Australian Government

Department of Infrastructure, Transport,
Regional Development, Communications, Sport and the Arts

BUREAU OF INFRASTRUCTURE AND TRANSPORT RESEARCH ECONOMICS
RESEARCH REPORT 159

Aviation

Economic measures of general aviation in Australia

September 2025

The Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts acknowledges the Traditional Custodians of Country of the land on which we work and live.

We recognise and respect the continuing connections to land, waters and communities.

We pay our respects to them and their cultures and to their Elders both past and present and to all Aboriginal and Torres Strait Islander people.

ISBN 978-1-922879-96-7
BITRE ref. 2025-003
September 2025

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Table of Contents

List of Figures and Tables

Glossary

Term	Definition
AAM	Advanced Air Mobility, a transportation system that moves people and property by air using aircraft with advanced technologies, including electric aircraft, or electric vertical takeoff and landing (eVTOL) aircraft, in controlled and uncontrolled airspace. AAM is an emerging aviation ecosystem that leverages new aircraft and an array of innovative technologies to provide the opportunity for more efficient, more sustainable, and more equitable options for transportation.
ABS	Australian Bureau of Statistics
ABR	Australian Business Register
ATEA	Australian Transport Economic Account, an experimental satellite account estimating the impact of transport on the economy, prepared by the ABS.
ATO	Australian Taxation Office
BLADE	Business Longitudinal Analysis Data Environment (BLADE) combines business tax data information from ABS surveys and other administrative data sources to provide a better understanding of Australian business and the economy.
BITRE	Bureau of Infrastructure and Transport Research Economics
CASA	Civil Aviation Safety Authority
Charter flights	Flights for the transport of people or freight, made on request and not conducted to a fixed schedule, for which the aircraft operator receives payment. While charter flights may be conducted in large and small aircraft, most charter flights are conducted in smaller aircraft.
DITRDCSA	Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts
GA	General Aviation is non-commercial business aviation, aerial work, pleasure flying, instructional flying, small passenger and freight charters, RPAS or other non-commercial flying.
GAAN	General Aviation Advisory Network
ICAO	International Civil Aviation Organization
In-house air transport	Aviation activity in non-transport industries which is not intended for market, e.g. a farmer using her own aircraft to spray crops; or secondary production of transport activity for which a fee is charged, e.g. a hospital flying injured patients in for treatment. This is defined by the ABS in more detail at Australian Transport Economic Account: An Experimental Transport Satellite Account, 2010-11 to 2020-21 | Australian Bureau of Statistics (abs.gov.au)
RPAS	Remotely Piloted Aircraft Systems, also known as drones, uncrewed aerial vehicles (UAVs), or uncrewed aerial systems (UAS).
RPT	Regular Public Transport flights; i.e. scheduled flights for the transport of people, which are open to the public and for which a fare is payable. RPT flights are typically conducted in large aircraft and also include the carriage of freight and mail.

Executive summary

General aviation plays a range of essential roles in Australia including servicing regional communities, delivering education and health services, regional freight and transport, tourism, recreation, agricultural mustering and spraying, instructional flying, sport and pleasure flying, and emergency services.

However, general aviation is not a stand-alone category in Australia's System of National Accounts. Instead it makes up a small subset of a very wide range of economic activities, making it difficult to estimate its economic impact.

This study considers a range of sources, including innovative methods of matching aircraft registrations to business activity, to estimate the contribution of general aviation to Australia's economy.

Report Highlights

- Under the narrowest definition of general aviation, covering in-house air transport only, general aviation directly generated approximately **$3.6 billion** to the Australian economy in 2018–19.
- This generated indirect or flow on impacts through the economy of $314 million in aviation fuel expenditure, $742 million in employee compensation, profits of $473 million and other intermediate inputs of $1.4 billion.
- Under the broadest definition of general aviation, which includes passenger charters and freight only flights, general aviation directly generated approximately **$10.2 billion** to the Australian economy in 2018–19.
- In 2022, charter flights reported 511,000 flying hours and other general aviation flights reported 1.28 million flying hours.
- Of these hours flown for general aviation, 25% were for agriculture, 26% for instructional flying, 17% for recreational flying, 4% for emergency services and 27% for other aerial services.

NOTE: these figures are adjusted for inflation to 2022–23 dollars as the most up to date information available at the time of processing in mid-2024.

The definition of general aviation

There is no universally accepted definition of general aviation.

The broader definition of general aviation includes non-commercial business aviation, aerial work, pleasure flying, instructional flying, other non-commercial flying and small charter flights. This definition is more common in Australia, and is preferred by the General Aviation Advisory Network (GAAN). This broader definition is used throughout this report, unless the narrow definition is specified.

The narrower definition of general aviation excludes charter flights, but includes other flying activity included in the broad definition. This definition is used by the International Civil Aviation Organization (ICAO).

All definitions of general aviation exclude scheduled commercial passenger or freight flights and military aviation.

The direct economic impact of general aviation

This analysis used two separate methods to estimate the direct economic impact of general aviation, one aligning with the narrow definition and the other aligning with the broad definition of general aviation.

Both methods use 2018–19 data, the most recent financial year for which data is available without COVID impacts. These were adjusted for inflation to 2022–23 dollars as the most up to date information available at the time of processing in mid-2024.

Method 1: ABS experimental Australian Transport Economic Account (ATEA)

The Australian Bureau of Statistics (ABS) releases an Australian Transport Economic Account, an experimental satellite account for transport in Australia. One of the measures they use is ‘in-house air transport’, which is similar to the narrow definition of general aviation, including non-commercial business aviation, aerial work and instructional flying, and excluding all charter flights, regular public transport (RPT) commercial flights and military flights.

BITRE’s estimates based on this data indicate that **general aviation was worth at least $3.6 billion in 2018–19**.

Method 2: ABS Business Longitudinal Analysis Data Environment (BLADE)

This research also tested an innovative method to link ABN/ACNs to which aircraft were registered to business data records.

BITRE conducts an annual census of Australian commercial and general aviation activity (BITRE, 2023), recording flight hours within specific activities. Key measures are the number of hours flown and the number of landings, classified by the type of flying activity being undertaken. Based on this data, each general aviation aircraft was assigned a primary industry using its ACN (or ABN if necessary) to match it with Business Longitudinal Analysis Data Environment (BLADE) spine data. ABS linked this business level information with income and wages data sourced from BLADE's Business Activity Statement (BAS) data. The BAS data is collected by the ATO and provided to the ABS, who then integrate it into BLADE. This measure is similar to the broad definition of general aviation, including charter flights, non-commercial business aviation, aerial work and instructional flying, and excluding RPT commercial flights and military flights.

BITRE’s estimates based on this data indicate that **general aviation was worth up to $10.2 billion in 2018–19.**

Table 0.1: Direct economic activity associated with general aviation[1], from data matching aircraft registrations with business activity

	2018–19 (Value in $2022–23) *		2019–20 (Value in $2022–23)*	
	Income ($m)	Wages ($m)	Income ($m)	Wages ($m)
Agriculture ($million)	255	45	359	66
Passenger charters and commercial flight instruction ($million)	7,068	2,362	5,507	
Other GA plus freight charters and freight only ($million) ***	2,831		2,757	
Maintenance and overhaul ($million) *	5,519	1,107	3,992	1,080

* BITRE adjusted the 2018–19 and 2019–20 values to 2022–23 dollars using the GDP implicit price deflator, the most up to date information available at the time of processing in mid-2024.

**includes Freight only, Freight only charters, Other commercial air transport, Air ambulance, Search and Rescue, Aerial policing, Firefighting, Observation and patrol, Sling loadings, Construction – other, Aerial photography, Pipeline or powerline surveying, Aerial surveying – other, Aerial advertising, Other aerial work

*** Values include some non-GA activity.

These estimates were not able to calculate the direct economic activity generated by:

- **Private recreational aviation:** The data sources used in these estimates were only able to collect data on business uses of aircraft. Private individuals using their own aircraft for recreational flying are not included in these datasets, although this use is included in broad and narrow definitions of general aviation.
- **Remotely Piloted Aircraft Systems (RPAS) operations:** 2018–19 and 2019–20 were chosen to exclude the impacts of COVID lockdowns and aftereffects. There were no reliable estimates of the economic impacts of RPAS for these years, so the economic impacts of RPAS were excluded.

General aviation also generates substantial indirect or flow on economic activity from backward linkages to supplying and supporting industries such as aircraft manufacturing and repair services, and airports, particularly smaller and regional airports. These backward linkages generate economic activity worth billions of dollars each year.

Forward linkages from general aviation are themselves worth billions of dollars, both in terms of the flow on impacts of wages and profits generated by general aviation businesses spent in the economy, and the economic activity enabled by general aviation.

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[1] The results of these studies are based, in part, on ABR data supplied by the Registrar to the ABS under A New Tax System (Australian Business Number) Act 1999 and tax data supplied by the ATO to the ABS under the Taxation Administration Act 1953. These require that such data is only used for the purpose of carrying out functions of the ABS. No individual information collected under the Census and Statistics Act 1905 is provided back to the Registrar or ATO for administrative or regulatory purposes. Any discussion of data limitations or weaknesses is in the context of using the data for statistical purposes and is not related to the ability of the data to support the ABR or ATO's core operational requirements.

Legislative requirements to ensure privacy and secrecy of this data have been followed. Only those authorised under the Australian Bureau of Statistics Act 1975 have been allowed to view data about any particular firm in conducting these analyses. In accordance with the Census and Statistics Act 1905, results have been de-identified to ensure that they are not likely to enable identification of a particular person or organisation.

The uses of general aviation aircraft

The BITRE Australian Aircraft Activity Survey (AAAS) contacts all aircraft owners across Australia and asks them about the use of their aircraft. This data shows the mix of activities performed by general aviation. It shows that while most aircraft are used at least in part for recreational flying and flying for the owner's business, the largest share of general aviation aircraft hours is from 'other aerial services[2]', followed by instructional flying and agriculture.

Table 0.2: The mix of general aviation activity in Australia, 2022

	Number of Aircraft*	Hours flown	Landings
Agriculture as a % of general aviation	24%	25%	27%
Emergency services as a % of general aviation	9%	4%	3%
Instructional flying as a % of general aviation	18%	26%	35%
Joy flights and recreational flying as a % of general aviation	51%	17%	18%
Other aerial services as a % of general aviation	71%	27%	18%
Total general aviation aircraft and uses	**9,526**	**1,277,500**	**1,913,000**

* Some aircrafts are used for more than one activity, therefore the column totals exceed 100%.

Source notes. Australian Aircraft Activity Survey 2022

Remotely Piloted Aircraft Systems (RPAS)

RPAS are increasingly used in agriculture, transportation, logistics, construction, mining, and urban and regional mobility. These small, un-crewed aircraft can be operated by a user on the ground, providing opportunities for some activities that traditionally depended on planes, cars or trucks to use a smaller, cheaper, quicker option to provide a similar service. Larger RPAS may be classified as general aviation.

Forecasts by Deloitte Access Economics (2020) estimated that RPAS technology could add $14.5 billion to the Australian economy by 2040. Some of the ways in which RPAS could reduce costs for existing activities or provide new services include:

- Survey RPAS for construction and planning, instead of traditional onsite surveying, which could be worth $1.5 billion to the Australian economy by 2040.
- RPAS deliveries of small packages, including rapid provision of medicine, with RPAS package deliveries estimated to be worth $600 million by 2030.
- Irrigation, crop monitoring, soil and field analysis, crop spraying, tree planting and bird control in agriculture, potentially worth $700 million.
- Faster reactions to emergency situations such as bushfire, or more rapid search and rescue operations could add $460 million to the economy.

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[2] Other aerial services includes construction (including sling-loads), photography, pipeline or powerline surveying, other surveying, observation and patrol, advertising, other aerial work, own business travel, community service flights, test flights, ferry flights and other flights

In addition to this, RPAS run on electricity which can be carbon neutral. Switching plane, car or truck operations for RPAS operations could assist in the Australian Government's net zero plans as discussed in the Aviation White Paper.

1. Introduction

General aviation is a vital component of the nation's economic and social fabric.

Aviation supports vital economic and social connections across a broad range of industries, outside of the familiar commercial airlines delivering freight and passengers around Australia. General aviation (GA) supports industries ranging from agriculture and mining to surveying and advertising; enables the fast response times required for health services, police and firefighters to save lives; and provides a source of leisure and recreation for operators and users of a range of aircraft from small planes to hot air balloons. The economic potential of GA is expanding with new aviation technologies, particularly RPAS.

Over recent years, some members of the GA community have voiced concerns about the sustainability and financial viability of GA in Australia. A number of studies were undertaken to investigate these issues, with the most recent undertaken by BITRE (BITRE, 2017). The aim of this GA Study was to examine the GA industry in Australia and outline the challenges facing the industry and opportunities to respond to those challenges. The study outlined a number of claims and counter claims made by GA participants; however, the study noted that it was difficult to verify many of the claims as there were no robust economic datasets compiled for the GA Sector, restricting analysis of the impact of the various cost pressures facing GA or the contribution GA makes to the economy.

The Federal Government's Aviation White Paper, released in August 2024, highlighted the importance of the GA sector to the Australian economy and society, with particular focus on the importance to regional communities. The key issues highlighted by the White Paper are:

Key issues for Australia's growing GA sector, identified by the Aviation White Paper (DITRDCA 2024, pp 138-149)

- GA has growth potential, with emerging cost-effective new technologies in particular presenting opportunities for regeneration of the sector.
- Appropriate regulatory frameworks will support growth of emerging technology in the GA sector, while maintaining safety standards.
- New propulsion technologies, such as electric and possibly hydrogen powered aircraft, may support the GA sector's transition to net zero.
- Improving training pathways for aviation maintenance engineers and simplifying the visa process for pilots will support a stronger GA sector
- Reviewing the Airports Act 1996 to streamline GA regulatory arrangements
- Supporting CASA regulations to provide risk-based oversight of the sector.

DITRDCA, (2024)

Policymakers responded by considering several priorities, including workforce skills, airport infrastructure, new technologies, aviation efficiency, support for regional communities and revitalising GA.

1.1 Strategic significance of this economic study

The Aviation White Paper has highlighted the importance of GA to the Australian economy, particularly in providing services to rural communities. GA plays a range of essential roles in Australia including servicing regional communities, delivering education and health services, regional freight and transport, tourism, recreation, agricultural mustering and spraying, instructional flying, sport and pleasure flying, and emergency services. Parts of GA are expanding rapidly while other areas struggle with the impact of changing markets and demand for their services, and skills shortages.

The sector is fast evolving, with new technologies such as RPAS playing an increasingly important role in GA, and with new propulsion technologies such as electric and hydrogen powered aircraft likely to be first used in GA before commercial flights.

To understand how these changes and new technologies will play out, it is important to understand the significance of GA in Australia's industries and across the economy as a whole.

To unlock the full potential of GA, the General Aviation Advisory Network (GAAN) *New Strategy for the Australian General Aviation Sector* (2020) aims to focus on estimating the sector's critical contribution to the national economy, job creation, and community well-being. The plan advocates for government policies and cooperative regulations that are fair, risk-based and responsive to costs and innovation, underpinned by deep engagement with the industry. Understanding the economic benefits is deemed essential for aligning government policy with the national importance of the GA sector, paving the way for increased jobs, exports, and support for dependent industries and communities.

1.2 Methods and sources used in this report

The research and analysis in this report draws from a number of sources. A wide-ranging literature review considered how GA has been valued in the past and around the world, and the value of the economic activity of upstream and downstream impacts of GA. BITRE worked with the Australian Bureau of Statistics to analyse business activity data from businesses to which aircraft are registered. BITRE also analysed data and descriptive statistics from several other sources, including Census data and the Australian Aircraft Activity Survey. BITRE also conducted discussions with members of the GAAN to better understand the operation of businesses using GA and the extent to which available data reflect their experiences.

2. Definitions of GA in Australia

GA is an integral input into our economy and our national supply chains.

GA supports every major industry in Australia, through supporting efficient agricultural practices, maintaining electrical and gas grids, providing emergency health care and education opportunities in rural and remote areas, allowing rapid emergency response in disasters and a range of other uses.

2.1 What is GA?

GA includes non-commercial business aviation, aerial work, pleasure flying, instructional flying or other non-commercial flying.

