New Zealand Trade and Enterprise / New Zealand Airports Association

NEW ZEALAND AIRPORTS: FUTURE INFRASTRUCTURE REQUIREMENTS

CHALLENGES AND OPPORTUNITIES FOR NEW ZEALAND'S AVIATION INDUSTRY

28 FEBRUARY 2025

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DRAFT	20 December 2024	Draft Report for Client Review and Comment
DRAFT	10 January 2025	Revised Draft Report for Client Review and Comment
FINAL	05 February 2025	Revised Report, incorporating client comments and feedback
FINAL v2	28 February 2025	Revised Final Report, incorporating some further client comments

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GLOSSARY

Airport Codes	Unique identifiers for airports. ICAO Codes are primarily used throughout the report for consistency.
City Pairs	A pair of airports that represent a flight's departure and arrival airport.
Conventional Aviation Fuel	Kerosene-based fuel used in jet, turboprop, and helicopter turbine engines. Commonly known as Jet A1 Fuel.
MTOW	Maximum Take Off Weight an aircraft is certified to operate at.
Power to Liquids	A process that uses renewable electricity to create liquid fuels.
Sustainable Aviation Fuel	An alternative fuel made from non-petroleum feedstocks that reduces emissions from air transportation.

Aircraft Models Referenced in Report

ALIA	A fully electric aircraft, design by BETA Technologies. To be trialled for use in NZ in 2025, before entering service (for freight) in 2026.
ATR	The ATR 72-600. A 68-seat Turboprop aircraft used by Air NZ domestically in NZ.
Electric Aircraft	Aircraft powered using electricity, stored in batteries on the plane. Hybrid planes are powered by a mix of electricity and conventional aviation fuel.
eVTOL	Electric vertical take-off and landing aircraft
Hydrogen Powered Aircraft	Aircraft powered using Hydrogen (either in liquid form, or through Hydrogen Fuel Cells).
Q300	The DeHavilland Q300. A 50-seat Turboprop aircraft used by Air NZ domestically in NZ. Currently the smallest aircraft in their fleet. Referred to interchangeably as a Dash-8.

ABBREVIATIONS

AAM	Advanced Air Mobility
AGL	Airfield Ground Lighting
Air NZ	Air New Zealand
AIP	Aeronautical Information Publication
AITP	Airspace Integrated Trials Programme
ASMGCS	Advanced Surface Movement Guidance and Control System
ATAG	Air Transport Action Group
ATS	Air Traffic Service
A-CDM	Airport Collaborative Decision-Making
CAF	Conventional Aviation Fuel
CTOL	Conventional Take-off and Landing
EIS	Entry into Service
eVTOL	Electric vertical take-off and landing aircraft
GA	General Aviation
GSE	Ground Service Equipment
IATA	International Air Transport Association
ICAO	Internation Civil Aviation Organization
MTOW	Maximum Take Off Weight
NZHAC	New Zealand Hydrogen Aviation Consortium
Pax	Passengers
PNAL	Palmerston North Airports Limited
PtL	Power to Liquid (fuel conversion)
RESA	Runway End Safety Area
RNZAF	Royal New Zealand Air Force
SAF	Sustainable Aviation Fuel
UAM	Urban Air Mobility

EXECUTIVE SUMMARY

New Zealand benefits from an extensive network of airports and commercial airline services spanning over 20 airports across the country. This is supplemented by a large and productive general aviation sector serving primary industries, first responders, health, tourism and education. Aviation is a vital transport mode today and into the future. That said, the industry is increasingly under threat from high levels of domestic airline market concentration, cost and regulatory burdens, minimal support mechanisms from Government, and an overriding need to ensure that airports, and the broader industry, is match fit for the next generation of aircraft, travel demand and for new types of fuel and aircraft segments.

At odds with the current global aviation market which is in high growth, New Zealand finds itself in a low growth period due to a variety of supply-side and demand-led factors. Withdrawals and capacity reductions on domestic routes are only partially offset by international airlines growing their presence at major airports, with a lack of domestic airline competition and significant headwinds for all New Zealand-based airlines having a negative trickle-down impact on the airport community.

Heading into 2025 and beyond, growing connectivity, both internationally and regionally and operating resilient assets remain critical focus points for airports. A gap in the national aircraft fleet is widening, and the timeframe for replacement uncertain, with Air New Zealand's Q300 fleet averaging 20 years of age, and without a direct replacement. In recent times, smaller carriers such as Air Chathams, Sounds Air, Barrier Air and others have stepped in and taken over routes with smaller, lower cost operations. However the overwhelming feedback received from these airlines when asked to respond to requests for information for this report, is that the likelihood of that pattern continuing is low. Citing high capital and operating costs which cannot be fully passed on to customers, increases in regulatory compliance costs, and the limited financial support measures available to airlines to service regional city pairs see these airlines focused on the maturity of existing routes.

In response to the operating environment, yet the critical nature of domestic aviation, this report recommends the establishment of a contestable regional route support funding programme, which could affect positive change and increase resilience of the regional airline network. This may resemble Essential Air Service models in other geographies and would strengthen domestic aviation by ensuring community access to major cities and airport hubs.

The report also recommends supporting smaller airlines by considering a programme of centralised aircraft procurement and access to capital, so that smaller airlines are able to operate and maintain modern, efficient aircraft fleets.

In the absence of a national aviation strategy, this report has sought to identify areas of alignment and potential investment for the airport sector. These focus on providing a wider understanding and consideration of the potential impacts of electrification, Sustainable Aviation Fuels (SAF) and Hydrogen, as well as highlighting how a 'New Zealand Inc.' approach to attracting Electric Vertical Take-off and Landing (eVTOL) manufacturing, test programmes and entry into service support may be an attractive investment strategy for the airport sector.

Being an attractive 'early adopter' market for new aircraft technology is in part an operational perspective, as new electrified aircraft will over time be ideal for tourism activity, flight training, and replacing surface transport in some areas. It is also an infrastructural consideration, with many airports highlighting to report authors that developing non-aeronautical assets as a key priority area. The intersection of this would see funding available to global eVTOL and next generation aircraft manufacturers incentivised to build, test, and scale up production of aircraft for Asia Pacific from a New Zealand base. With many airports featuring low traffic movements, developable land, access to aeronautical, navigation and controlled airspace, New Zealand can leverage its environment to attract investment as aviation makes a technological step change in the coming decades.

The national airport landscape will also need to invest in future fuels, with benefits to surface transport modes if airports can become energy hubs offering existing fuel supply as well as SAF, Hydrogen and electrification. Onsite generation (mostly solar) is an area which many airports are already investing in. However, a nationally aligned focus on growing SAF production in order to reduce unit costs and decarbonise existing flights and understand the runway for hydrogen's use in aviation would be a sensible starting point. With many airports already harnessing their location and landside developments to enable the national and international supply chain, investment in fuels and energy will increase national resilience as well as unlock new energy transportation for road users as well as be ready for aviation's future.

Airports are community assets, and with most of the country's regional airport infrastructure owned by local government, the report considered how to ensure that airports are productive assets for its stakeholders in the decades ahead. Central to this will be enabling airports to firstly maintain safe, secure and appropriate aeronautical infrastructure. This covers runway and taxiway facilities, navigational equipment, terminal and passenger facilities, and must be done in a way which is cost-sensitive to share costs and benefits with aviation users and passengers.

The growth opportunity for airports is in supplementing their focus on aeronautical assets with a focus on diversifying their revenue streams, balance sheets and creating resilient assets by landside developments. This may provide an opportunity for airports to consider opportunities to attract outside investment, either through traditional investors such as superannuation funds and capital markets, and/or with iwi and other local investors. Striking the right balance of local and outside ownership of airports will be unique to each asset but looking at examples in Australia where regional airports have successfully sought outside investment, ownership models are a significant opportunity for airports of all sizes to be the best version of themselves now and into the future.

In summary, this report highlights the current state and challenges that New Zealand's aviation sector faces. It may read at times as showing symptoms of market failure, certainly when compared to peer global markets which are seeing sustained growth. However, the opportunities throughout note that with a coherent national strategy to help the sector remain resilient, attract new investment, be futureproofing and be ready for the next generation of technology and travellers will catalyse the industry and allow it to thrive.

1 PROJECT BACKGROUND

Air connectivity is critical for New Zealand. New Zealand's prosperity and wellbeing relies on affordable and efficient air transport that connects people and facilitates freight and business across our regions, nationally and internationally.

Airports need to plan, design, finance and deliver infrastructure to meet the long-term needs of airlines and consumers.

Over the next 5-20 years, the New Zealand aviation industry is expecting fleet changes and technology innovations that will require decisions about the right strategic infrastructure investments for airports.

There are a few key drivers behind this:

1. New Zealand's regional connectivity relies on Air New Zealand's fleet of turboprop aircraft which (particularly the Q300) are reaching their end of life.
2. Longer-term, the decarbonisation of regional air transport in New Zealand will require shifts to battery electric and green hydrogen aircraft, but we do not yet know which aircraft are likely to be procured by New Zealand airlines.
3. Both battery electric and green hydrogen aircraft will require significant supply of electricity from renewable energy sources, as will the production of synthetic or green SAF.
4. Airports are well positioned to provide regional co-benefits from both aeronautical and non-aeronautical investment.

This report outlines the current context of New Zealand's aviation network. It explores future aircraft technologies and the infrastructure they will require to operate in New Zealand. Finally, it outlines some key opportunities and challenges for New Zealand's aviation industry.

2 NEW ZEALAND'S AIRPORT NETWORK

2.1 OVERVIEW OF AIRPORT NETWORK

New Zealand has a long history of reliance on aviation due to challenging terrain and limited surface transport options. As a result, New Zealand has a large amount of airport infrastructure in operation today. These community assets are highly valued by residents and visitors for access and connectivity. They also operate as critical regional and national infrastructure so are vital to be maintained by asset owners and operators.

This report serves to introduce each airport cohort by their characteristics, their risks, and their future opportunities to pursue both aviation derived growth as well as non-aviation development.

New Zealand's airport network is extensive, catering to both international and domestic travel. For the purposes of this study, the airports have been classified into 5 categories:

- Large International Airports (regulated for information disclosure, serving overseas destinations).
- Small International Airports (serving overseas destinations).
- Regional Airports (serving domestic routes only).
- Small Aerodromes (enabling flight training, air ambulance services, tourist flights and general aviation operations); and
- Military Bases.

A total of 136 airports/aerodromes have been grouped under the 5 categories mentioned above, based on the destinations served and services provided to the public (NZANR, 2018; AIP NZ, 2024). In addition to these, we note that the New Zealand aviation network consists of 81 Heliports listed under the Aeronautical Information Publication (AIP) (AIP NZ, 2024).

New Zealand has unique geography and relatively low population densities outside the three main metropolitan regions (Auckland, Wellington and Christchurch). Domestic air connectivity is anchored by services connecting to and from these three major centres. With limited inter-region connectivity currently, airport operators and communities are focused on ensuring robust connectivity, resilience and affordability of airfares to allow essential, as well as discretionary travel and tourism to occur.

2.2 LARGE INTERNATIONAL AIRPORTS

New Zealand has three major/large international airports which are regulated for information disclosure.

- Auckland Airport (NZAA) – The busiest airport in New Zealand and the main gateway to the country. Auckland Airport handles most of New Zealand's international flights and is currently undergoing significant development.
- Christchurch Airport (NZCH) – The main airport in the South Island of New Zealand. It supports long-haul international and domestic services.

- **Wellington Airport (NZWN)** – Located in the capital city, it provides a crucial link for government and business travel.

2.3 SMALL INTERNATIONAL AIRPORTS

There are a few other airports that do or will provide short-haul international services from New Zealand, primarily to destinations in Australia such as Brisbane, Gold Coast, Melbourne, and Sydney.

- **Queenstown Airport (NZQN)** – The fourth busiest airport in New Zealand by passenger traffic and caters to both international and domestic tourists.

Jetstar recently announced it will be beginning international services from Hamilton and Dunedin airports to Australian tourist destinations. The services are expected to commence in June 2025.

- **Hamilton Airport (NZHN)** – Located in the Waikato region, primarily handling domestic passenger flights. It is expected to begin serving international destinations starting June 2025 (3 days a week to Gold Coast and 4 days a week to Sydney) (Hamilton Airport, 2024). Previously operated international services between 1994 – 2012.
- **Dunedin Airport (NZDN) –** Located in the Otago region, primarily serves domestic flights with Air NZ being the main carrier. Dunedin Airport is expected to go international beginning June 2025 connecting to Gold Coast, Australia (3 days a week), (Dunedin Airport, 2024). Previously operated international services between 1995 – 2020.
- In addition to this current group of airports, several other airports have had a significant period of international service in prior years. This history signals both the opportunity to grow connectivity but also the constant challenge for airports and airline operators to operate commercially viable international services outside the large international airport group. These airports are as follows:
  - Rotorua: Previous international services between 2009-2015
  - Palmerston North: Previous international services between 1996-2008

2.4 REGIONAL AIRPORTS

New Zealand currently has 22 airports that receive scheduled domestic flights. The domestic flights are primarily served by Air NZ. Other airlines that serve domestic routes include:

- Air Chathams.
- Barrier Air.
- Jetstar.
- Golden Bay Air.
- Originair.
- Sounds Air.
- Stewart Island Flights.
- Sunair Aviation.

Table 1 Regional Airports in New Zealand

	ICAO Airport Code	Regional Airports
1	NZGS	Gisborne Airport
2	NZHK	Hokitika Airport
3	NZNV	Invercargill Airport
4	NZKK	Kerikeri Airport
5	NZKT	Kaitaia Airport
6	NZNR	Hawkes Bay (Napier) Airport
7	NZNS	Nelson Airport
8	NZNP	New Plymouth Airport
9	NZPM	Palmerston North Airport
10	NZPN	Picton Airport
11	NZPP	Kapiti Coast (Paraparaumu) Airport
12	NZRO	Rotorua Airport
13	NZAP	Taupo Airport
14	NZTG	Tauranga Airport
15	NZTU	Timaru Airport
16	NZCI	Tuuta/Chatham Airport
17	NZWF	Wanaka Airport
18	NZWS	Westport Airport
19	NZWK	Whakatane Airport
20	NZWU	Whanganui Airport
21	NZWR	Whangarei Airport
22	NZWB	Marlborough (Woodbourne) Airport

2.5 SMALL AERODROMES

This category includes airstrips and small aerodromes across New Zealand, enabling general aviation operations, flight training for students, tourist flights, and air ambulance services.

Currently, there are about 102 aerodromes under this category, most of them non-certificated (i.e., not a part 139 certified operator) except Ardmore Aerodrome.

