliver economic growth and more jobs to the NT by using local gas production to develop a gas-based processing and manufacturing sector
- Develop pipeline infrastructure so that gas production in the NT can further contribute to Australia's energy security
- Prioritise supporting local capability to retain the economic benefits of the oil and gas industry in the NT
- Leverage NT's competitive advantage in natural deposits of oil and gas to position the NT for the emerging hydrogen industry.

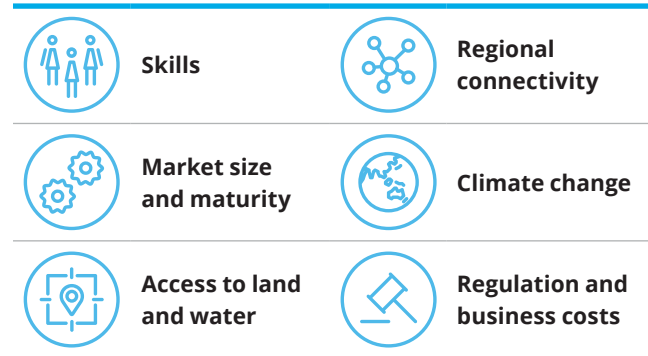
4 Industry barriers & pathways forward

Seizing the opportunities for growth is, of course, not without challenges. This Chapter discusses key barriers that the NT industries will face over the next decade and potential pathways to overcome these barriers.

Industry research and consultation identified six overall barriers—the availability of employees with appropriate skills, regional connectivity, market size and maturity, climate change and its impact on investment, access to land and water and the general regulatory environment. The relative impacts of the barriers differs somewhat between the four industries of focus in this report—maritime, agribusiness, minerals, and oil and gas.

To some extent, all of these barriers are common to other Australian jurisdictions. However, unique features of the Northern Territory at times exacerbate the impact of these barriers. Compared with other jurisdictions, the NT has relatively large natural assets for a modest population size, so the combination skills shortages, and regulations for access to land and water represent the biggest barriers. Key barriers to economic development in the NT are identified in Figure 4.1

Figure 4.1 Key barriers to economic development in the NT

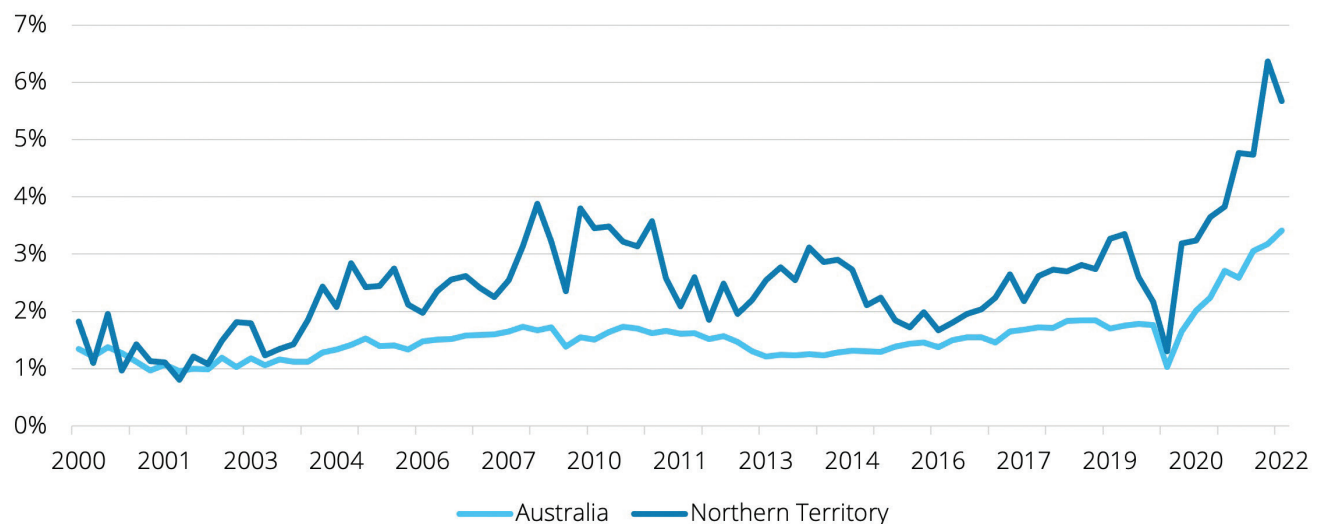


Source: Deloitte Access Economics

4.1 Skills shortages

A lack of access to skills, and challenges in retaining skilled workers, was cited as a major barrier to growth across every industry. Skills shortages are being reported across skilled and unskilled occupations in the NT, with the unemployment rate declining to 3.7 per cent in June 2022—a level not seen in the NT since early 2019.⁵⁶ Between February 2020 and May 2022, job vacancies in the NT have increased by 170.6 per cent—the greatest increase compared to pre-COVID levels of any state or territory Chart 4.1.⁵⁷

Chart 4.1: Job vacancies as a ratio of the labour force



Source: ABS⁵⁸

Note: Data unavailable for five periods from August 2008 to August 2009.

Stakeholders described experiencing **skill shortages** across the broader economy in the NT. This is despite the NT already investing more per capita in vocational education and training than any other jurisdiction in Australia and having a number of workforce initiatives through the Skilling the NT investment Plan.^{59,60} Examples of targeted skills in demand within the maritime, agribusiness, minerals, and oil and gas industries are set out in Table 4.1. In addition, shortages are also experienced across roles in the service industries supporting production—such as transport, retail, and accommodation.

Table 4.1: Example high priority occupations to fill in the NT, by industry, 2022

	Maritime	Agribusiness	Minerals	Oil and Gas	General service or support roles
High priority or priority* occupations					
Boiler or engine operator*			✓	✓	✓
Bus driver, truck driver		✓			✓
Community worker (disability services, youth worker, aged or disabled carer)					✓
Construction rigger*	✓	✓	✓	✓	✓
Crane, hoist or lift operator*	✓		✓	✓	✓
Deck and fishing hand*	✓				
Engineer (civil, structural, mechanical)	✓		✓		✓
Farmer (mixed crop, beef cattle, livestock, aquaculture*)		✓			
Forklift operator*	✓		✓	✓	✓
Health (occupational therapist, general practitioners, specialist physicians, midwife, registered nurses)					✓
Hospitality, retail and service managers					✓
Metal fabricator and fitter			✓		
Plumber and electrician					✓
Seafood process worker*		✓			
Ship's Engineer*	✓				
Ship's Master*	✓				
Taxi driver*					✓
Teachers (early childhood, primary, middle, secondary schools, VET)					✓
Welder*			✓	✓	✓

Source: NT Government⁶¹

Despite this range of skilled and unskilled employment opportunities, the continued outwards flow of migration from the NT points to **challenges in retaining workers**. Once a significant project winds up, people are seldom able to find a similar job opportunity to retain them in the NT.

Additionally, some projects see workers in the NT **operate on a fly-in fly-out (FIFO) basis**, which means they are less likely to build connections in the NT and remain in the State following the project's closure. In August 2021, FIFO workers represented an estimated 6.3 per cent of the NT workforce.⁶²

For those who do choose to stay longer term, residents face challenges including both the **seasonality of demand for labour** (e.g., a larger population during seasonal working patterns in the agriculture and maritime industries), and **normal industry cycles**, which sees populations increasing and subsequently decreasing in response to a significant project in a comparatively small population. The TERC final report highlighted the need to address liveability issues around housing availability and affordability to encourage workers to stay.⁶³

Population sustainability has been a consistent challenge for the NT, with just under 250,000 people living in the jurisdiction. Population growth has been modest in three of the last four financial years.

To achieve its 2030 economic objectives, the NT will need to expand to a population of over 300,000 and create an additional 35,000 jobs.⁶⁴ These objectives reflect the importance of critical mass of population and industry for the NT's economic sustainability, as recognised in the TERC report.

The limited size of the resident workforce also means that industry growth in the NT is vulnerable to **crowding out in the labour market**. The constraints on population growth mean that large projects commencing in the NT, in addition to bringing in resident workers, could draw in local workers from other industries, intensifying the competition among industries in the labour market.

Potential pathways

- Fill existing capability gaps (as identified by the Industry Capability Network) by encouraging skilled employees to the NT from other jurisdictions (including FIFO workers) or overseas, through a coordinated industry/government campaign that highlights the employment and lifestyle benefits of the NT.
- Strengthen local training by mapping of training provision (e.g. course design, enrolments and subsidies) with future jobs growth and skilling needs of industry.
- Support the development of more housing by partnering with industry bodies such as Defence Housing Australia which can organise labour at a national scale and ensuring the Building Practitioner's Board is sufficiently resourced to certify the quality and safety of new housing supply.

4.2 Regional connectivity

Stakeholders highlighted a lack of **digital connectivity** in regional and remote areas in the NT as a barrier to economic activity and liveability. Access to reliable, quality and affordable telecommunications coverage is limited outside major urban centres in the NT.^{ix} Based on the share of sites with 4G technology in 2021, the NT had the least advanced mobile infrastructure of any jurisdiction in Australia.⁶⁵ While five jurisdictions had over 95 per cent of sites with 4G, the NT had only 88 per cent.⁶⁶ According to that same report, the NT was also the only jurisdiction without any 5G sites. In 2018, an estimated 25,000 Territorians were without internet or mobile access in the area where they lived (excluding satellite services, which can be unaffordable and less reliable).^x The NT also has the least mobile coverage along national highways of any jurisdiction in Australia. Where coverage is available, services may only be offered by one service provider, limiting competition in the provision of telecommunications.

ix Such as Darwin, Katherine, Nhulunbuy, Alice Springs, and Tennant Creek.

x By comparison, WA and QLD had 91% and 93% respectively.

Combined with the remote and isolated dispersion of communities and economic activity across the NT, this lack of digital connectivity can limit economic opportunity and liveability in regional and remote areas in the NT. Stakeholders described that without digital connectivity, businesses in remote NT may be prevented from implementing innovations in products and processes, such as AgriTech innovations in the agribusiness sector. A lack of digital connectivity can exacerbate barriers for communities, hindering the delivery of government and human services across governance, health, education and safety. Digital connectivity is also important to improving liveability for regional and remote populations, bringing social and economic benefits for residents—such as access to online banking, fostering family and social connections, and increasing the availability of job and entrepreneurship opportunities on land.⁶⁷

Stakeholders also highlighted the challenges of a lack of general enabling infrastructure in regional and remote NT, such as transport and logistics infrastructure, and access to utilities. Transport systems can support regional economic

development through connecting supply chains, supporting access to inputs for production ('inbound' access) as well as access to end markets and consumers ('outbound' access). Across the NT, only 30 per cent of the road network is sealed—creating additional costs for businesses in using unsealed roads or limiting access at particular times of the year.⁶⁸ The lack of connecting transport infrastructure can therefore limit the economic potential of resources based in regional and rural NT.