Some definitions of GA include small charter flights; some include remotely piloted aircraft systems (RPAS).

All definitions of GA exclude scheduled commercial passenger or freight flights and military aviation.

GA is a broad term that covers a range of flying activities and its precise scope varies depending on the definition of GA used. Some definitions include private charter flights conducted in small CASA-regulated aircraft, while others encompass a broader spectrum of aerial activities within this category, including RPAS and hot air balloons. Others include businesses that support GA, for example aircraft engineers and parts manufacturers that support GA aircraft. There is consensus, however, that GA does not encompass commercial regular public transport (RPT) airline operations[3] or military aviation.

2.1.1 The ICAO definition of GA

The International Civil Aviation Organization's (ICAO) Classification of Civil Aviation Activity is presented in Figure 1[4]. The ICAO Classification separates civil aviation activities into either commercial air transport services or GA, where commercial air transport services are classified as either scheduled or non-scheduled services and GA is classified as non-commercial or private business aviation[5], aerial work, pleasure flying, instructional flying or other flying (BITRE, 2017).

The ICAO (2013) classifies civil aviation activities as:

Commercial air transport services

- Scheduled
- Non-scheduled
  - Charter
  - On demand (air-taxi, commercial business aviation, other)

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[3] An operator that, for remuneration, provides scheduled air transport services to the public for the carriage of passengers, freight or mail.

[4] This classification was published in the ICAO Reference Manual for Aviation Statistics in 2013 (ICAO 2013).

[5] Commercial aviation refers to flights operated for other parties for hire or a fee, while non-commercial or private business aviation refers to aviation for a non-transport business' own internal operations. For example, a company's own corporate jet used to transport its executives on company travel is considered non-commercial or private business aviation. If the same jet with the same crew was used to transport other people for a fee, this would be considered commercial aviation.

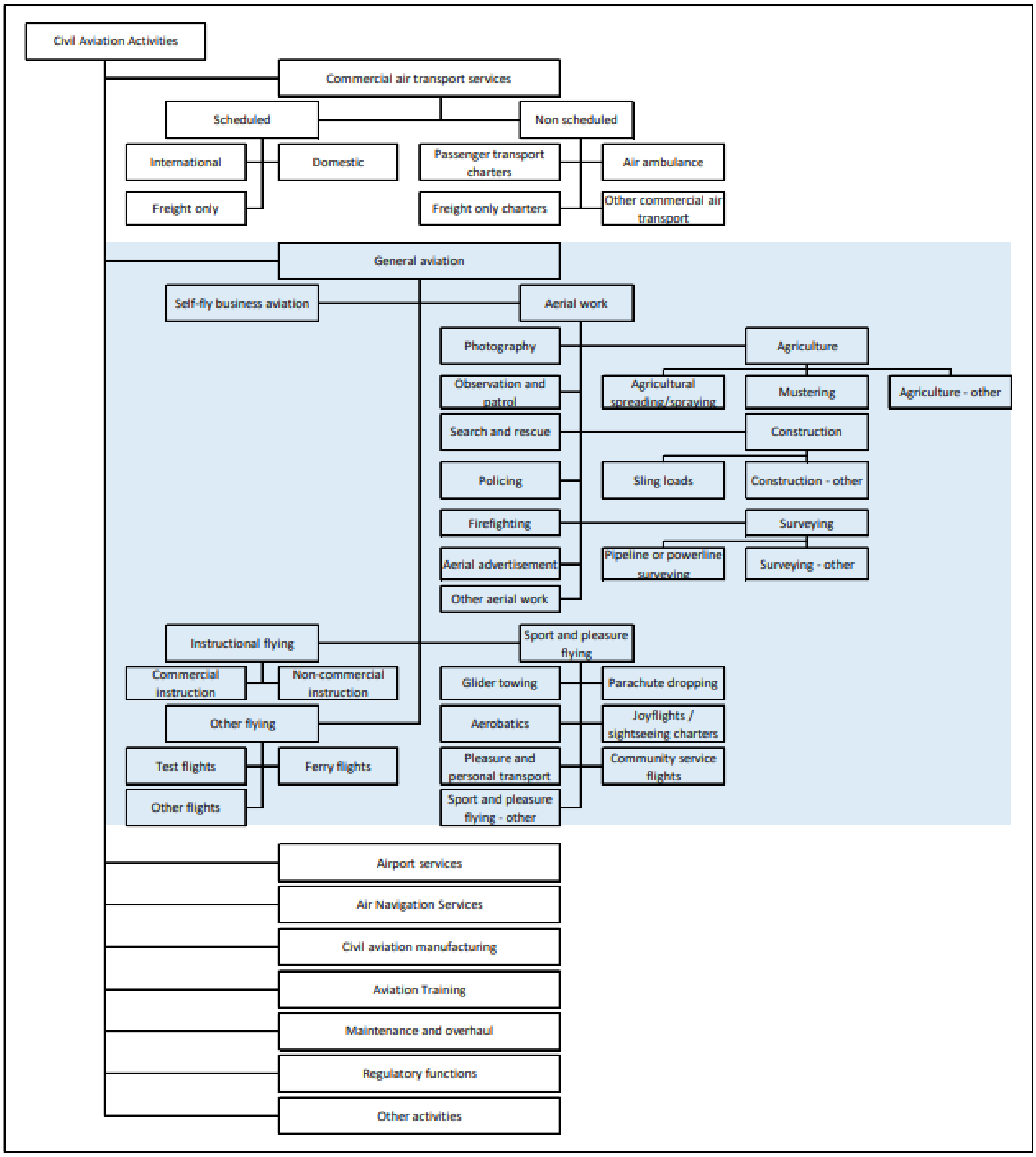
- Other.

General Aviation (GA)

- Non-commercial business aviation
- Instructional flying
- Pleasure flying
- Aerial work (agriculture, construction, surveying, photography, advertisement, etc.)
- Other flying.

Using a borderline between commercial and non-commercial air transport service in 2013, ICAO made a clear distinction between the traditional view of GA and the treatment of air transport charter activity. Previously, small transport charter operations were considered to be part of GA but the ICAO definition in 2013 explicitly excludes them.

Figure 1: Classification of civil aviation activities, based on ICAO definition



Source BITRE (2017), page 7

2.1.2 Small aircraft charters and RPAS in GA

The problem with a definition of GA that excludes small charters and RPAS is that a great deal of the GA activities highlighted in the figure above are performed by small charter flights, and increasingly, RPAS for some activities.

Some definitions of GA include small freight or passenger charters. CASA's definition of GA includes charter services operated by small aircraft. The GAAN includes low capacity charters[6] in its definition, along with businesses supporting GA aircraft. The fixed wing, single engine aircraft and rotary wing aircraft that are typically used in GA are also used for small charters.

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[6] As well as the manufacturing, design and maintenance of general aviation aircraft.

Discussions with the GAAN highlighted practical difficulties with the ICAO definition's exclusion of commercial uses or charter flights. Aviation businesses, and even individual aircraft within aviation businesses, can be used for both commercial and non-commercial uses. For example:

- A tourist flight operator might operate sightseeing charters over a beautiful location (GA) and also operate charter flights to transport people around the area (commercial aviation under the ICAO definition). The same aircraft and staff may be used to operate both GA and commercial aviation – possibly even on the same flight.
- Some businesses who own and operate aircraft for their own business use (GA) may provide ad-hoc charter services for a fee, or flight instruction, the first of which would be classified as commercial aviation by ICAO.
- In addition to patient transfers, business jets may also be chartered by hospitals to support time-critical organ retrieval and transplant operations.
- Aircraft charter companies (commercial aviation according to ICAO) may provide community service flights (GA) on occasion.

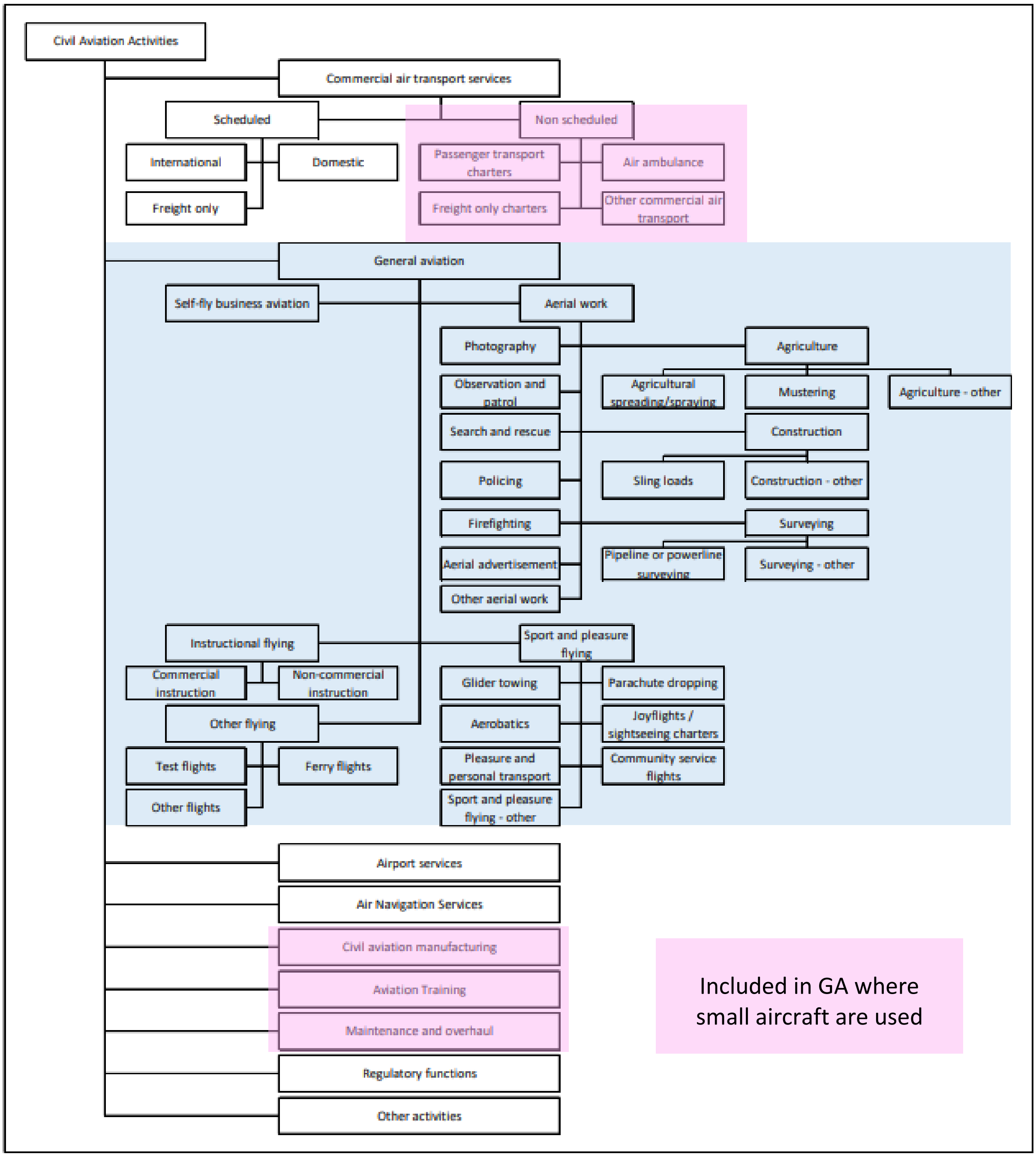
Sometimes, two identical flights for identical purposes might be classified differently, depending on the financial and corporate arrangements surrounding the flights. For example:

- A large business that regularly flies to remote areas can buy their own aircraft, hire their own pilots and so on, and its flying activities would be classified as GA. However, if this business uses a charter service for the same flights to the same location, this would be classified as commercial aviation under the more restrictive ICAO definition.
- If an owner of a small charter aircraft pays her own costs to fly her nephew to hospital for necessary medical treatment, this flight would be GA. However if the hospital pays her a fee to transport her nephew, this would be an air ambulance or charter flight, and so would be commercial aviation under the ICAO definition.
- Police services have their own aircraft and pilots for police operations, national parks own aircraft and hire pilots for surveying, search and rescue and so forth, all of which are GA. It is not uncommon for them to hire a charter flight for police operations or search and rescue if needed, which would be classified as commercial aviation under the ICAO definition.

Some types of GA activities can now be performed by RPAS; for example, aerial photography, surveying, search and rescue and agricultural spreading/spraying.

Figure 2 over the page shows activities that can be included in a broader definition of general aviation, if the activities are performed by or relate to small aircraft. For example, under this definition pleasure aircraft, rotary wing aircraft (helicopters) and many fixed wing, single engine aircraft would mostly perform GA activities.

Figure 2: BITRE classification of civil aviation activities, based on broader classification of GA



Source BITRE (2017), page 7, and discussions with GAAN

The analysis in this report endeavours to measure the broader definition where data is available, however in many cases data could not be separated by specific aircraft operations or size of aircraft.

3. The size and value of GA in Australia

GA has economic impacts across a broad range of industries, well outside the transport sector.

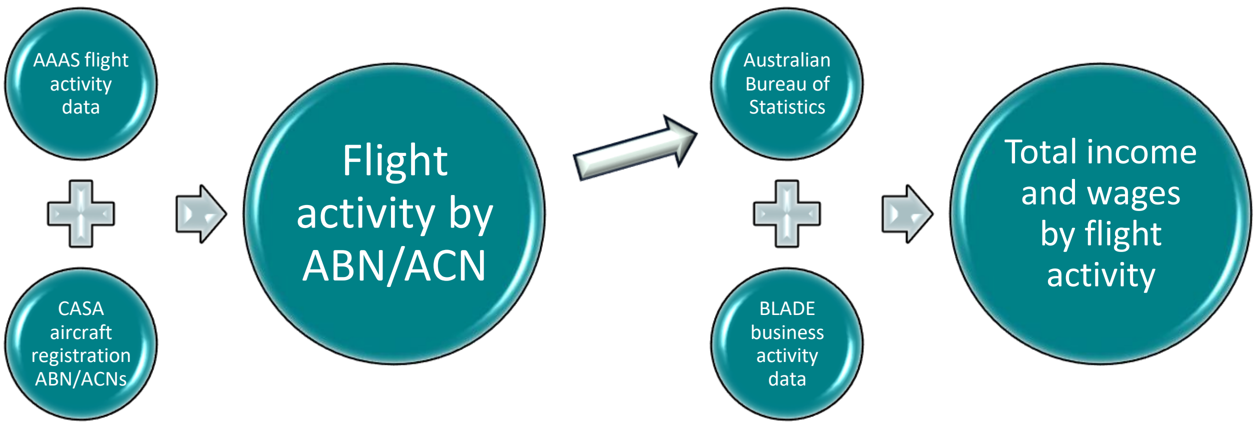
Australia has 20 broad industry classifications. In the 2021 Census, each one of these industries had air transport professionals (e.g. pilots, flying instructors) working in them. Aviators drive economic activity in Australia through a wide range of roles outside of commercial air transport, such as infrastructure surveying, news and traffic reporting via helicopters, and emergency medical services. Two distinct data analysis methods were used to estimate the economic impact of general aviation.

3.1 Impacts of GA, by flight business activity

The Australian Aircraft Activity Survey (AAAS) conducts an annual census of Australian aircrafts' GA activity, recording flight hours within specific activities. Key measures are the number of hours flown and the number of landings, classified by the type of flying activity undertaken. Based on the type of flying activity, BITRE assigned a primary industry to each aircraft.

From there, BITRE used CASA records to identify the Australian Business Number (ABN) or Australian Company Number (ACN) to which aircraft were registered. BITRE then provided the ABN/ACNs it had associated with each industry to the ABS, who linked business level information with income and wages data sourced from BLADE's BAS data. The ABS then provided the total income and wages from each industry classification to BITRE.

Figure 3: Aircraft data matching



For example, if most of an aircraft's flying hours were for agricultural mustering, the primary industry of the ACN/ABN attached to that aircraft was classified by BITRE as Agriculture. BITRE then provided ABNs/ACNs it associated with Agriculture to the ABS, who linked this to business level information with income and wages data sourced from BLADE's BAS data. The ABS then provided the total Agriculture income and wages to BITRE.