Table 2 Small Aerodromes in New Zealand

	ICAO Code	Aerodrome Name		ICAO Code	Aerodrome Name		ICAO Code	Aerodrome Name
1	NZLX	ALEXANDRA	35	NZKF	KAIPARA FLATS	69	NZUK	PUKAKI
2	NZAN	ANAMA	36	NZKM	KARAMEA	70	NZPU	PUKEKOHE
3	NZAR	ARDMORE	37	NZKP	KOPUTAROA	71	NZRA	RAGLAN
4	NZAS	ASHBURTON	38	NZKY	KOWHAI	72	NZRI	RAKITATA ISLAND
5	NZBA	BALCLUTHA	39	NZHP	LAKE HAUPIRI	73	NZRT	RANGIORA
6	NZCG	CENTENNIAL PARK	40	NZLE	LAKE STATION	74	NZRK	RANGITAIKI

	ICAO Code	Aerodrome Name		ICAO Code	Aerodrome Name		ICAO Code	Aerodrome Name
7	NZCB	CENTRE BUSH	41	NZLA	LOBURN ABBEY	75	NZRX	ROXBURGH
8	NZCL	CLOUDY BAY	42	NZMW	MAKARORA	76	NZRR	RUATORIA
9	NZCX	COROMANDEL	43	NZVL	MANDEVILLE	77	NZRW	RUAWAI
10	NZCW	CROMWELL	44	NZMJ	MARTINS BAY	78	NZRC	RYANS CREEK
11	NZCS	CROMWELL RACECOURSE	45	NZMS	MASTERTON	79	NZSF	SPRINGFIELD
12	NZDV	DANNEVIRKE	46	NZMA	MATAMATA	80	NZSL	SPRINGHILL
13	NZDA	DARGAVILLE	47	NZME	MERCER	81	NZSD	STRATFORD
14	NZDY	DRURY	48	NZML	MID WAIHO LOOP	82	NZTI	TAIERI
15	NZFI	FEILDING	49	NZMF	MILFORD SOUND	83	NZVR	TAIHAPE
16	NZFE	FERNSIDE FIELDS	50	NZKD	MOTU KAIKOURA ISLAND	84	NZTK	TAKAKA
17	NZFL	FLAT HILLS	51	NZMK	MOTUEKA	85	NZTM	TAUMARUNUI
18	NZFT	FLAT POINT	52	NZMC	MOUNT COOK	86	NZTJ	TAWHAKI
19	NZFF	FOREST FIELD	53	NZMR	MURCHISON	87	NZTR	TE ARAROA
20	NZFO	FOX GLACIER	54	NZNF	NORFOLK	88	NZTE	TE KOWHAI
21	NZFP	FOXPINE	55	NZNE	NORTH SHORE	89	NZTT	TE KUITI
22	NZFJ	FRANZ JOSEF	56	NZOU	OAMARU	90	NZTL	TEKAPO
23	NZGA	GALATEA	57	NZOX	OKIWI STATION	91	NZTH	THAMES
24	NZGY	GLENORCHY	58	NZOF	OMAHA FLATS	92	NZTO	TOKOROA
25	NZGT	GLENTANNER	59	NZOM	OMAKA	93	NZTN	TURANGI
26	NZGC	GORE	60	NZOA	OMARAMA	94	NZKE	WAIHEKE
27	NZGB	GREAT BARRIER	61	NZOI	ONGAIO ISLAND	95	NZWV	WAIHI BEACH
28	NZGM	GREYMOUTH	62	NZOP	OPOTIKI	96	NZWM	WAIMATE
29	NZHT	HAAST	63	NZOT	OTAKI	97	NZYP	WAIPUKURAU
30	NZHM	HANMER	64	NZPW	PAPAWAI	98	NZWO	WAIROA
31	NZHS	HASTINGS	65	NZPI	PARAKAI	99	NZWQ	WAITIKI
32	NZHA	HAWERA	66	NZUN	PAUANUI BEACH	100	NZWL	WEST MELTON
33	NZKO	KAIKOHE	67	NZPO	PORANGAHAU	101	NZES	WHAREPAPA SOUTH
34	NZKI	KAIKOURA	68	NZPH	PUDDING HILL	102	NZWT	WHITIANGA

2.6 MILITARY BASES

Two military bases are currently operational in New Zealand, operated by the Royal New Zealand Air Force (RNZAF). Both are in the North Island.

RNZAF Base Whenuapai – Located in the city of Auckland on the North Island, the base supports air surveillance and tactical and strategic air mobility.

RNZAF Base Ohakea – A key operational base for RNZAF located near Palmerston North in the North Island. The base houses squadrons providing training for fixed-wing and helicopter pilots as well as airborne surveillance/maritime patrol.

3 NEW ZEALAND'S DOMESTIC AVIATION MARKET

3.1 OVERVIEW OF DOMESTIC AVIATION MARKET

New Zealand's domestic aviation market is primarily served by Air New Zealand (Air NZ). Air NZ has an 86% market share across New Zealand's domestic aviation market. This makes New Zealand's domestic aviation market one of the least competitive in the world for markets with more than 5 million seats operated by airlines (Sabre, 2024).

Currently, the only other operator to operate jet aircraft in the domestic market is Jetstar. Jetstar flies between Auckland to Wellington, Christchurch, Dunedin and Queenstown; as well as Wellington to Christchurch and Queenstown. Jetstar flies the Airbus A320 for these flights.

Other operators in the domestic market include Tier 2 Airlines such as Sounds Air, Air Chathams, Originair, Barrier Air and Sunair. Combined, the Tier 2 Airlines account for approximately 3% market share. They operate around 900 flights per week, between 35 city pairs with approximately 9,500 seats per week across the network (PNAL, 2024). These airlines utilise smaller capacity aircraft, including the Saab 340 and Cessna 206 (Stationair)/208 (Caravan), focusing on regional routes, inter-island routes and niche markets.

Additionally, general aviation (GA) operations such as tourism and flight training, are also prevalent in New Zealand. These activities utilise aircraft such as the Cessna and Diamond models.

3.2 HISTORIC COMPETITOR ENTRY

The New Zealand domestic aviation market has had several changes over the years. Many competitors for Air New Zealand have come and gone. This includes Ansett New Zealand (which operated in the domestic market between 1997 – 2001), Pacific Blue (2007 – 2010) and Origin Pacific (1997 – 2006). Qantas also operated a domestic jet operation operated by its fully owned Jet Connect subsidiary between 2002 to 2009, operating on domestic trunk routes. This operation was ultimately wound up and New Zealand domestic operations transferred to the Qantas Group's Jetstar operation from 2009 onward.

Jetstar also introduced a regional operation comprised of five Bombardier Q300 aircraft (sourced from Qantas Group Australia) which operated from 2015-2019 on routes between Auckland and Nelson, Napier, New Plymouth and Palmerston North, as well as between Nelson and Wellington. This competition on regional routes was welcomed at the time by the Airport sector and communities alike. However, it was withdrawn due to reports of marginal returns, as well as the opportunity cost of deploying the fleet of aircraft onto more profitable intrastate operations in Australia for QantasLink.

These operators have ultimately exited the domestic market for a variety of reasons, including large jet aircraft being unsuited to shorter domestic sectors, the mobility of aircraft as capital assets which allows deployment to more profitable markets such as Australia domestic, and the strength of competition posed by Air New Zealand throughout each competitor's experience in the New Zealand market.

3.3 AIRLINE CONSOLIDATION

Over the years, Air NZ has purchased various smaller domestic airlines and consolidated them to be a part of the Air NZ fleet. These subsidiary airlines of Air NZ originally operated under the brand name "Air New Zealand Link" (between 1991 and 2019). Air NZ purchased these airlines as it found it was not viable to operate its own regional services because of the competition from Ansett New Zealand (Eagle Air, 2007).

The three airlines that formed part of Air New Zealand Link were:

1. Mt Cook Airlines
2. Air Nelson
3. Eagle Airways.

In 2016, with the retirement of the Beech 1900 fleet, Eagle Airways ceased to operate. In 2019, Air Nelson and Mount Cook Airlines ceased to exist when they were merged with Air NZ. Their fleet of aircraft (Q300 and ATR 72s respectively) became part of the mainline Air NZ Fleet. (3rd Level New Zealand, 2019).

3.4 MARKET CHARACTERISTICS

New Zealanders have a high propensity to travel by air, as demonstrated through Figure 1 below.

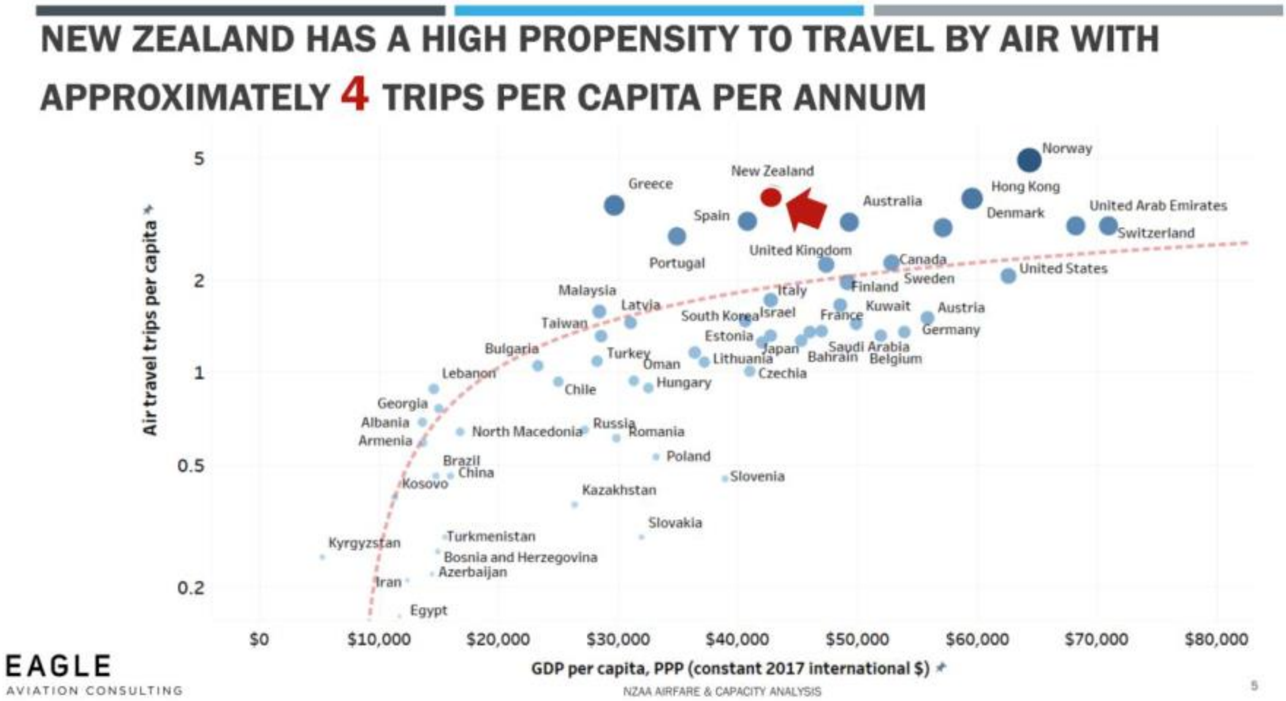

Figure 1 Air Travel Trips vs. GDP per capita. (Eagle Aviation Consulting, 2024)

There is a high reliance in New Zealand on aviation to facilitate tourism, business, deliveries, as well as access to both education and healthcare. In turn, this means there is a reliance on having good quality regional airport infrastructure that facilitates flights between regional airports to the main centres.

Most airports in New Zealand are either owned by local or central government. Currently, there is limited private investment in New Zealand airports outside of Auckland and Wellington.

3.5 AIR NEW ZEALAND'S RECENT FLEET SIMPLIFICATION STRATEGY

Over the past decade, Air NZ has undertaken a fleet simplification strategy, which has led to a significant reduction in the number of both domestic and international aircraft types and seat capacities. Whilst having a variety of seat counts allows an airline to 'right size' many of the markets it serves, having many different types of aircraft and seat counts adds significant cost, and complexity to any airline's operation, especially a medium sized carrier like Air NZ.

In 2014, Air NZ's fleet had seating configurations totalling 19, 33, 50, 68, 133, 168, 171, 234, 302, 312 and 342 seats. The rapid withdrawal of the Beech 1900D (19 seats), Boeing 737-300 (133 seats) and Boeing 767-300 (234 seats) fleets have allowed Air NZ to both simplify and modernise its fleet The effect this has had on the New Zealand domestic market is shown in Figure 2 below. Air NZ's fleet development strategy through the 2020s and into the 2030s will likely be through consolidating and using the remaining (and new) fuel efficient aircraft types.

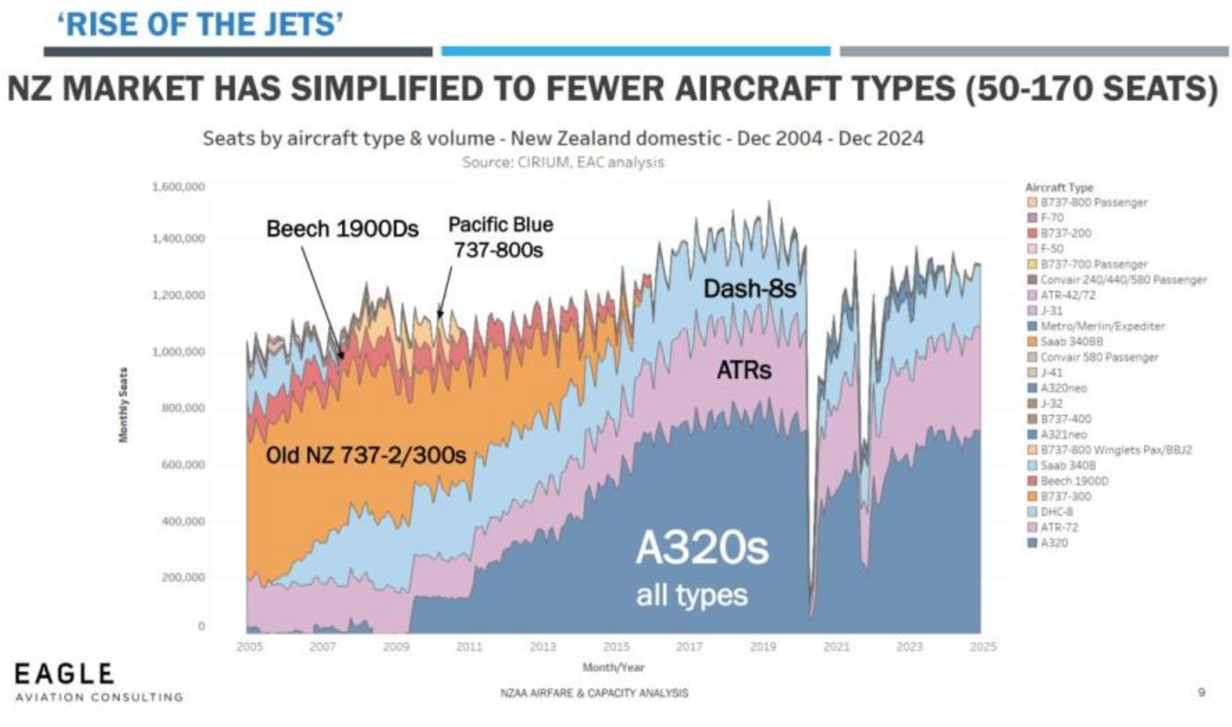

Figure 2 New Zealand Domestic Seats by Aircraft Types. (Eagle Aviation Consulting, 2024)

Air NZ currently operates two turboprop aircraft, the Bombardier Q300 (delivered 2005-2007), ATR72-600 (2012-present), Airbus A320CEO/320NEO/321NEO (2004-present), the Boeing 787-9 (2014-present) and the Boeing 777-300ER (2010-present).