Work is underway to address the infrastructure needs of the NT. The NT Infrastructure Strategy identifies a range of priority infrastructure investment programs in the NT to 2030—including a number which are relevant to the maritime, agribusiness, minerals and oil and gas industries (set out in Table 4.2. Other current investments in infrastructure in the NT highlighted as a priority by stakeholders included the NT Strategic Roads Package (\$200 million investment in road upgrades in remote NT).⁶⁹

Table 4.2: Key infrastructure investments identified in the NT Infrastructure Strategy 2022 to 2030

Project	Industry priority			
	Maritime	Agribusiness	Minerals	Oil and gas
Common user infrastructure for Middle Arm Sustainable Development Precinct			✓	✓
Darwin Regional Water Supply Program		✓		
Industrial and residential land supply		✓	✓	✓
Regional logistics hubs and intermodal facilities	✓	✓	✓	
Strategic road corridors (Central Arnhem Road, Tanami Road)	✓	✓	✓	✓
Common user infrastructure for Beetaloo Sub-basin development				✓

Source: NT Infrastructure Strategy 2022 to 2030

Potential pathways

- Leverage Commonwealth or Northern Australia Infrastructure Facility investment in telecommunications infrastructure based on maximising business opportunities, not just addressing household connectivity issues.
- Infrastructure Australia to analyse the NT's share of infrastructure investment, based on economic development opportunity, not just population or economic share of Australia.
- Develop more local capabilities in infrastructure by asking proponents to demonstrate local use cases and supplier participation.

4.3 Market size and maturity

Stakeholders highlighted limited market size and industry maturity within the NT as another key barrier to growth. Representing approximately one per cent of Australia's population, and one sixth of Australia's land mass, low population size and growth in the NT is a constraint on the **scale of local business and industry demand**—creating a limit to the growth potential of services such as container freight in the maritime sector, local beef consumption in the agribusiness sector, or building construction using mineral resources.

Low population size and growth also **limits the size of the local workforce** which is available for industry to draw upon throughout the year—increasing industry reliance on seasonal or FIFO workers. This limited market size can prevent businesses in the NT from achieving economies of scale in production, translating into higher average costs for businesses compared to counterparts in larger jurisdictions interstate, more seasonal production cycle, and reduced job security for workers.

Given the constrained size of business and industry demand in the NT, and inability to achieve economies of scale through local demand, industry in the NT is **often not supported by a local ecosystem of suppliers**—such as maintenance and repair, fitters and fabricators—to provide inputs to industry on an ongoing basis. This can further increase the costs of doing business in the NT, and disadvantages businesses in regional areas where connectivity remains a challenge.

To overcome these barriers to growth and realise economies of scale in production, businesses in the NT need to export to larger population hubs interstate or overseas. However, businesses in the NT also face challenges in exporting goods, given the lack of transport and logistics infrastructure across regional and remote areas (outlined in section 4.5).

This means that NT businesses must be more efficient than their counterparts interstate, to be able to overcome higher goods transport costs and compete on price in interstate markets. Within the agribusiness industry, speed to market is also important to protect the freshness of produce and realise the price premium for fresh over frozen products.

A lack of economies of scale may also **prevent businesses from achieving the scale of throughput required to efficiently undertake downstream processing** or manufacturing activities. In the agribusiness sector, the challenge created by a lack of economies of scale is further intensified by the seasonality of production. For example, given the seasonal nature of horticultural production for produce such as mangos, any investment in the facilities required to process mango also requires sufficient scale in other produce which can be processed across other seasons, to reduce the average costs of processing throughout the year. Without this scale, producers lack the incentive to invest in downstream facilities and equipment. This can reinforce **an extractive mindset** within the NT, as producers feel unable to progress to further stages of production or value added.

Potential pathways

- To overcome barriers, the NT Government could showcase examples of investment success through InvestNT and Innovation showcases and demonstrate the supportive role of the NT Government to make them happen
- The NT Government could work with the NT Industry Capability Network to better measure the nature of supply chains within an industry can inform an understanding of the maturity of existing local capabilities, and the drivers of costs or risks for businesses in the NT.
- To guide the development of local supply networks in the NT, the NT Government could establish a new 'Supply Advocate' for the NT, as a central position for considering the strategic interests and outcomes of supply chains in the NT. A central Supply Advocate could undertake tasks such as:
 - Considering the strategic interests in supply chains in the NT, including where industries and sectors are adjacent (for example, the adjacencies between access to natural gas in the NT, and the demand for fertilizer in the agribusiness sector in the NT)
 - Establishing strategic targets, and measures, for local supplier participation in major projects
 - Considering the case for targeted government action to improve market access or infrastructure in supply chains across industries in the NT, where intervention could improve the viability of production across multiple industries.

4.4 Climate change

The 'Towards 2050' climate change response by the NT Government proposes the transition to a Net Zero emissions target in the NT by 2050. Climate change impacts in the NT and globally have the potential to have significant impacts on the productivity and profitability of economic activities across industries in the NT.

Within the NT, climate modelling indicates increasing average temperatures, and an increasing number of extremely hot days in the NT, higher sea levels, rising temperatures, and ocean acidification.⁷⁰ These impacts are expected to be particularly significant for the agribusiness industry. They can limit productivity, reduce access to water, and narrow the options for agricultural diversity. For example, consultations cited evidence to date of fish populations shifting over time. Climate change will also impact the maritime, minerals and oil and gas industries by reducing labour productivity and damaging infrastructure.⁷¹

Furthermore, the adoption of Net Zero targets among global trading partners is expected to impact commodity demand and prices, impacting the minerals and oil and gas industries. The adoption of Net Zero targets can open up opportunities, but it also can create barriers. On one hand, the increase in demand for batteries, electric vehicles and renewable energy strengthens the demand for critical minerals and carbon capture and storage facilities. On the other hand, the adoption of Net Zero targets may impact the demand for oil and gas and impose additional regulations on agricultural practices.⁷² The impacts on oil and gas, minerals, and agribusiness industries can flow-on to the maritime industry, which services trade across these industries.

One critical area that represents both a risk and an opportunity for the NT is the decarbonisation journey of its logistics system. There is a risk here that in the leadup to 2030, the NT supply chain will not decarbonise this system in time. This could have impacts including negative perceptions as we move quickly towards decarbonisation to help improve the environment and global markets. Further, should the decarbonisation journey not occur fast enough, transition costs may be higher. However, the NT is well placed to capitalise on its industries which are competitively advantageous (e.g., energy and minerals), to ensure it's at least some way along this journey by the time the \$40b economy is reached.

Potential pathways

It is imperative for the NT Government and industries, including the maritime, agribusiness, minerals, and oil and gas industries, to account for climate risks in making investment and operation decisions. A deep understanding of the barriers created by climate change and the opportunities associated with decarbonisation is a good place to start.

To extend on this and further build this into an opportunity, better collaboration between industry and government is needed. This could be through direct investment and incentives to support technologies for decarbonisation and climate change reduction that have the potential to build significant opportunities now, and into the future.

4.5 Access to land and water

Throughout consultation, stakeholders highlighted that access to land and water resources often presents a barrier, or causes delay to, industry activity. The NT has established a range of requirements to effectively govern access to common resources such as land and water, which businesses must understand and comply with when seeking to invest.

Types of tenure in the NT are outlined in Table 4.3. Based on native title rights established to date, approximately 50 per cent of the land in the NT, including 85 per cent of the coastline, is held under Aboriginal freehold title.⁷³

Table 4.3: Types of tenure in the NT

Type of title	Description
NT freehold	The government has passed all interest in the land, other than resources, onto the owner. It is not subject to native title.
Aboriginal freehold	The land is inalienable freehold title and cannot be bought, acquired or mortgaged. It is formally held by the Aboriginal land trust. Applications for resource exploration, production or other development on Aboriginal freehold land must follow the process under the Aboriginal Land Rights (NT) Act 1976 (Cth).
Pastoral leasehold	Pastoral leasehold is land which is owned by the government and leased to a private individual for pastoral purposes. This may include grazing or crops. It is subject to native title.

Source: NT Government 2022⁷⁴

Land and water held under Aboriginal freehold is overseen by NT Land Councils, in consultation with Traditional Owners.⁷⁵ Land council management is part of an ecosystem to support Aboriginal Territorians being involved in, and benefitting from the development of their land, provided this supports their desired social, cultural and environmental sustainability. For key development activities, including in mining and exploration, negotiations must be undertaken with Traditional Owner groups facilitated by the land councils.⁷⁶ These negotiations can include land use payments, rent and other non-monetary benefits to ensure that the use of Aboriginal land provides benefits back to the relevant traditional owner groups.

Such negotiations draw in diverse stakeholders and may require specialist advice to reflect the diversity of different locations across the NT. Stakeholders described that the negotiation process can be prolonged, and with uncertain outcomes—which can increase the risk and cost of investment decisions.⁷⁷ Where investors in the NT are required to undertake negotiations under the Land Rights Act, they may require significant guidance to understand benefits and risks, ensure clear communication, and deliver positive outcomes. Without investment into understanding how this barrier impacts the NT compared to other states, where negotiation is undertaken with private land holders, it will remain a barrier in the NT.

Significant development in the NT will require larger pieces of land to be unlocked. This can be done in a way that has benefits to all key stakeholders and starts to truly scale opportunities that require the release of significant amounts of land. Aboriginal land, making up the aforementioned 50 percent of land in the NT, is critical to growth opportunities, and any development must be carefully discussed with key Aboriginal stakeholders to ensure benefits are shared.

Potential pathways

De-risk investment opportunities by undertaking strategic reviews of land access, across pastoral land and Aboriginal land and consider directly entering into Land Use Agreements (LUAs) with owners, and sub-leasing this land to investors.

4.6 Regulation and business costs

Regulation and business costs are frequently cited as some of the most significant challenges to attracting investment and activity to the NT. Businesses can face **significant costs or delays** associated with attaining the regulatory approvals required to progress resource exploration or production. This can include meeting complex—and even conflicting—environmental requirements set out by territory and federal departments. While one level of government may undertake extensive regulatory reform, more may equally be created at different levels or across different departments, at the same time.⁷⁸ There is a perception that regulatory hurdles are increasing over time, and that changing public attitudes over time can have an impact on the regulatory framework and regulatory approvals.

A 2016 Productivity Commission report into *Regulation in Australian Agriculture* provides a high-level overview of the multiple levels of regulation that can impact businesses, and demonstrates the complex requirements faced by investors. These include regulations relating to native title, environmental protections, water access and regulation, animal welfare, food labelling and standards, and export controls. While many of these regulations are determined nationally and apply equally across Australia, stakeholders described a perception that, as a small market at an earlier stage of development compared to other jurisdictions, the same national regulations impose a greater burden on businesses in the NT. In the minerals industry, stakeholders highlighted the uncertainty associated with the profits-based royalties scheme in the NT as a barrier to growth.⁷⁹ This includes the high cost of the NT dual mineral royalty system (ad valorem and profits based) which key stakeholders believe deters investors as the system results in the costs being the highest of any Australian jurisdiction, in a jurisdiction which does not have the same level of infrastructure available elsewhere.

However, regulation is critical. Regulation supports business and investment sustainability, it helps protect the environment, and helps protect people's rights.⁸⁰ Regulations in the NT are complex because they reflect the complexity of the NT. The geography is vast, the communities are diverse. Regulation is not simply a roadblock to be removed. Regulations can support Aboriginal Rights and sustainable development. When regulation is well-designed, it can ensure the best outcomes for all individuals and businesses.

