RPAS and AAM Market Sizing and Economic Impact

Final Report

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Drones are set to further change the ways we work, live, and travel, becoming an important aspect of both global and Canadian society and economy

Project Background and Key Outcomes

Context

The **growing use of RPAS and AAM applications** requires a **deeper understanding** of their impact on **air navigation services**

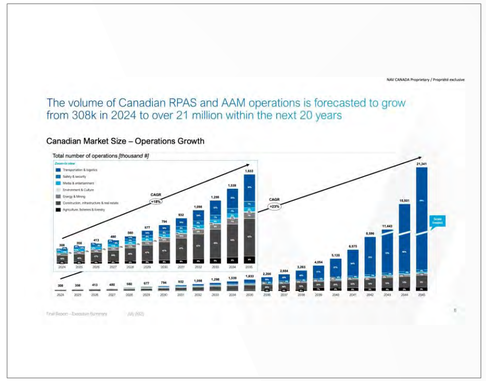
NAV CANADA is making **strategic decisions for RPAS Traffic Management**

Understanding the market forecasts and future structure **is critical for informed** data-driven decisions for NAV CANADA, Transport Canada, and other stakeholders

Key outcomes

Market Sizing

In-depth market analysis regarding the **anticipated scale and scope** of **RPAS and AAM operations** in Canadian airspace

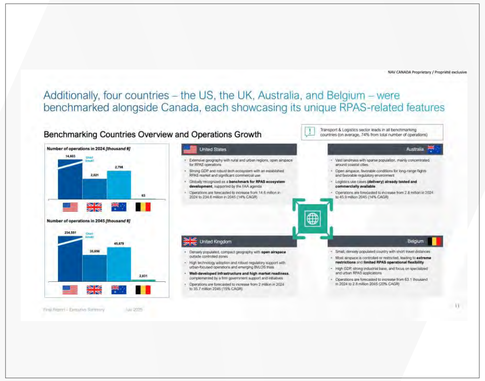


Impact Assessment

The impact of future RPAS and AAM operations in a broader context, including the GDP contribution, job creation, IT infrastructure, as well as society and business

International Benchmarks

Furthermore, a **market comparison of four benchmark countries (Australia, Belgium, the US, and the UK)** to highlight essential factors for Canadian RTM relative to others



Significant resources were dedicated to market analysis, conducting research, and collaborating with stakeholders and the industry to reach the project's objectives

Accomplishments and Contributions

Efforts

The most sophisticated and comprehensive forecasting model for the RPAS and AAM industry

40+ people participated in the development and consultation processes

2000+ working hours dedicated to research and deliverables development

3000+ data sources, reports and facts verified

Detailed analysis of **60+ RPAS and AAM use cases**

150 GB of GIS mapping data analyzed to support and inform the study

Consultations

Facilitating continuous **dialogues, collecting feedback, and conducting workshops** to engage key stakeholders