3.5.1 MARKET WITHDRAWALS DUE TO FLEET SIMPLIFICATION

The downside to Air NZ's fleet consolidation has been the associated exit of Air NZ from various regional centres (Masterton, Kaitaia, Whakatane, Kapiti Coast, Westport, Wanaka) due to the withdrawal of the B1900 fleet. Its replacement, the 50-seat Q300, is too large to efficiently serve these small markets. Secondly, after the withdrawal of the 133 seat B737-300 from Air NZ's fleet, the wide difference between the 68 seat ATR72 and the 171 seat A320 has reduced Air NZ's flexibility on certain domestic routes, and the loss of a smaller jet aircraft has limited Air NZ's growth on secondary Tasman and Pacific routes where the A320 capacity is not needed.

Figure 3 below shows the network map of routes that are no longer served by an airline or have had a significant capacity reduction because of Air NZ's exit from these routes.

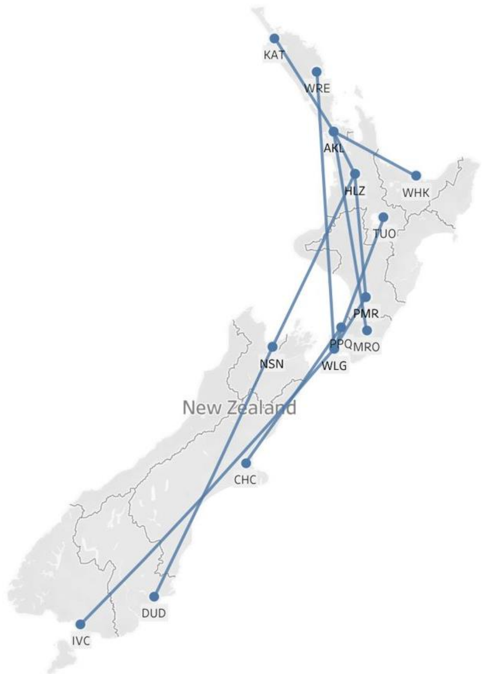

Figure 3: Network map showing domestic routes lost or significantly reduced due to Air NZ's exit

3.5.2 Q300 FLEET REACHING END OF LIFE

Air NZ's Dash 8-Q300 fleet is reaching the end of its life. This aircraft is no longer being produced by de Havilland and Air NZ has signalled its retirement from around 2030. As part of its Zero Emissions Aircraft product requirements document, Air NZ outlined that they were hoping to find an aircraft by 2031 which "will be a drop-in replacement for the Q300 for seamless integration into the existing Air New Zealand turboprop network, which may include retrofit of the existing aircraft." (Air NZ, 2021).

In 2024, Air NZ indicated it needed to step away from its 2030 climate targets (Air NZ, 2024c) partially because it was too difficult to secure more efficient aircraft. It is probable that Air NZ's Q300 fleet will extend its operations well into the 2030s. However this may bring with it a reduction in aircraft utilisation to maintain operational reliability and on-time performance. Air NZ has advised that they are working with the manufacturer to guarantee parts for longer service of these aircraft.

Currently, it is unclear which aircraft will be procured by Air NZ to replace this fleet and by what timeframe. Replacement aircraft may be larger than the current Q300s, which would have an impact on regional airports with restricted airfield infrastructure (including runway length, nearby terrain and weather characteristics), and airports with lower demand profiles. Larger aircraft may not be able to land at these airports, or the lower demand profiles will make them uneconomic for Air NZ to service. This could thus lead to a potential loss of regional connectivity.

Airports identified as vulnerable to service reductions by include Taupo, Timaru and Hokitika (NZAA, 2024a), as well as many which have had airline service at various times in history such as Te Anau Manapouri, Oamaru, Kapiti, Masterton and others. It is important to note Air NZ's ongoing public commentary noting the importance and its commitment to providing domestic growth over time. We recommend a coordinated approach supporting the ambition of Air NZ, as well as the interests of the smaller airlines noted in this report.

3.6 PRESENCE OF TIER 2 AIRLINES

The New Zealand aviation system has long been complemented by a variety of second tier airlines, whose networks have minimal overlap with Air New Zealand, and who ensure smaller communities retain connectivity to key domestic hubs. This strategy has also included these airlines (particularly Air Chathams, Sounds Air, Barrier Air and Originair) stepping in to operate routes discontinued by Air New Zealand.

Looking ahead, the risk to the aviation network is two-fold, in that these smaller airlines are facing increasing cost pressure to maintain current level of operations, and their ability to expand and supplement Air New Zealand's future network direction is becoming limited.

Input factors behind these challenges are broad. Post-Covid, the global supply chain for many aircraft parts and/or components is severely hampered. Parts for many of the aging aircraft currently used on the New Zealand regional domestic network are becoming almost impossible to source. Operators have cited maintenance cost increases of 300%. Critically, those that own their aircraft are likely to secure a higher investment return by leasing their aircraft internationally rather than operating regional flights in New Zealand.

Labour and capital are also significant challenges to this airline group, with engineers and pilots often sought by larger airlines. Additionally, access to and the cost of capital limits these airlines' ability to upgrade their fleet, avionics capability and synthetic training aids including simulators. In short, economies of scale are against this cohort of smaller airlines, and while they continue to serve communities, their ability to maintain and grow is at risk.

3.7 GAP IN AIRCRAFT SERVICING DOMESTIC MARKET

As shown in Figure 4 below, there are currently limited to no 19 – 50 seat aircraft in the New Zealand domestic aviation market presently. The economics of aviation depends on matching the right routes with the right aircraft, and currently aircraft manufacturers are not developing aircraft between 19-50 seats that would serve as a suitable replacement aircraft for New Zealand regional routes (NZAA, 2024a). Until next generation aircraft become viable, there is a gap in the market that is leading to a risk of decreased regional connectivity.

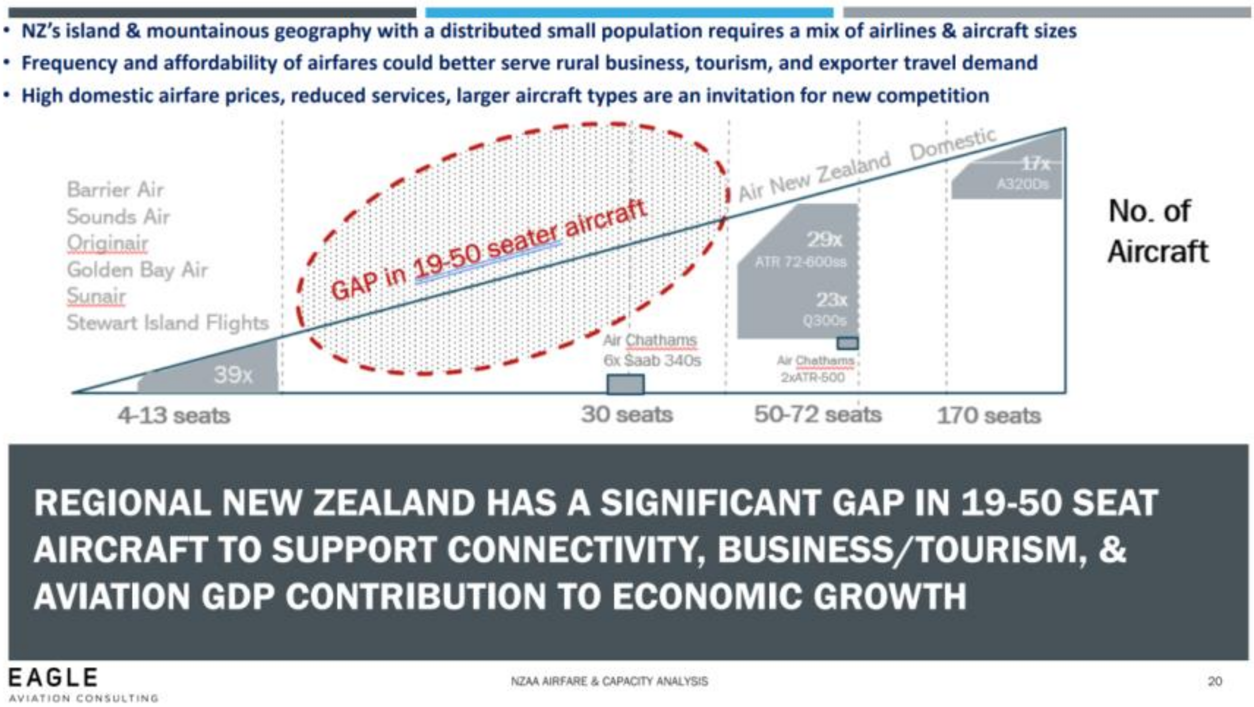

Figure 4 Aircraft Present in the New Zealand Domestic Market. (Eagle Aviation Consulting, 2024)

3.8 SEAT CAPACITY IN THE NZ AVIATION MARKET

Since the Covid pandemic, New Zealand's aviation market has not bounced back or grown to the same extent as overseas markets. As of the end of November 2024, annual visitor numbers into New Zealand from overseas were at approximately 84% of pre-Covid numbers (Stats NZ, 2025). This recognises that there is still significant room to grow to reach 2019 inbound visitor numbers.

Globally, all regions (Asia Pacific, Europe, North America, Middle East, Latin America and Africa) have surpassed their 2019 pre-pandemic commercial air traffic levels. While areas like Latin America (111%) and Asia-Pacific (106%) are operating above pre-pandemic flight levels, New Zealand is still lagging behind with only 91% of pre-pandemic flights (IATA, 2025). This is in-part due to the national carrier being constrained by global engine issues (grounding some of its fleet), fleet downsizing due to Covid-19 and delays to receiving new planes on order. However, it is also due to softened international demand from key markets. Compared to our peak visitor numbers in 2019, inbound arrivals from Australia are down ~180,000, China down ~160,00, UK down ~57,000, Germany down ~32,000 and Japan down ~31,000 people (Stats NZ, 2025). Domestically, the number of flights has also decreased due to softened demand from tourism and business travel.

As shown in Figure 5 and Figure 6 below, within the domestic aviation market, since 2005 the number of seats has been increasing. However, there is a reduced number of flights (particularly to regional airports). This is due to larger aircraft being used to service regional routes (Eagle Aviation Consulting, 2024). However, in 2025 the number of domestic seats and flights is likely to reduce, as signalled through Air NZ and other Tier 2 carriers announcing that they will be cutting routes or reducing frequency.

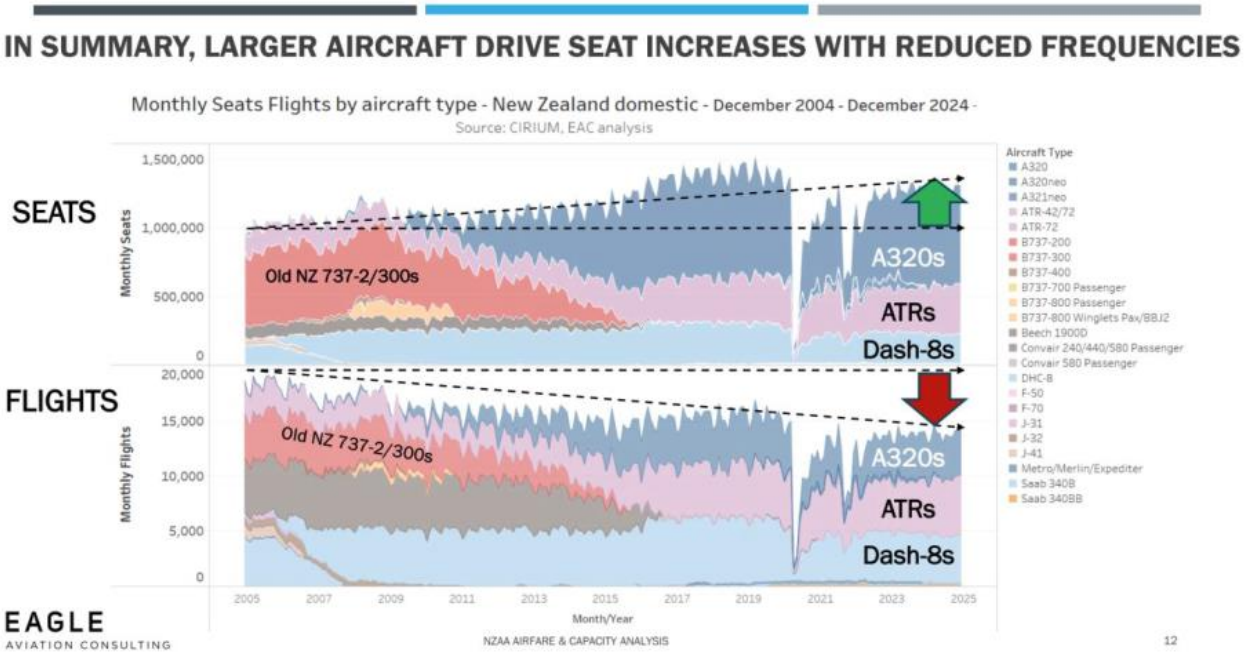

Figure 5 Trend in Seats vs. Flights for New Zealand Domestic Market. (Eagle Aviation Consulting, 2024)

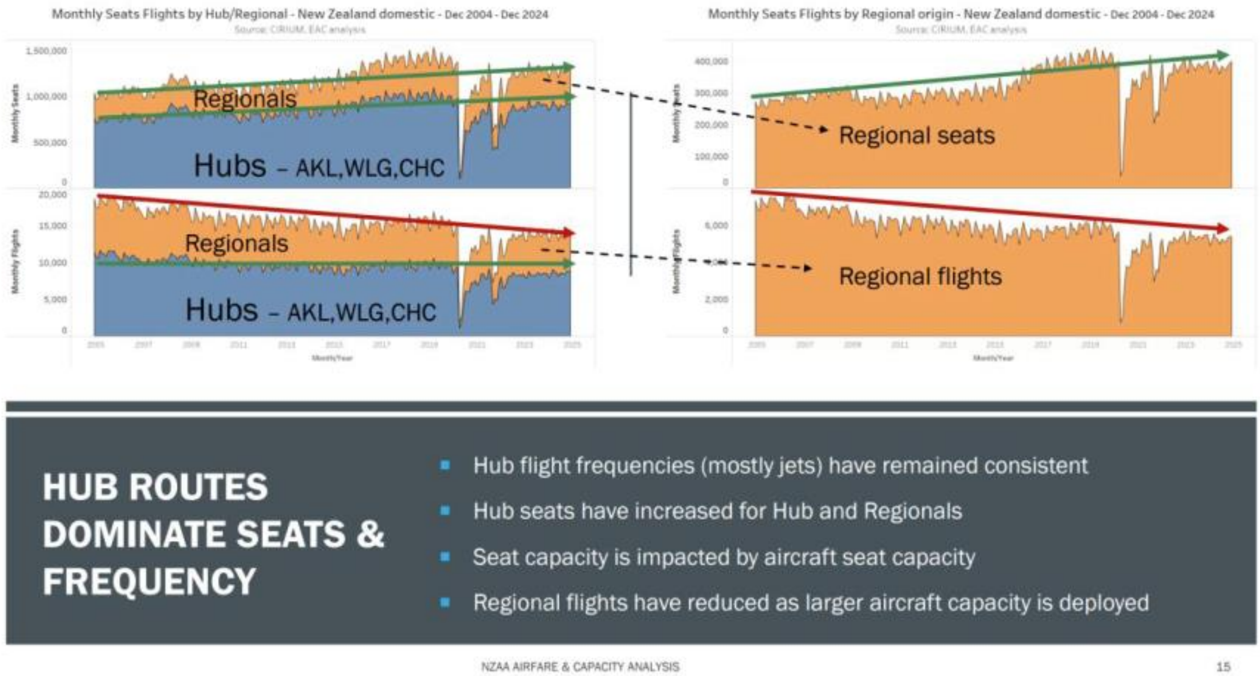

Figure 6 Trend in Regional Seats vs. Flights for New Zealand Domestic Market. (Eagle Aviation Consulting, 2024)

3.9 FUTURE DEMOGRAPHIC TRENDS FOR NEW ZEALAND

This section outlines some key Future Ready™ Demographic Trends that are expected to impact the New Zealand Aviation Industry over the next 20-70 years.