The NT Government has made in-roads into helping to streamline regulations for the private sector—including through its initiatives such as can-do Territory which has an initial focus on helping small businesses, with the aspiration to make the NT one of the easiest places to do business.⁸¹ This is a critical step to supporting the TERC's aspiration for a one-stop shop approach to regulation.⁸²

Potential pathways

The regulatory guide: *A guide to land access in the Northern Territory for onshore petroleum exploration and production on private land* (April 2022) is an example of the type of work already undertaken by the NT Government that is comprehensive, and is useful to stakeholders as it is targeted to a specific industry. Similar guidance across other industries would be beneficial, and should be considered for the agribusiness and minerals to make this type of government expertise more readily available to the private sector. These could even lead to future projects which overcome overlap between government departments and could determine opportunities for single regulatory points of contact.

Another opportunity to refine the regulatory environment in the NT to provide better outcomes for industry is to undertake an investigation of processes in other jurisdictions to understand where there are opportunities to speed up regulatory approvals processes by industry, for example to understand the approvals process for new mines. One example of a regulatory system from which insights could be drawn is the South Australian system for new mine approvals. Their approach, which takes a risk-based approach that increases trust for large operators who have multiple assessments over time, is favoured by industry as it facilitates the process for those with significant local investment.

5 Optimising economic potential

This chapter provides quantified estimates of the economic impact of taking concerted actions across business and government. Industry potential is demonstrated in the high growth scenario, which uses the Computable General Equilibrium (CGE) to examine the potential value that the maritime, agribusiness, minerals, and oil and gas industries could contribute to the NT economy. The outcomes of the high growth scenario are compared to the baseline scenario that represents industry values in a business-as-usual situation. The baseline scenario is not a 'do nothing' scenario, rather the baseline scenario reflects a situation in which the economy experiences the same enablers and barriers as it did in the past, and in which industries undertake actions that they have committed.

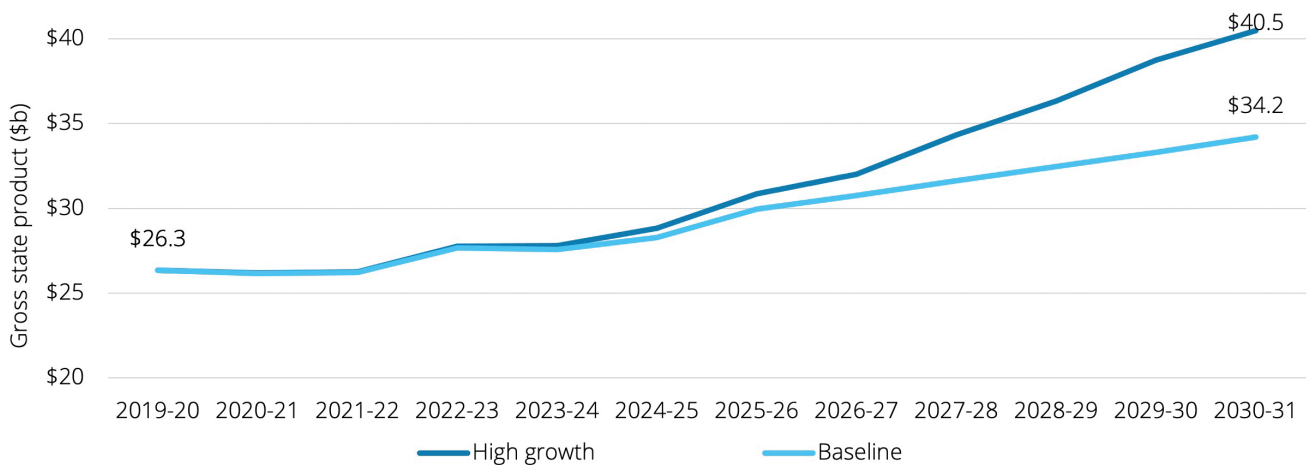
Under the baseline scenario, the NT economy is estimated to reach \$34.2 billion by 2030-31, representing a 2.4 per cent annual growth from 2019-20 to 2030-31. This growth is in line with the historical experience in the past decade, which saw the economy growing by 2.3 per cent from 2010-11 to 2020-21.⁶³ Private investment underpinned the economic growth in the past, and it is expected to have a strong influence over the NT economy in the future.

Significant investment projects that have been committed to, such as the Barossa gas project, the Finnis Lithium project, and the Tanami mine expansion project, underpins the economic growth in the NT in the baseline scenario.

Apart from major investment projects, economic growth in the baseline is also driven by fundamental factors such as population growth and continued productivity growth. Population levels have been stagnant both before and during the COVID-19 pandemic, with natural increase offset by interstate migration.

With investment and concerted actions under the high growth scenarios modelled across the maritime, agribusiness, minerals and oil and gas industries, the NT economy grows to \$40.5 billion and provides over 168,000 jobs by 2030-31. This suggests that high growth in these industries could contribute to closing the gap on the \$40 billion target by \$6.3 billion compared to the baseline scenario modelled.

Chart 5.1: Actual and forecast GSP for NT, 2019-20 to 2030-31 (\$b)



Source: Deloitte Access Economics

The most significant contributor to closing the gap is the growth from the oil and gas sector. In the high growth scenario, the oil and gas sector successfully capitalises on the window of opportunity for gas production. The Beetaloo basin comes into production after 2024 and the demand for gas is strengthened by downstream manufacturing opportunities from investments in the Middle Arm sustainable development precinct.

The minerals sector also plays an important role in achieving a \$40 billion economy target. With the approval process gaining efficiency, 22 mines will begin operation at a faster pace, increasing the diversity of the NT minerals industry to include production of new minerals such as lithium, magnesite and vanadium.

The agribusiness also drives significant growth for the NT economy, especially within regions, with the cattle and plant-based agricultural sub-industries reaching their anticipated production goals by 2030. The maritime industry grows with each of these industries as export demand increases, and the industry is also developing through investment in the Darwin Ship Lift project.

The contributions of each industry under the baseline and high growth scenarios can be found in Table 5.1.

Table 5.1: Summary of industry outputs, 2019-20 and 2020-31

Industry	Output	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
Maritime	GVA (\$m)	184	283	4.0%	347	6.0%
	Employment (FTEs)	980	1,170	1.6%	1,490	3.9%
	Employment (headcount)	1,080	1,520	1.6%	1,660	3.9%
	Bulk and containerised freight (TEU equivalent)	110,000	Up to 220,000 TEUs of bulk and containerised freight in the high growth scenario in 2030-31			
Agribusiness	GVA (A \$m)	517	682	2.60%	1,274	8.60%
	Employment (FTEs)	4,200	3,950	-0.50%	6,320	3.80%
	Employment (Headcount)	4,650	4,380	-0.50%	7,010	3.80%
	Cattle turnoff (heads)	687,630	Approximately 832,300 with a higher quality in the high growth scenario in 2030-31			
	Cotton (hectares)	1,000	Over 30,000 hectares in the high growth scenario in 2030-31			
	Mangoes (tonnes)	32,300	3 new high-yielding mango varieties in the high growth scenario in 2030-31			
	Forestry (hectares)	42,000	20% plantation expansion in the high growth scenario in 2030-31			
Minerals	GVA (A \$m)	1,409	1,511	0.6%	2,461	5.2%
	Employment (FTEs)	3,130	3,360	0.7%	4,570	3.5%
	Employment (headcount)	3,470	3,730	0.7%	5,070	3.5%
	Total mines in operation	8 mines ⁸⁴	11 mines		Up to 33 mines	
Oil and gas	GVA (A \$m)	4,847	5,168	0.6%	6,829	3.2%
	Employment (FTEs)	1,690	1,900	1.1%	2,800	4.7%
	Employment (headcount)	1,870	2,110	1.1%	3,110	4.7%
	Oil and gas exports (tonnes)	1,696	1,800		2,400	

Source: Deloitte Access Economics

This scenario should be interpreted as an estimation of the potential economic impact of the various opportunities available to the NT across industries rather than forecast of the state of the economy. The figures include some of the flow-on opportunities in other industries but do not fully capture the economic benefits of developing downstream industries.

We note some modest differences in the scenario presented here compared with the TERC report. While both have scenarios reaching \$40 billion, the TERC report envisions a population of 300,000 and 166,000 jobs, while the scenario outlined in this report comprises a population of 292,000 and 168,000 jobs.⁸⁵ This means there is a higher job-to-population ratio in the scenario than in the TERC report, indicating the NT economy described in the scenario exhibits a tighter labour market.

5.1 Maritime industry

Growth in the NT's maritime industry is largely dependent on the growth of exports and passenger travel. The NT's position as a gateway to Southeast Asia has supported a bustling maritime industry, with significant growth opportunities. One such opportunity is the potential growth presented by the superyacht industry. This sub-sector would provide growth in vessel maintenance and repair services, as well as potentially tourism and retail service sectors.

Under the baseline scenario, growth in the maritime industry is a function of a business-as-usual increase in international trade driven by growth in exporting industries. The NT maritime industry can expect to reach a GVA of approximately \$283 million by 2030-31—a growth rate of approximately 4.0 per cent per year, significantly higher than the average NT industry growth rate of 2.4 per cent in the baseline over the same period. This would see an estimated 1,170 FTE jobs for those in the industry by 2030-31.

Under a high growth scenario, however, the maritime industry will receive additional income from the Darwin Ship Lift project. This project has the potential to catalyse the maritime industry, enabling the maritime industry to strengthen its service offerings to defence sector and oil and gas sector. The Darwin Ship Lift is expected to start operation in 2024 and is expected to generate a net economic benefit of up to \$1.4 billion.⁸⁶

Additionally, growth in the agribusiness, minerals and oil and gas industries is expected to lead to further increases in export activity. This growth will be contingent on building international engagement and partnerships in order to strengthen trade and create new opportunities. Growing demand for agribusiness and critical minerals, as well as leveraging the NT's geographic proximity to the Indo-Pacific region will be important. Goods exports will be 15 per cent higher than the business-as-usual forecast by 2026.⁸⁷ Over the 8 years to 2030-31 on average, this growth translates to almost a doubling of freight throughput from the 2019-20 level, from 110,000 TEU to approximately 220,000 TEU.