NAV CANADA, Transport Canada

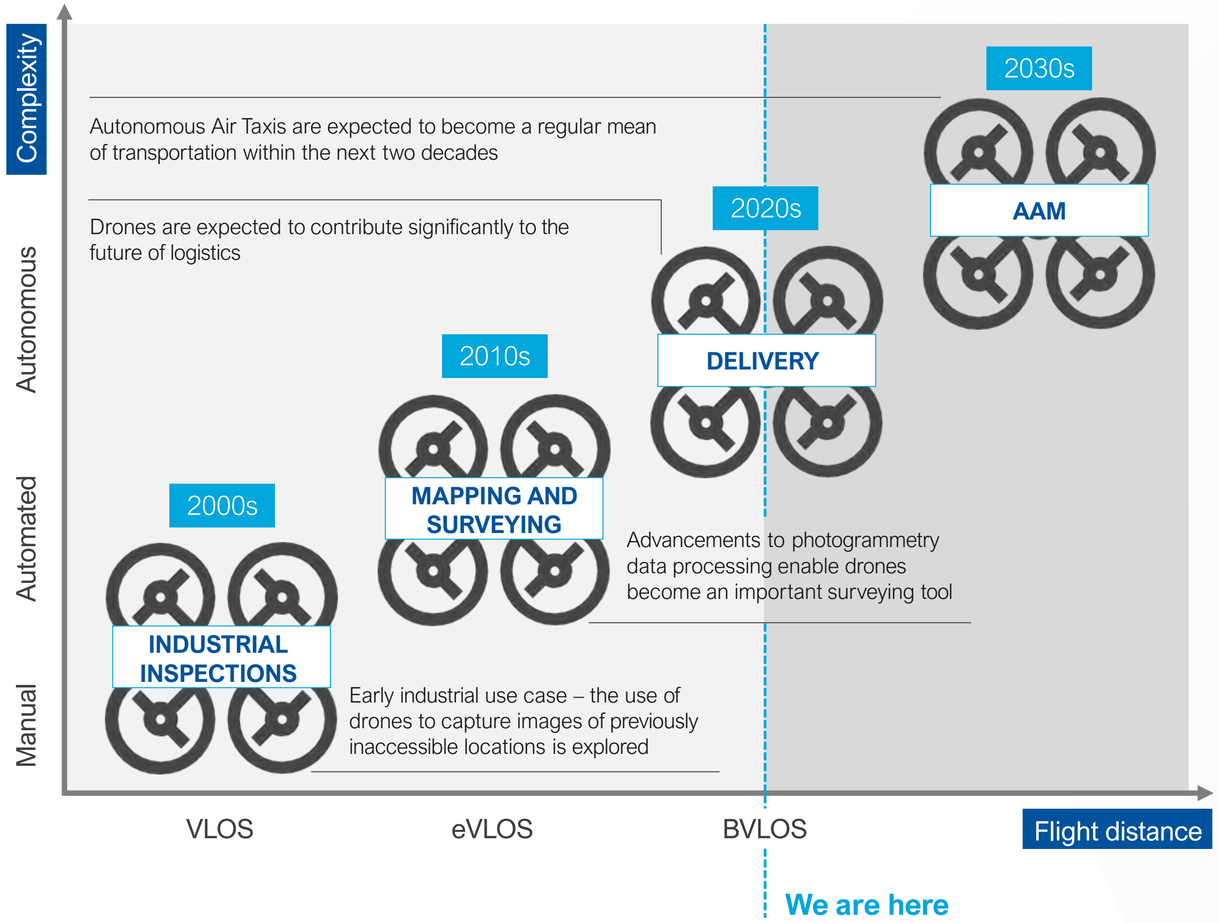
Leveraging a **global network of specialists in drone technology and advanced air mobility** to enhance the study

Consulting with **leading industry players from Canada** and globally to test the outcomes and assumptions

AERIUM ANALYTICS, Transport Canada, Unither, AIRmarket, CAAM, Volatus Aerospace, INDRO Robotics, EIA Edmonton International Airport, Canadian UAVs

The RPAS industry is relatively well-established, but it is also undergoing rapid evolution, continually innovating and exploring new applications

Evolution of Commercial RPAS and AAM Use Cases



2000s

- Recognizing initial applications for RPAS as the technology develops, drawing from the expertise of the RC modelling community

2010s

- Recreational and commercial consumption of RPAS increases technology advances as reliability and usability improve
- Airspace regulators (FAA & EASA) outline initial proposals for RTM airspace
- Countries implement first rules and basic regulations for RPAS pilots
- Manufacturers release reliable, more advanced platforms (e.g. DJI Phantom 1)

2020s

- Creation and delivery of RTM tools to enable simultaneous BVLOS operation within airspace by multiple operators
- Industry expands beyond basic use cases to Advanced Air Mobility (e.g. drone delivery and air taxis) and autonomy-driven solutions