3.9.1 POPULATION GROWTH

The 'Golden Triangle', compromising Hamilton, Tauranga, and Auckland, is projected to experience the highest population growth in New Zealand. By 2048, these regions are expected to grow by 40%, becoming home to 3.3 million people. The Waikato region is anticipated to continue growing at an annual rate of 1%, the fastest among all 16 regions in New Zealand. Overall, the North Island is expected to contribute to 80% of New Zealand's total population growth by 2048 (WSP NZ, 2024).

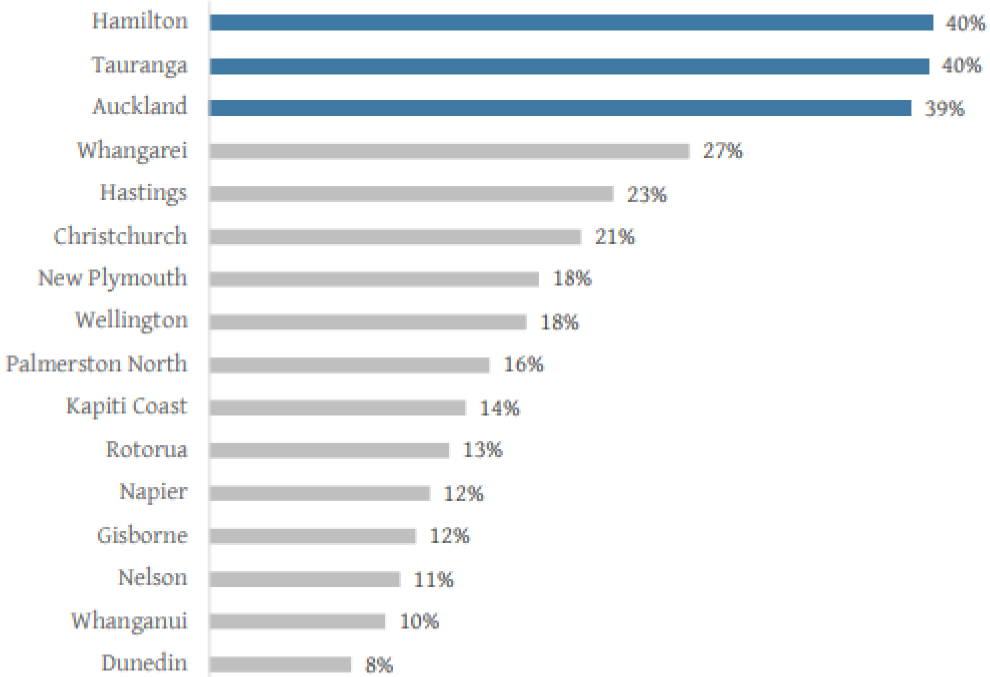

Figure 7: Projected population growth by 2048. Information produced by WSP NZ. (WSP NZ, 2024).

The following figures illustrate NZ's current population density and expected growth rates. Currently, the main population densities are located around the metropolitan centres of Auckland, Hamilton, Tauranga, Wellington and Christchurch. Figure 9 illustrates that most of the projected growth in the next few decades are expected around the Golden Triangle, greater Canterbury Region and around Queenstown and Central Otago.

Figure 8 Population Density Map of New Zealand, sourced from Terence Fosstodon (Researchremora 2020)

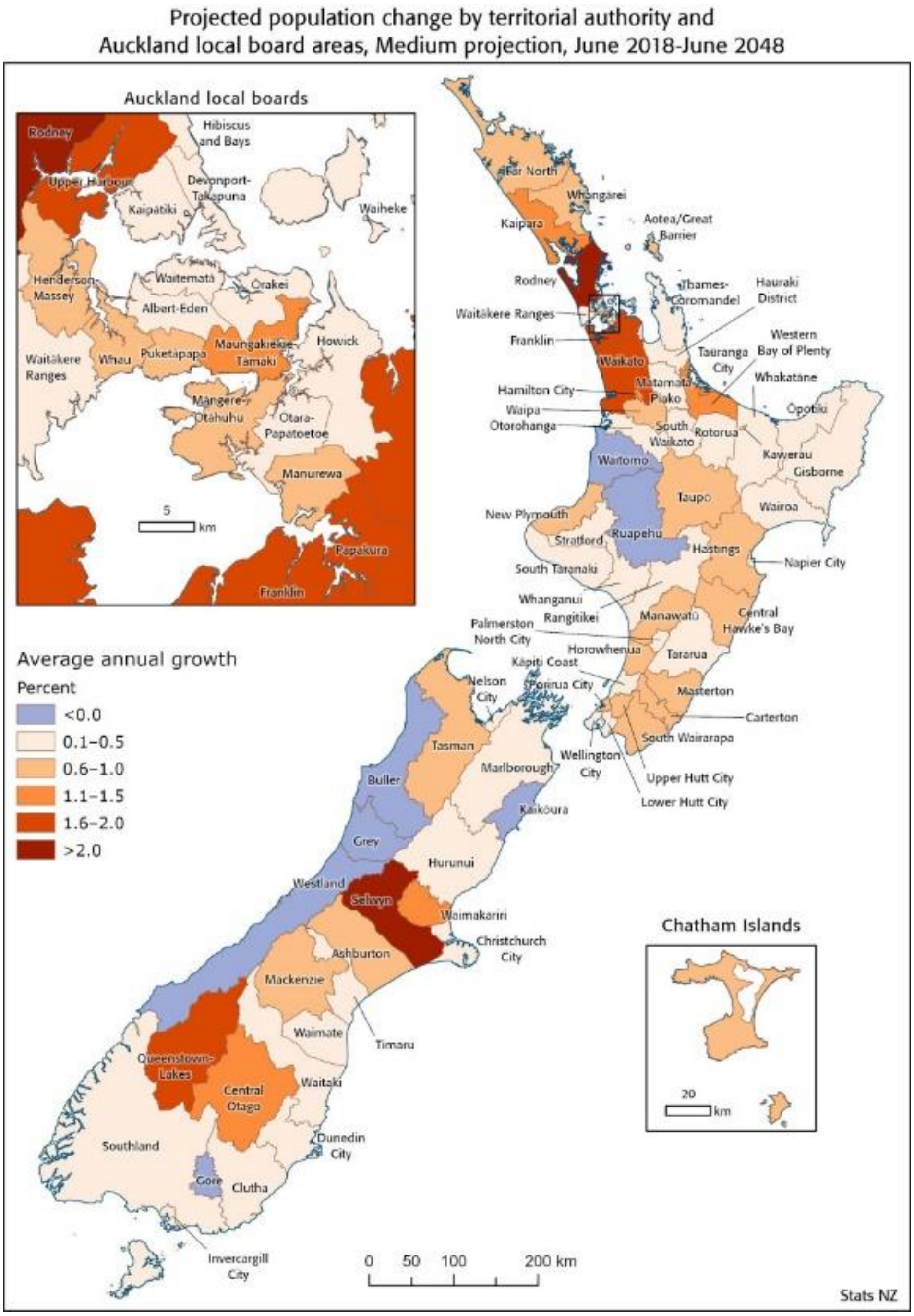

Figure 9. Projected population changes across New Zealand. Sourced form Statistics NZ (Stats NZ, 2022)

Population growth is closely linked to aviation demand, as highlighted by the International Civil Aviation Organisation (ICAO). With global aviation demand forecast to increase by an average of 4.3% annually over the next 20 years, a similar trend is expected in New Zealand due to its population growth (ICAO, 2024a; ICAO, 2024b).

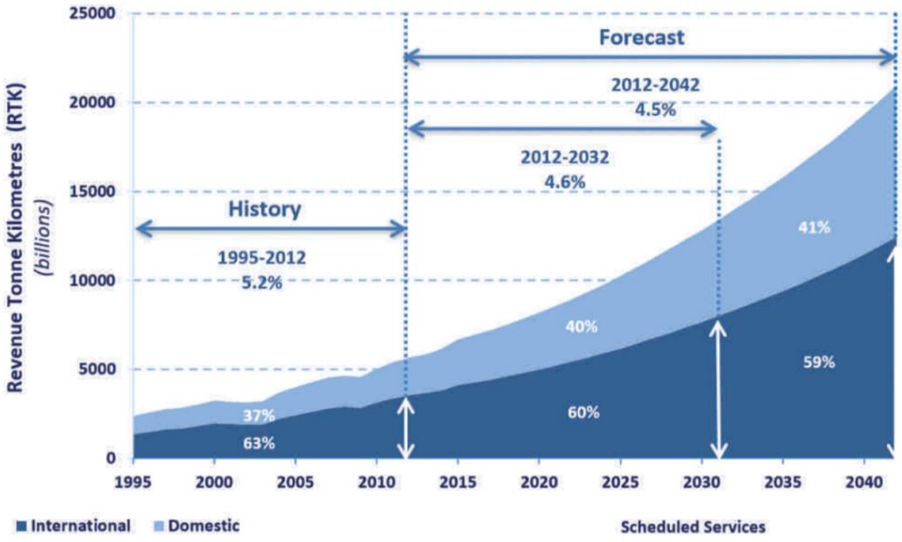

Figure 10: Forecast revenue in contrast to increased International / Domestic Services. (ICAO, 2024a).

3.9.2 DEMOGRAPHIC CHANGES

Demographic changes are also anticipated. By 2043, 465,000 people in New Zealand will live alone, and the average household size is projected to decrease from 2.7 people in 2018 to 2.6 people.

The ethnic composition of New Zealand is projected to become more diverse, with overall increases in the Asian (8%), Māori (4%), and Pasifika (3%) populations by 2043. The European population is expected to decrease (-5%). Migration plays a significant role in this, with an average of 25,000 migrants annually from 2026 onwards, leading to over 600,000 additional migrants by 2050 (WSP NZ, 2024). This increase in migration is likely to boost aviation demand as migrants travel to visit their home countries. For example, research in Canada has indicated that an increase in 10% of Canadian immigrants led to an increase of 3% in inbound travel demand (Choo, 2018).

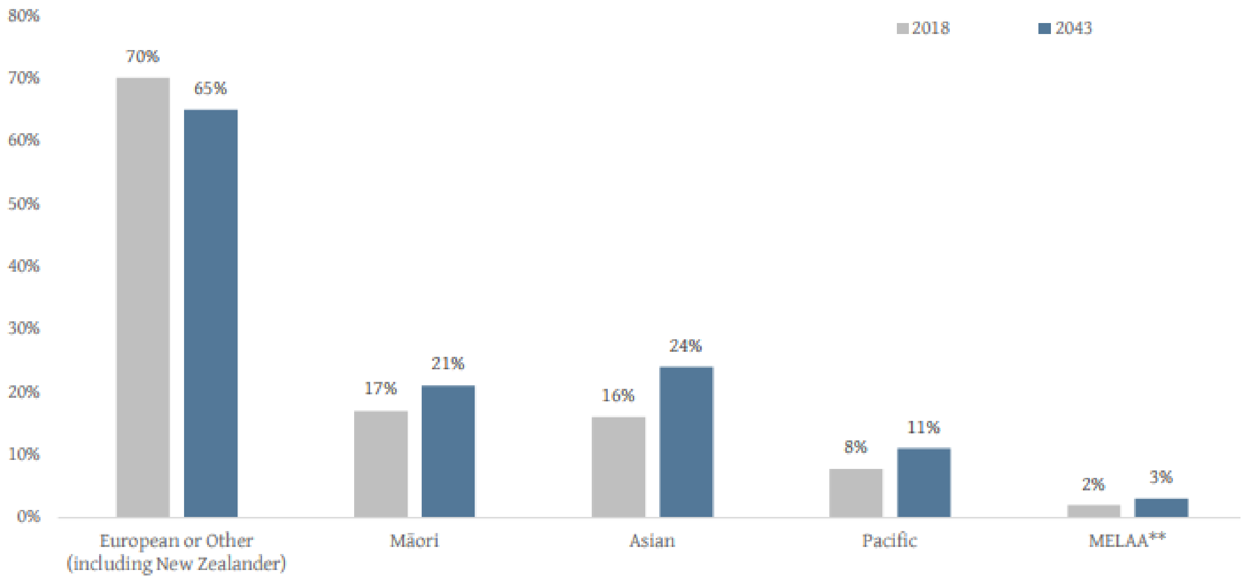

Figure 11: 2043 Ethnicity forecast (2018 base). Information provided by WSP NZ. (WSP NZ, 2024).

An ageing population, due to increasing life expectancy and decreasing birth rates, will likely raise the average age (WSP NZ, 2024). This shift will increase the proportion of older passengers, who tend to travel more for leisure and visiting family and prefer point-to-point flights to avoid layovers (Burghouwt et al., 2006). The increase in leisure travellers will likely impact New Zealand airlines, as older leisure passengers will prioritise comfort, convenience, and most importantly, the airline's schedule (Kaiser Associates, 2024). An airline's use of smaller aircraft with increased flight frequency can attract such passengers by offering the flexibility to choose the most suitable flight times and days (Brink et al., 2023).

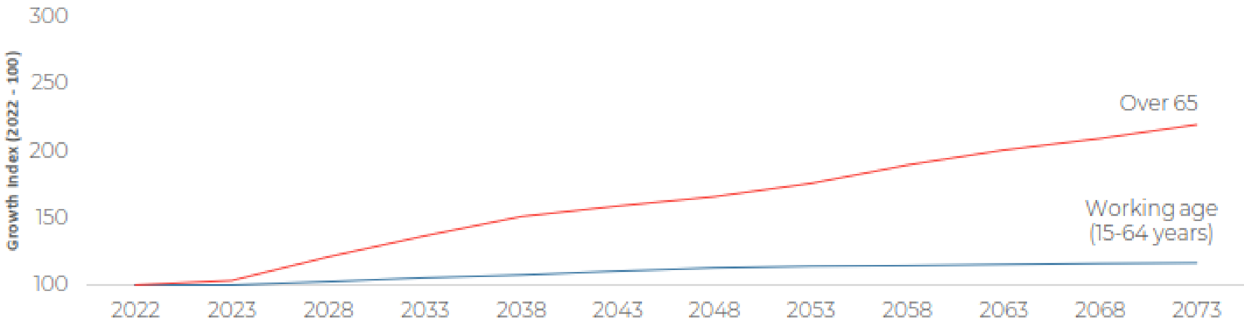

Figure 12: Rate of population growth for working age and people over 65 years, 2022 to 2073. Information provided by WSP NZ. (WSP NZ, 2024).

The median age of New Zealanders is expected to rise from 38 to 47 by 2073, and the percentage of people aged 65 and over still working is projected to increase (WSP NZ, 2024). Assuming New Zealand's economy continues to grow, there should be a rise in aviation passenger numbers, driven by higher household incomes and economic growth (Addepalli et al., 2018).