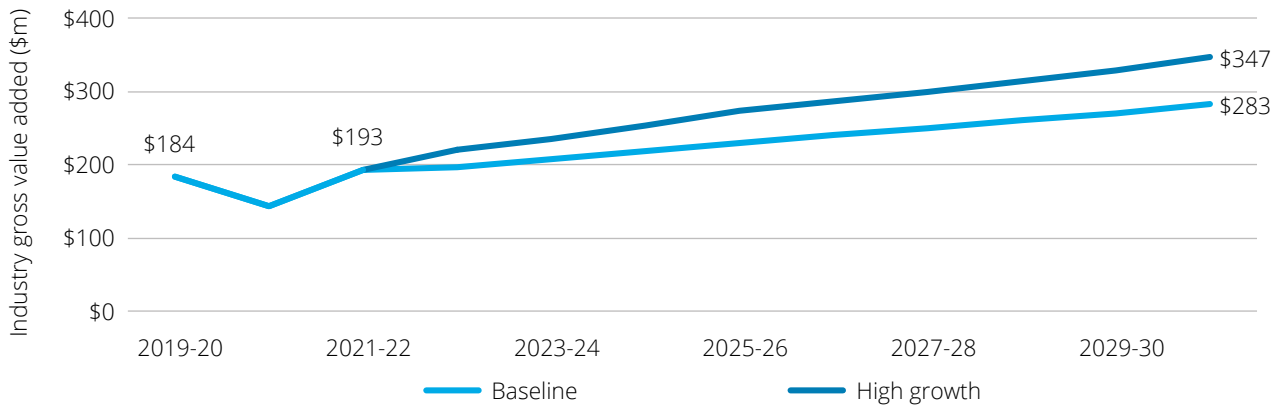
The Darwin Ship Lift and the growth in exports are estimated to support the NT maritime industry significantly, increasing the industry's size by approximately 50 per cent with an estimated GVA for the industry of \$347 million and 1,490 FTEs by 2030-31 (Table 5.2 and Chart 5.2). However, the maritime industry's importance to the future of the NT economy is not captured by the direct value added and jobs figures alone as it is also a critical enabler for much of the export opportunity identified in this report. Without appropriate growth in the maritime sector, the overall target of \$40 billion is not achievable.

Table 5.2: Summary of results: Maritime

	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
GVA (\$m)	184	283	4.0%	347	6.0%
Employment (FTEs)	980	1,170	1.6%	1,490	3.9%
Employment (Headcount)	1,080	1,520	1.6%	1,660	3.9%
Bulk and containerised freight (TEU equivalent)	110,000	Up to 220,000 TEUs of bulk and containerised freight in the high growth scenario in 2030-31			

Source: Deloitte Access Economics, Port of Darwin
Note: CAGR is between 2019-20 and 2030-31

Chart 5.2: Maritime industry gross value added (\$m)



Source: Deloitte Access Economics

5.2 Agribusiness industry

The NT’s agribusiness sector is well positioned to take advantage of its strengths in cattle, horticulture and aquaculture to strengthen the territory’s economy into the future.

Without significant changes in investments, the agribusiness sector is forecast to experience slightly above NT GSP growth, with an estimated baseline GVA of \$682 million in 2030-31. In this baseline scenario, the agribusiness industry is expected to employ a total of 3,950 FTEs workers by 2030-31, compared to the current 4,200 FTE workers employed in industry. This growth is reflective of ongoing trajectory growth, with approximately 21 per cent more cattle turn-off and almost twice as much horticultural production than in 2019-20. The slight decline in employment is driven by productivity improvements in the industry, leading to less labour input required for a greater economic output.

With infrastructure investment and intensification, the agribusiness industry can achieve a greater growth. In the GVP terms, the agribusiness could reach \$3.1 billion in 2030-31, a significant increase from the \$1.3 billion in 2019-20. In terms of contribution to the NT economy, it is estimated that agribusiness under a high growth scenario could reach a GVA of \$1,274 million by 2030-31 (Table 5.3 and Chart 5.3). This would be an additional \$592 million to the Northern Territory’s economy compared to the baseline scenario. In terms of employment, this expansion of the industry would provide more jobs within the industry, with an additional 2,370 FTEs estimated in the high growth scenario, compared to the baseline.

In more tangible terms, this could see cattle production turn-off in the NT increasing from 687,630 cattle turn-off in 2019-20 to approximately 832,300 cattle turn-off with a higher quality and value added in 2030-31.

The cotton industry, with the development of four cotton gins across northern Australia, is also critical to the success of the agribusiness industry.⁸⁸ With this development, the area under cotton cultivation in the NT could increase from 1000 hectares in 2019-20 to 30,000 hectares in 2030-31. In horticulture, the production of mangoes and melons has been pivotal to the success of the NT horticulture industry. Consultations with stakeholders suggest that there is a potential for 3 new high-yielding mango varieties.

Given the NT’s current strengths in the agribusiness industry, the sector has already set high growth targets for the future.^{89,90} The projected growth in this scenario reflects the attainment of these industry goals, leading to a doubling in the size of the agribusiness industry. The key drivers that will facilitate this growth centre around the NT’s greatest and most unique assets—both its natural resources and its geographic proximity to South East Asia. The NT has the opportunity to capitalise on these strengths and take advantage of growing foreign demand for agribusiness exports.

Already, the NT exports 40 per cent of all of Australia’s live cattle exports, sending an average of 400,000 head of cattle each year to Indonesia alone.⁹¹ As foreign demand increases due to growing incomes and dietary changes, the NT is well-placed to lead Australia in supplying cattle for both new and traditional markets in the Southeast Asia region.

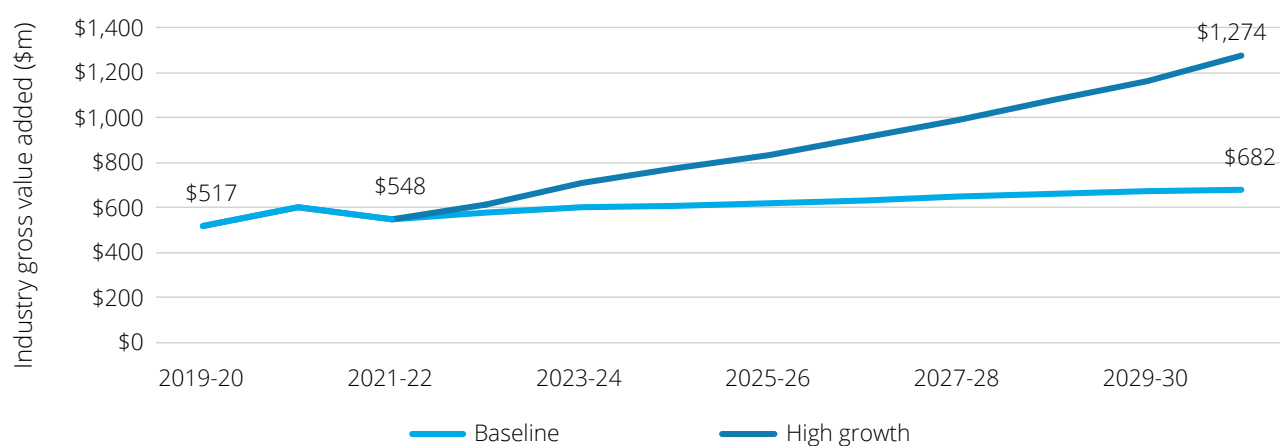
The Northern Territory’s agribusiness industry is, however, diverse and the opportunity for growth will go beyond just cattle exportation, with strong horticulture and aquaculture sub-sectors as well. This diversity is in itself a strength, providing resilience to the NT to fluctuating demand, as well as providing greater growth opportunities through products such as mangoes and prawns.⁹²

Table 5.3: Summary of results: Agribusiness

	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
GVA (A \$m)	517	682	2.60%	1,274	8.60%
Employment (FTEs)	4,200	3,950	-0.50%	6,320	3.80%
Employment (Headcount)	4,650	4,380	-0.50%	7,010	3.80%
Cattle turnoff (heads)	687,630	Approximately 832,300 with a higher quality in the high growth scenario in 2030-31			
Cotton (hectares)	1,000	Over 30,000 hectares in the high growth scenario in 2030-31			
Mangoes (tonnes)	32,300	3 new high-yielding mango varieties in the high growth scenario in 2030-31			
Forestry (hectares)	42,000	20% plantation expansion in the high growth scenario in 2030-31			

Source: Deloitte Access Economics, NT Department of Industry, Tourism and Trade

Note: CAGR is between 2019-20 and 2030-31

Chart 5.3: Agribusiness industry gross value added (\$m)

Source: Deloitte Access Economics

5.3 Minerals industry

As the globe transitions its energy mixes towards renewables, there will be greater foreign and domestic demand for the critical minerals required by these renewable sources. Given the Northern Territory's abundance of natural resources, and proximity to South East Asian markets, this creates a significant opportunity for growth.

In the baseline scenario, the mining sector sees the closure of four mines—Ranger and the Bootu Creek in 2021 and Rio Gove and the South 32 Groote in 2030—while seeing the opening of the Finnis lithium mine. This forecasts that GVA for the industry could reach approximately \$1,511 million in 2030-31, as well as a total of 3,360 FTEs in the industry.

This translates to an economic growth rate of approximately 0.6 per cent annually, lower than the GSP growth in the NT over the same timeframe.

A notable project in the pipeline included in the baseline is the Finnis Lithium Project, which is expected to begin production at the end of 2022. This mine will provide significant lithium export opportunities for the NT, as well as potential opportunities in downstream processing (which is not included within the minerals industry contributions).⁹³ Several offtake arrangements for the Finnis Lithium mine have been established or are being finalised, including the 75,000 tpa arrangement with China's Sichuan Yahua Industrial Group who will supply battery-grade lithium hydroxide to Tesla over the next five years.

In the high growth scenario, the NT sees significant investment in new mines and corresponding levels of demand to meet supply. In June 2022, there were 22 minerals projects identified as potential mining developments in the NT Table 5.4.⁹⁴ Alongside lithium, a number of new mines will support significant growth in manganese and gold ore—all of which are essential to renewable technology and will likely see continued foreign demand.⁹⁵ The high growth scenario assumes that there will be an uplift in 5 year approval rate compared to the historical level, an increase from about 73 per cent to 83 per cent.⁹⁶ This assumption is combined with publicly available data on potential extraction volume to estimate value of the minerals sector in the high growth scenario.

Table 5.4: Potential mining projects

Project	Product	Current Estimated Timeframe
Ammaroo	Phosphate	2026—2030
Batchelor Phos	Phosphate	2023—2027
Chandler	Salt products	2026—2030
Finniss (BP33)	Lithium	2025—2029
Fountain Head	Gold	2023—2028
Frances Creek	Iron	2023—2030
Hayes Creek	Base metals	2025—2030
Jervois	Copper, gold, silver, zinc, lead	2023—2030
Merlin	Diamonds	2024—2030
Molyhil	Molybdenum, Tungsten	2024—2030
Mt Bundy	Gold	2024—2030
Mt Peake	Vanadium, Titanium, Iron	2025—2030
Mt Todd	Gold	2025—2030
Nobles Nob	Gold	2023—2030
Nolans	Rare earths, phosphate	2023—2030
Roper Valley	Iron	2023—2030
Toms Gully	Gold	2023—2028
Union Reefs UG	Gold	2024—2026
Warrego	Iron	2023—2029
Winchelsea	Manganese	2024—2030
Winchester	Magnesite	2024—2030
Wonarah	Phosphate	2023—2030

Source: NT Government; Deloitte Access Economics

In addition, there are a number of mineral processing projects in the pipeline. These include the processing and production of rare earth elements (as part of the Nolans project), processing and production of vanadium and titanium (related to the Mt Peake project), processing of phosphate to produce phosphoric acid and fertilisers, as well as processing of phosphate to produce phosphoric acid, fertilisers and lithium iron phosphate cathodes for electric vehicle batteries (related to the Wonarah project).