Table 1 shows the findings of this data matching. The linkage rates column indicates the percentage of aviation related ABN/ACNs by flight activity generated by BITRE that were able to be matched to BLADE records by the ABS. Uses were aggregated to protect the confidentiality of businesses.

Table 1: Direct economic activity generated by businesses to which GA aircraft were registered[7]

	2018–19 (Value in $2022–23) *		2019–20 (Value in $2022–23) *		
	Income ($m)	Wages ($m)	Income ($m)	Wages ($m)	Linkage rates (%)
Agriculture ($million)	255	45	359	66	74
Passenger charters and commercial flight instruction ($million)	7,068	2,362	5,507		76
Other GA plus freight charters and freight only ($million) ***	2,831		2,757		82
Maintenance and overhaul ($million) *	5,519	1,107	3,992	1,080	62

* BITRE adjusted the 2018–19 and 2019–20 values to 2023–23 dollars using the GDP implicit price deflator.

**includes Freight only, Freight only charters, Other commercial air transport, Air ambulance, Search and Rescue, Aerial policing, Firefighting, Observation and patrol, Sling loadings, Construction – other, Aerial photography, Pipeline or powerline surveying, Aerial surveying – other, Aerial advertising, Other aerial work

*** Values include some non-GA activity.

Economic activity in Agriculture

Aviation businesses in Agriculture produced **$255 million in income** and $45 million in wages in 2018–19 and **$359 million in income** and $66 million in wages in 2019–20. These estimates were based on BITRE's identification of 84 agricultural aviation businesses in 2018-19 and 104 in 2019–20 that could be matched to BLADE data, which represent 72% and 75% of agricultural aviation businesses identified.

Passenger charters and commercial flight instruction

Passenger charters and commercial flight instruction generated income of **$7.1 billion** in 2018–19 and **$5.5** billion in 2019–20, from 150 businesses in 2018–19 and 148 in 2019–20, which represent 77% and 75% of businesses identified. Note that this includes small and large passenger charters.

Other GA

Other GA, plus freight charters and freight only businesses, generated income of **$2.8 billion** in 2018–19 and **$2.8 billion** in 2019–20; from 86 businesses in 2018–19 and 78 in 2019–20, which represent 82% and 81% of businesses that were identified by BITRE. These estimates may be higher or lower than actual GA activity, as not all ABNs/ACNs with registered aircraft could be matched to BLADE records and they do not distinguish between small and large freight charters, and include all freight only flights (including scheduled flights).

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[7] **ABR and ATO data disclaimer**

The results of these studies are based, in part, on ABR data supplied by the Registrar to the ABS under *A New Tax System (Australian Business Number) Act 1999* and tax data supplied by the ATO to the ABS under the *Taxation Administration Act 1953*. These require that such data is only used for the purpose of carrying out functions of the ABS. No individual information collected under the *Census and Statistics Act 1905* is provided back to the Registrar or ATO for administrative or regulatory purposes. Any discussion of data limitations or weaknesses is in the context of using the data for statistical purposes and is not related to the ability of the data to support the ABR or ATO's core operational requirements.

Legislative requirements to ensure privacy and secrecy of this data have been followed. Only those authorised under the *Australian Bureau of Statistics Act 1975* have been allowed to view data about any particular firm in conducting these analyses. In accordance with the *Census and Statistics Act 1905*, results have been confidentialised used to ensure that they are not likely to enable identification of a particular person or organisation.

Economic activity generated by aircraft whose operators do not have ABNs/ACNs cannot be counted using this method. This method cannot account for economic activity from aircraft operated by individuals or entities without ABNs/ACNs.

Maintenance and overhaul

Maintenance and overhaul of aircraft, which includes both GA and commercial aviation aircraft, was worth **$5.5 billion** in 2018–19 and **$4.0 billion** in 2019–20. These estimates should be interpreted with caution as only around 61% of BITRE's aviation business records were able to be matched to BLADE data (165 and 162 businesses respectively), suggesting that this may be an underestimate of total economic activity in this area.

Outcomes and conclusions of matching business registered aircraft with BLADE data

While this analysis was helpful in gaining a general understanding that GA in Australia generates billions of dollars in economic activity through GA and related businesses, it was not possible to come up with a specific estimate of the economic value of GA in Australia because:

- Around 20-25% of businesses to which GA aircraft were registered could not be matched to BLADE records.
- Some GA aircraft are used in different GA industries, or are used in a combination of GA and non-GA business activities.
- It was not possible to separate small and large passenger and freight charters.
- Some GA aircraft may only be responsible for a small amount of turnover in their business.
- The economic activity generated by own business flying and recreational flying is excluded.
- If an aircraft operator does not have an ABN or an ACN, their economic activity is not collected by this data source and so won't show up in the totals.

The analysts preparing this research also matched RPAS registrations to businesses in Australia to estimate economic activity from RPAS. However, the values drawn from this matching showed the *total* turnover from any business with a registered RPAS – so for example, a mining company with a registered RPAS used for surveying mine sites would potentially have billions of dollars of turnover matched to a small number of RPAS registrations. Since these estimates were not helpful in estimating the economic impact of RPAS as a component of GA, they were not included in the report.

3.2 Impacts of GA, from the Experimental Transport Satellite Account

The ABS has produced the Australian Transport Economic Account (ATEA), an experimental satellite account for transport activity in Australia. It produces estimates of the contribution of transport to the Australian economy in terms of GDP, value added and employment. The ATEA draws on National Accounts data and surveys of businesses to understand how transport is incorporated into the production process.

Transport output is separated by mode (road, rail, water and air) and by in-house output and for-hire output. In-house transport is defined as:

"Activity of businesses in non-transport industries, including:

- ancillary transport activity which is not intended for market, and is consumed in the production of an industry's primary output. An example of this activity is a retail business using their own truck to deliver goods from a warehouse to their retail outlet.
- secondary production of transport activity for market where a fee is charged. For example, where that same retail business then uses their own truck to deliver the goods to the customer for a delivery fee." (ABS, 2023)

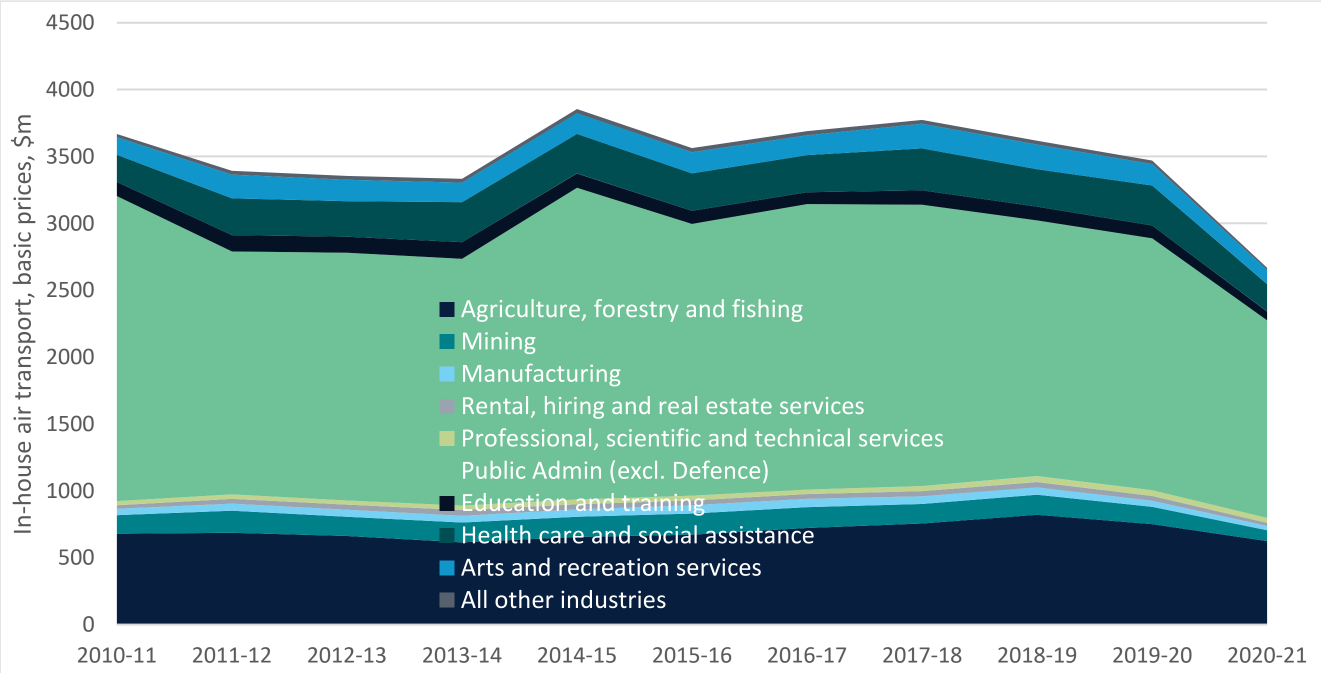
In other words, where a business operates an aircraft to produce or supply its output, this will be classified as in-house air transport. From 2010–11 to 2019–20, in-house air transport contributed to 11% of air transport's total GDP contribution on average. This jumped to 37% in 2020–21, when COVID travel restrictions were in place, halting a great deal of for-hire air transport. In 2018–19, the last full year before COVID restrictions on transport were imposed, total in-house air transport contributed $3.6 billion to annual economic activity.

For most components of the aviation industry, this definition lines up with the stricter ICAO definition of general aviation.

The main difference is that in-house air transport includes Defence, which is easily the largest user of in-house air transport and is excluded from the definition of general aviation. Public Administration and Safety, of which Defence is a part, contributed $2 billion to economic activity in 2018–19. Since GA only applies to civilian aircraft, Defence activity needed to be separated out. The 2021–22 Supply Use tables indicate that 23% of intermediate inputs, 17% of compensation of employees and 35% of gross operating surplus generated by in-house aviation activity in Public Administration and Safety is attributable to Defence. There is little variation in these percentages over time. The remaining inputs – approximately 79% of Public Administration and Safety – are attributable to Federal, State and Local government activities, and Public Order, Safety and Regulatory Services.

Based on this, the annual production of in-house civilian air transport by industry is shown below.

Figure 4: In-house air transport 2010–11 to 2020–21, excluding Defence



Source: Modelling based on Table 4, Australian Transport Economic Account: An Experimental Transport Satellite Account, ABS (2023)

Public Administration and Safety is the largest user of in-house air transport, worth $1.9 billion in 2018–19 across a wide range of uses. This covers operation of aircraft by police, national parks, emergency services, search and rescue, local, state and Federal governments. The second most significant is Agriculture, Forestry and Fishing, worth $821 million, 2018–19. Health care and social assistance used $281 million in in-house air transport, predominantly transporting sick or injured people for treatment. Arts and Recreation Services was worth $184 million, Mining $150 million and Education and Training $104 million.

Outcomes and conclusions of using ATEA to estimate GA

While these estimates are helpful in understanding the value of GA under a strict interpretation of the definition, it is not possible to say that this is a robust estimate of the value of GA in Australia. Some activities that are classified as GA according to the ICAO definition are not classified as in-house air transport by the ATEA; and vice versa. For example:

- Sightseeing flights are classified as for-hire air transport, not in-house, by the ATEA, but the narrow ICAO definition classifies these as GA.

- From 2014–22 an average of over 18,000 hours were flown each year for pipeline or powerline surveying according to BITRE's Australian Aviation survey, but the ATEA shows no contribution of in-house air transport in Electricity, gas, water and waste services.
- Air ambulance is included in in-house air transport if the hospital/health provider is the operator of the aircraft; if the health provider charters an aircraft to collect a patient for treatment this is not in-house air transport.

3.3 Inclusions/exclusions in definitions and values of GA

The two main data sources used to estimate the economic activity of GA – the Australian Transport Economic Account (ATEA) and the data extracted from the Business Longitudinal Analysis Data Environment (BLADE) do not perfectly line up with any definition of GA: either the narrow version used by ICAO which excludes small charters, or the broader definition of GA used by CASA and the GAAN which includes small charters and some of the businesses that support GA. For example:

- Pleasure/personal air transport and RPAS are not included in either set of economic estimates despite inclusion in both narrow and broad definitions of GA.
- The ATEA estimates do not include commercial joy flights, sightseeing or parachute dropping.
- The BLADE estimates include large charters.

Table 2 shows the activities that are included and excluded from each definition of GA, and whether these activities are included in the economic estimates from the two datasets.

Despite this, they give a broad range of likely values for GA's impact on economic activity in Australia.

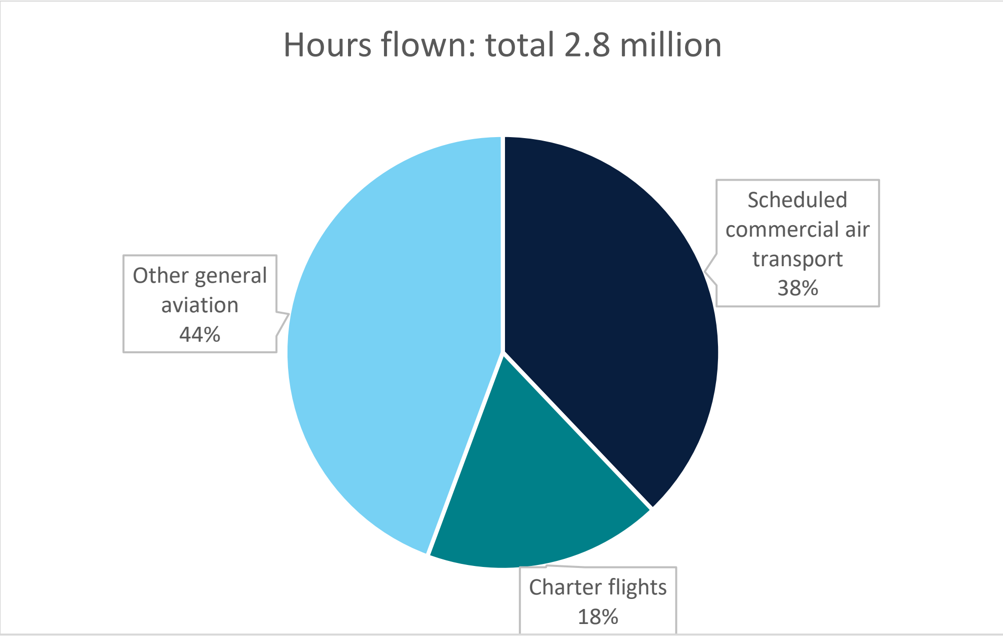
Table 2: Narrow (ICAO) and broad (GAAN) definitions of GA, and inclusion in economic estimates

	Included in economic estimates based on ATEA Value = $3.6 billion	Included in economic estimates based on BLADE Value = $10.2 billion
Included in ICAO definition		
Self-fly business aviation	✓	✓
Aerial work	✓	✓
Instructional flying	✓	✓
Sport and pleasure flying:		
Joy flights, sightseeing	X	✓
Parachute dropping	X	✓
Other hired flights	X	✓
Pleasure/personal transport	X	X
Other GA flying	✓	✓
Included in GAAN definition		
Small passenger charters	X	✓
Small freight charters	X	✓
Air ambulance	✓	✓
Not included in either definition		
Scheduled passenger flights	X	X
Scheduled freight only flights	X	✓
Large passenger/freight charters	X	✓
Military flights	X	X
RPAS activity	X	X

3.4 Impacts of GA, from other measures of flying activity

Another way of looking at aviation activity is to look at the number of hours flown and aircraft registered by purpose. While a commercial flight on a Boeing 737 can undoubtedly generate much more economic activity than a small agricultural sprayer or a firebombing helicopter, the total hours flown and number of aircraft in charter flights and other general aviation exceeds hours flown and aircraft numbers in scheduled commercial aviation. Figure 5 shows that of the 2.8 million hours flown by aircraft in Australia in 2022, 18% were charter flights, 44% were GA flying (excluding charters) and 38% were scheduled commercial air transport.

Figure 5: Hours flown in 2022 by broad flying activity



Source: BITRE (2023) Australian Aircraft Activity Survey 2022

Several types of aircraft are used in aviation in Australia. While the great majority of GA aircraft are single engine, twin engine aircraft are widely used in GA for own business transport, flight instruction, charter, and aerial work.