Up to 15% of the New Zealand population lives in rural areas (MPI, 2024). Utilising economically efficient next-generation aircraft for short-haul services to rural areas can enhance connectivity, allowing people to connect with extended families, access services, and receive better emergency and healthcare support.

The aviation industry plays a crucial role in job creation. In 2017, it generated 65 million jobs globally, contributing 3.5% to the global GDP, equivalent to USD $2.7 trillion. If the forecasted growth in aviation demand is achieved by 2036, the industry could create an additional 15.5 million direct jobs globally (ICAO, 2024a).

In conclusion, New Zealand's population growth, demographic changes, and rising economic activity are poised to significantly influence New Zealand's aviation demand. Airlines and airports that adapt to these changes will be better positioned to meet future needs and drive sustainable growth in the sector.

4 AIRCRAFT FUEL TECHNOLOGIES

4.1 PRESENT STATE

4.1.1 ELECTRIC AIRCRAFT

Electric aircraft technology remains limited for commercial operations due to battery-specific energy constraints and heavy weight. Current lithium batteries are 50 times heavier than Jet A fuel (Ying, 2022).

However, electric aircraft technology for smaller scale operations in New Zealand is steadily developing, driven by the New Zealand aviation industry's commitment to sustainable aviation goals. Air NZ has partnered with BETA Technologies to acquire electric ALIA conventional take-off and landing (CTOL) aircraft. In collaboration with NZ Post, Air NZ plans to introduce the BETA ALIA aircraft on Wellington – Marlborough Airport routes by 2026. Wellington Airport will serve as the base for Air NZ's next-generation aircraft, with Marlborough Airport investing in charging infrastructure to support return journeys (Air NZ, 2024a). This initiative aligns with Air NZ's broader sustainability strategy, which initially aimed to reduce carbon emission intensity by 28.9% by 2030, against a 2019 baseline. However, Air NZ withdrew this target in July 2024 due to challenges including manufacturing, cost constraints, and regulatory complexities outside the airline's direct control (Air NZ, 2024b). Despite this statement, the development and testing of the BETA ALIA aircraft remain on schedule. Air NZ recently announced that the BETA ALIA will arrive in 2025, with test flights commencing at Hamilton Airport. These flights will gradually expand to surrounding airports before the aircraft makes its journey to Wellington later in 2026 (Air NZ, 2024f). The New Zealand Air Ambulance Service has also ordered two ALIA aircraft, with options for 10 more (AIN, 2024).

Further analysis of electric aircraft, along with emerging technologies including hybrid, hydrogen, and electronic vertical take-off and landing (eVTOL) aircraft, will be discussed in the medium-term section of this report.

4.1.2 FUEL TECHNOLOGY

Currently, the New Zealand aviation sector relies predominantly on conventional kerosene-based Jet A-1 fuel. However, with the global aviation industry's Net Zero target by 2050 in alignment with IATA and ICAO's committed target, the industry is shifting towards sustainable alternatives to reduce carbon emissions.

Sustainable Aviation Fuel (SAF) is at the forefront of fuel technology, compared to hydrogen or electric alternatives, due to its compatibility with existing infrastructure and aircraft systems. SAF's drop-in capability makes it the most practical solution for adoption, requiring minimal changes to fuel storage and distribution facilities (Ara Ake, 2024). In July 2024, Air NZ received its first shipment of SAF in Wellington, where they plan to utilise it on selected ATR-operated routes (Air NZ, 2024b). SAF is becoming a critical element in airline operations as major Australian airports (e.g., Melbourne, Sydney, Brisbane) announce planned SAF infrastructure investments to support mandates for flights starting in 2030 (Australian Infrastructure Government, 2024). This development will also impact New Zealand airports, which will need facilities for SAF storage to enable airlines to refuel with SAF. A recent example of a SAF-blended commercial operation was a United Airlines outbound from Los Angeles and San Francisco (New Zealand Foreign Affairs & Trade, 2023), with these trials becoming widespread as the industry partnerships accelerate.

SAF is generated from cooking oil and feedstock that absorb CO_2 and provide a net reduction in CO_2 emissions when compared to fossil fuels. Today, SAF is blended with conventional Kerosene based fuel to ensure compatible with existing aircraft, engines, and fuelling systems. Commercial flights today fly a blend of SAF and conventional kerosene-based fuel. Note that 100% SAF flights are not yet feasible today, but the industry is working towards developing commercial aircraft being permitted to operate with 100% SAF soon (ATAG, 2023).

4.2 MEDIUM TO LONG TERM (10-20 YEARS)

4.2.1 *SUSTAINABLE AVIATION FUEL*

Within 10 years, SAF is expected to form up to a 50% hybrid mix with conventional aviation fuel (CAF). This limitation is due to aircraft technology and fuel storage infrastructure, which caps SAF blends at 50% (IATA, 2024a). In saying that, aircraft manufacturers including Boeing, Airbus and Embraer have all committed that their commercial airplanes will be capable and certified to be 100% SAF compatible by 2030 (Airbus, 2024c; Boeing, 2020; Embraer, 2024). A study by Air Transport Action Group (ATAG) (2021a) concluded that it is feasible to replace almost all legacy jet fuel with SAF by 2050. It is forecast that SAF will contribute 65% of the aviation industry's goal to be net zero carbon by 2050, indicating the cruciality of SAF manufacturing and uptake in the next few decades (KPMG, 2024).

It is crucial that SAF production and uptake is considered as it is likely that governments will increasingly seek to introduce SAF mandates in the next decade. For example, the European Union has mandated a minimum of 2% SAF by 2025 (Climate Change Commission, 2024). This requirement will steadily increase at five-year intervals to reach a minimum of 63% by 2050 (IATA, 2024c). Similarly, there has been discussions in Australia to adopt such mandates in the coming years (Australian Infrastructure Government, 2024). This policy shift would encourage the uptake of SAF by New Zealand airlines, as well as international airlines arriving at New Zealand.

By 2030, SAF production in New Zealand should have advanced, supported by government policies and partnership between airports, airlines, and fuel storage technology providers. By 2050, it is likely that airlines will increase their uptake of SAF in commercial operations in line with the forecasted technological improvement of increased SAF mixture in aircraft and airport fuel storage systems. Efforts will also focus on preparing for higher SAF intake in the long-term, including retrofitting aircraft fuel tanks and enhancing airport infrastructure to handle 100% SAF operations.

4.2.1.1 COST AND SUPPLY CHALLENGES

SAF adoption faces significant cost barriers, costing double the average price of conventional aviation fuel (KPMG, 2024). Cooking oil alone is not an ideal SAF feedstock for New Zealand due to its limited availability. In contrast, locally sourced waste woody biomass offers a more viable option to support SAF production and supply within the country (Ara Ake, 2024). The SAF Consortium (which includes Air NZ, Z Energy, Scion, LanzaTech, and LanzaJet) conducted an analysis concluding that New Zealand's SAF industry could meet 50% of the country's aviation fuel demand by 2050 (MBIE, 2024a). Having this option of locally produced SAF could potentially lower costs substantially. Without government intervention, reliance on imported SAF could result in costs remaining two times higher than conventional aviation fuel, deterring widespread adoption. SAF uptake will support aviation's decarbonisation goals. Ara Ake, a New Zealand clean energy technology organisation, estimates that three quarters of New Zealand's domestic aviation emissions could be mitigated using local woody biomass (Ara Ake, 2024).

4.2.2 *HYDROGEN TECHNOLOGY*

In the medium term, hydrogen fuel has potential for landside applications. However, it is unlikely to scale for commercial passenger operations within 10 years due to aircraft technology and infrastructure requirements.

While hydrogen-powered aircraft are a key focus of the aviation industry's goal to achieve net zero emissions by 2050, their adoption faces hurdles. Hydrogen fuel can reduce emissions by 94% compared to conventional aviation fuel while maintaining comparable capacity, but its larger volume requires more onboard storage space, as well as extensive infrastructure upgrades at airports (Ara Ake, 2024). Research indicates that hydrogen must be stored in the aircraft fuselage rather than the wings, complicating integration into existing aircraft design (Yusaf et al., 2023). This complexity thus points to the need of a new purpose-built aircraft as mentioned above, rather than retrofitting traditional aircraft.

Due to the additional weight, it is unlikely that long-haul or ultra long-haul aircraft will be developed using hydrogen technology within the next 20 years. Hydrogen technology is thus likely to be used regionally, domestically and for short-haul international travel within the New Zealand context.

Additionally, the requirements of cryogenic systems for hydrogen in liquid form adds further complexities and cost (Adler et al., 2023). Development delays and high operating costs may hinder adoption, and substantial investment will be required for hydrogen aircraft technology. As highlighted in Air NZ's 2024 Climate Statement, these challenges make widespread hydrogen adoption within the next decade far-fetched (Air NZ, 2024c). By 2050 however, according to the Air Transport Action Group (2021b), improvements in hydrogen technology could result in increased range, power, and capacity. Consequently, hydrogen aircraft propulsion systems could be deployed for aircraft with up to 150 seats, operating routes under 120 minutes.

While hydrogen aircraft are unlikely to play a significant role in commercial aviation within the next decade, there have been developments in airport landside applications. Christchurch Airport has been selected by Airbus as its launchpad for hydrogen technology. The newly formed Hydrogen Consortium aims to put New Zealand at the forefront of carbon-free passenger flight operations. A 400-hectare renewable energy precinct called Kowhai Park will be installed with solar panels that will be used to generate electricity and hydrogen fuel on site (Airbus, 2023). In the near term, hydrogen fuel is expected to be used for airport ground vehicles. Wellington Airport for example, have partnered with Toyota New Zealand and Hiringa Energy to trial hydrogen fuel on Air NZ's electric tugs and service vehicles (Air NZ, 2024d). These developments suggest that hydrogen will play a growing role in airport landside operations over the next decade, paving the way for broader adoption, including flight operations in the future.

4.2.3 ELECTRIC AIRCRAFT

The development of electric aircraft technology in New Zealand is positioned for significant improvements in the next 10 years, with most efforts focused on reducing aviation emissions. Development in the next decade is likely to focus on applications of general aviation (GA), urban air mobility (UAM), inter-island routes, and tourism.

In February 2023, Air NZ announced its partnership with Heart Aerospace to explore replacing its Q300 fleet with ES-30 aircraft by 2030 (Heart Aerospace, 2023). The ES-30, a conventional take-off and landing (CTOL) aircraft that is under development, offers 30 seat capacity and runway requirements similar to Air NZ's ATR fleet but boasts hybrid-electric capabilities. It has an all-electric range of 200km and a hybrid range of 800km (Heart Aerospace, 2024). While lower than the ATR's 1,345 km range on conventional jet fuel, this is a major step towards the aviation industry's emissions reduction goals (ATR, 2024). Air NZ's goal is to have the first zero-emissions demonstrator flight by 2026, using a combination of electric, green hydrogen, and hybrid aircraft.

One drawback of electric aircraft is the need to recharge the aircraft or hybrid batteries in a quick and efficient manner. The turnaround time for all aircraft is a key consideration in their overall economics for airlines, as high rates of utilisation generally translate into strong commercial outcomes. For electric or hybrid aircraft to be viable, fast charging facilities and advancements in battery capacity and charging are also required to ensure they can be recharged during as short a turnaround time as possible.

Another technology development we are likely to expect in the next decade is the use of electric aircraft for Urban Air Mobility (UAM) operations. This will likely use electric vertical take-off and landing (eVTOL) aircraft, show promising potential for short-distance passenger transport between cities without the need for runways (NZ Government, 2019). Wisk Aero, under the New Zealand Government's Airspace Integration Trial Programme (AITP), has successfully tested eVTOL aircraft in Christchurch, operating in controlled airspace alongside regular air traffic (Wisk Aero, 2023). Such trials demonstrate promising feasibility for limited UAM operations within the next decade. In the continued pursuit of reducing emissions and lowering the cost of alternative fuels, investments in electric propulsion systems indicate positive developments in electric aircraft technology

4.2.4 CONCLUSIONS

SAF is poised to be the most viable and impactful aircraft fuel technology compared to hydrogen or electric aircraft in the medium term. Its low weight makes it ideal for flight operations, particularly in long-haul flights, where weight reduction is a crucial factor. SAF's adoption is supported by its compatibility with existing aircraft and infrastructure, allowing it to be used as an interim solution while electric and hydrogen technologies are developed, tested, and deployed.

While electric and hydrogen aircraft technologies may become viable for general aviation in the medium term, their use in commercial airline operations faces significant challenges. In the longer term, as hydrogen and electric aircraft technologies continue to develop, we can expect to see such aircraft steadily operating on New Zealand and Australasian routes.

New Zealand is currently better placed to benefit from electric aircraft than hydrogen aircraft. This is because the amount of new infrastructure required to support electric aircraft will be less, and there is already an existing distribution network for electricity (as opposed to hydrogen which would require development of one). There is a need to undertake a network-level assessment of the impacts this will have on airports, airspace management and infrastructure. As small electric aircraft enter the existing system, consideration to volume of air traffic movements, approach and departure speeds (which will be slower than legacy aircraft types), ground service equipment (GSE) requirements and apron space and facilities will need to be assessed and provisioned according to demand.

For the aviation industry is to be net zero by 2050, IATA forecasts that contributions are likely to come from SAF (65%), new technology inclusive of electric and hydrogen (13%); infrastructure and operational efficiencies (3%), with the remaining 19% achieved through carbon offsets and carbon capture (IATA, 2024b).

4.3 EXAMPLES OF FUTURE AIRCRAFT

There are several aircraft being developed with future fuel technologies. For the purposes of this report, we will refer to them as next-generation (next-gen) aircraft. This section profiles a few examples of next-gen aircraft, some of which may be used in domestically in New Zealand in future years.

4.3.1 BETA CX300 CTOL (FULLY ELECTRIC)

Air NZ chose BETA's ALIA CTOL as its first next-generation aircraft (Air NZ, 2023). The targeted flight routes for this aircraft are in the range of 150-200 km. Due to the shorter range, ALIA aircraft will likely fly at lower altitudes ranging from 1,500 to 3,000 meters. The goal of Air NZ in partnership with BETA is to fly a commercial demonstrator by 2026.

Additionally, the New Zealand Air Ambulance Service has recently announced an order of two Beta Technologies aircraft (Hawkes Bay Today, 2025) to complement its fleet of 12 fixed-wing aircraft. This signals an evolutionary step in medical transport in New Zealand and identifies a niche which these CTOL aircraft can fill between existing helicopter and fixed wing aircraft types.

Figure 13 CX300 CTOL

Specifications and Compatibility	
Wingspan	15.24m
Length	12m
Propulsion	One H500A Electric Motor
Maximum take-off weight	3.2 tonnes (7000 lbs)
Max cruise speed	135 kts
Capable of speed up to	250 km/hour
Passenger capacity	5 passengers excluding pilot
Cargo capacity	5.6 m^3
Max demonstrated range	336 nautical miles
Take-off method	Conventional Take-off
Take-off distance required at MTOW	1200m (4000 ft)
Anticipated charging time for a full charge	60 minutes

Charging solution	Universally accepted mobile charge solution or permanent charge solution.
Airfield Compatibility	Able to utilize the existing infrastructure/surfaces. No special requirements.