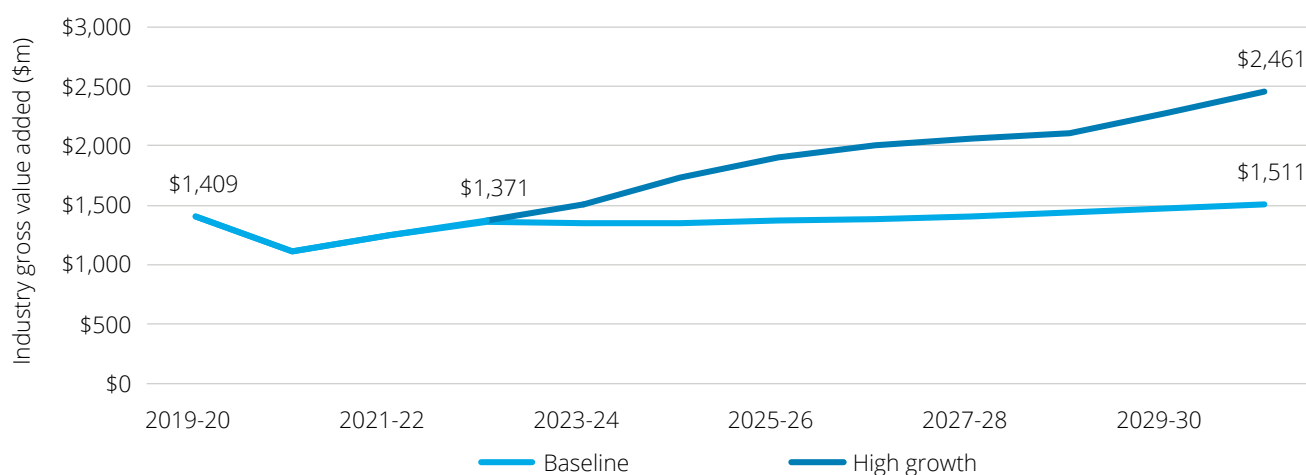
It is estimated that under a high growth scenario, the minerals sector could reach a GVA of \$2,461 million in 2030-31—a growth rate of 5.2 per cent, almost nine times higher than the baseline growth rate. As this growth is driven by opportunities from new mines being opened, it is estimated that a total of 4,570 FTE jobs could be available in 2030-31—an additional 1,210 jobs to the NT compared to the baseline (Table 5.5 and Chart 5.4).

Table 5.5: Summary of results: Minerals

	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
GVA (\$m)	1,409	1,511	0.6%	2,461	5.2%
Employment (FTEs)	3,130	3,360	0.7%	4,570	3.5%
Employment (Headcount)	3,470	3,730	0.7%	5,070	3.5%
Total mines in operation	8 mines ⁹⁷	11 mines		33 mines	

Source: Deloitte Access Economics

Note: CAGR is between 2019-20 and 2030-31

Chart 5.4: Minerals industry gross value added (\$m)

Source: Deloitte Access Economics

5.4 Oil and gas industry

Oil and gas continue to be fundamental to energy supply in Australia and globally. Together, oil and gas comprise over 50 per cent of Australia's primary energy consumption, and gas accounts for 16 per cent of Australia's energy generation.⁹⁸ However, this energy mix is expected to change over time as Australia works to meet its Net Zero targets. Currently, Australia's energy sector is dominated by coal, however, as the country seeks to reduce its emissions, greener alternatives will be deployed. This will require that coal be phased out over time, and gas offers a cleaner, short-term alternative to coal, particularly while the renewable energy industry develops in Australia and globally. As such, the baseline scenario assumes that there will be growth the gas sector as it acts as 'bridge fuel' to replace coal.⁹⁹

Under this baseline growth scenario, the oil and gas sector is expected to see overall growth in the short term. By 2030-31, it is estimated that the GVA of this industry will be around \$5,168 million, compared to its 2019-20 level of \$4,847 million—a growth rate of 0.6 per cent annually, which is lower than the NT GSP growth over the same period. This modest growth is influenced by depletion of the Bayu-Undan gas field by 2023, with the production from Bayu-Undan being replaced by the Barossa from 2025.¹⁰⁰ Under this scenario, the oil and gas industry will support approximately 1,900 FTEs in the NT by 2030-31.

Under a high growth scenario, the gas sector benefits from both greater demand and higher supply as the Beetaloo Basin is further developed. The basin is estimated to contain 200,000 Petajoules (PJ) of gas, with the potential to service a range of markets and downstream activities.¹⁰¹ The benefit from the Beetaloo basin could be enhanced by the development of the Middle Arm sustainable development precinct, which would allow utilisation of gas in the production of lower emissions manufactured goods such as ammonia or urea. This activity is downstream to the oil and gas industry, and thus is not included in the headline figures.

The Beetaloo basin has the potential to be a significant contributor to meet the increasing demand for gas. If fully developed, it is estimated that by 2030-31 the economic contribution to GVA could reach \$6,829 million—\$1,982 million greater than the baseline, with a growth rate of 3.2 per cent

which is more than five times baseline growth. Notably, the net impact for the NT economy is expected to be larger than this due to benefits to downstream industries, leading to sectoral spillovers as discussed in the next section.

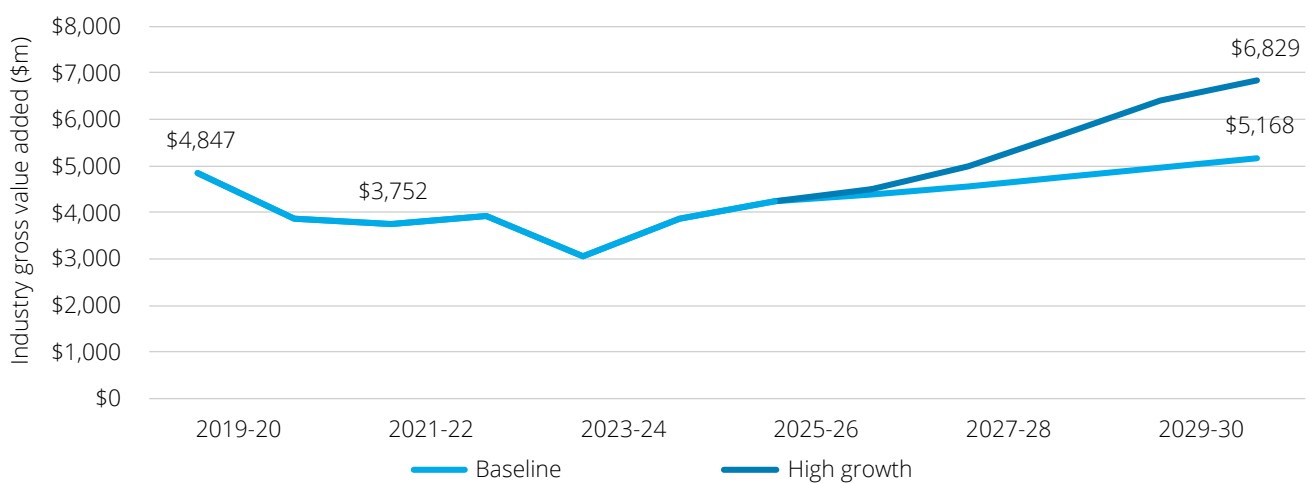
Furthermore, the basin could provide significant opportunities for job growth, with the estimated provision of an additional 900 jobs in the high growth scenario compared to the baseline. In terms of exports, this high growth scenario could see the NT increasing oil and gas exports from approximately 1,700 tonnes in 2019-20, to around 2400 in 2030-31 (assuming the ratio of volume/value added stays the same at the 2019-20 level). There could also be downstream local NT service and supply activities but the economic benefit of this is not included separately in the an oil and gas industry GVA level.

Table 5.6: Summary of results: Oil and gas

	2019-20	2030-31 (baseline)	CAGR (baseline)	2030-31 (high growth scenario)	CAGR (high growth scenario)
GVA (\$m)	4,847	5,168	0.6%	6,829	3.2%
Employment (FTEs)	1,690	1,900	1.1%	2,800	4.7%
Employment (Headcount)	1,870	2,110	1.1%	3,110	4.7%
Oil and gas exports (tonnes)	1,696	1,800		2,400	

Source: Deloitte Access Economics
 Note: CAGR is between 2019-20 and 2030-31

Chart 5.5: Oil and gas industry gross value added (\$m)



Source: Deloitte Access Economics

5.5 Downstream opportunities and crowding out

The NT is some distance from the goal of \$40 billion GSP by 2030. However, the modelling detailed in this chapter suggests it may be achievable with the growth in the maritime, agribusiness, minerals and oil and gas industries, as well as their flow on industries which are estimated to generate approximately half of the total benefits to the NT. Reaching this goal will require both policy changes and industry actions.

The four sectors analysed do not operate in isolation from the rest of the economy. Maximising opportunities in the maritime, agribusiness, minerals and oil and gas sectors creates opportunities in other sectors (such as upstream construction and downstream manufacturing). On the other hand, in a resource-constrained economy (which the modelling simulates), driving certain activities necessarily involves ‘crowding out’ others.

Sectoral spillovers are created through efficiency gains and additional demand associated with the growth in the maritime, agribusiness, minerals and oil and gas industries (Table 5.7). The most significant beneficiary is the construction industry which will be employed to develop the infrastructure required for major projects to commence, particularly in the minerals and oil and gas industries—with annual gains expected to be around \$563 million on average. The larger population required to support growth in the maritime, agribusiness, minerals and oil and gas industries will also benefit the NT’s services industry by \$207 million annually and the manufacturing industry by \$151 million per year. It is notably that approximately half of the benefits to the NT economy are the sectoral spillover effects driven by growth in the maritime, agribusiness, minerals and oil and gas industries (Chart 5.6).

Table 5.7: Key spillovers from the growth in maritime, agribusiness, minerals and oil and gas

Industry	Average annual spillover (\$m)	Scenario opportunity
Construction	563	The construction industry benefits from the increased infrastructure required for high growth industries to capitalise on opportunities.
Services	207	The services industry benefits from the larger population base required for the NT to reach its goal. Growth in the maritime, agribusiness, minerals and oil and gas industries stimulates demand in upstream services industries.
Manufacturing	151	Manufacturing benefits from the increased production of primary resources which are key inputs to manufacturing processes.
Trade	61	Similar to the services industry, the NT’s larger population produces additional demand for wholesale and retail trade, as well as accommodation, food and service activities.
Communications	51	A key input to growth in the maritime, agribusiness, minerals and oil and gas industries is greater access to digital infrastructure, in turn creating greater demand for the communications industry.
Dwellings	34	Due to a larger population, housing and housing services experience an increase in demand, leading to additional value being generated in the dwelling industries through rent.