Fixed wing, single engine aircraft are smaller airplanes, and are mostly used for GA (instructional flying, personal and pleasure transport and own business flying, for example) or non-scheduled commercial air transport, also known as charter transport. They may also be used for some small RPT flights. Rotary wing aircraft (helicopters) are largely used in agricultural mustering, other aerial work and passenger charter transport. These aircraft are classified as GA aircraft in the AAAS but as shown in Table 3 below, they can perform a mix of GA and commercial aviation activities.

Hot air balloons, gyroplanes, ultralights, gliders and hang gliders are used for sport and pleasure flying, performing exclusively GA activities.

Table 3: General Aviation aircraft in Australia, 2022

	Fixed wing, multi engine	Fixed wing, single engine	Helicopters	Balloon/ Airship	Sports and recreational aircraft
	Regular scheduled passenger/ freight flights, some charters	Charters, instructional flying, own business flying, pleasure, small RPT	Charters, agriculture, other aerial work	Sport and pleasure flying	Sport and pleasure flying (hang gliders, ultralights, gyroplanes, etc)
Type of activity	Commercial aviation, some GA incl. charter	General and commercial aviation	General aviation, charter	GA	GA
Number of aircraft	11,347	9,046	2,386	406	8,253
Hours flown (thousands)	**1,479.3**	**868.5**	**524.7**	**7.8**	**353.1**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

In 2022, 9,526 aircraft were used in GA flying (excluding charters) for a total of 1,277.5 thousand hours of flying, compared to 2,348 aircraft flying in commercial air transport for 1,602.7 thousand hours.

Non-scheduled commercial flights; also known as charter flights, are considered separately from GA in the Aviation Activity Survey. Charter flights flew fewer hours than scheduled flights, but with far more aircraft. Passenger charters used 1,780 aircraft in 2022, while scheduled domestic flights used 634 aircraft and international flights used 170 aircraft. Only seven aircraft were used for scheduled freight only flights, while 134 aircraft were used for freight only charters. More aircraft were used for air ambulances (198) than for scheduled international flights (170).

In the Australian Aircraft Activity Survey, GA consists of five different sectors of flying. Aerial work (548,027 hours, up 8.3 per cent compared to 2021), own use business (136,934 hours, up 10.5 per cent compared to 2021), instructional flying (337,090 hours, up 11.1 per cent compared to 2021), sport and pleasure flying (223,185 hours, up 27.9 per cent compared to 2021), and other flying (32,259 hours, down 18.9 per cent compared to 2021). Charter flights flew 511,249 hours.

The largest flying activity in aerial work was agricultural mustering, recording 158,658 hours. Commercial instructional flying activity[8] made up the majority of the instructional flying sector, recording 294,125 hours. Within the sport and pleasure flying sector the largest flying activity was pleasure and personal transport, recording 124,256 hours (Figure 6).

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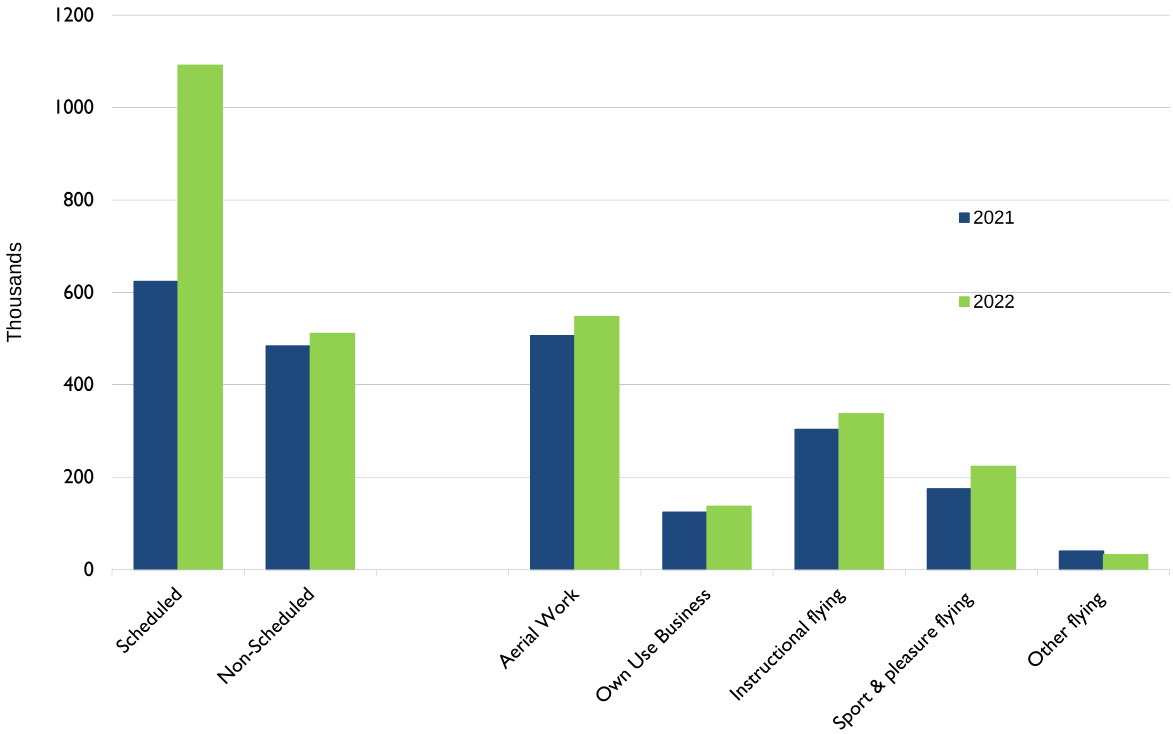
[8] Instructional flying is commercial if a fee is charged for the service, or non-commercial if no fee or payment is charged, for example, free instruction provided by a friend or relative. Instructional flying is a supervised training for the issue or renewal of a licence or rating, aircraft type endorsement or conversion training. Also includes non-commercial solo navigation exercises conducted as part of a course of applied flying training.

Figure 6: Hours flown by activity, 2021 and 2022 calendar years



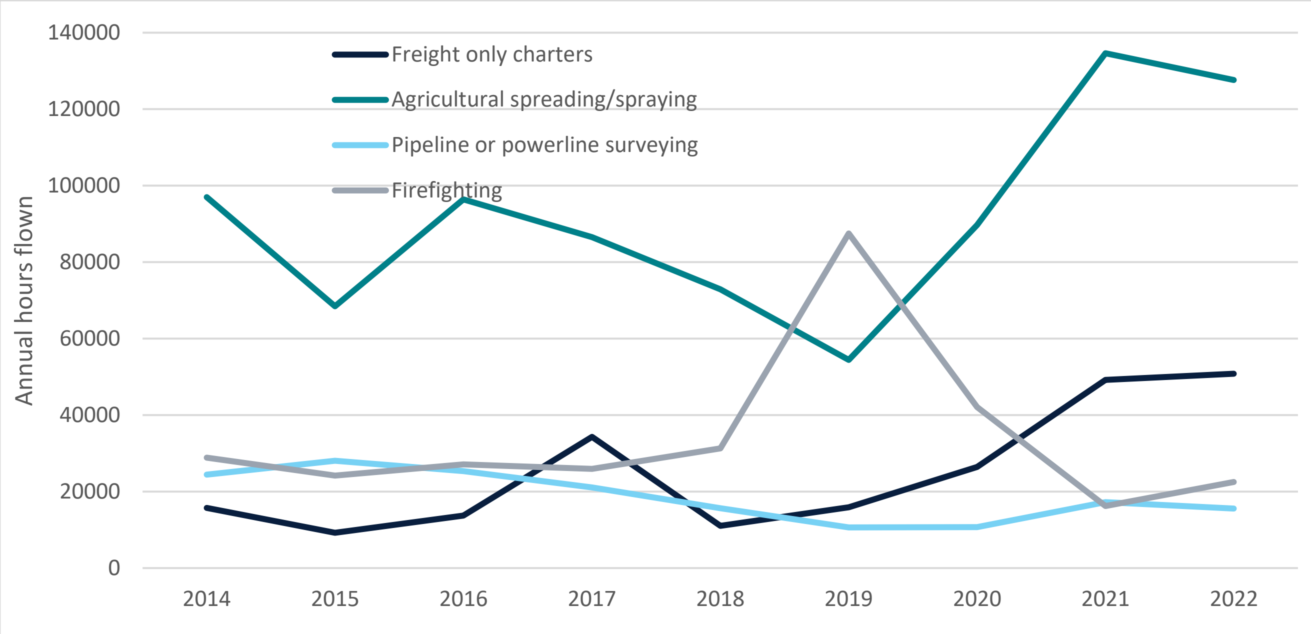
Source: BITRE (2023) Australian Aircraft Activity Survey 2022

The COVID-19 lockdowns had less of an impact on the number of hours flown by aircraft used in GA, compared to those exclusively used for commercial aviation. The drivers of GA demand can be very different from the drivers of scheduled passenger and freight flights, and they vary by the type of GA. Figure 7 shows the number of hours flown for selected GA purposes from 2014 to 2022.

Demand for freight only charters jumped during the COVID years, as fewer scheduled passenger flights with some freight capacity increased the need for freight only flights. Passenger charters also showed an increase during COVID years as fewer RPT flights were available.

Agricultural spreading/spraying boomed during the COVID years, driven not by COVID impacts but the La Nina conditions bringing rain to the east coast of Australia, boosting agricultural productivity and increasing the need for fertiliser and pesticide application to crops. The inverse of this is the surge in firefighting hours in 2019 to manage the Black Summer bushfires in late 2019 and early 2020. The increase in rainfall resulted in fewer firefighting hours in 2020 and beyond, with firefighting hours still lower in 2022 than any time in the 2010s.

Figure 7: Trends in hours flown for select GA uses

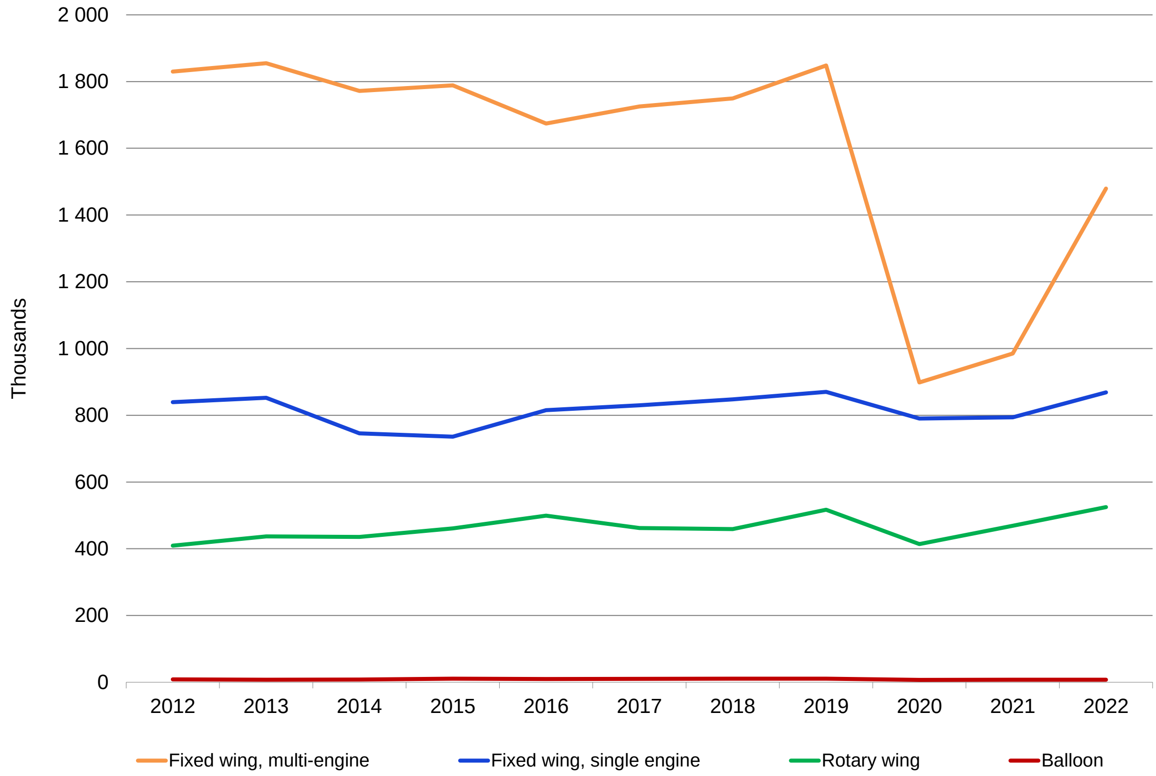


Source: BITRE (2023) Australian Aircraft Activity Survey 2022, selected aircraft use classifications

Finally, hours flown for pipeline and powerline surveying have trended down since 2015, possibly due to uncrewed aircraft or RPAS taking over some tasks that would have otherwise been completed by crewed aircraft.

Hours flown by fixed wing, single engine aircraft and rotary wing aircraft fell in 2020 compared to 2019, and remained lower than 2019 levels in 2021 before recovering in 2022. However, the fall in hours flown between 2019 and 2020 was less than 20 per cent for GA aircraft, compared to almost a 40 per cent drop in hours flown for fixed wing, multi engine aircraft. This highlights how comparatively resilient general aviation activity (mostly fixed wing single engine and rotary wing aircraft activity) was during the pandemic compared to RPT flights (mostly fixed wing, multi engine aircraft). This is due to the use of GA across a wide range of industries, as shown in Figure 4.

Figure 8: Hours flown by aircraft type, 2012–22



Source: BITRE (2023) Australian Aircraft Activity Survey 2022

Summary of findings

This section has drawn on two sources to highlight the economic significance of general aviation. Estimates of the economic impact of in-house aviation activity from the ABS' Australian Transport Economic Account suggest that a conservative, direct economic impact of general aviation that excludes all passenger charters could be around $3.6 billion in 2018–19, excluding flow on economic impacts.

Estimates of the turnover of businesses engaged in general aviation, including passenger charters and freight only flights amount to $10.2 billion in 2018–19, however records could not be matched for around 20-25 per cent of businesses.

These economic estimates also exclude private use of aircraft, which represents around 10 per cent of all hours flown by aircraft in Australia, and exclude RPAS.

4. Indirect or flow on impacts of GA

GA has economic impacts across a broad range of industries, well outside the transport sector.

The previous section estimated that the direct economic activity generated by general aviation was worth between $3.6 billion and $10.2 billion in 2018–19, depending on the extent to which charter flights are included in the definition of general aviation.