Image and information sourced from: Carpetyan, S - BETA Team Member and (Beta, 2024)

4.3.2 EVIATION ALICE (FULLY ELECTRIC)

Air NZ has signed a letter of intent with Eviation to procure up to 23 (All Electric) Alice aircraft as part of its Mission Next Generation aircraft program. Alice is an all-electric aircraft powered by two Magni X 650 electric propulsion engines.

Figure 14 Eviation Alice

Specifications and Compatibility	
Wingspan	20.1m
Length	20.5m
Propulsion	Two X Magni 650
Maximum take-off weight	8.3 tonnes (18400 lbs)
Max cruise speed	260 knots (480 km/hour)
Passenger capacity	9 passengers excluding pilot
Cargo capacity	12.7 m^3
Max demonstrated range	150 miles to 250 miles
Take-off method	Conventional Take-off
Take-off distance required at MTOW	1000m (3280 ft)

Image and information sourced from (Eviation, 2024a)

4.3.3 VOLT AERO CASSIO (ELECTRIC HYBRID)

The Cassion aircraft family features a unique hybrid propulsion system that combines electric motors and an internal combustion engine. This setup allows for all-electric power during taxi, take-off, primary flight, and landing, with the combustion engine acting as a range extender. This aircraft can take off and land on short runways, which makes it a potential aircraft to operate at small to regional airports

Figure 15: Cassio

Specifications and Compatibility	Cassio 330	Cassio 480	Cassio 600
Wingspan	10m	12.4m	12.4m
Length	9m	9.2m	11.1m
Propulsion	Parallel electric-hybrid powertrain		
Maximum take-off weight (MTOW)	1930 kg	2500 kg	3500 kg
Max cruise speed	180 kts (333 km/h)	200 kts (370 km/h)	250 kts (463 km/h)
Passenger capacity	5 pax	6 pax	10-12 pax
Cargo configuration capacity	479 kg	703 kg	867 kg
Max demonstrated range (no reserve)	1200 km (Range in pure electric mode is 200km)		
Take-off method	Conventional		
Take-off distance required at MTOW	600m	600m	650m
Anticipated charging time for a full charge	25 min fast charge and 58 min slow charge		
Charging solution	Fast charging on the ground. The power requirement for ground charging is 380 volts, which is widely available at airports.		

Image and information sourced from (Volt Aero, 2024)

4.3.4 HEART AEROSPACE ES-30 (ELECTRIC HYBRID)

The ES-30 is a regional hybrid-electric airplane with a standard seating capacity of 30 passengers. It promises to deliver unparalleled sustainability and efficiency on short-haul routes. With an electric zero-emission range of 200km and an extended hybrid range of 400km. Heart Aerospace is aiming for type certification in 2029 and commercial operation in 2030.

Figure 16: ES-30

Specifications and Compatibility	
Wingspan	32m
Length	22.7m
Propulsion	Hybrid electric propulsion system
Maximum take-off weight	20 tonnes
Max cruise speed	200kts (370km/h)
Passenger capacity	30 max excluding pilot
Max demonstrated range	All Electric 200km and Hybrid Range 800km
Take-off method	Conventional Take-off
Take-off distance required at MTOW	1100m
Anticipated charging time for a full charge	30 minutes
Charging solution	800 volts Megawatt Charging System (MCS), requires a battery thermal management cart on the ground during charging (See image below)
Airfield Compatibility	Suitable on a Code C Compatible Airfield (ACN – Pavement Strength: < 12/F/A/Y)

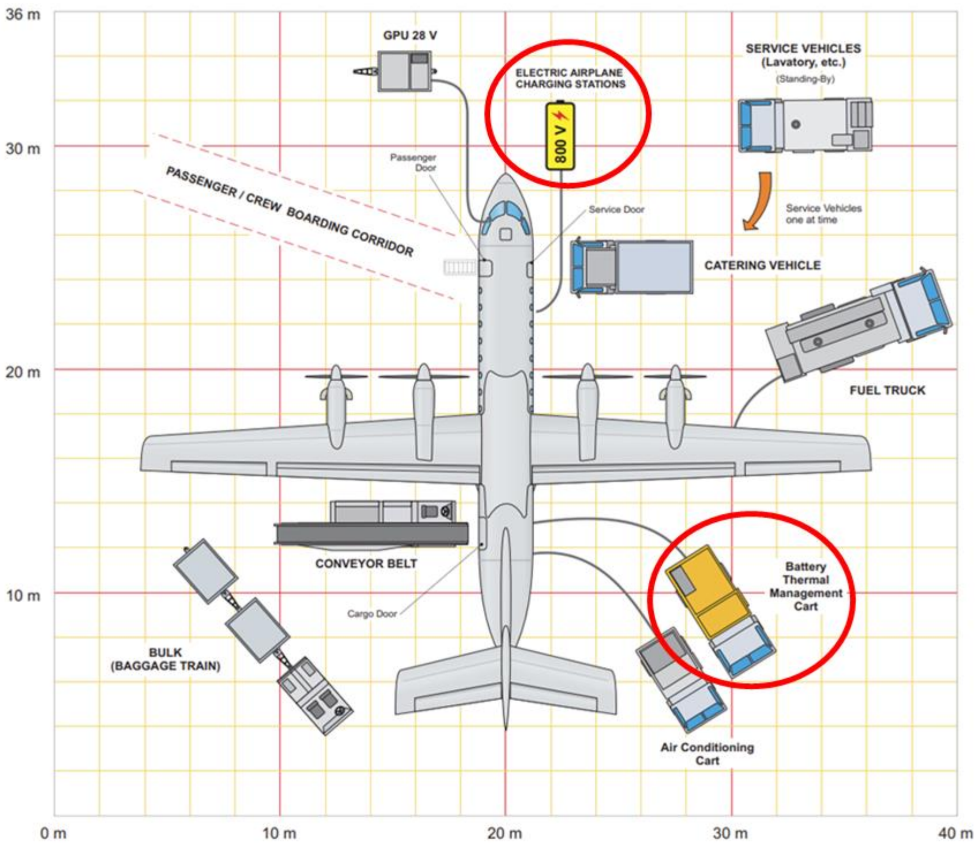

Figure 17: ES-30 configuration provided by Heart Aerospace

Image and information sourced from (Sustainable Skies, 2024), (Heart Aerospace, 2023) and (Heart Aerospace, 2024)

4.3.5 DEUTSCHE AIRCRAFT D328ECO (100% SAF)

The D328eco is built based on the foundation of Dornier 328 turboprops but provides 25% more passenger capacity and a 14% decrease in fuel consumption per passenger. The D328eco is designed to be compatible with 100% SAF. The aircraft can reach up to 30,000ft service ceilings, allowing the aircraft to access less crowded upper airways therefore reducing fuel consumption and allowing longer missions. The aircraft is set for Entry into Service (EIS) in the fourth quarter (Q4) of 2027 (Deutsche Aircraft, 2024).

Figure 18: D328Eco

Specifications and Compatibility	
Wingspan	20.9m
Length	23.3m
Propulsion	2 X PW127XT-S (100% SAF Compatible)
Maximum take-off weight	15,660 kg
Max cruise speed	324 Knots (600 km/h)
Passenger capacity	40 Pax
Cargo capacity	750kg
Max demonstrated range	655 Nautical Mile Range @100% Load Factor
Take-off method	Conventional Take-off
Take-off distance required at MTOW	1082m (standard conditions)
Airfield Compatibility	No special requirements

Image and information sourced from (Deutsche Aircraft, 2024)

4.4 IMPLICATIONS OF FUTURE AIRCRAFT AND FUEL TECHNOLOGIES ON AIRPORT INFRASTRUCTURE

Developments in new fuel and aircraft technologies are driving significant change in airport infrastructure worldwide and are crucial for reducing the environmental impact of air travel.

The below sections will focus on discussing some of the developments in fuel and aircraft technology and how airports in New Zealand can adapt to meet future demands and support the aviation industry's shift towards more sustainable and efficient operations.

There are three main possible alternatives to replace the conventional aviation fuel:

1. Sustainable Aviation Fuel,
2. Hydrogen, and
3. Batteries (Electrical).

4.4.1 SUSTAINABLE AVIATION FUEL (SAF)

4.4.1.1 BREAKDOWN OF SAF TECHNOLOGY

All SAF today that is being used on commercial aircraft is paraffinic and cannot be used in the purest form. It must be blended with conventional aviation fuel (CAF). For this reason, Air NZ has partnered with Exxon Mobil and Z Energy for blending and achieving consistency with the desired standards prescribed by regulatory bodies (ASTM, 2024).

Through the support of local partners, imported SAF is blended and supplied to the airport by physical deliveries (trucks) or through a pipeline network directly from a refinery.

Aircraft manufacturers are developing aircraft that will be compatible with pure (100%) paraffinic SAF and expect it to be operational by 2030. If this becomes a reality, then the blending process can be eliminated and the purest form of SAF can be directly pumped into the aircraft.

4.4.1.2 NEW ZEALAND NEEDS TO ADVANCE SAF INVESTMENT AND PRODUCTION

As of December 2024. Air NZ has received two shipments of SAF in pure form. The first shipment arrived at Marsden Point in 2022 and the second arrived in Wellington in 2024. The total volume of SAF imported so far by the national carrier totals 1.7 million litres.

New Zealand does not have a local SAF supplier and relies heavily on overseas suppliers such as Neste (Singapore) and Eco Ceres (China).

The government of New Zealand and Air NZ have collectively committed approximately NZD $2 million in feasibility studies to enable the production of SAF locally in New Zealand. Until that becomes a reality, the national carrier and other airlines intending to use SAF for air transportation will need to depend on imported SAF.

In its August 2024 joint submission on the government's second Emissions Reduction Plan, New Zealand Airports Association, the Board of Airline Representatives of New Zealand (BARNZ) and IATA noted that the majority of industry is aligned on the pathway forward (BARNZ, IATA. 2024c). It called for:

- A stronger and more proactive stance from government to explore a regional SAF industry.

- Bilateral engagement with key trade partners.
- Strategies that harness the ability of airports to serve as hubs for decarbonisation.

4.4.1.3 AIRPORT INFRASTRUCTURE REQUIREMENTS TO ENABLE SAF TECHNOLOGY

Airports need an intermediate storage facility to blend a pure form of SAF with CAF to achieve consistency per the standards prescribed for use in commercial aircraft engines. The blended fuel can then be supplied to the airport fuel farm for further distribution to the aircraft.

Wagner SAF, in collaboration with Boeing, has begun designing and constructing Australia's first consistent supply of Sustainable Aviation Fuel (SAF) within Wellcamp Airport's fuel precinct, in Toowoomba, Queensland. This facility will blend SAF to meet international aviation standards (Nelson, 2024).

4.4.1.4 LIMITATIONS OF SAF TECHNOLOGY

Feedstock availability is a significant factor that can limit the supply of Sustainable Aviation Fuel (SAF) for aviation.

The global production of Sustainable Aviation Fuel (SAF) is anticipated to have some residual emissions because of the differences in feedstocks and production methods. SAF indeed offers a substantial reduction in GHG emissions compared to traditional jet fuel, however, the extent of this reduction varies based on the feedstock and production pathway used.

4.4.2 HYDROGEN FUEL TECHNOLOGY

The two most promising zero-carbon energy solutions for aircraft are hydrogen and batteries.

Hydrogen propulsion could reduce the climate impact of flights by 50-75% compared to traditional CAF used today. Also, hydrogen is an input in almost all SAF pathways. But 99% of all hydrogen used today is not green (i.e., not produced from renewable sources).

Hydrogen is a versatile energy source that can meet various needs, including heating, powering electrical systems, and driving mobility propulsion systems. This flexibility makes it a valuable asset in aligning aviation with climate goals.

Hydrogen is increasingly being explored as a power source for airside vehicles, which are the vehicles used to support aircraft operations on the ground.

4.4.2.1 BREAKDOWN OF THE HYDROGEN FUEL TECHNOLOGY

Hydrogen can be used to power aircraft in two different ways

- To generate electrical energy in a fuel cell to drive an electric-powered aircraft.
- Combusted in a gas turbine like jet fuel.

Hydrogen Fuel in Liquid Form

If hydrogen is used and scaled up as an energy carrier for aircraft, it must be stored in liquid form on the plane. The use of a liquid form of hydrogen is very rare and only for niche applications, such as in the space industry. Therefore, scaling up hydrogen and liquefaction facilities is an important condition to be met before aircraft can operate on this source of energy. There is no working example of such a facility at airports today, but it could be expected in the future.

Pre-charged Hydrogen Pods

Supplying hydrogen in liquid form for aircraft propulsion requires drastic changes to today's airport fuel infrastructure. The other potential solution that could minimize the airport infrastructure requirements is providing aircraft with pre-charged exchangeable hydrogen pods so that the whole tank is exchanged instead of being refuelled. This technology has been successfully tested /demonstrated in the year 2023 by companies such as Zero Avia and Universal Hydrogen through a retrofitted Dornier 228 and Dash-8 aircraft (IATA, 2023).

New regulations on hydrogen fuel technology will be essential to facilitate its implementation at airports and determine the necessary changes to current operational procedures.

4.4.2.2 AIRPORT INFRASTRUCTURE REQUIREMENTS

Some airports might bring hydrogen in its gaseous form via a pipeline and liquefy and store it on-site. In other locations, it could be more feasible to transport the liquid hydrogen by truck or rail.

Hydrogen Fuel (in Liquid Form) - New infrastructure to store and distribute the hydrogen at airports will be needed, including facilities such as require extra electrical energy, an electrolyser plant, a liquefier, and storage tanks.

Hydrogen Pods (Fuel Cell) – Requires limited infrastructure in the airport such as on-airport hydrogen gas storage tanks, delivery of hydrogen gas by truck, on-airport hydrogen refuelling station, and on-airport maintenance facility for fuel cell systems.

Note – Hydrogen fuel necessitates insulated tanks, and because it has a lower volumetric energy density compared to traditional jet fuel, the tank must be three times larger to store the same volume. This is applicable for both, storage tanks at the airport and tanks inbuilt within the aircraft.

4.4.2.3 NEW ZEALAND HYDROGEN AVIATION CONSORTIUM

The consortium was established in early 2023 to develop a green hydrogen ecosystem for aviation in New Zealand (NZHAC, 2023). The consortium is of partnership of six international businesses:

1. Airbus.
2. Air NZ.
3. Christchurch Airport.
4. Fortescue.
5. Hiringa Energy; and
6. Fabrum.

4.4.2.4 LIMITATIONS OF HYDROGEN FUEL FOR POWERING AIRCRAFT

Hydrogen has a low volumetric energy density (i.e., it requires much more space than traditional jet fuel). Storing hydrogen as a liquid requires cryogenic tanks that can maintain temperatures around -253˚C, which adds weight and complexity to the aircraft (Memon, 2022).

Developing the infrastructure to produce, transport, and store hydrogen at airports is a significant challenge and will likely be very costly. Unlike SAF, hydrogen cannot be used in the fuel distribution network existing at today's airports. Converting them to handle hydrogen will require substantial investment.

This fuel technology is currently limited to medium and short-haul operations for the following reasons:

- low volumetric energy density.
- storage and safety onboard (more manageable for shorter flights).