Source: Deloitte Access Economics

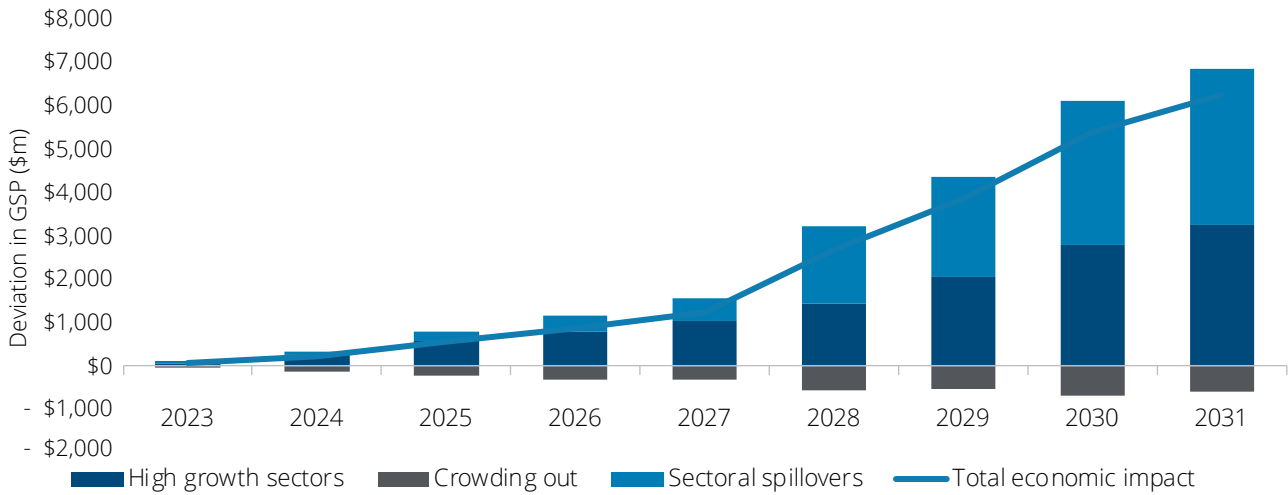
However, growth in the maritime, agribusiness, minerals and oil and gas industries may ‘crowd out’ other NT industries as industries compete for inputs. Under the modelling from this chapter, an estimated \$347 million would be crowded out annually from the NT economy to support growth in the maritime, agribusiness, minerals and oil and gas industries, primarily from the NT’s transport industry.

Modelling in this report suggests that rail transport services are almost entirely dependent upon the NT’s minerals and oil and gas sectors. However, rail transport is a small component of the NT’s transport sector in comparison to the road, air,

space and other components of the transport industry, each of which are significantly less dependent upon the minerals and oil and gas industries.

Modelling for this project suggests annual capital productivity growth must lift from an average of 0.04 per cent (between 2018 and 2021) to at least 0.15 per cent on average between 2023 and 2031 to deliver the target. But the economic dividend will be significant, with GSP per capita scenario estimated to be 15 per cent higher in the high growth scenario than in the baseline scenario.

Chart 5.6: Annual increase in GSP relative to the baseline (\$m)



Source: Deloitte Access Economics

There are a number of other considerations to note. Firstly, the oil and gas industry is significantly exposed to the boom and bust cycle, putting the NT economy at risk of not being sufficiently diverse. Secondly some of the projects included in this modelling are currently contested and may not be approved. Thirdly, there will need to be significant population growth to ensure the NT has the necessary skills to support industry growth, and with that there will be a need for more housing, sufficiently supported social infrastructure such as education and health, and an Indigenous participation plan.

Of course, the NT's economic journey does not end in 2030. If the objectives of economic diversity and sustainability can be achieved, by maximising downstream opportunities, building industry capabilities, growing the local workforce and sharing the benefits of economic growth, that will help NT also achieve its economic aspirations for 2040 and beyond.

Table 5.8: Key outputs of baseline and high growth scenario, 2030-31

	Baseline	High growth scenario
GSP (\$b)	34.2	40.5
Employment (FTE)	138,646	151,929
Employment (Headcount)	153,706	168,432
Population	281,785	292,101
Annual capital productivity growth (%)	0.04	0.15
GSP per capita (\$)	121,369	138,651

Source: Deloitte Access Economics

Broader NT Industries

Achieving a strong, diverse and resilient economy does not depend solely on the four industries of focus in this report. The TERC report identified defence, space, and digital among the sectors that will contribute to economic growth.

National security and defence

The NT is a critical location for Australian defence capability. It serves as a strategically important location due to its proximity to Asia, with significant opportunities for joint operations with other nations. Defence activity represents over 7.6 per cent of the Territory economy. Thus, growing the defence industry is important to economic growth in the NT. Local businesses, including those in the maritime sector, will have opportunities to capitalise on the opportunities provided by this growth, and gain considerable work and subcontracting roles with defence. This provides opportunities for NT industries and businesses to specialise in defence subcontracting work. The growth of the industry to support defence opportunities builds sustainability for the industry, meaning where national security and defence projects are required, there is national confidence that the capability exists locally.

Digital

The ICT industry and more broadly the digital industry are critical to the future growth of the NT. The local industry has green shoots, and these must be capitalised on to continue to mature. This maturity will include improved infrastructure which will attract a greater workforce in the digital industry. Not only can this mean a better ICT industry in the NT, but the digital knowledge attracted and expanded locally will mean more opportunities to support existing businesses across all industries in their digital transformation, supporting the uptake of future trends such as big data analytics and high-performance computing. A better digital industry will also help to overcome the challenges posed by distance, which can have flow-on improvements to participation in the NT's remote and regional areas.

Space

The space industry is growing globally and taps into expertise and capability from all sectors. The NT has unique advantages for the space industry that are already being capitalised on. These advantages include its location and climate (e.g., for ground stations and rocket launches), as well as existing space infrastructure (e.g., NASA's Balloon Facility in Alice Springs, the Arnhem Space Centre). This infrastructure based on competitive advantage place the NT in the front row for future growth in the space industry. These strong foundations mean that the NT is well placed to capitalise on opportunities arising from an industry that's predicted to be worth USD1 trillion by 2040.¹⁰²

Appendix A

Macroeconomic baseline

A.1. Expectations of future growth

The baseline forecast for the maritime, agribusiness, minerals and oil and gas industries is estimated using the Access Economics Macroeconomic Model (AEM).

AEM is a macro-econometric model of the Australian economy. It is made up of a number of accounting identities and behavioural equations which describe the aggregate actions of households, businesses, government and international entities. The formulation of these behavioural equations is based on mainstream theory. The model is best described as a small open economy model in which all foreign (world) prices and interest rates are taken as given (that is, they are exogenous to the model).

Domestic production is divided into farm and non-farm. Given the variable nature of farm output, this change allows us to account for volatile changes in farm output that could not be captured when farm output was combined with non-farm output. Farm output is an exogenous input to the model.

Non-farm production is further divided into household, general government and business sector production:

- The household sector produces housing rental services, modelled as a fixed proportion of the housing capital stock.
- Public sector production is limited to general government output, which comprises general government services (equal to the wage cost of the general government employees) and general government gross operating surplus (equal to the depreciation of general government capital).
- All other non-farm production takes place in the business sector, which incorporates private and public enterprises. Business sector output is produced using capital and labour via a standard constant returns production technology. Business sector production is also influenced by the level of total factor productivity.

The size of the **labour force** is forecast using exogenous assumptions about age specific population growth and labour force participation. There are two measures of employment in the model. There is the potential employment that underlies the estimate of potential output and actual employment. The output gap to a large extent reflects the gap between the actual and potential employment.

Potential employment is the actual labour force less the level of unemployed workers implied by the natural rate of unemployment, where the natural rate of unemployment is the level of unemployment that would exist in the absence of cyclical fluctuations. Actual employment is the actual labour force less the level of unemployed workers implied by the actual rate of unemployment.

Business sector employment is driven by a standard labour demand function that relies on labour productivity, real wages and business sector output growth.

Industry output and employment are forecast following the top-down methodology set out above. Industry output is determined through the forecasts of industry final demand. Industry final demand can be thought of as the total value of goods and services that are produced by a specific industry.

For example if commodity exports increase in response to international demand this will generate an increase in mining output, measured in real gross value-added terms. Similarly, if construction investment increases in response to low interest rates, this will generate an increase in construction output.

Industry employment is linked to output through exogenously determined levels of productivity. Considering the mining example from above, if the increase in commodity exports generates a 2 per cent increase in output for the next quarter with no changes to a productivity assumption of 100 per cent mining employment will increase by 2 per cent. A final adjustment is made for both output and employment so that their respective sums equal the national totals.

Meanwhile, **Gross State Product** is determined by distributing Gross Domestic Product based on State GSP and population relativities. GSP relativities are influenced by the gross value add of industry within each state. As with other demographic variables, population relativities are exogenously determined. Continuing with the mining example above, the increase in mining output will result in a more than proportionate increase in GSP for the mining intense states such as Western Australia, Queensland and the NT.

Industry output and employment by State are driven by a combination of industry output and employment at the national level, and a combination of State variables, including GSP, consumption and investment. Industry relativities between the States are also utilised. For example, Victoria has a relatively higher share of manufacturing output when compared to the national manufacturing share of total output. This means that if manufacturing output is forecast to decline nationally, a larger portion of that decline will be felt in Victoria.

The industry forecasts for each State are then normalised over several iterations, to ensure that state industry output and employment add to national, and each industry within a State adds to total State GSP or total State employment.

The NT 1 digit industry employment and output forecasts produced for this report are shown in Table A.1. Importantly, these forecasts were modelled using the top-down methodology described above, although some specific events, such as the NT gas sector's transition from the Bayu-Undan field to the Barossa field between 2023 to 2025, were incorporated.

Table A.1: Baseline forecast of annual growth for each NT 1 digit industry

	Last 5 years	Next 4 years	Next 9 years
Employment			
Agriculture, Forestry and Fishing	2.3%	3.1%	2.7%
Mining (minerals and oil and gas)	-13.7%	-1.7%	-0.8%
Manufacturing	-0.7%	-4.5%	-3.5%
Retail Trade	-2.4%	0.5%	0.2%
Transport, Postal and Warehousing	-0.2%	0.7%	-0.2%
Output			
Agriculture, Forestry and Fishing	2.4%	3.1%	2.7%
Mining (minerals and oil and gas)	11.5%	2.2%	2.6%
Manufacturing	0.0%	0.3%	0.5%
Retail Trade	-0.1%	1.6%	1.6%
Transport, Postal and Warehousing	-0.4%	5.4%	3.5%

Note: Last five years refers to estimates from 2016-17 to 2021-22, next 4 years refers to estimates from 2021-22 to 2025-26, and next 9 years refers to estimates from 2021-22 to 2030-31. Annual growth estimated as a compound annual growth rate.

Source: Deloitte Access Economics

Appendix B

Economic contribution methodology

B.1. Economic contribution studies

Economic contribution studies are intended to quantify measures such as value added, exports, imports and employment associated with a given industry or firm, in a historical reference year. The economic contribution is a measure of the value of production by a firm or industry. The analysis above includes an account of the direct and flow-on value added generated by the sector in question.

B.1.1 Value added

Value added is the most appropriate measure of an industry's/ company's economic contribution to gross domestic product (GDP) at the national level, or gross state product (GSP) at the state level.

The value added of each industry in the value chain can be added without the risk of double counting across industries caused by including the value added by other industries earlier in the production chain.

Other measures, such as total revenue or total exports, may be easier to estimate than value added but they 'double count'. That is, they overstate the contribution of a company to economic activity because they include, for example, the value added by external firms supplying inputs or the value added by other industries.