2030s

- Completion of RTM airspace for major use cases and possible integration with ATM airspace
- Drone deliveries are increasingly common and widely embraced by customers, leading to a substantial rise in RTM operational volume
- Consumer adoption of AAM for transport accelerates as industry meets community expectations for safety with minimal disruption

The Canadian ecosystem is expected to grow significantly in the next 20 years, leading to 290,000 new jobs, notable impact on GDP and industry redefinition

Key Outcomes of the Market Sizing

Market Size Projection

2024

Total operations	Total aircraft
308k	**24k**

2035

Total operations	Total aircraft
1.8m	**132k**

2045

Total operations	Total aircraft
21.4m	**507k**

Dominant Sectors in 2024

45% of operations	Construction, infrastructure & real estate
15% of operations	Media & entertainment
14% of operations	Energy & mining

Dominant Sector in 2045

84% of operations	Transportation & logistics

Economic Impact

Jobs creation

30k in 2024	**89k** in 2035	**290k** in 2045

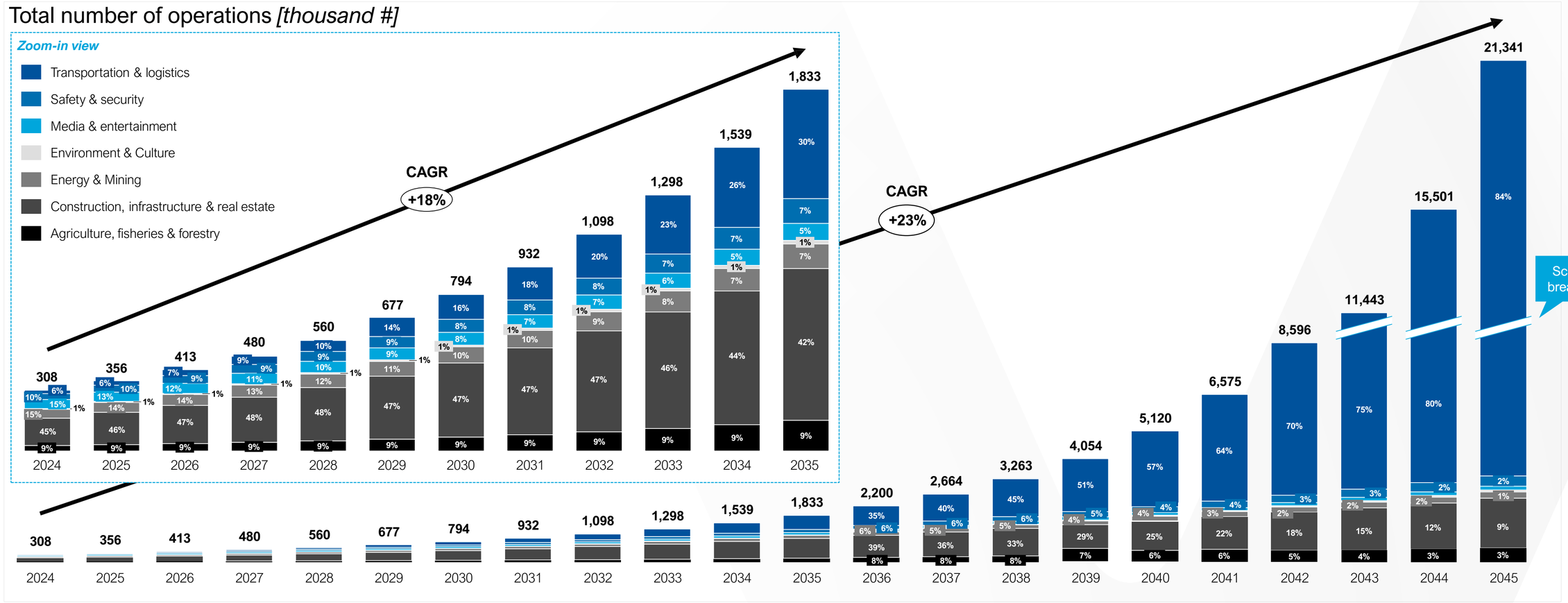
Contribution to GDP

2.4–3.6 bn CAD in 2024	**14–23 bn CAD** in 2035	**69–120 bn CAD** in 2045

- **The demand for RPAS has proven to be significantly higher than initially anticipated**, based on recent industry consultations. As a result, the original 10-year forecast has been revised upward, **highlighting a substantial and immediate need for the development of RTM systems.**
- This feedback-driven adjustment underscores **the urgency of proposing and implementing effective solutions without delay.**