4.4.3 ELECTRIC TECHNOLOGY

Electric aircraft have constraints in terms of range and the number of passengers they can carry. Nevertheless, certain regions (particularly air carriers in New Zealand) may find them suitable for specific needs and conditions (Air NZ, 2022).

4.4.3.1 AIRPORT INFRASTRUCTURE REQUIREMENTS

Battery plug-in chargers (similar to refuelling stations) for small aircraft

To power electric aircraft, the airports will require a scale-up of electricity availability at airports and charging stations. Certain electric aircraft designs might need as much as 2-3 MW of power for rapid recharging. By comparison, mid-sized airports typically consume 30-50 MW of power (Biz Energy Advisor, 2020). Therefore, even a small fleet of all-electric aircraft could necessitate an increase in renewable (green) energy capacity at the airport, along with the necessary infrastructure upgrades.

The standard operating procedures (SOPs) followed at airports today may have to be modified to be applicable for electric aircraft operations (which are operated by batteries). Special training may be required for personnel involved in firefighting and rescue operations.

4.4.3.2 LIMITATIONS OF ELECTRIC TECHNOLOGY

The range and payload capacity of electric aircraft is limited (mainly due to energy density of batteries used on the aircraft) (Crownhart, 2022).

The consistent weight of the batteries is another limitation. Aircraft today operate using jet fuel. This provides better range because as it flies, the aircraft becomes lighter due to the fuel burn. However, the weight of the batteries does not reduce with the distance travelled.

The future of electric planes is heavily dependent on the development and progress in battery technology. This will determine how far these planes can fly, and how long it will take for them to recharge between flights.

4.4.4 DEVELOPMENT ROAD MAP (SHORT TO MEDIUM TERM)

Technology	2025	2030	2035	2040
SAF	• Unblended SAF is not allowed on commercial aircraft and must be blended with 50% regular jet fuel (CAF) for powering today's aircraft engines. • The only commercial pathway (available today) for SAF production is through resources like vegetable oil and animal fats (Hydro-processed Esters and Fatty Acids-Synthetic Paraffinic Kerosene). • SAF is transported to the airport using various methods, depending on the infrastructure and logistics available. Some common ways of deliveries are by trucks and pipelines.	• Boeing/Airbus will start delivering commercial aircraft compatible with 100% unblended SAF. • New SAF production pathways become commercially available (Fischer-Tropsch and Alcohol to Jet). • Demonstration of Power to Liquids (PtL) pathway (highly sustainable compared to other pathways) for SAF production.	• Airports may need special infrastructure to store and supply Unblended SAF, on a small scale, as not all the fleet will be fully compatible with 100% Paraffinic SAF except the newly delivered planes (from 2030 onwards). • SAF produced through PtL may become commercially available. This will depend on development in technology, supportive policies, and investment in infrastructure.	Large scale-up of SAF production to meet aviation decarbonization needs.
Hydrogen	• Some airports are starting to use hydrogen-powered ground support equipment (GSE) to reduce their carbon emissions. This involves using hydrogen fuel cells to power vehicles that operate on the ground, such as baggage tugs, cargo loaders, and aircraft	• Hydrogen-powered aircraft (potential) entry into service for regional/sub-regional markets (Vigor X, 2022). • Standards developed for hydrogen equipment and its use on aircraft.	• Airport hydrogen infrastructure scale-up – storage tanks, bowsers, pipelines, and liquefiers. • Ramp up liquid hydrogen regional aircraft operations.	Large scale-up of liquid hydrogen for Aviation.

Technology	2025	2030	2035	2040
	tow tractors (Bristol Airport, 2024). • The potential for this technology to be used in airport passenger buses is under consideration (Cobus Industries, 2024).	• Exclusion zones defined on the apron during hydrogen refuelling.		
Electric	• Airports are generating renewable energy on-site (mostly via solar panels). • Airports have installed e-charging stations for GSE vehicles on the airside. • Small **electric test aircraft** are already flying. • Demonstrate battery swap or fast recharge methods. • Demonstrate electric aircraft turnaround at commercial airports. • Regulations for operating eVTOL in place.	• Some airports will have to integrate e-VTOL/CTOL aircraft types into their operations. • Implement charging infrastructure for aircraft at selected airports. • Scale-up electric aircraft charging stations.	Scale-up electric aircraft charging stations.	

4.4.5 HOW NZ AIRPORTS CAN ADAPT TO THE DEVELOPMENT IN FUEL/AIRCRAFT TECHNOLOGY TO DECARBONISE

Airport Size	Fuel Technology	2025	2030	2035	2040
Large International	SAF	Blended SAF is delivered to the airport by truck or pipeline from the refineries.	**An intermediate storage facility** may be needed at the airport depending on the SAF demand. This facility can receive a pure form of SAF from a local/overseas supplier and blend it with jet fuel (CAF) to achieve consistency.		Special Infrastructure may be needed to store unblended SAF as more aircraft become compatible with a pure form of SAF.
	Hydrogen		Liquid hydrogen is delivered to the airport by truck. Required infrastructure at the airport is storage tanks, a hydrogen refuelling station, and a maintenance facility for fuel cell systems.		Hydrogen is generated off-site, supplied in a gas pipeline, and liquefied at the airport. This setup demands a liquefier, and storage tanks at the airport.
	Electric	On-site renewable energy production. Develop new electricity connections to the national grid that enable battery plug-in chargers for small aircraft and future larger hybrid/electric aircraft.			
Small International	SAF	Blended SAF is delivered to the airport by truck or pipeline from the refineries.			Special Infrastructure may be needed to store unblended SAF as more aircraft become compatible with a pure form of SAF.
	Hydrogen		Liquid hydrogen is delivered to the airport by truck. Required infrastructure at the airport is storage tanks, a hydrogen refuelling station, and a maintenance facility for fuel cell systems.		

Airport Size	Fuel Technology	2025	2030	2035	2040
	Electric	Develop new electricity connections to the national grid that enable battery plug-in chargers for small aircraft and future larger hybrid/electric aircraft			
Regional/Domestic	SAF	Blended SAF is delivered to the airport by truck or pipeline from the refineries.			
	Hydrogen		Liquid hydrogen is delivered to the airport by truck. Required infrastructure at the airport is storage tanks, a hydrogen refuelling station, and a maintenance facility for fuel cell systems.		
	Electric	On-site renewable energy production	Develop new electricity connections to the national grid that enable battery plug-in chargers for small aircraft and future larger hybrid/electric aircraft		

4.4.6 AIRPORT INFRASTRUCTURE REQUIREMENTS FOR DIFFERENT FUEL TECHNOLOGIES

The table below summarises some of the key infrastructure requirements at airports for different fuel technologies. It excludes the development of aircraft for each of the fuel technologies, as this is assumed to be separate.

Fuel Technology	Infrastructure Requirements
Sustainable Aviation Fuel	• Local SAF production facilities o Local SAF Feedstock • International SAF importation • Infrastructure to transport SAF from point of production/import to airport (e.g. via road, pipeline). • Storage facilities at airports • Blending facilities at airports (until 100% SAF is certified for use on aircraft)

Hydrogen Fuel	For use in liquid form (noting no working examples at airports currently exist):
	• Production facilities (converting hydrogen gas to liquified hydrogen)
	  o Electrolyser plant
	  o Liquefier
	  o Additional electrical supply (as electrolyses requires electricity to occur)
	• Storage facilities at airports
	  o Requires insulated cryogenic tanks. Liquid hydrogen stored at around -253˚C
	• Infrastructure to distribute hydrogen from storage facilities to aircraft
	  o Requires a completely new and separate system. Would need to be retrofitted into existing facilities
	
	For use in fuel cells:
	• Production facilities (of pre-charged pods)
	• Hydrogen gas storage tanks
	• Pod refuelling station
	• Maintenance facilities for fuel cells
	• Infrastructure to distribute hydrogen pods from storage facilities to aircraft
	  o Trucks and trailers
	
	Also requires the development of new regulations and operating procedures, as well as safety certifications.

Fuel Technology	Infrastructure Requirements

Electric	• Battery Plug-in Chargers for planes
	  o May need up to 2-3MW of power draw per aircraft
	• Increased Electrical Supply to airports
	  o Either from on-site renewable electricity generation, or
	  o Increased draw from the national power grid
	• Upgrading of electrical infrastructure (i.e. distribution network) at airports
	
	Battery technology advancement is assumed to be occurring separately

4.4.7 ENTRY INTO SERVICE CONSIDERATIONS OF NEW AIRCRAFT TECHNOLOGIES

As the aviation industry continues to develop new technologies for more efficient flight operations, cost savings, and sustainability, aircraft such as battery electric and eVTOL are gradually being introduced into the New Zealand aviation environment. These advancements promise more sustainable aviation and advanced air mobility (AAM), making passenger travel more efficient. However, their integration poses challenges for existing airport infrastructure and air traffic management. This section explores current thinking around the introduction of new aircraft technology and the primary considerations for integrating them into the NZ aviation landscape.

Current thinking around New Aircraft Technologies

Battery-electric and eVTOL aircraft are mainly developed to address the challenge of reducing carbon emissions and improving efficiency. Battery-electric aircraft utilise batteries onboard the aircraft, eliminating the use of fossil fuels and therefore significantly reducing emissions. Such aircraft is best suited for short-haul routes due to the limitation of battery energy and its heavy weight. eVTOLs however, are designed to operate as air taxis, operating in short distances urban air networks. Such operation offers passengers an alternative to ground commute that is otherwise time consuming due to ground traffic congestion.

Industry stakeholders, including the Civil Aviation Authority NZ recently in March 2024, launched its **Reduced and Zero Emissions Project (RZEP)** to support the introduction of zero emission aircraft into the NZ aviation system (CAA, 2024). The project aims to introduce electric aircraft and ensure NZ operators can readily navigate the NZ Civil Aviation Rules and regulations. The CAA anticipates that the first next-gen aircraft to most likely come into service in NZ is the BETA ALIA CTOL aircraft, that will be operated by Air NZ in partnership with NZ Post to deliver mail between Wellington and Marlborough (CAA, 2024; Air NZ, 2023). While such aircraft is not likely to replace Air NZ's existing fleet, it aims to act as a catalyst for the change and introduction of electric aircraft into the NZ aviation system, eventually encouraging the development and introduction of larger electric aircraft with fleet replacement of next gen aircraft (Air NZ, 2023). Another development around electric aircraft, the ES-30 aircraft by Heart Aerospace, have partnered with Christchurch Airport to help fast track the release of its electric aircraft. Christchurch Airport, Wellington Airport, Air NZ, and Sounds Air are on a 21-member board that will provide advice to Heart Aerospace for its introduction into NZ airspace later (Christchurch Airport, 2022).

Another current development around the introduction of new aircraft technology in NZ is the establishment of **Sustainable Aviation Aotearoa**, a public-private advisory body to advance new aviation technology, including battery-electric and eVTOL aircraft to accelerate aviation decarbonisation. This governing body operates similarly to establishments of globally governing bodies, such as the UK's Jet Zero Council where its purpose is to advise on airport and energy infrastructure to enable new aircraft technology operations to deliver net zero aviation (MBIE, 2024a). Similarly, Sustainable Aviation Aotearoa aims to foster collaboration across sectors, between airlines, airports, and enabling infrastructure like electricity providers (Ministry of Transport, 2022).

Local NZ firm ElectricAir has introduced the Pipistrel Alpha Electro, a two-seater electric aircraft designed for demonstration and flight training purposes. This all-electric aircraft has been operational since 2020, supported by charging facilities at Christchurch International Airport. Its charge time of only 45 minutes can power the aircraft for 90 minutes, making it ideal for pilot training (ElectricAir, 2024). As highlighted earlier, there is significant interest in scaling such operations to eventually service regional routes. With advancements in battery technology and upcoming introduction of eVTOL aircraft in NZ, it's crucial that airport infrastructure and air traffic management systems evolve in parallel.

Current **developments in the eVTOL sector** highlights increased investment, enticed by its promise to revolutionise urban mobility and medical evacuation operations. For example, Life Flight NZ recently partnered with AMSL Aero, an Australia zero emissions aircraft manufacturer to support medical operations in Australasia using its Vertiia eVTOL aircraft (AMSL Aero, 2024). Despite promising advancements, concerns regarding safety of eVTOL operations prevail (Lineberger et al., 2019). Thus, major work remains for aviation regulators, manufacturers, and operators to convince the public's confidence in eVTOL technology. Furthermore, integration of eVTOL into the current aviation landscape requires substantial infrastructure development, including charging facilities and enhancement to air traffic management systems. Such considerations are key to ensuring successful deployment eVTOL technology in the future.

5 FUTURE DEVELOPMENT OF THE NZ AVIATION INDUSTRY

In compiling this report, it has become evident that New Zealand lacks a unified national aviation strategy. As such, each player within the industry (airlines, airports and other businesses) is left to develop plans for growth and investment independently. While this is not a bad thing in itself, the matter needs to be considered in light of current issues faced by the sector, and the transformational impact of future technology.

New Zealand's domestic aviation market is currently experiencing significant challenges. The moves from the main airline (Air NZ) to reduce passenger capacity on regional routes coupled with regional (Tier 2) airlines experiencing significant cost pressures poses the reality of decreased regional connectivity in the short term.

However, there are opportunities to help the industry to grow and develop. The following sections outline the risks and opportunities being faced by various parts of the industry, as well as some options for investment (either locally or internationally) and Government intervention.

5.1 FEEDBACK FROM AIRPORTS

In preparing this report, we have consulted with airports across New Zealand. We asked airports to identify key threats, mitigation measures and opportunities they were facing. Below is a summary of key themes identified from their responses. Airport responses have been grouped as per the cohorts outlined in Section 2 of this report.

Airport Cohort	Key Threats	Key Mitigations	Opportunities
Large International Airports	- Airline capacity reduction. - Climate change. - Lack of airline competition. - Regulatory environment.	- Infrastructure development and renewal to increase capacity. - Procurement of more (electric) GPUs. - Sustainability initiatives including investments in renewable energy. - Route development. - Collaboration with airlines and regulators.	- Non-aeronautical property development; Retail. - Energy generation. - Grow domestic and international network connectivity. - Increased competition.
Small International Airports	- Passenger volume changes. - Airline capacity reduction. - Airside & Landside facility constrictions. - Urban encroachment.	- Diversification of airport income; non-aeronautical revenue streams. - Runway & terminal expansion/improvement. - Climate risk planning.	- Non-aeronautical property development. - New International connectivity. - Decarbonisation technologies.
Regional Airports	- Passenger volume changes. - Airline capacity reduction. - Lack of airline competition. - Climate change. - Fleet change from Q300 to ATR on some airports could pose challenges including (lack of) required increased runway distance; RESA; and weight restrictions. - Fleet change ATR to A320 challenges including terminal security challenges; airport security	- Stakeholder & airline engagement to manage demand. - Pricing framework for alternative airport funding approaches. - Climate initiatives & sustainable financing. - Investment in route development & jet capability to boost connectivity.	- Non-aeronautical property development. - Regional connectivity. - GA growth. - Energy generation.

	fencing; weight restrictions; RESA; terminal capacity; and apron space.		
Small Aerodromes	- Limited airfield infrastructure for larger aircraft. - Urban encroachment. - Regulation & safety.	- Upgrade taxiway & runways for larger aircraft. - Engage with council on urban encroachment. - Engage with regulators and developers on airport risks.	- GA growth. - Growing capacity for emergency response services. - Growing flight training. - Non-aeronautical property development.