B.1.2. Measuring the economic contribution

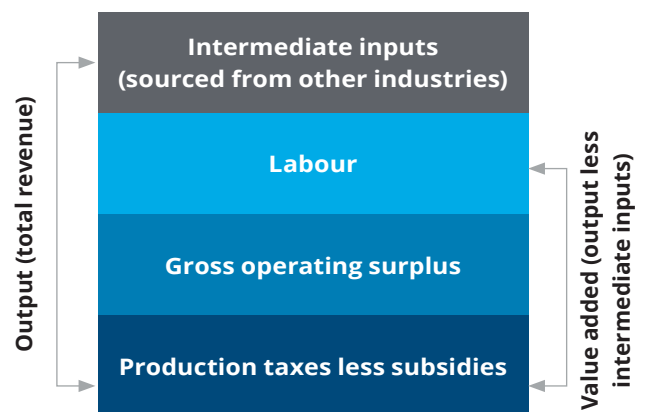
There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution:

- Value added measures the value of output (ie goods and services) generated by the entity's factors of production (ie labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals gross domestic product. Given the relationship to GDP, the value added measure can be thought of as the increased contribution to welfare.
- Value added is the sum of:
 - Gross operating surplus (GOS). GOS represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation and amortisation (EBITDA).
 - Labour income is a subcomponent of value added. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.
 - Tax on production less subsidy provided for production. This generally includes company taxes and taxes on employment. Note: given the returns to capital before tax (EBITDA) are calculated, company tax is not included or this would double count that tax.

- Gross output measures the total value of the goods and services supplied by the entity. This is a broader measure than value added because it is an addition to the value added generated by the entity. It also includes the value of intermediate inputs used by the entity that flow from value added generated by other entities.
- Employment is a fundamentally different measure of activity to those above. It measures the number of workers that are employed by the entity, rather than the value of the workers' output.

Figure B.1 shows the accounting framework used to evaluate economic activity, along with the components that make up gross output. Gross output is the sum of value added and the value of intermediate inputs. Value added can be calculated directly by summing the payments to the primary factors of production, labour (ie salaries) and capital (ie gross operating surplus, 'GOS', or profit), as well as production taxes less subsidies. The value of intermediate inputs can also be calculated directly by summing up expenses related to non-primary factor inputs.

Figure B.1: Economic activity accounting framework



Source: Deloitte Access Economics

B.2. Direct and indirect contribution

The **direct** economic contribution is a representation of the flow from labour and capital within the sector of the economy in question.

The **indirect** contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by the sector in question. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics input-output tables which report the inputs and outputs of specific sectors of the economy (ABS 2010).

The **total** economic contribution to the economy is the sum of the direct and indirect economic contributions.

B.3. Limitations of economic contribution studies

While describing the geographic origin of production inputs may be a guide to a firm's linkages with the local economy, it should be recognised that these are the type of normal industry linkages that characterise all economic activities.

Unless there is significant unused capacity in the economy (such as unemployed labour) there is only a weak relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. Indeed, the use of labour and capital by demand created from the industry comes at an opportunity cost as it may reduce the amount of resources available to spend on other economic activities.

In a fundamental sense, economic contribution studies are simply historical accounting exercises. No 'what-if', or counterfactual inferences—such as 'what would happen to living standards if the firm disappeared?'—should be drawn from them.

The analysis—as discussed in the report—relies on a national input-output table modelling framework and there are some limitations to this modelling framework. The analysis assumes that goods and services provided to the sector are produced by factors of production that are located completely within the state or region defined and that income flows do not leak to other states.

The IO framework and the derivation of the multipliers also assume that the relevant economic activity takes place within an unconstrained environment. That is, an increase in economic activity in one area of the economy does not increase prices and subsequently crowd out economic activity in another area of the economy. As a result, the modelled total and indirect contribution can be regarded as an upper-bound estimate of the contribution made by the supply of intermediate inputs.

Similarly the IO framework does not account for further flow-on benefits as captured in a more dynamic modelling environment like a Computable General Equilibrium model.

B.4. Industry input-output analysis

Using the Deloitte Access Economics Region Input-Output Model (DAE-RIOM), the economic contributions of the maritime, agribusiness, minerals and oil and gas industries were estimated.

B.4.1. Maritime

There is insufficient data available at the NT level to estimate the size of the Maritime industry using territory-level data. Consequently, national-level data has been utilised alongside labour force data to estimate output at the territory level. Where industries were defined at the 3-digit ANZSIC level, they were able to be disaggregated to the NT level using only the ABS detailed labour force dataset.¹⁰³ Where sub-industries were defined to the 4-digit ANZSIC level, the ABS detailed labour force dataset was supplemented by census labour force data. For information on the ANZSIC definition and data source of each sub-industry (Table B.1).

Table B.1: Maritime industry Australian and New Zealand Standard Industrial Classification (ANZSIC) definition and source

Sub-industry	ANZSIC	Output estimate (\$m)	Data source
Ship building and repair services	2391	34	Australian Industry ¹⁰⁴
Boat building and repair services	2392	16	Australian Industry ¹⁰⁵
Water transport	48	29	Australian Industry ¹⁰⁶
Water transport support services	521	237	IBIS World ¹⁰⁷
Marine equipment retailing	4245	52	IBIS World ¹⁰⁸

Source: ABS; IBIS World; Deloitte Access Economics

B.4.2. Agribusiness

Data on the NT agribusiness industry is available at the territory level through the Primary Industry and Fisheries economic profile published by the Department of Industry, Tourism and Trade.¹⁰⁹ The data was mapped to ANZSIC codes as displayed in Table B.2.

Table B.2: Agribusiness industry ANZSIC definition and source

Sub-industry	ANZSIC	Output estimate (\$m)	Data source
Aquaculture	020	47	NT Primary Industry and Fisheries economic profile ¹¹⁰
Fisheries	041	77	NT Primary Industry and Fisheries economic profile ¹¹¹
Forestry and logging	030	n/a	NT Primary Industry and Fisheries economic profile ¹¹²
Horticulture	011, 012, 013, 0146, 0149, 0151, 0152	306	NT Primary Industry and Fisheries economic profile ¹¹³
Field crops	0159	37	NT Primary Industry and Fisheries economic profile ¹¹⁴
Cattle production	0142, 0143, 0145	765	NT Primary Industry and Fisheries economic profile ¹¹⁵
Buffalo production	0142	9	NT Primary Industry and Fisheries economic profile ¹¹⁶
Crocodile and other livestock production	016, 017, 018, 019	24	NT Primary Industry and Fisheries economic profile ¹¹⁷
Wild harvest	042	n/a	Insufficient data available

Source: NT Department of Industry, Tourism and Trade; Deloitte Access Economics

B.4.3. Minerals and Oil and Gas

Data on the NT minerals industry is available through mineral production statistics data published by the Department of Industry, Tourism and Trade,¹¹⁸ as well as through ABS mineral and petroleum exploration accounts.¹¹⁹ Notably, mineral production statistics data is collected through the NT minerals titles act, and so is expected to be comprehensive of the NT minerals extraction sub-industries. This data was mapped to ANZSIC codes as displayed in Table B.3.

Table B.3: Minerals industry ANZSIC definition and source

Sub-industry	ANZSIC	Output estimate (\$m)	Output source
Bauxite	0802	548	NT mineral production statistics ¹²⁰
Gold	0804	1,190	NT mineral production statistics ¹²¹
Mineral sands	0805	12	NT mineral production statistics ¹²²
Zinc and lead	0807	795	NT mineral production statistics ¹²³
Manganese	0809	1,610	NT mineral production statistics ¹²⁴
Uranium oxide	0809	203	NT mineral production statistics ¹²⁵
Other non-metallic minerals	09	39	NT mineral production statistics ¹²⁶
Mineral exploration	1012	123	Mineral and petroleum exploration, Australia ¹²⁷

Source: NT Department of Industry, Tourism and Trade; ABS; Deloitte Access Economics

Note: Minerals are only listed in this table if there was any production in 2019-20. Minerals not listed which are produced in the future (e.g. coal, iron, new economy minerals) should be included in this industry in future analysis.

Oil and gas extraction was derived using a combination of NT mineral production statistics and Australian Industry data.^{128,129} The ABS publishes service and sales income data for the sum total of coal mining (ANZSIC 06), oil and gas extraction (ANZSIC 07), metal ore mining (ANZSIC 08) and non-metallic mineral mining and quarrying (ANZSIC 09). Because the minerals sector includes any coal mining, metal ore mining and non-metallic mineral mining and quarrying occurring in the NT, these figures can be used to estimate the service and sales income of the oil and gas extraction sub-industry. Oil and gas exploration was estimated using ABS mineral and petroleum exploration accounts.¹³⁰ This data was mapped to ANZSIC codes as displayed in Table B.4.

Table B.4: Oil and gas industry ANZSIC definition and source

Sub-industry	ANZSIC	Output estimate (\$m)	Data source
Oil and gas extraction	07	6,495	Australian Industry; ¹³¹ NT mineral production statistics ¹³²
Petroleum exploration	1011	186	Mineral and petroleum exploration, Australia ¹³³

Source: NT Department of Industry, Tourism and Trade; ABS; Deloitte Access Economics

B.4.4. Comparison to ABS estimates

The agribusiness industry as defined in this analysis is close to the ABS definition of the agriculture, forestry and fishing industry, while the definition of the minerals and oil and gas industries is close to the ABS definition of the mining industry. However, the agribusiness industry is estimated in this analysis to be worth \$517 million compared to the ABS estimation of agriculture, forestry and fishing industry to be worth \$644 million for 2019-20.¹³⁴ Similarly, the total of the minerals and oil and gas industry in this analysis is estimated to be \$6,255 while the ABS estimation of the mining industry was \$7,142 million.¹³⁵ There are two key reasons for this discrepancy:

- The agribusiness industry as defined in this report excludes agriculture, forestry and fishing support services (ANZSIC 05), while the minerals and oil and gas industries exclude mining support services (ANZSIC 1090). This means the industries are defined as smaller portions of the NT economy than the ABS definitions.
- The ABS estimates industry division value added through a top-down approach by carving out a proportional amount of industry activity from national accounts figures,¹³⁶ while the approach utilised in this analysis estimates the industry from the bottom-up, using sub-industry level data and aggregating figures to a total.

Appendix C

Economic impact methodology

A change (or shock) in any part of the economy has impacts that reverberate throughout the rest of the economy. For example, the shock scenario would generate economic activity throughout the NT, because of increased capital investment and expanded production, as well as related increases in consumer spending through higher levels of employment and disposable income.

This study seeks to model these impacts using the Deloitte Access Economics Regional General Equilibrium Model (DAE-RGEM). DAE-RGEM is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium (CGE) model of the world economy with bottom-up modelling of Australian regions. DAE-RGEM encompasses all economic activity in an economy—including production, consumption, employment, taxes, and trade—and the inter-linkages between them. For this project, the model has been customised for the NT economy, adopting its unique economic characteristics.

A set of inputs that stylize these alternative scenarios have been developed, so that the economic impact of the scenarios can be estimated. The database underlying the model has been calibrated to reflect the current economic climate, and the future economic trajectory for the NT and Australia between 2024 and 2030, in terms of economic growth and employment. Further details on the modelling framework used is provided in this Appendix.