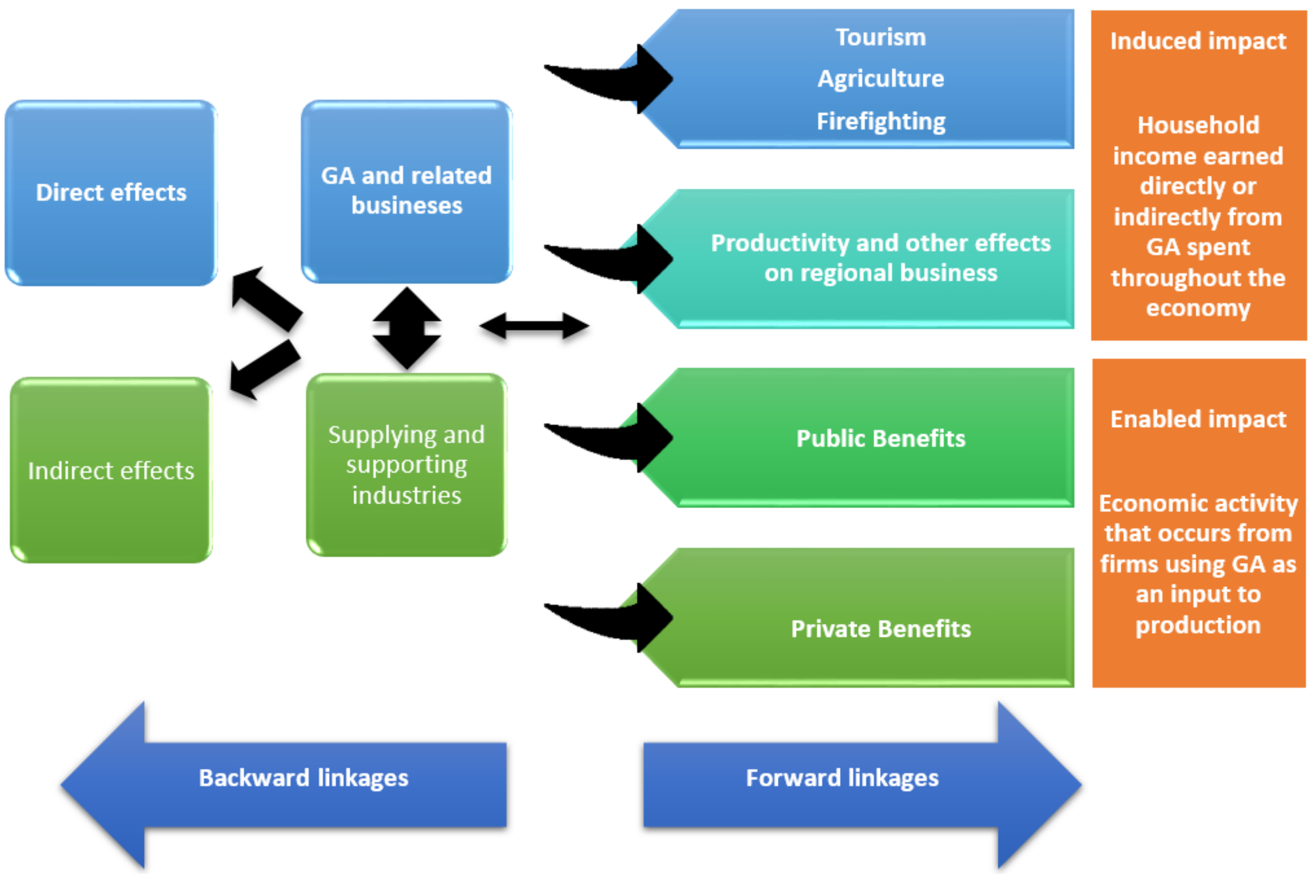
These economic impacts generate further activity throughout the economy, by generating demand for inputs such as fuel and maintenance, enabling new industries using GA as a production input, and wages generating general spending in the economy.

This section goes into more detail on how GA supports and enables other sectors of the economy.

4.1 A conceptual framework for the economic impact of GA

The impacts of GA in the wider economy can be illustrated using a modified version of a proven model (PwC, 2020, cited in GAAN, 2020), structured around four categories. Backward linkages are the economic activity generated by GA itself (direct effects) and from GA operators using inputs such as fuel, maintenance, airports and so on to operate their businesses (indirect impacts). Forward linkages are the economic activity generated from industries using GA as an input (enabled impact) and from GA workers spending their wages in the wider economy (induced impact). Total impacts are the sum of direct, indirect, induced and enabled effects. These impact categories are summarised in Figure 9.

Figure 9: Conceptual economic framework of GA



4.2 GA backward linkage effects

Direct effects account for the immediate economic activity within the GA sector. In economic terms, direct economic effects arise from all GA flight operations, flight school instruction and other directly GA related activities.

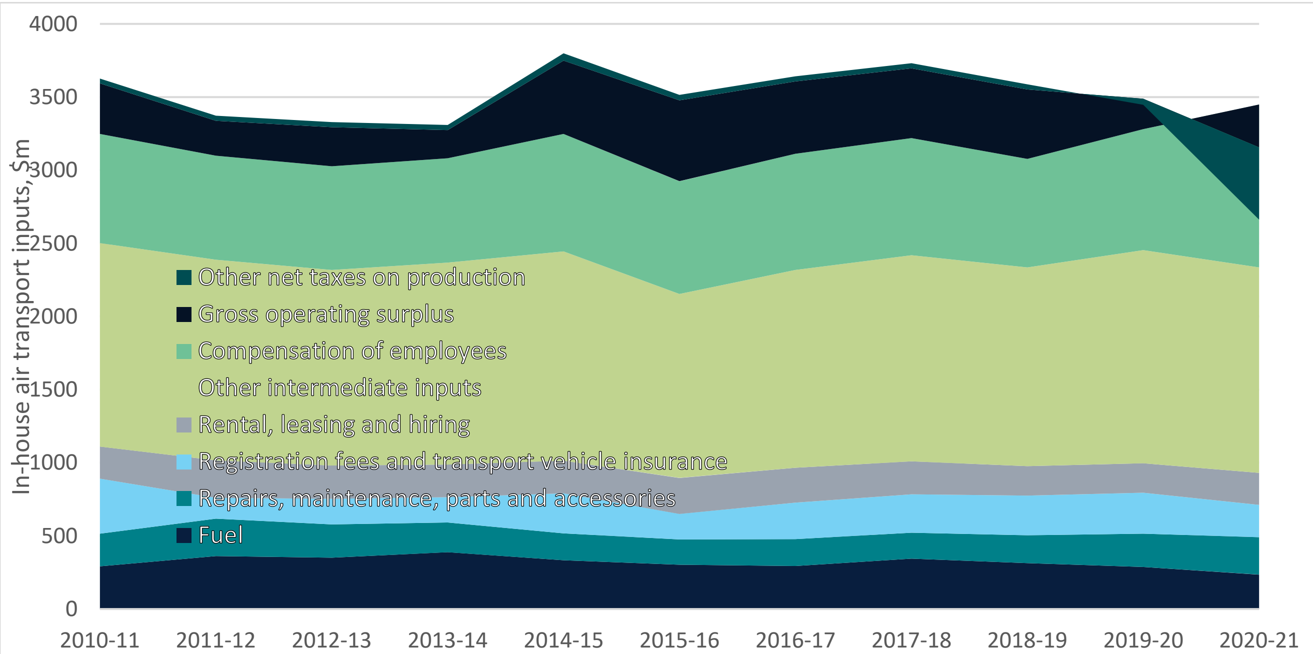
Indirect effects emanate from direct effects, encompassing the economic value generated across the supply chain by downstream sectors that thrive due to the existence of the GA industry. Indirect income and employment stem from industries that either supply goods or offer services to support the GA sector. These indirect consequences exhibit a positive correlation with the direct impacts. Examples of indirect impacts encompass activities like maintenance, aircraft and component manufacturing, oil refining for jet fuel, refining inputs for aircraft parts as well as general business support for aviation businesses such as legal and accounting services, among others.

Figure 4 showed estimates that in-house air transport consumed during the production process were $3.6 billion in 2018–19, based on ATEA data. This $3.6 billion is generated by the use of inputs such as pilot labour, maintenance labour, fuel, parts and so forth, and the total value of these inputs is estimated by the ATEA. These inputs are not separated by industry and are provided for in-house aviation as a whole. These estimates indicate that in 2018–19:

- The largest cost faced by in-house aviation is other intermediate inputs ($1.4 billion in 2018–19).
- Employee compensation came to $742 million in 2018–19; $1.1 billion in 2020–21. Gross operating surplus (profits) came to $473 million in 2018–19 and -$293 million (i.e., a $293 million loss) in 2020–21).
- $314 million was spent on fuel in 2018–19 and $236 million was spent in 2020–21.

In 2020–21, when COVID measures were operational, profits fell to -$293 million while compensation of employees grew to $1.1 billion. Net taxes on production fell from a positive figure $36 million in 2018–19 to a negative figure -$493 million in 2020–21, which is likely related to JobKeeper and other COVID-era business supports. Figure 10 shows how economic activity in GA flows through economic activity in wages, profits, fuel, maintenance and so forth.

Figure 10: Inputs into in-house aviation



Source: Modelling based on Table 4, Table 6, Australian Transport Economic Account: An Experimental Transport Satellite Account, ABS, 2023; Census 2016,2021

4.2.1 Supplying and supporting industries

GA has significantly contributed to Australia's economy by creating demand for critical infrastructure. Over time, a specialised industry with backward linkages has developed to cater to the requirements of GA businesses nationwide. These backward linkage industries can be categorised into the following key groups:

Aircraft manufacturing and repair services

Aircraft manufacturing and repair services in Australia generated revenue in excess of $US2.2 billion ($A3.2 billion) in 2022, reflecting a substantial decline of approximately 40% in total revenue from a peak in 2015–16. The decline has been apparent each year since 2015–16 and is driven by a mix of factors including cheaper offshore options and also a preference to centralise some maintenance, repair, and overhaul (MRO) activities overseas in the U.S. Exports were climbing modestly but steadily until 2020–21 when they fell substantially by some 35%. Imports had been increasingly steadily also until 2020–21 when they fell by 20% (International Trade Administration, 2024).

In the fiscal year 2016–17, the aircraft manufacturing and repair services sector made a significant contribution of $2 billion to the Gross Value Added (GVA) in the Australian economy. When considering its interconnections with various sectors of the Australian economy and the ensuing ripple effects, this industry annually contributes an additional $0.9 billion in associated value added. This sector is comprised of 937 registered businesses and provided employment to 13,396 individuals across the nation in the same fiscal year. Additionally, 4,889 more jobs were created in support of this industry. Notably, in the 2017–18 fiscal year, the Aircraft Manufacturing and Repair Services sector achieved sales revenue of $4.8 billion. Furthermore, in 2016–17, the industry contributed $2 billion through merchandise exports (KPMG, 2019). Note that these estimates do not differentiate between GA aircraft and fixed wing, multi engine aircraft.

Regional airports

Deloitte Access Economics reported that airport activities generated 170,000 jobs and $27 billion in value added to the Australian economy in 2022, while enabling a total of $105 billion in economic activity through tourism, freight and exports (Deloitte Access Economics, 2023).

The Aviation White Paper highlighted the importance of regional airports in supporting GA. While smaller population centres in regional Australia are often not commercially viable for regular passenger transport air services, these communities are reliant on local airports and airstrips for air services such as charter flights, freight and mail, medical transport, private business transport, agricultural aerial services and aerial firefighting. In some communities, air services are the only way to access fresh food and transport to major cities when roads are cut off during the wet season or due to emergencies.

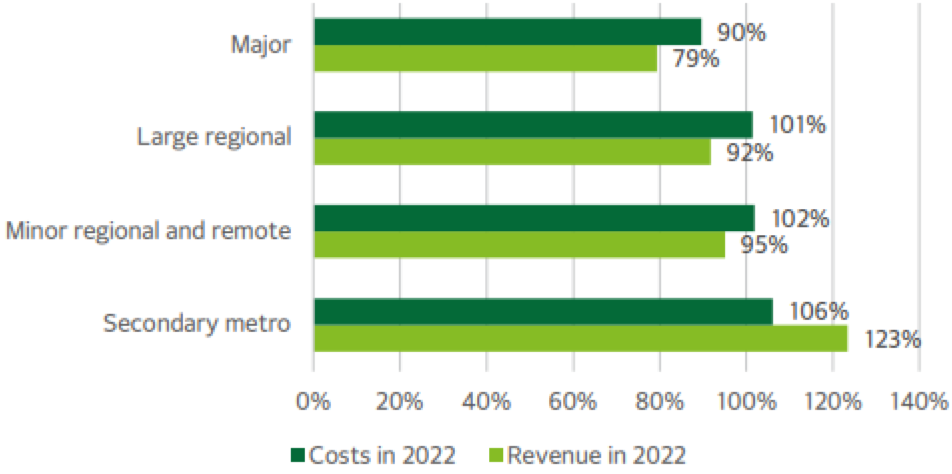
Between 1989 and 2019, the number of regional routes fell from 458 to 291 and the number of remote routes fell from 264 to 163. The number of airlines serving regional aerodromes has also decreased from 53 in 1984 to 21 in 2024.

Around 350 airports in Australia are located in inner regional, outer regional, remote or very remote locations. Most of these are owned by local councils, which can have difficulty raising the funds for their maintenance.

In addition to these, there are around 2,000 other small airstrips in Australia. Three quarters of these are owned privately or by local, state and territory governments, and are located in regional and remote areas.

Deloitte Access reported that regional and remote airports had experienced both an increase in costs and a decline in revenue in 2022 compared to 2019.

Figure 11: Costs and revenues of airports in 2022 as a percentage of 2019



Source: Deloitte Access Economics survey of airports, n=24
Note: Only airports that responded to the survey are included in these results

A large number of tenants located at the regional airports are GA operators and RPT operators. According to the Department of Treasury, regional airports across Australia invested $185 million in 2014–15 to maintain and improve operations. Regional airports across Australia employed 1,720 FTEs in 2014–15. These airports induced another $83.4 million in spending in the rest of the Australian economy with a linked or induced employment of another 2,750 FTEs in the rest of the Australian economy. Modelling by ACIL Allen prepared for the Australian Airports Association on regional airports reveals that using Computable General Equilibrium (CGE) and input-output analysis, $1 of airport expenditure results in an additional $0.32 in induced spending in the state/territory in which the airport is located and an additional $0.13 in induced spending in the rest of Australia (ACIL Allen, 2016).

Across Australia, airports house more than 500 aircraft available to be deployed for firefighting duties. Regional airports directly employ over 1,700 full-time workers and support an additional 2,750 jobs. Over 6,000 emergency evacuations are facilitated by regional airports a year.

Despite the social and economic benefit, regional airports are also facing great financial challenges and had an overall 6 per cent funding gap in 2014–15 between the expenditure required to operate the airport and subsequent revenue collected from its operations. The funding gap[9] was 3.4 per cent for Regular Public Transport (RPT) airports and 45.6 per cent for non-RPT airports (most of them are related to GA). Financial expenditures at regional airports are expected to rise by 38 per cent over the next decade and this means that the expected annual budget deficit will be $17 million per year.

4.3 GA forward linkage effects

The induced impact represents economic activity that arises from households spending their wages, salaries, and income earned from GA-related endeavours. The initial economic effects, comprising output, income, and employment generated by direct and indirect impacts, can trigger subsequent cycles of expenditure and household spending across various industries. For example, a pilot in a regional area will spend her salary on groceries at the local supermarket and sports lessons for her children, which will induce income and jobs in the supermarket and sports teachers. This ripple effect, often referred to as a 'multiplier' impact of GA activity, can be quantified using input-output models.

Numerous sectors use GA as an input into their production processes, which generates enabled impacts. That is, their businesses depend on using GA in order to produce their goods and services at a particular quality,

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[9] Revenue minus expenditure.

volume and price. In fact, certain industries may not even thrive in Australia without the presence of a robust GA sector. For example, a mining firm may not be able to explore remote areas for mineral deposits without GA aircraft, so GA is enabling economic growth in the mining sector. Some crops rely on aerial application of pesticides to rapidly respond to disease outbreaks, enabling agricultural economic growth, and the prospect of a helicopter tour over Uluru and Kata Tjuta enables economic activity in Accommodation and Food Services around Alice Springs and Yulara.

The uses of small aircraft as inputs into economic activity are many and varied. This section highlights how GA creates forward linkage economic impacts, which allow industries to produce more through their use of GA. This section summarises major users of GA in Australia and the aviation jobs they directly create.

4.3.1 Agriculture

The engine rooms of Australian agriculture are generally in regional and remote areas, where land for crops, animals and plants is widely available and relatively cheap, with 55% of Australia's land used for agriculture. Cropping and grazing farms tend to require large farm sizes. The average farm in Australia is over 4,000 hectares (ABS 2017), with the largest cattle stations in Australia over a million hectares (LaScaLa 2018). Distances of that magnitude make aviation an essential part of farm operations.

- In cropping industries, small aircraft are often the most efficient method of applying pesticides (crop dusting), fertiliser (top dressing) and aerial seeding in large open fields.
- In livestock industries, aircraft can be used for mustering or simply travelling from one area of a large station to another.
- Many agricultural industries are remotely located, far from access to services and assistance in case of emergency. Services such as the Royal Flying Doctor Service, search and rescue, and fire services are essential to ensuring that people who work on these farms can receive assistance when needed.

Agriculture flying represents around a quarter of GA aircraft, hours flown and landings, based on the 2022 AAAS. Agricultural mustering was the most common use of GA aircraft in Agriculture, followed by spreading/spraying applications. In 2018–19, in-house air transport in the Agriculture, Forestry and Fishing industry was worth $821 million, based on the ATEA.