The volume of Canadian RPAS and AAM operations is forecasted to grow from 308k in 2024 to over 21 million within the next 20 years

Canadian Market Size – Operations Growth



The number of aircraft and the operations carried out are anticipated to rise considerably, resulting in a major reshaping of the current low-level airspace

The need for RTM services is critical due to increasing number of simultaneous operations which cannot be handled at scale without automation

Canadian Market Size – Aircraft Units & Flight Time

Aircraft Units

Forecasted increase in the number of commercial aircraft

24 200 aircraft in 2024 → **132 300** aircraft in 2035 → **506 800** aircraft by 2045

In 2024
Construction, infrastructure & real estate sector

accounted for 39% of the total aircraft

By 2045
Transportation & logistics sector

is expected to cover 37% of the total aircraft

The growth in the number of aircraft is considerable, particularly with the rise of drone delivery services, which will lead to a **significant increase in the number of aircraft operating simultaneously – this factor is critical from RTM systems perspective**

Flight Time

Forecasted increase in total RPAS and AAM flight time

685 000 hours in 2024 → **3 300 000** hours in 2035 → **12 400 000** hours by 2045

In 2024
Construction, infrastructure & real estate sector

accounted for 36% of the total flight time

By 2045
Transportation & logistics sector

is expected to cover 40% of the total flight time

This shift will place **significant demands on Canada's RTM system**, especially in the Transport & Logistics sector, where **efficient flight tracking and real-time conflict resolution** are essential for the safe integration of all airspace users in a limited space

The necessity for operations requiring RTM service support is expected to rise, leading to further challenges in RPAS traffic management and conflict resolution

Canadian Market Size – Impact on RTM

Share of operations expected to fall under **RTM services grows**

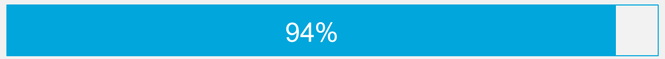
from 52% in 2024

to 90% in 2045

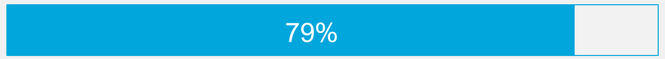
- All sectors are witnessing an increase in expected RTM-related activities, with **Transportation & Logistics leading in RTM significance** due to the highest demands for flight management and the resolution of traffic congestion
- The expansion is fueled by the rising **prevalence and dominance of various BVLOS flights over time**, primarily influenced by drone deliveries and other activities where long-range flights offer substantial improvements

In 2045, sectors with **highest potential of operations falling under RTM** are:

Transportation & Logistics



Safety & Security



VLOS operations still account for a significant share (around 50%) in the initial years…

…with a gradual shift towards **BVLOS becoming the predominant mode** within the next decade.

By the year 2045, **the RTM system is projected to handle**

19.2 million operations

(17 million in T&L)

equating to more than **50,000 operations daily**

Most **operations take place in uncontrolled airspace**, both in the early years and in the long-term forecast, with this share increasing over time.