C.1. Introduction

A change in any one part of the economy will have impacts that reverberate throughout the entire economy. For example, the building of a new mine will involve increased economic activity in the mining industry but it will also have a range of impacts in other parts of the economy:

- There will be effects up and down the **supply chain**. As a sector expands it will draw in an increased volume of intermediate inputs from related sectors resulting in an increased demand for their output and an expansion in production. If the expansion in the sector is demand driven (especially foreign demand) then the price of its output will increase putting pressure on those who use it as an intermediate input meaning their production may contract.
- The expansion in both the sector directly affected and those which supply it will result in an increased competition in **factor markets** (like those for labour and capital). Factors will move between industries in response to changes in demand and the price (wage) they can earn. This will result in the 'crowding out' of some activity in competing sectors as they lose workers and capital.

- At an aggregate level (across the whole economy) there may be an increase in demand for labour such that it induces increased labour supply (the encouraged worker effect) or an inflow of capital as relative rates of return shift. This **induced factor supply** enables an expansion of the economy, meaning more income and consumption which can stimulate sectors oriented toward this.
- If the expanding sector is export-oriented, then the expansion of its production which resulted in increased export income and could be associated with a positive shift in the terms of trade. However, this positive effect—in conjunction with an inflow of investment—would increase demand for local currency, causing **real exchange rate** appreciation with consequences for other exporting industries.
- Computable General Equilibrium (CGE) models, are the best-practice method available for examining the impacts of a change in one part of the economy on the broader economy as they can capture the multitude of impacts highlighted above. Not only can CGE models account for these effects, the results from the models can be used to build a narrative which stakeholders respect—because it is based on accepted economic theory and the latest data—and one which is easily understood.

C.2. DAE-RGEM

The Deloitte Access Economics regional general equilibrium model (DAE-RGEM) belongs to the class of models known as recursive dynamic regional CGE models.^{xi} Other examples of models in this class are the Global Trade and Analysis Project Dynamic (GDyn) model, the Victoria University Regional Model (VURM) and The Enormous Regional Model (TERM).

Like GDyn, DAE-RGEM is a global model, able to simulate the impact of changes in any of the 140 countries in the GTAP database (including Australia) onto each of the 140 countries. The ability to incorporate the flow-on impacts of changes that may occur in rest of the world is a key feature of global models that is not available in single-country models, such as the VURM Model or TERM.

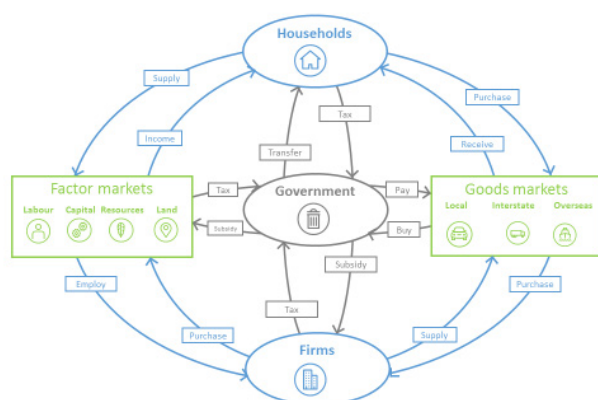
However, like those models, DAE-RGEM is a bottom-up model of regional Australia. So DAE-RGEM is able to project the impacts on different States and sub-State regions of Australia of changes occurring in any region of Australia or in rest of the world within a single, robust, integrated economic framework.

^{xi} In North America the term Applied General Equilibrium (AGE) is also used.

This model projects changes in macroeconomic aggregates such as GDP, employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports by commodity and employment by industry are also produced.

The following diagram gives a stylised representation of DAE-RGEM, specifically a system of interconnected markets with appropriate specifications of demand, supply and the market clearing conditions determine the equilibrium prices and quantity produced, consumed and traded.

Figure C.1: A stylised representation of DAE-RGEM



Source: Deloitte Access Economics

The model rests on the following key assumptions:

- All markets are competitive and all agents are price takers
- All markets clear, regardless of the size of the shock, within the year.
- It takes one year to build the capital stock from investment and investors take future prices to be the same as present ones as they cannot see the future perfectly
- Supply of land and skills are exogenous. In the business as usual case, supply of natural resource adjusts to keep its price unchanged; productivity of land adjusts to keep the land rental constant at the base year level.

All factors sluggishly move across sectors. Land moves within agricultural sectors; natural resource is specific to the resource using sector. Labour and capital move imperfectly across sectors in response to the differences in factor returns. Inter-sectoral factor movement is controlled by overall return maximizing behaviour subject to a CET function. By raising the size of the elasticity of transformation to a large number we can mimic the perfect mobility of a factor across sectors and by setting the number close to zero we can make the

factor sector specific. This formulation allows the model to acknowledge the sector specificity of part of the capital stock used by each sector and also the sector specific skills acquired by labour while remaining in the industry for a long time. Any movement of such labour to another sector will mean a reduction in the efficiency of labour as a part of the skills embodied will not be used in the new industry of employment.

DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key features of the model are:

The model contains a 'regional household' that receives all income from factor ownerships (labour, capital, land and natural resources), tax revenues and net income from foreign asset holdings. In other words, the regional household receives the gross national income (GNI) as its income.

The regional household allocates its income across private consumption, government consumption and savings so as to maximise a Cobb-Douglas utility function. This optimisation process determines national savings, private and government consumption expenditure levels.

Given the budget levels, household demand for a source-generic composite goods are determined by minimising a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and foreign sources. In the Australian regions, however, households can also source goods from interstate. In all cases, the choice of sources of each commodity is determined by minimising the cost using a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function defined over the sources of the commodity (using the Armington assumption).

Government demand for source-generic composite goods, and goods from different sources (domestic, imported and interstate), is determined by maximising utility via Cobb-Douglas utility functions in two stages.

All savings generated in each region are used to purchase bonds from the global market whose price movements reflect movements in the price of creating capital across all regions.

Financial investments across the world follow higher rates of return with some allowance for country specific risk differences, captured by the differences in rates of return in the base year data. A conceptual global financial market (or a global bank) facilitates the sale of the bond and finance investments in all countries/regions. The global saving-investment market is cleared by a flexible interest rate.

Once aggregate investment level is determined in each region, the demand for the capital good is met by a dedicated regional capital goods sector that constructs capital goods by combining intermediate inputs in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these intermediate inputs subject to a CRESH aggregation function.

Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Source-generic composite intermediate inputs are also combined in fixed proportions (or with a very small elasticity of substitution under a CES function), whereas individual primary factors are chosen to minimise the total primary factor input costs subject to a CES (production) aggregating function.

C.3. Scenario development

Desktop research was undertaken to inform a series of output target. Under the high growth scenario sectors are assumed to achieve targets, with a ‘best-case’ scenario for project development taken.

C.3.1. Maritime

Maritime industry growth is related to two potential pipeline opportunities. Greater sector output and new areas of opportunity. A 15 per cent larger than forecast sector by 2026 to accommodate exports growth. Maritime growth to accommodate. Gathered from the NT Government’s International Engagement Strategy.

The operation of the Darwin Ship Lift, which is expected to commence in 2024 and is expected to generate a net economic benefit of up to \$1.4 billion.¹³⁷ Superyacht industry development was derived from a report prepared for the NT Government by AEC. Under this report the investment in superyacht facilities will generate an additional \$77.6 million annually to the NT economy by 2028.

C.3.2. Agribusiness

All outlined targets for agribusiness and cattle sectors are assumed to be achieved by 2030. For plant industries, gross output targets were sourced from NT Farmers Association Plant Industries Economic Impact Analysis. This document outlines an aspirational target of \$1.5 billion in total economic contribution to the NT by 2030. Achieving this goal would require the plant industries to reach \$1 billion in GVP by 2030.

For the cattle sector, gross output targets were sourced from NT Cattlemen’s Association inquiry into growing Australian agriculture to \$100 billion by 2030. This document outlines aspirational targets of becoming a \$2.4 billion industry to the NT by 2030—a size which is around twice the current industry output.

Under the high-growth scenario, the agribusiness sector is assumed to double in output by 2030.

C.3.3. Minerals

Mineral inputs were constructed from publicly available resource reserve data and early-stage project applications. The geological surveys of NT land gave an understanding of the potential extraction volume. The NT Government provided information on mining projects provided by the proponent company, ASX announcements or other public documents. Information included resources, mine life and estimated time horizons.

Using the previous 5-year success rate of mine approvals from the NT EPA, we calculated the proportion of expected potential mines being approved. That proportion was given as the baseline scenario. The high growth scenario assumes that there will be an improvement in the efficiency of the approval process, and approval rate increase by 10 percentage point, from 73 per cent to 83 per cent. Time frames of mine production were brought into the model. Short mine activity thereby reduced the value added during the time horizon.

Most pipeline projects were considered in the modelling. Those with varying levels of uncertainty were omitted, due to the difficulty in knowing the potential value and start time of projects.

Forecast price for common minerals were sourced from World Bank forecasts. Lithium oxide and rare earth metals were estimated from Core Lithium and Shanghai metals market data respectively. Zircon, rock salt and diamond estimates sourced from Iluka, Maxisalt and Gibb River Diamonds.

Mining projects captured in this analysis are listed in Table C.1.

Table C.1: Potential mining projects

Project	Product	Current Estimated Timeframe
Ammaroo	Phosphate	2026—2030
Batchelor Phos	Phosphate	2023—2027
Chandler	Salt products	2026—2030
Finniss (BP33)	Lithium	2025—2029
Fountain Head	Gold	2023—2028
Frances Creek	Iron	2023—2030
Hayes Creek	Base metals	2025—2030
Jervois	Copper, gold, silver, zinc, lead	2023—2030
Merlin	Diamonds	2024—2030
Molyhil	Molybdenum, Tungsten	2024—2030
Mt Bundy	Gold	2024—2030
Mt Peake	Vanadium, Titanium, Iron	2025—2030
Mt Todd	Gold	2025—2030
Nobles Nob	Gold	2023—2030
Nolans	Rare earths, phosphate	2023—2030
Roper Valley	Iron	2023—2030
Toms Gully	Gold	2023—2028
Union Reefs UG	Gold	2024—2026
Warrego	Iron	2023—2029
Winchelsea	Manganese	2024—2030
Winchester	Magnesite	2024—2030
Wonarah	Phosphate	2023—2030

Note: Timeframe indication is relative to forecast time horizon. Mine life may extend beyond 2030.

Source: NT Department of Industry, Tourism & Trade as at May 2021; Deloitte Access Economics

C.3.4. Oil & Gas

High growth targets for the Oil & Gas sector were constructed based on the assumption that development of the Beetaloo sub-basin occurs from 2024. Inputs for production volumes for the were constructed using data from CORE Energy & Resources, Energyview and AEMO. CORE's supply and demand forecasts for the gas market from Energyview's data cross checked forecasts with projections from the AEMO to ensure accuracy. CORE developed three scenarios (high, mid and low level). A mid-level scenario for the gas potential was used to inform this analysis. In the mid-level volume scenario, output is expected to scale up to 420 PJ per annum by 2030.

C.3.5 Productivity

Research undertaken by the Productivity Commission's Econometric Modelling of Infrastructure and Australia's Productivity was utilised to inform the magnitude of the productivity improvements attributable to transport, digital and communications infrastructure investment in the NT. This research suggests that a 1 per cent increase in Australia's infrastructure investment capital is associated with a 0.22 per cent increase in multi-factor productivity at an acceptable level of statistical significance.

Limitation of our work

General use restriction

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