Table 4: Agriculture, Forestry and Fishing aviation activity, 2022

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Spreading/spraying	782	127.6	293.2
Mustering	820	158.7	165.4
Other agriculture	701	38.2	49.5
Total agriculture	2,303	324.5	508.1
Total GA	9,526	1277.5	1,913.0
Agriculture as a % of GA	**24%**	**25%**	**27%**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

Case study: Economic impacts of aerial application in agriculture

Aerial application of fertilisers and pesticides offers several distinct advantages over ground-based application, making it a preferred method for many agricultural operations:

- Crop Protection: Aerial application allows for precise and uniform coverage of crops, ensuring that pesticides and fertilisers reach all areas effectively, minimising damage to crops and maximising the effectiveness of treatments.
- Timeliness and efficiency: Aerial application is significantly faster than ground-based methods, enabling farmers to respond quickly to pest infestations or disease outbreaks. A single aerial application can cover thousands of hectares in a day, while a ground rig would take several days to complete the same task.
- Accessibility: Aerial application is not hindered by wet soil conditions, which can render ground rigs inoperable. This flexibility allows farmers to apply treatments even in challenging environments, ensuring timely crop protection.

Aerial agricultural application businesses can be approximately grouped into three different sizes:

- Large businesses, which have more than $6 million in turnover each year. These will generally have more than ten aircraft, several pilots, a business manager and several support staff. They will often have their own aircraft maintenance employees. They tend to have separate aircraft for firefighting and aerial agriculture. There are around half a dozen firms of this size.
- Medium sized firms have around five to ten aircraft. They will usually have an operations manager and a few pilots.
- Small (family owned or "mum and dad" operations) – one or two aircraft and pilots. These will hire contract pilots in for peak periods.

The majority of businesses have under $6 million in turnover each year; that is, small to medium businesses. These businesses mostly outsource their aircraft maintenance to specialised firms. Most businesses borrow to buy their planes rather than lease them or have rent-to-buy financing arrangements with banks. The Air Tractor 802 is a popular aircraft for aerial application in agriculture, carrying around 3,000 litres of liquid. As an approximate rule of thumb, an aircraft of this size can generate around $500,000 in revenue each year, depending on the type of operation.

4.3.2 Emergency services

Emergency services includes aviation activities aimed at saving property and lives from crime, accident, fire, flood, other natural disasters or people lost in remote areas. Several volunteer and charity organisations are involved in rescue as well as publicly funded organisations such as police. It includes activities such as:

- Searching for people who are lost or missing where there are large areas to search, e.g. ocean rescue, flood rescue, people missing in remote areas.
- Police aerial operations, including assistance with search and rescue efforts, road traffic operations and searching for fugitives.
- Firefighting activities, including travelling to and from firefronts and waterbombing aircraft, which allow bushfires to be reached far more quickly, particularly fires in areas inaccessible by road.

Emergency services uses 854 aircraft, or 9 per cent of GA aircraft and 1.3 million hours, or 4.3% of GA hours.

Table 5: Emergency services GA activity, 2022

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Search and rescue	104	12.6	13.1
Policing	69	19.7	13.6
Firefighting	681	22.5	26.1
Total emergency services	854	54.8	52.8
Total GA	9,526	1,277.5	1,913.0
Emergency services as a % of GA	**9.0%**	**4.3%**	**2.8%**

Note: Aircraft may have multiple uses so the sum of aircraft used for each purpose exceeds the total number of GA aircraft.

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

The interaction of firefighting and agricultural aerial operations

Small to medium agricultural application businesses frequently use their aircraft for firefighting in months when there is less demand for agricultural spraying. The same type of aircraft can be used for both operations.

In the cotton belt of Australia, it is common practice for pilots to spend the summer months (November to May) engaged in cotton spraying and then relocate to Greece for the fire season during the Australian winter. Aerial firefighting contracts can be lucrative, with a pilot potentially earning up to $250,000 for overseas fire season deployments.

4.3.3 Flying instruction

All licensed pilots in Australia, from an occasional user of recreational aircraft to the pilot of a major commercial airliner, have to learn how to fly. This typically involves hundreds of hours of flight instruction with an experienced pilot. Most instructional flying is commercial; that is, offered for a fee or payment through licensed flight schools or professional flying instructors, as opposed to non-commercial; that is, instruction provided for no payment, such as licensed pilot supervising a friend or family member in flight training. Flight instructors can work in mainstream educational institutions such as universities or technical schools, dedicated flying schools or even at airlines or airports. Institutions that offer flying instruction may also offer other aviation related education, such as aircraft engineering and maintenance courses.

In-house air transport in the Education and Training industry was worth $104 million in 2018–19, based on the ATEA. This does not include the value or economic impact of non-commercial instructional flying.

While instructional flying aircraft only represented 18% of GA aircraft, these aircraft were very busy as instructional flights made up 26% of total hours flown and 35% of total landings. Commercial instructional flights and aircraft made up a far greater share of total instructional flying than non-commercial flight instruction.

Table 6: Instructional flying GA activity, 2022

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Instructional flying - commercial	1,092	294.1	586.1
Instructional flying - non-commercial	613	43.0	82.8
Total instructional flying	1,705	337.1	668.9
Total GA	9,526	1,277.5	1,913.0
Instructional flying as a percentage of GA	**18%**	**26%**	**35%**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

4.3.4 Joy flights and recreational flying

Commercial or charter flights are those that provide transport for people or goods to get from A to B; in contrast, a joy flight takes passengers from A to A. That is, they are passenger flights where the purpose of the journey is to enjoy scenery from the air or the adventure of the flight itself. These are popular in locations with beautiful scenery, with joy flights offered from the Whitsundays to Lake Eyre to Margaret River.

Many charter operators will offer both joy flights and charter flights. The ICAO definition of GA includes the former and excludes the latter in its definition of GA, while the broader definition of GA includes both. The line between the two can be very uncertain. A leisurely sightseeing flight to a scenic, isolated location for a gourmet lunch and back again in the same day, or a scenic wine tour by helicopter are much more characteristic of a joy flight than a passenger charter.

Thousands of aircraft across Australia are flown by recreational pilots using aircraft for their own enjoyment or transport. Some of these aircraft might be useable for both recreational flights and personal transport, such as fixed wing two or four-seater aeroplanes; other aircraft are exclusively used for pleasure and recreation, such as gliders and hot air balloons.

While flying for recreation and personal transport is included in both definitions of GA, they are not included in either of the data sources used to estimate the economic impact of GA.

Most of Australia's GA aircraft are used at least in part for joy flights and recreational flying: 4,854 aircraft or 51% of total GA aircraft. These flights only make up 17% of total hours flown and 18% of landings. The bulk of these aircraft are used and owned for pleasure and personal transport, and the economic activity generated by this flying is not included in either the ATEA or BLADE estimates of economic activity in GA; although some of the maintenance costs of the aircraft may be shown in Table 1.

Table 7: Joy flights and pleasure flying GA activity, 2022

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Glider towing	63	4.7	29.2
Parachute dropping	307	13.9	33.4
Aerobatics	163	3.6	7.1
Joy flights/sightseeing charters	488	59.9	102.9
Pleasure and personal transport	3419	124.3	149.8

	Number of Aircraft	Hours flown (‘000s)	Landings (‘000s)
Other sport and pleasure flying	414	14.3	19.8
Total GA	9526	1277.5	1913.0
Joyflights and recreational flying as a percentage of GA	**51%**	**17%**	**18%**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

4.3.5 Other aerial work and charters, aerial services and own business travel

GA is an essential or beneficial input for a range of other industries, including sling loads for construction, surveying pipelines and powerlines, mining surveying and advertising; also known as aerial work.

In some larger and high value businesses, having a private plane is a worthwhile investment to ensure executives can travel quickly at short notice, staff can easily access regional or remote locations or to facilitate connections with high value clients.

Finally, other flights that are included in general aviation include test flights (testing new aircraft, software or aircraft equipment); ferry flights (moving an aircraft back to its base, to a customer or to a new base); and community service flights (volunteers flying people or goods for a benevolent purpose).

Seventy-one per cent of GA aircraft in Australia are used for some other form of aerial work or aerial services, with the most common of these being for own business travel. These other uses in total make up 27% of hours flown and 18% of landings.

Table 8: Other aerial services GA activity including own business travel, 2022

	Number of Aircraft	Hours flown (‘000s)	Landings (‘000s)
Construction - sling loads	36	2.6	2.9
Construction - other	8	0.7	0.7
Photography	116	13.0	9.0
Pipeline or powerline surveying	564	15.6	16.3
Other surveying	623	44.4	30.4
Observation and Patrol	546	24.8	12.9
Advertising	9	0.5	0.4
Other aerial work	824	67.3	94.7
Own business travel	2,339	136.9	132.6
Community service flights	72	2.6	2.4
Test flights	403	2.1	5.1
Ferry flights	798	13.1	10.4
Other flights	470	17.0	23.1
Total other aerial services	6,808	340.6	341.1

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Total GA	9,526	1,277.5	1,913.0
Other aerial services as a percentage of GA	**71%**	**27%**	**18%**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

Case study: the economics of own business travel

Firms across a broad range of industries use private business aviation as part of their regular business activities, encompassing industries from health, logistics, supply chains, banking and finance, the arts, agriculture and mining.

Why do firms choose business aviation?

GA is a broad term which is typically understood to encompass unscheduled civil aviation operations as opposed to scheduled (airline) operations. Business aviation is considered a part of GA but only one small part of many. Business aviation is not a low-cost transport option; instead, it offers time-saving and greater flexibility compared to RPT flights or larger charters. While dedicated aircraft management companies strive to generate profits through the operation and management of business jets, the underlying purpose of business aviation remains centred on efficiency and convenience for the individual or business.

Business aviation can allow faster access to multiple regional locations. For example, a private aircraft allows company executives to visit multiple regional locations in one day, while visiting the same number of locations using RPT would take several days. Some of these locations may be inaccessible using RPT. Since some regional airports have shorter runways or other limitations, smaller business jets emerge as a more practical transportation option for these routes.

Safety and security are paramount considerations for businesses opting for private jet ownership or charter. Companies and high-profile individuals often prioritise confidentiality during travel and this plays a role in their decision. Additionally, business aviation provides flyers the autonomy to have greater control over the hire of personnel operating their aircraft, enabling them to engage pilots and maintenance personnel in whom they have the greatest confidence.

How a firm can use business aviation in their operations

Business aviation can be set up for a firm in two ways:

- The firm can set up their own flight department, hiring its own pilots, organising its own travel, maintenance etc. The majority of these firms own their aircraft. This aligns with the ABS' definition of 'in-house air travel'.
- The firm owns its own aircraft and engages a management company to employ pilots and manage aircraft scheduling, maintenance, safety and compliance, resourcing, billing, accounts, etc., on behalf of the owner.

Companies may use their aircraft for both commercial and non-commercial purposes. In both categories, the owner may establish the ability to conduct charter operations in their aircraft in accordance with Australia's flight operations regulations. Aircraft ownership is not always a viable option for Australian businesses. In these cases, companies may choose to meet their business travel needs through the ad-hoc charter of aircraft owned by others.

The majority of Australian business jets are managed under the second category. Some Australian businesses, listed companies in particular, are less inclined to own private jets due to the perception of extravagance, prompting them to favour ad-hoc charter. This contrasts with the US, where companies like Costco and Coca-Cola maintain their own aircraft fleets. Some companies will use their aircraft for both commercial and non-commercial purposes.

4.3.6 Charter flights

The Australian Aviation Activity Survey uses the narrow or ICAO definition of GA, which includes non-scheduled transport under commercial air transport. They are discussed here to maintain consistency with the broader definition of GA. This data does not distinguish between small and large charter flights.

In 2022, passenger transport charters made up the bulk of activity in non-scheduled commercial air transport, representing 82% of charter aircraft and 65% of flying hours. Air ambulances were the second most significant contributor to charter flights, representing 22% of charter flying hours.

Table 9: Charter flights, 2022

	Number of Aircraft	Hours flown ('000s)	Landings ('000s)
Passenger transport charters	1,780	334.4	407.6
Air ambulance	198	115.8	139.8
Freight only	134	50.8	45.0
Other commercial air transport	66	10.2	17.4
Total charter flights	**2,178**	**511.2**	**608.9**

Source: BITRE (2023) Australian Aircraft Activity Survey 2022

Summary of findings

The approximately $3.6 billion to $10.2 billion generated by GA in 2018–19 has wider, flow on impacts throughout the economy, although these can be difficult to calculate accurately.

Economic activity generated by backward linkages from GA includes approximately $1.4 billion in other intermediate inputs, $314 million on fuel, $190 million in repairs, maintenance, parts and accessories, $271 million in registration and insurance and $742 million in compensation of employees in 2018–19.

Across the aviation industry as a whole, aircraft manufacturing and repair generated revenue of $3.2 million, and airports as a whole generated $27 billion in value added (excluding tourism and exports).

Forward linkages enable economic activity in a wide range of industries. Table 10 shows the mix of aircraft uses, hours flown and landings by flight purpose in GA (note that aircraft may be used for more than one purpose, so the number of aircraft percentages do not sum to one), which indicates the range of industries that experience induced impacts from GA.

Table 10: The mix of GA activity in Australia, 2022

	Number of Aircraft*	Hours flown	Landings
Agriculture as a percentage of GA	24%	25%	27%
Emergency services as a percentage of GA	9%	4%	3%
Instructional flying as a percentage of GA	18%	26%	35%
Joy flights and recreational flying as a percentage of GA	51%	17%	18%

	Number of Aircraft*	Hours flown	Landings
Other aerial services as a percentage of GA	**71%**	**27%**	**18%**

* Some aircrafts are used for more than one activity, therefore the column totals exceed 100%.

Source notes. Australian Aircraft Activity Survey, 2022

5. RPAS: an emerging technology with a growing impact

RPAS are increasingly used in agriculture, transport, logistics, construction, mining and recreation to conduct aerial surveys, take photographs or deliver goods and services.

They can be considered a new and growing form of GA that is accessible to members of the public. Larger RPAS have been designed to conduct deliveries of goods, conduct large aerial surveys, spray fertiliser or pesticide on fields and a growing range of other uses. Other terms used are RPA (Remotely Piloted Aircraft); uncrewed aircraft, UAV (Uncrewed Aerial Vehicle) or UAS (Uncrewed Aerial Systems).

CASA recently introduced a commercial RPAS registration and accreditation scheme [10], as a way to monitor the safe and lawful operation of RPAS in Australian airspace, under Civil Aviation Safety Regulation (CASR) 101.030 (2). While some countries do not classify RPAS as GA, RPAS are able to perform some tasks that had previously relied on manned aircraft, such as surveying.

The use of RPAS has grown significantly in Australia in recent years, and it now has almost 35,000 distinct RPAS registrations compared to just under 16,000 aircraft registrations. CASA has issued three times as many Remotely Piloted Aircraft Operator's Certificates (ReOCs) as Air Operator's Certificates. The sector has grown rapidly with two-thirds more ReOCs existing in 2022 than in 2017, while the number of licensed remote pilots has doubled since 2018 (CASA, 2022).

In 2020, Deloitte Access Economics was commissioned by the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) to investigate the economic benefit of RPAS in Australia. As shown in Figure 12, Deloitte Access Economics forecasts suggest that by 2040 the RPAS technology could add $14.5 billion to the Australian economy through GDP expansion in a medium scenario, as opposed to around $9 billon in a low uptake scenario and over $20 billion if uptake is high. A thriving RPAS economy also brings jobs with it – 5,500 full time equivalent (FTE) jobs per annum (2020–40) and direct cost savings at a 7% real discount rate of $9.3 billion across all sectors between 2020 and 2040. Figure 13 represents state and territory distribution of economic potential of using RPAS over 2020 to 2040. The modelled national gains of $344 million in real GDP are concentrated in non-metropolitan areas.

5.1 RPAS and 'jet zero'

The Australian Government has established the Australian Jet Zero Council which aims to inform policy settings to reduce carbon emissions in aviation, as part of the national emissions reduction targets of 43 per cent below 2005 levels by 2030 and net zero emissions by 2050[11]. Aviation is a 'hard to abate' sector in that technology does not yet exist that can replace all aviation activities with net zero alternatives. Sustainable aviation fuel, electric and hydrogen powered aviation are all considered as future options.

Some GA activities that are currently conducted using standard aircraft could potentially switch to RPAS, for example, aerial photography and some localised surveying. Since RPAS run on electricity – which is rapidly transitioning to renewable and carbon neutral sources – switching some traditional aerial operations for RPAS operations could assist in achieving 'jet zero' targets.