These changes will significantly affect the economy and everyday life, highlighting the need for continued support and improvement of RTM services and regulations

RPAS/AAM Impact Assessment

After consultations with NAV CANADA and TC, the following impact pillars were analyzed

RPAS/AAM Market

Explores the estimated revenues of companies dedicated fully or partially to RPAS/AAM services provision

$69-$120 bn CAD

Contribution to GDP in 2045

The sector's contribution to GDP may currently seem minor ($2.4-$3.6 bn CAD in revenue in 2024), but will grow over time, **making RPAS and AAM one of important areas of Canadian economy**

Jobs Creation Impact

Directly refers to the Canadian market model data and would provide relevant numerical outcomes

290k

Number of jobs created until 2045

Skilled and educated local workforce will be required, **supporting universities and research, local businesses development and IP localization in Canada**

Social Impact

Focuses on market sectors which mainly address the social support aspects rather than business results

663.3k

RTM operations are set to prioritize societal benefits in 2045

Key areas benefiting society:

- **Healthcare deliveries**
- **Emergency response and public security**
- **Remote communities and First Nations support**

These areas may require support from the government to grow and prospect

Business Value Impact

Concentrates on market sectors that emphasize business operations and value creation

97%

RTM operations will provide measurable business process optimization in 2045

In industries such as Construction or Mining, **automated solutions can achieve cost savings of 50-70% when implemented on-site**

Business related applications provide potential for monetization of RTM services with careful pricing

IT Infrastructure Impact

Focuses on infrastructure requirements generated by the growing RPAS/AAM sector

290k TB

Data to be processed

39k TB

Data to be transferred over mobile network

Supporting development of data storage, processing centers, high-capacity 5G networks which are **required for RPAS, IoT and Smart Cities, enhancing quality of life in Canada**

The advancements in the RPAS and AAM ecosystem are noteworthy and are likely to alter Canadian society's perception of the industry and the technology behind it

Selected Ecosystem Figures by 2045

Over **150,000** RPAS passenger transportation operations, including tourism, commute, and healthcare applications

4.9 million consumer goods delivery flights, including food, grocery, parcels, and e-commerce

Over **350 thousand** yearly healthcare deliveries, including pathology samples, blood, organs, prescription medicine, and other medical goods

3.4 million RPAS mapping, inspection, surveillance, and broadcasting operations*

**excluding Transportation & Logistics sector*

Nearly **450 thousand RPAS/AAM operations** may involve crossing the Canadian border

About **2% of all operations are likely to benefit remote communities**, First Nations, and other indigenous population

While 90% of operations occur in RTM airspace, the actual flight time within RTM is lower, comprising **81% of the total**

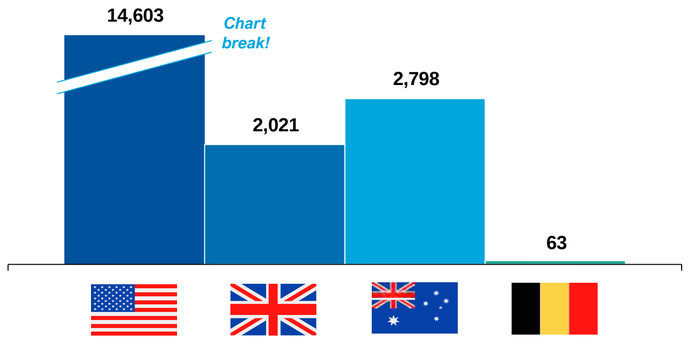
40% of total flight time will be in Transportation & Logistics sector

Around **15 thousand RPAS** will assist with law enforcement, border surveillance, emergency management, and disaster management

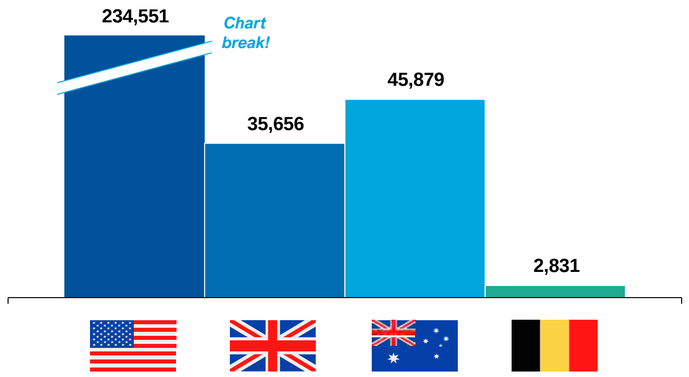
Additionally, four countries – the US, the UK, Australia, and Belgium – were benchmarked alongside Canada, each showcasing its unique RPAS-related features