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[10] All RPAS more than 250 grams (other than 'micro') must be registered and any drones flown for commercial or business reasons must be registered, regardless of their weight. People flying and/or supervising drones more than 250 grams must undertake a free online education and accreditation course (excluding remote licensed pilots).

[11] Aviation White Paper (2024), page 27

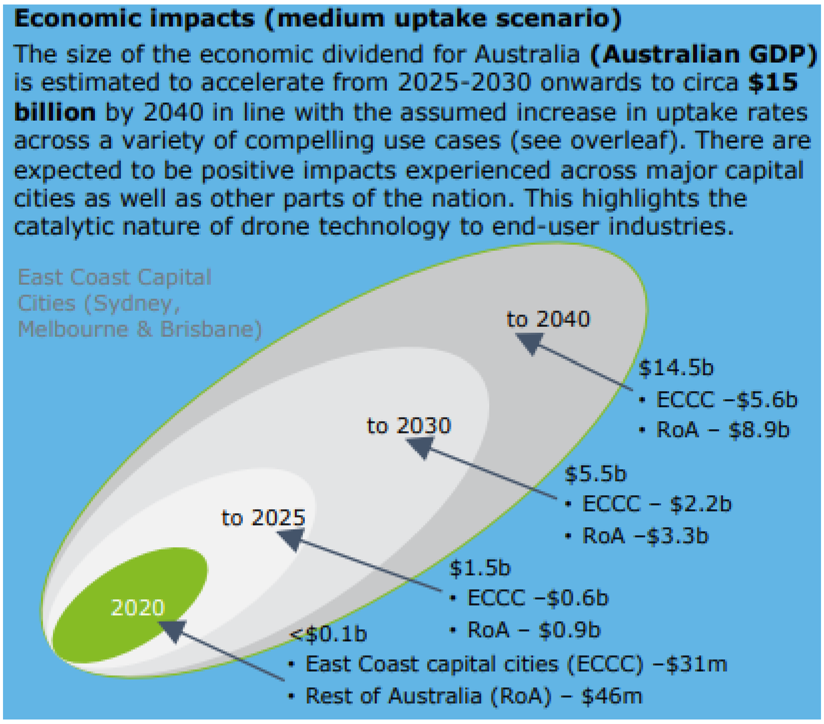
5.2 The estimated future economic potential of RPAS

Several studies have reviewed the potential of RPAS to create new services or replace existing services currently provided by other methods. This chapter highlights some estimates of the potential of RPAS to generate cost savings or provide new services. Note that some of these potential uses of RPAS may not come to fruition or reach these levels of economic activity due to technical barriers, lack of consumer demand or regulatory barriers.

These estimates of the economic impact of RPAS are not included in the overall economic impact of GA discussed in Chapter 3.

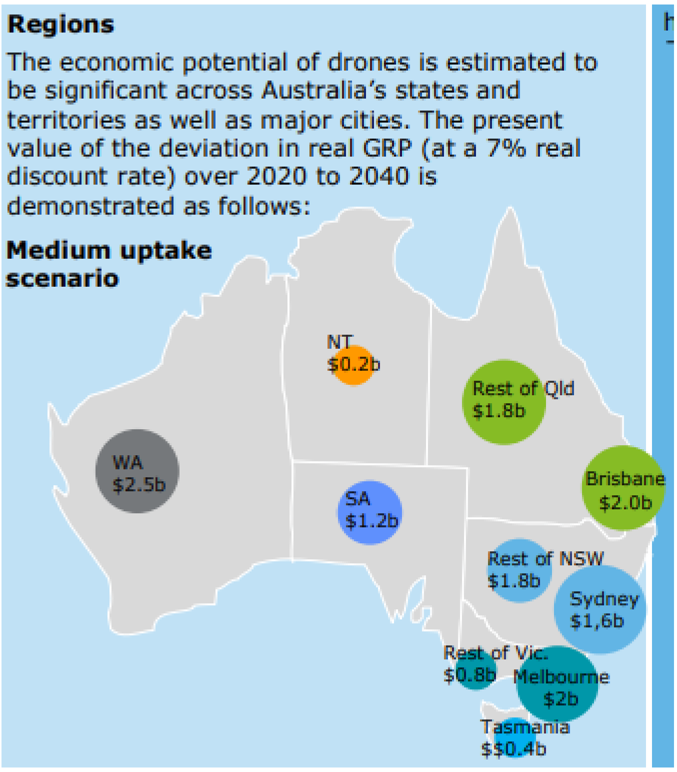
- Chapter 3 focused on values from 2018–19 and 2019–20, to exclude years for which COVID restrictions were in operation for most of the financial year. These estimates only provide an estimate of the impact of RPAS in 2020, and the total impact ($77 million) is too small to make a noticeable impact on the total impact of GA.
- Some uses of RPAS are substitutes for GA performed by crewed aircraft, such as surveying, transport/deliveries and agricultural spraying. The economic impacts in this section would replace some economic activity currently performed by crewed aircraft or other vehicles.
- Values provided for 2025 onwards are estimates of future values, which may not come to fruition.

Figure 12: Economic impacts of the economic potential of RPAS in Australia



Source: Deloitte Access Economics (DAE), 2020.

Figure 13: Regional distribution of the economic potential of RPAS in Australia (medium uptake scenario)



Source: DAE 2020

The **entertainment industry** is increasingly using RPAS instead of expensive cranes and helicopters for aerial shots (Wiedemann et.al., 2023). CASA (2019) estimates that the recreational RPAS market is made up of around 1.7 million current and 1.6 million intending users, skewed towards males (69%), and people aged under 35 (50%), with above average household incomes (approximately $90k p.a.). The economic outlook for the recreation and entertainment sector is projected to have a market size of about $900 million in Australia by 2040 (Deloitte Access Economics, 2020) and demand for RPAS is predicted to grow simultaneously.

In the **construction sector**, RPAS applications are projected to grow significantly, especially for the surveying industry (Fassbender et al., 2018). A survey RPAS can capture data or images from the field 30 times faster and more easily than can traditional onsite surveying or inspection methods (Position Partners, 2022). Various forms of construction activity, including building, infrastructure and civil engineering construction, account for a large share of the national economy, exceeding 8% of GDP. The modelled gain in this study from RPAS usage in construction sectors is an increase in real GDP of approximately 0.19% or $4 billion (Wiedemann et.al., 2023)**.** The global market for construction RPAS is expected to reach $18 billion by 2027. Deloitte Access Economics (DAE) projected a $1.5 billion boost to the construction industry by 2040 for Australia from the use of RPAS (Wiedemann et.al., 2023).

Modelling by Poikonen et al. (2017) and Dorling et al. (2016) both suggest that optimising the use of RPAS and trucks in combination may generate substantial **delivery time savings**. In addition, there was clear evidence that the ability to reduce labour costs through RPAS deliveries is also an important factor that drives RPAS adoption (Dorling et al., 2016) with cost savings and the ability to redeploy labour instead of cutting jobs (Weidemann et al., 2023). The global RPAS package delivery market is projected to grow to $8.7 billion by 2030, with the Australian market projected to grow to about $600 million by 2030. These result in a gain in the national real GDP of 0.016% or $344 million (Wiedemann et.al., 2023). However, in practice, there have been some setbacks to RPAS delivery services. Wing Aviation commenced RPAS delivery services for small items in Canberra in 2018, and ceased operations there in 2023 following resistance from local residents citing noise, privacy and safety concerns, as well as bird attacks disrupting deliveries (Groves, 2023).

RPAS have the potential for use in **agriculture** (Mazur et al., 2016). Currently in Australia, RPAS can be used for crop spraying and mapping, livestock management and, increasingly, as part of precision agriculture even though they are fairly expensive at about $45,000 (for those capable of carrying larger payloads; Goldman Sachs, 2016). Deloitte Access Economics (2020) estimated that some 38,000 RPAS could be deployed in Australia by 2030 for agricultural uses. RPAS technology could reach up to 75% market penetration in agriculture by 2040, creating nearly $3 billion in savings for the sector (Deloitte, 2020).

Dukkanci et al. (2021) estimated that the total cost of tree planting could be reduced by 30% by using multiple RPAS together with a delivery truck to decrease the total distance covered. Compared with the traditional planting of about 800 seedlings a day, RPAS can plant 40,000 per day, planting up to 1,000 seed pods in 10 minutes. Their system can also be deployed faster and has the advantage of easier access to difficult terrain, enabling lands to be restored up to 25 times faster and 80% cheaper than with traditional planting. Equipped with AI, their RPAS can identify the species that have been successfully established and control weeds (WWF, 2020). The agricultural scenario models potential productivity effects for each of these potential uses. The modelled gain in real GDP is 0.034% or $700 million (Wiedemann et.al., 2023).

Mining companies, such as BHP, are also aiming to adopt RPAS and uncrewed technology to improve safety, operations and financials. Savings of more than $5 million per year from using RPAS for conducting various hazardous and long inspections were reported (Innovate Energy, 2021).

The environmental and safety benefits associated with RPAS monitoring of old mines are not depicted in this CGE modelling exercise. The increase in real GDP of $1,711 million is slightly smaller than the modelled dollar increase in real consumption $1,742 million (Wiedemann et.al., 2023).

Emergency services comprise an estimated $4 billion sector. The adoption of RPAS is expected to yield a 10% net increase in productivity, from obtaining information on emergency incidents more quickly, reducing labour costs and hastening rescues. This results in a long-run increase in real GDP of about 0.022% or $460 million in present-dollar terms (Wiedemann et.al., 2023).

Deloitte Access Economics (2020) estimate that there may be between 46 million and 65 million **medical delivery trips** by 2040. A modest 0.75% productivity increase in other health and pathology service sectors is expected to yield cost savings ranging from $2.40 to $3.40 per trip. The productivity shock ascribed to last-mile deliveries was based on a $3 cost saving per trip on 50 million trips per annum. Potential gains may be in the form of lower freight costs in non-metropolitan areas and more timely delivery of medical items.

The modelled $8 billion welfare gain from hypothetical responses to the extreme example of the 2019–20 **bushfires** may translate into a possible $1 billion gain in a more typical year. RPAS may hasten information gathering and **search and rescue efforts**. The illustrative impact of RPAS use is a $460 million increase in the annual real GDP (Wiedemann et.al., 2023).

Industry consultation suggests that RPAS still have some way to go before displacing traditional aerial application in agriculture

RPAS technology has made significant strides in agriculture, but it still falls short of the expertise, capacity and adaptability of aircraft with human pilots:

- Common RPAS sprayers can carry up to 50 litres of spray, while an Air Tractor 802 can carry 3,000L. Even the Pyka Pelican Spray, a battery powered, remote RPAS designed for spraying, only has capacity of 300L. RPAS are closer replacements to a farmer on a quad bike with a backpack or onboard sprayer rather than a replacement for an Air Tractor.
- Remotely operated aircraft continue to struggle with navigating obstacles like power lines and minimising spray drift, issues that human pilots can effectively address through their visual perception, experience, and decision-making capabilities.

Summary of findings

Economic modelling of the potential to use RPAS to supplement or replace existing aviation and road transport, or to supplement existing services, suggests this could improve efficiency and add billions of dollars to the economy across a wide range of industries. In addition to this, many of these RPAS will be operating on renewable energy rather than aviation fuel, diesel or petrol, assisting in Australia reaching its net zero goals.

Table 11: Potential economic impacts of RPAS by industry

	Projected impact
Entertainment	$900 million by 2040
Construction	$4 billion
Deliveries	$344 million
Agriculture	$3 billion in savings by 2040
Mining	Current savings of more than $5 million per year
Emergency services	$460 million

Source notes. Multiple sources

These forecasts are highly dependent on the progression of regulations and technology to support the development of RPAS uses in industry. A supportive regulatory environment that encourages innovation in RPAS is essential to the RPAS technology and markets for this technology to continue to develop.

The practicalities of implementing RPAS throughout the economy may be more difficult than estimated, and result in lower economic impacts than those modelled. RPAS delivery services have been hampered by community opposition and bird attacks, and agricultural RPAS do not yet have the load capacity and precision of crewed aircraft.

While the studies referred to in this chapter have attempted to be conservative, they are dependent on assumption of a reasonably supportive regulatory environment. A regulatory environment that encourages RPAS use, innovation and market development may produce economic impacts larger than those noted here.

6. Trends in GA in 2022 and beyond

The economic impacts of GA in this analysis are mostly focused on the pre-2020 economy. The travel and movement restrictions imposed in response to the outbreak of COVID-19 lasted from early 2020 to early 2022, and some of the impacts on aviation are still felt. As of 2024, regular public transport flights, both domestic and international, have still not returned to 2019 levels despite population growth.

GA weathered the storm of COVID with less of a downturn than RPT flights, as shown in Figure 8. As the industry begins to rebound, we expect to see some trends in GA that have already been observed to continue, such as the decline in crewed flying hours for surveying as reported in Figure 7, and the increasing use of RPAS as discussed in Section 5.

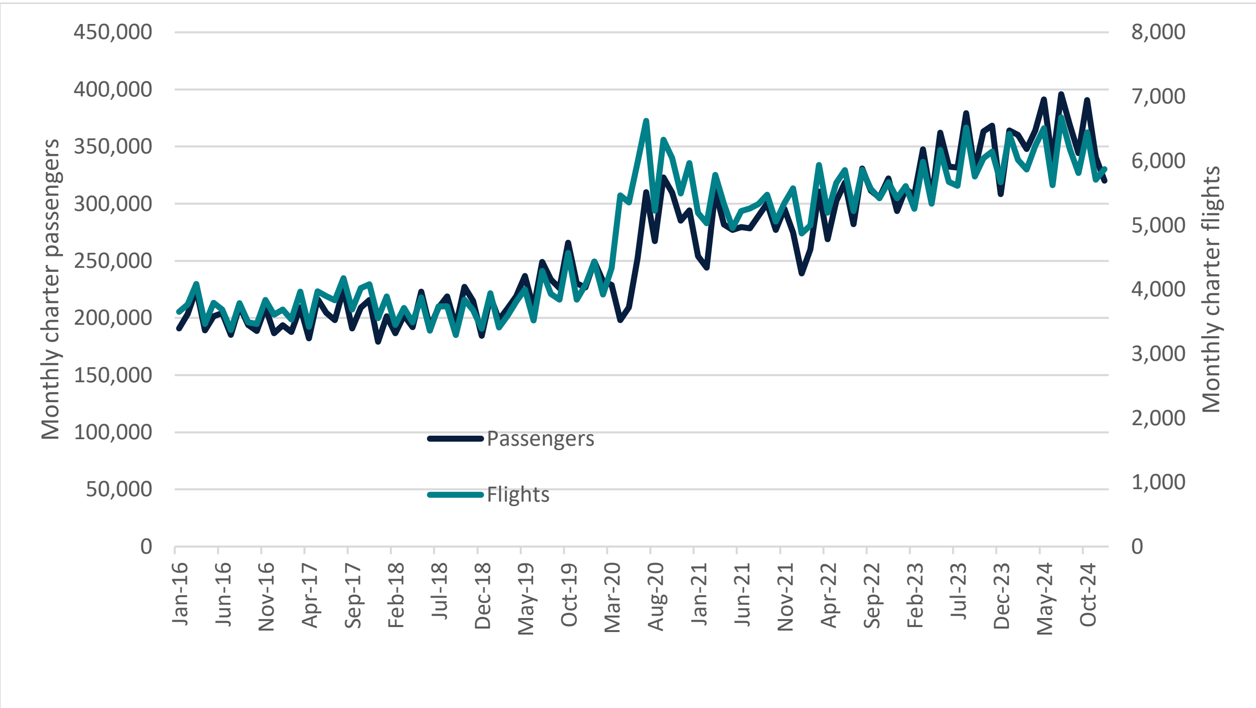
6.1 The growth in demand for charter flights

In the years to 2019, demand for charter flights in Australia had been reasonably steady, averaging around 200,000 passengers per month.

The COVID lockdown period resulted in a surge in demand for passenger charters. RPT services were severely restricted, so for some travellers a charter may have been the only option for air travel. Some air travellers may have preferred an aircraft with limited fellow passengers to reduce the risk of catching COVID-19 from a stranger while travelling – charter passenger numbers in September 2020 were 39% higher than in February 2020, while flight numbers were 61% higher, indicating that each charter flight held fewer people.

Mining companies were a driver of these trends. Mine sites are often located in remote areas and are inaccessible by RPT travel, especially during COVID restrictions. Private charters allow mine workers to travel directly to their worksite minutes before the start of their shift, and leave shortly after. Fortescue used charter flights to minimise COVID risks to its workers, through halving the number of passengers on its charter flights and doubling the number of aircraft movements to reduce the likelihood of exposure (Deloitte Access Economics, 2023).

Figure 14: Charter passengers and flights, 2016–24



Source: BITRE, Domestic Aviation Activity, 2025

Despite a fall in charter passenger and flight numbers as RPT services resumed in 2021 and 2022, charter demand has continued to grow. Organisations or individuals that relied on charter flights during COVID may have developed a preference for charters, and have no intention of returning to RPT flights. The increase in demand on charter services may have also increased the breadth of their offer, leading to more flight consumers leaning towards charters.

6.2 Developments in Advanced Air Mobility

Advanced Air Mobility (AAM) refers to an emerging aviation sector that uses new aircraft types to transport people and goods. It includes a range of new technologies, including:

- Large remotely piloted aircraft
- Vertical take-off and landing (VTOL) aircraft
- Electric aircraft
- Hydrogen electric engines
- Autonomous air transport
- New materials and shapes for aircraft.

Aviation research and development is examining how these technologies and concepts will combine to create new ways of air travel. The Australian Government released the RPAS and AAM Strategic Regulatory Roadmap in December 2024 to provide long term policy settings to encourage investment in this sector.

Electric aircraft

While RPT passenger aircraft are looking to Sustainable Aviation Fuels (SAF) to reduce emissions, most GA aircraft do not use turbine engines that are able to use SAF as an easy alternative (DITRDCA, 2024). The GA sector is well placed to adopt new propulsion technologies, such as electric aircraft.

Electric aircraft are powered by onboard batteries and charged with electricity on land. The weight of the batteries needed to power aircraft means that in the short term, only small, low weight aircraft will be able to fly with battery power alone, such as those used in flight instruction, surveying and tourist flights. Electric aircraft with 50 minutes of flying time are already in operation for flight instruction out of Jandakot Airport (DITRDCA, 2024, p 121). As battery technology improves, electric aircraft could be used for a wider range of GA applications.

VTOL aircraft

Vertical take-off and landing (VTOL) aircraft have the advantage of not requiring a runway, so they can take off and land from anywhere from the rooftop of CBD office tower to remote bushland, for example, helicopters. Electric VTOL, or eVTOL aircraft, use multiple rotors and rely on electric power through batteries or hydrogen and provide zero-emission transport with much less noise than a helicopter and at much lower cost.

In 2023, the hydrogen powered eVTOL aircraft Vertiia made its first test flight, made by Australian start-up AMSL Aero. It can carry a pilot and 4 passengers a distance of 1,000 km at 300 km an hour and can be adapted for use as an air ambulance. It has already secured orders from an aero-medical provider and is expected to be commercially available following CASA safety certification (DITRDCA, 2024).

Hydrogen electric aircraft

Hydrogen electric vehicles use compressed hydrogen to generate electricity. Since hydrogen can be generated from renewable sources and hydrogen is much lighter than batteries for a similar amount of energy, it has greater long-term potential to replace conventional fuels in medium to long haul jets.

Trials of hydrogen powered aircraft are currently underway in Australia, with Stralis Aero and Dovetail Electric Aviation testing small hydrogen electric aircraft suitable for charter flights or smaller regional RPT flights. Stralis Aero is testing a 15 seat hydrogen aircraft, with the possibility of it entering service as early as 2026.

Remotely piloted and autonomous aircraft

Section 5 discusses potential uses of large remotely piloted aircraft that can handle heavy payloads, such as those used for agricultural spraying. The Aviation White Paper notes that there is potential for autonomous aircraft to be part of Australia's aviation future, but substantial development in AI will be necessary before this can occur.

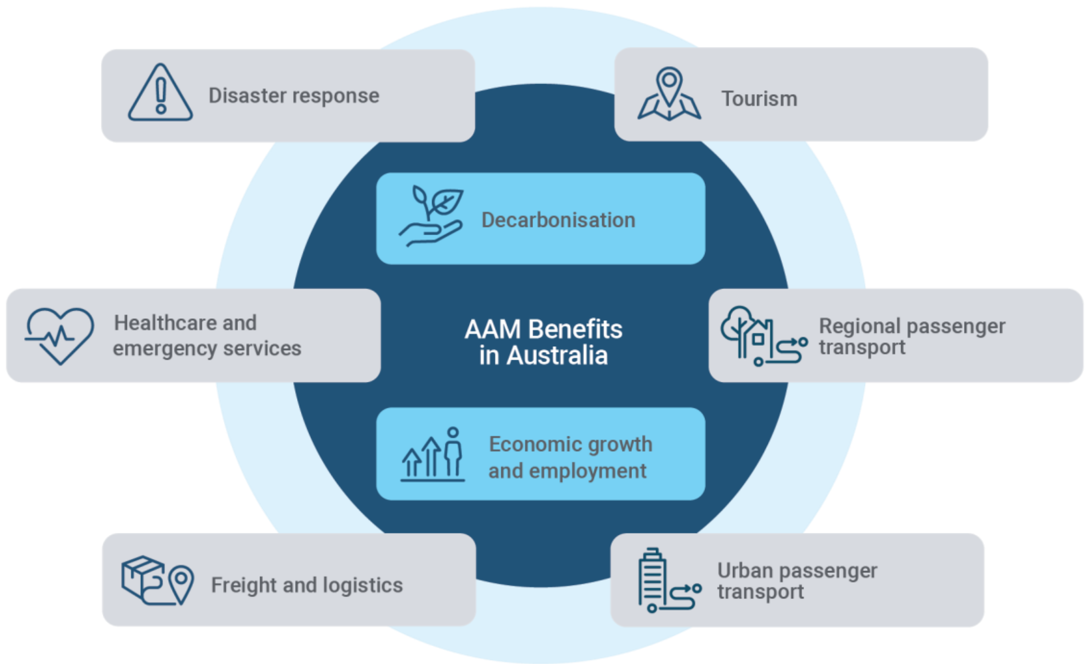
New materials and shapes for aircraft

Many elements and materials used in conventional aircraft design may no longer be suitable in an aviation future of new fuel and engine types, new ways of taking off and landing and with less need for human pilots. The drive to reduce carbon emissions from aircraft in the short term may lead to lighter and more aerodynamic aircraft designs. Finally, new uses for AAM will mean new, more efficient aircraft designs to ensure they are adapted for their intended purposes – such as quieter aircraft for transport in cities and suburbs, or more compact footprints for access to difficult terrain in remote areas.

6.3 Impacts of AAM on general aviation

The Aviation White Paper consultation identified significant benefits of AAM in general aviation, including improved regional connectivity, lower emissions, greater safety and potentially thousands of jobs and business opportunities.

Figure 15: Benefits of AAM



Source: DITRDCA, 2024, p152

Many of these benefits will flow more quickly to GA – the small aircraft incorporating these new technologies will be used by small charters, emergency services, goods charters and so forth before they are adopted by large passenger jets.

7. Summary and conclusions

There is no universally accepted definition of general aviation, with ICAO preferring a definition of GA that excludes all hired transport services, and broader definitions preferred by the GA industry including small charter and freight services. This paper does not attempt to resolve a preferred definition, instead it indicates an approximate range of the value of GA activity.

The value of GA in Australia

Drawing from BITRE's calculations from the ATEA and from data extracted from BLADE, we estimate that direct economic activity in GA was worth between **$3.6 billion and $10.2 billion** in 2018–19 (2022–23 dollars) depending on the extent to which charter flights are included in the definition of GA. Note that this is not a precise range, the datasets used do not line up precisely with any definition of general aviation.

These estimates exclude RPAS, which was estimated at $77 million in 2020 and is expected to grow rapidly. They also exclude recreational use of aircraft, which contributed to 17% of total GA hours flown in 2022. Over half (51%) of GA aircraft are used at least in part for recreational purposes, most frequently pleasure and personal transport, so these dollar value estimates may be conservative.

A key difficulty in coming up with a more precise value of GA is that many businesses whose records are included in the ATEA and BLADE data operate both GA and non-GA services, regardless of the definition; for example, operators of small charter aircraft will offer sightseeing flights as well as transport flights, and some charter operators will have a mix of aircraft sizes. The data obtained from these businesses does not allow the costs and revenues of GA and non-GA activity to be separated, regardless of the definition of GA.

Flow on impacts through the economy

In addition to this, GA also generates substantial flow on economic activity from backward linkages to supplying and supporting industries such as aircraft manufacturing and repair services and airports, particularly smaller and regional airports. These backward linkages generate economic activity worth billions of dollars each year.

Forward linkages from GA are themselves worth billions of dollars, both in terms of the flow on impacts of wages and profits generated by GA businesses spent in the economy, and the economic activity enabled by GA.

New developments in general aviation – RPAS and AAM

RPAS can be considered a new and growing form of GA that is accessible to members of the public. Forecasts commissioned by DITRDCA suggest that by 2040, RPAS technology could add $14.5 billion to the Australian economy. However, this will depend on a number of factors, including a supportive regulatory environment, consumer demand and the ability of technology and the industry to generate community support.

Advanced Air Mobility (AAM) has the potential to revolutionise GA through new technologies such as battery and hydrogen powered aircraft, eVTOL aircraft and new materials and shapes. These new technologies are initially tested in smaller aircraft, so will be incorporated into GA use through air ambulances and small charters. The growth in demand for small charters seen post-COVID could provide a strong market for these new technologies.

The Aviation White Paper outlines the way forward to support the role of GA in underpinning Australia's economy through regional and city areas, and across industries.

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Appendix A – GA Satellite Account

A.1 Introduction

The GA Satellite Account is a method of measuring economic contributions of GA to a national economy. Its unique approach derives from employing the principles and structure of the internationally-adopted System of National Accounts.

The latest version of the international statistical standard for the national accounts, adopted by the United Nations Statistical Commission (UNSC), is the System of National Accounts 2008 (2008 SNA). “The SNA describes a coherent, consistent and integrated set of macroeconomic accounts in the context of a set of internationally agreed concepts, definitions, classifications and accounting rules. In addition, the SNA provides an overview of economic processes, recording how production is distributed among consumers, businesses, government and foreign nations” (UNStats, 2022). However, the latest version (2008) of the SNA does not list civil aviation as an industry per se (therefore, GA is out of any measurement scale). There is a need to establish a global standard to measure the economic activities of civil aviation in a manner that would group GA in a different setting and would make international comparison possible and feasible, while maintaining compliance with the SNA. For this reason, ICAO developed a ‘recommended methodological framework’ for aviation satellite accounts (ICAO, 2019). A robust national-level economic measures of GA following the ICAO (2019) recommended methodology would potentially be useful to measure aviation economic activity (isolating GA) by the ABS.

Following the completion of the 2017 GA Study, BITRE researched options for compiling economic measures for GA. A scan of international work in this field found that no country compiles robust estimates of GA economic activity (particularly at the sub-GA industry level).

A.2 Developing a GA Satellite Account

The international standard for economic statistics, the System of National Accounts (SNA), recognises that there are a number of areas where the statistical framework for industry statistics may not meet some users’ needs. On these occasions, the SNA proposes a series of minimal adjustments to the framework that enables analysts to compile the industry statistics they need while maintaining consistency and comparability with main SNA economic aggregates. These adjusted frameworks are called satellite accounts.

BITRE proposed to develop an aviation satellite account by defining a new industry ‘General Aviation’ and reassigning individual businesses to the new industry from their current industry classification (e.g. moving ‘Aerial Mustering’ from ‘Other Agriculture and Fishing Support Services’ to ‘General Aviation’) and tracking their financial information using ATO data. This form of satellite account was intended to provide robust estimates of economic activity for aviation and was considered possible because:

- Civil aviation in Australia is closely regulated for safety purposes, with all commercial activity requiring authorisation. It may therefore be possible to identify virtually all businesses involved in the production of civil aviation goods and services.
- The ABS and the ATO hold rich administrative datasets on business activity that can be used to calculate headline economic measures for selected industries.

A.3 Planned methodology

BITRE aimed to compile a simple Aviation Satellite Account by:

- Identifying commercial civil aviation operators in CASA’s Air Operator Certificate (AOC) Database.
- Classifying these operators based on their flying activity (hours flown), as recorded in BITRE’s annual AAAS.
- Link AOCs with ABNs using the ATOs business register or data from CASA.

- Request aggregated business activity for these ABNs from the Australian Bureau of Statistics in ABS' Business Longitudinal Analysis Data Environment (BLADE), (ABS 2022). BLADE tracks the performance of actively trading businesses in Australia from 2000–01 onwards, including turnover, employment and labour productivity.
- Using BLADE will enable economic measures like business revenue and expenses, as well as expenses components, such as rent, capital expenditure, repairs and maintenance, and lease payments.
- Where necessary, supplementing the BLADE data with a limited number of surveys.

The benefits of this approach are:

- Data are available for several years (2000–01 to 2019–20, so the economic history of GA can be analysed for the impact of events on various GA industries.
- Data quality is very robust as estimates are based on actual business reports with minimal data modelling.
- The methodology is repeatable and transparent.
- It is scalable- e.g. further research (and if costs are justified, targeted surveys) can be done to address specific policy questions within the satellite accounting framework.

Why this approach cannot alone be relied upon for valuing GA

BITRE completed this process, identifying the commercial civil aviation operators in the AOC database, classifying their type of flying activity, matching these to ABNs and requesting business turnover and wages data from the ABS for these ABNs. From there, BITRE considered the gaps in the available data and what surveys would be necessary to supplement this data. After some review, BITRE determined that this method does not provide a sufficiently reliable method of estimating economic activity in GA and so would not be suitable for generating a GA Satellite Account.

A significant share of ABNs with aircraft used for business could not be matched to business activity data

BITRE was able to identify 2354 ABNs which had some form of aircraft registered to them (including RPAS). Of these, only 70.56% were able to be successfully matched to business records in BLADE. Of the aircraft categories most relevant to GA, passenger charters and commercial flight instruction showed linkage rates of 76.36%, agriculture showed linkage rates of 73.63% and Other GA flus freight charters and freight only flights showed linkage rates of 81.66%.

In comparison, of the ABNs that were associated with international and domestic commercial aviation and airports. The vast majority, 85.75%, were successfully mapped to business records.

Table 12: Linkage rates for matching ABNs registered to aircraft to business activity records

	Linkage rate (%)
Passenger charters and commercial flight instruction	76.36
Agriculture	73.63
Other GA^ plus freight charters and freight only *	81.66
Maintenance and overhaul *	61.67
Remotely Piloted Aircraft Systems (RPASs)	67.14
International and domestic commercial flights, airports	**85.75**

* Values include some non-GA activity.
^ includes Freight only, Freight only charters, Other commercial air transport, Air ambulance, Search and Rescue, Aerial policing, Firefighting, Observation and patrol, Sling loadings, Construction – other, Aerial photography, Pipeline or powerline surveying, Aerial surveying – other, Aerial advertising, Other aerial work

There may be any number of reasons why an ABN to which aircraft are registered cannot be matched with an ABN in the BLADE database; including errors in recording the ABN or businesses commencing or ceasing operation. This suggests that the business records matched may be an underestimate of economic activity in the GA sector.

Does not provide information on how GA businesses interact

BLADE contains mainly tax data and will provide no information on how GA businesses interact with each other or other industries. These businesses will need to rent space airside, and will need to purchase fuel, parts and other equipment to keep their aircraft operating.

Excludes recreational flying, personal transport

This methodology does not measure the economic activity generated by private recreational flying or sport aviation. While it would be possible to include private flying in aviation satellite accounts, it is outside the scope of standard national accounts and any estimates including private flying should not be compared to national accounts aggregates (such as contribution to GDP).

Confidentiality of respondents prevents clear distinction between GA and non-GA activity

The classifications of economic activity in Table 1 were aggregated together from a large range of GA activities. Further distinction between revenue and wages by business activity was not possible without compromising confidentiality of respondents. It was not possible to separate out revenue that was clearly GA from revenue that was a mix of GA and non-GA.

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