Benchmarking Countries Overview and Operations Growth

Number of operations in 2024 *[thousand #]*



Number of operations in 2045 *[thousand #]*



Transport & Logistics sector leads in all benchmarking countries (on average, 74% from total number of operations)

United States

- Extensive geography with rural and urban regions, open airspace for RPAS operations
- Strong GDP and robust tech ecosystem with an established RPAS market and significant commercial use
- Globally recognized as a **benchmark for RPAS ecosystem development**, supported by the FAA agenda
- Operations are forecasted to increase from 14.6 million in 2024 to 234.6 million in 2045 (14% CAGR)

Australia

- Vast landmass with sparse population, mainly concentrated around coastal cities
- Open airspace, favorable conditions for long-range flights and favorable regulatory environment
- Logistics use cases **(delivery) already tested and commercially available**
- Operations are forecasted to increase from 2.8 million in 2024 to 45.9 million 2045 (14% CAGR)

United Kingdom

- Densely populated, compact geography with **open airspace** outside controlled zones
- High technology adoption and robust regulatory support with urban-focused operations and emerging BVLOS trials
- **Well-developed infrastructure and high market readiness**, complemented by a firm government support and initiatives
- Operations are forecasted to increase from 2 million in 2024 to 35.7 million 2045 (15% CAGR)

Belgium

- Small, densely populated country with short travel distances
- Most airspace is controlled or restricted, leading to **extreme restrictions** and **limited RPAS operational flexibility**
- High GDP, strong industrial base, and focus on specialized and urban RPAS applications
- Operations are forecasted to increase from 63.1 thousand in 2024 to 2.8 million 2045 (20% CAGR)

All benchmarking countries are expected to experience significant growths, particularly in Transport and Logistics (T&L), which is projected to lead by 2045

Benchmarking Countries: Flight Time and Aircraft Growth

Flight time

12 million hours in 2024 to 115 million hours by 2045

In 2024
Construction, infrastructure & real estate sector
accounted for 42% of the total flight time

By 2045
Construction, infrastructure & real estate sector
is expected to cover 42% of the total flight time

2 million hours in 2024 to 23 million hours by 2045

In 2024
Media & entertainment sector
accounted for 35% of the total flight time

By 2045
Transportation & logistics sector
is expected to cover 47% of the total flight time

2 million hours in 2024 to 20 million hours by 2045

In 2024
Energy & mining
accounted for 55% of the total flight time

By 2045
Transportation & logistics sector
is expected to cover 38% of the total flight time

122 thousand hours in 2024 to 2 million hours by 2045

In 2024
Construction, infrastructure & real estate sector
accounted for 28% of the total flight time

By 2045
Transportation & logistics sector
is expected to cover 41% of the total flight time

Aircraft

437 thousand aircraft in 2024 to 2 million aircraft by 2045

In 2024
Agriculture, fisheries & forestry sector
accounted for 26% of the total aircraft

By 2045
Energy & mining sector
is expected to cover 23% of the total aircraft

42 thousand aircraft in 2024 to 165 thousand aircraft by 2045

In 2024
Agriculture, fisheries & forestry sector
accounted for 24% of the total aircraft

By 2045
Transportation & logistics sector
is expected to cover 26% of the total aircraft

95 thousand aircraft in 2024 to 704 thousand aircraft by 2045

In 2024
Energy & mining
accounted for 65% of the total aircraft

By 2045
Transportation & logistics sector
is expected to cover 36% of the total aircraft

63 thousand aircraft in 2024 to 3 million aircraft by 2045

In 2024
Construction, infrastructure & real estate sector
accounted for 39% of the total aircraft

By 2045
Transportation & logistics sector
is expected to cover 82% of the total aircraft