5.2 FEEDBACK FROM AIRLINES

In preparing this report, we have also consulted with airlines across New Zealand, including Air New Zealand and Tier 2 airlines. We asked airlines to identify key threats, mitigation measures and opportunities they were facing. Below is a summary of key themes identified from their responses.

Key Threats	Key Airline Mitigations	Opportunities
- **Access to Capital and Operating Costs**: Challenges in increasing operating costs (maintenance & parts availability). - **Passenger Volume and Demand Changes**: Fluctuations in volume & demand influenced by broader economic trends. - **Regulatory Environment**: Compliance with regulatory requirements adds significant costs and complexity, particularly for smaller airlines. - **Skilled Workforce Shortages**: Shortage of skilled engineers and pilots, exacerbated by competition from overseas markets. - **Infrastructure**: Issues with runway lengths, airfield safety requirements, and urban encroachment impact operations. - **Market Perception and Pricing**: The perception of airline pricing and the financial viability of small, privately-owned airlines are significant concerns. - **Uncertainty Around Fleet:** With aging fleet and no confirmed replacement aircraft, uncertainty over the pathway forward and next steps/future network - **Future Technologies**: Lack of network wide wholistic direction for investing in future technologies	- **Cost Management**: Airlines are reassessing their cost bases and renegotiating finance arrangements. - **Operational adjustments**: Some airlines have expanded schedules on key routes while withdrawing from less viable routes. - **Government support**: Smaller airlines highlight the need for central government support to ensure financial viability and sustain regional air services. - **Technological exploration**: Early exploration of low or no-emission technologies, such as hybrid and electric aircraft, to gain a competitive edge. - **Environmental and Technological initiatives**: Airlines are exploring sustainable aviation fuels (SAF) and renewable energy projects, such as solar farms, to reduce their environmental footprint.	- **Network Expansion**: Growth opportunities include expanding networks to connect regional ports with main centres and developing new regional city pairs. - **Future Technologies**: Awareness of developments in SAF, hydrogen, and electric-powered aircraft, though practical application is seen as a long-term prospect - **Capital for Growth:** If Tier 2 Airlines were able to access capital, they would be able to purchase more aircraft that could enable them to grow and reach further airports - **Investment in Future Technologies:** infrastructure required to enable next generation planes to use airports - **Better Industry Awareness:** mapping out fleet progression and evolution. Explaining triggers for up or downgauging routes

5.3 OPPORTUNITIES FUTURE AIRCRAFT BRING TO THE NEW ZEALAND AVIATION NETWORK

Advancements in aircraft technology are showing promising potential to transform air travel. A country such as New Zealand, which is geographically spread and heavily relies on its aviation network for domestic and international connectivity, stands to benefit significantly from these developments.

5.3.1 EXISTING CHALLENGE

Currently, a notable gap in New Zealand's regional aviation network is recognised. Air NZ, the country's major airline, recently reduced its regional services due to softened demand, profitability challenges, and aircraft shortages. Such factors have led the airline to a strategic focus on higher-demand routes serving larger cities. As a result, regional routes are impacted negatively in favour of utilising its aircraft (Dash 8-Q300 and ATR-72) on high-density routes.

Smaller regional airlines, such as Air Chathams, play a vital role in serving regional airports. Air Chathams operates aircraft like the Fairchild Metroliner III (19 seats) and the Saab 340 (34 seats) to regional airports, including Whakatane, Kapiti Coast, and Whanganui (Air Chathams, 2024a; Air Chathams, 2024b). Despite their efforts, many regional airports remain underserved. Currently, aircraft models like the Dash 8-Q200 and ATR-42, with capacities of 36 and 50 seats respectively, could address this gap. These aircraft present a viable alternative for low-demand routes compared to Air NZ's existing Dash 8-Q300 (50 seats) and ATR-72 (68 seats) fleets (ATR, 2024; Air NZ, 2024e, Qantas, 2024). Through engagement for this report, Air NZ confirmed they currently do not operate aircraft like this because they are uneconomic for them, and they are looking towards next-generation aircraft to fill the gap.

The reduction in regional service by major airlines thus further limits connectivity to the New Zealand airport network. Underserved airports face difficulties in maintaining essential links to larger cities, constraining opportunities for regional development. The following section explores opportunities that aircraft advancements can address these challenges and enhance the New Zealand airport network, particularly to improve connectivity and foster economic growth.

5.3.2 OPPORTUNITIES

5.3.2.1 IMPROVED CONNECTIVITY

Air connectivity in New Zealand is crucial as it allows more people to live where they wish, and to remain connected to business, education, healthcare and social connections in a timely manner. Further to this, the geography of New Zealand occasionally sees surface transport options limited or challenged by seasonal weather disruptions. Domestic air connectivity also acts as an effective distributor of visitors and their tourism expenditure.

Next-generation aircraft can enhance regional connectivity in New Zealand, especially for smaller communities where flight options are limited. For instance, the ES-30 by Heart Aerospace, a conventional take-off and landing (CTOL) aircraft, is designed for short-haul regional flights with a range of 200 km in all-electric mode and up to 800 km in hybrid mode. With a passenger capacity of 30 and 25 kg of luggage per passenger, the ES-30 presents a viable solution for improving regional connectivity (Heart Aerospace, 2024). Its limited flight range and lower passenger capacity indicate its potential for higher frequency flights for regional airports and cities in New Zealand, a potential solution to current challenges faced by the regional New Zealand airport network.

However, its operation requires infrastructure upgrades at regional airports, including runways of at least 1,100 m and charging facilities capable of recharging the aircraft in 60 minutes, allowing for quick turnaround times. This ultimately enables higher frequency operations and profitability for the carrier (Heart Aerospace, 2024). Regional airports such as Oamaru, Masterton, Wanaka, Kaitaia, Te Anau, and Milford Sound are just some examples where next-gen aircraft can make a positive impact to improve New Zealand network connectivity. The capabilities of the ES-30 thus make it an ideal aircraft to connect smaller New Zealand regional airports, which are often underserved by airlines such as Air NZ with its traditional aircraft fleet of ATRs or Q300s due to high operational costs and lower passenger demand. By providing frequent and affordable connections, the ES-30 could link regional airports to larger hubs.

Through next-gen aircraft, the possibility of new aircraft routes across New Zealand can be realised. The illustrations below show the Part 139 operator airports within a 200km range of each of the three large international airports in New Zealand (Auckland, Wellington and Christchurch).

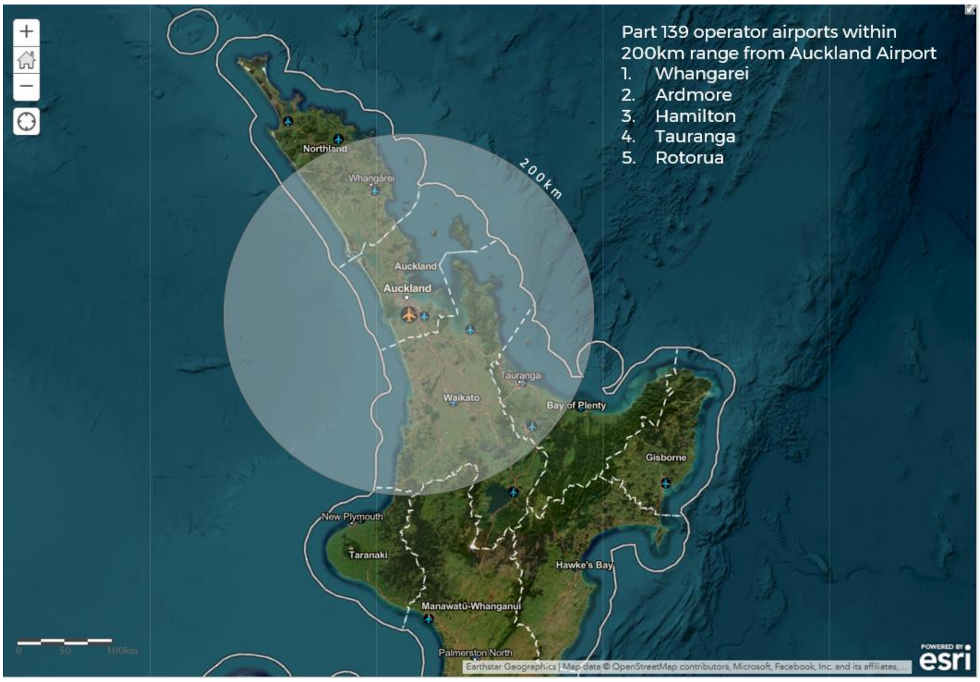

Figure 19 200km range from Auckland Airport

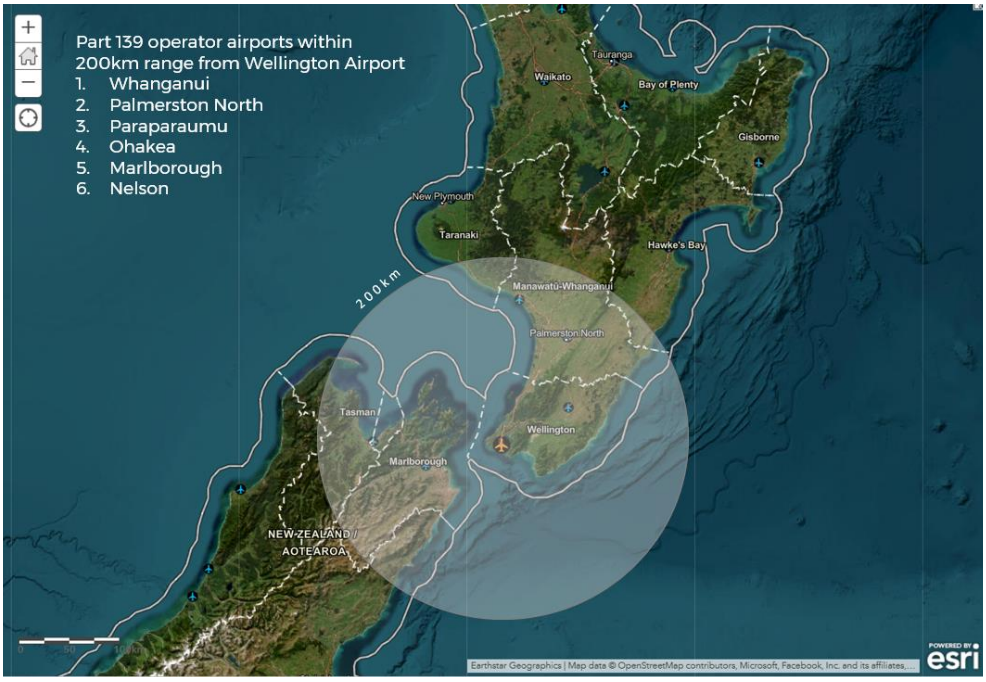

Figure 20 200km range from Wellington Airport

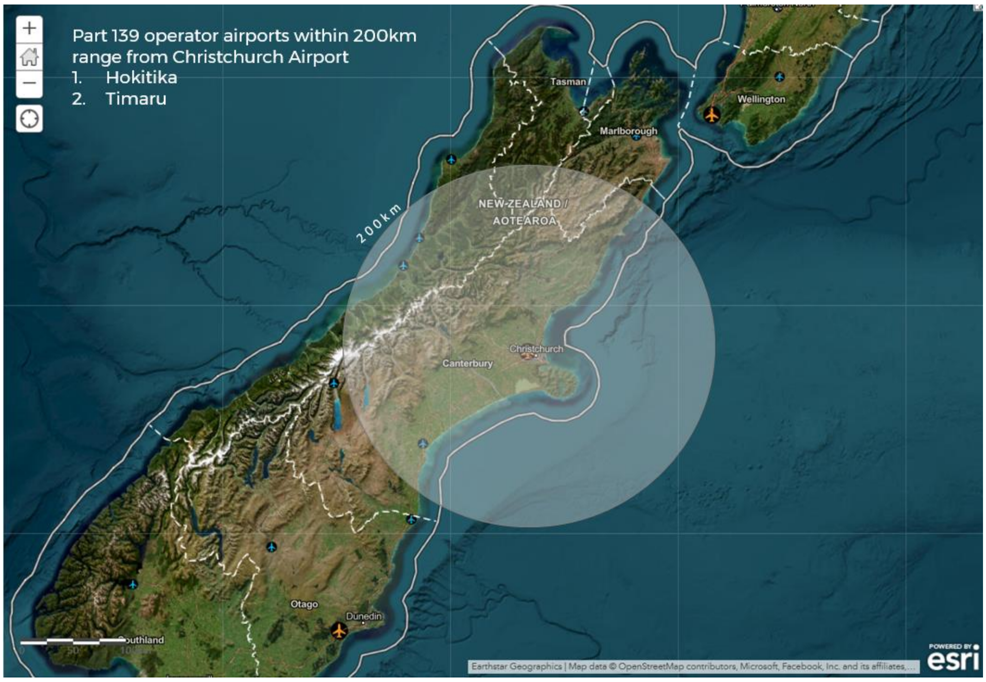

Figure 21 200km range from Christchurch Airport

5.3.2.2 ECONOMIC GROWTH

Adoption of new technologies is expected to increase jobs in New Zealand in the technology and aviation sector, as well as trade opportunities. This is predicted to resulting in economic growth of $2 billion over the next 20 years (Beehive New Zealand Government, 2023). IATA and Oxford Economics' 2023 report highlights the total economic impact of aviation to New Zealand contributing USD14.2 billion to GDP, or 5.6% of the total value of New Zealand's economic output. It also supports 177,000 jobs (IATA, 2024d).

Next-gen aircraft will help promote and support 'time-sensitive' primary industries, where goods need to reach their final markets within a time limit from being harvested or caught. For example, it may offer greater opportunities to the aquaculture industry (such as faster or more affordable transport of freshly caught seafood from previously hard to connect to areas), floral industry and horticulture industries (again through faster and more affordable transport from remote areas to main centres). Greater and more affordable links to New Zealand's key export hubs will help to drive regional economic growth and development.

5.3.2.3 ELECTRIC VERTICAL TAKE-OFF AND LANDING (EVTOL) AIRCRAFT

eVTOL aircraft offer significant potential to enhance connectivity in metropolitan areas, acting as air taxis to address challenges posed by congested ground commutes. For example, eVTOL operations could dramatically reduce travel times for business commuters (Gnadt et al., 2019). Joby Aviation, a California-based company, has demonstrated this with flights between New York City and Downtown Manhattan (Joby Aviation, 2023a). Applying this to New Zealand, routes such as Hamilton to Auckland (126 km by road, approximately 1 hour and 50 minutes by car) could see travel times reduced by over 50%, with eVTOL aircraft completing the trip in around 30 minutes at a flight speed of 320 km/h (Joby Aviation, 2023b). Such aircraft technology developments highlight the opportunity of CTOL and eVTOL aircraft to improve New Zealand's airport network.

5.3.2.4 LOWER OPERATIONAL COSTS

While initial procurement of next-gen aircraft may be costly, they promise significant long-term savings due to reduced fuel consumption and maintenance costs compared to conventional jet engines. According to Welstead et al., (2017), electric propulsion aircraft can reduce maintenance costs by 50%, making routes to less profitable regional airports more viable and encouraging airlines to serve underserved markets.

5.3.2.5 IMPROVED FEEDER NETWORK

Next-gen aircraft can act as feeders for larger hub airports, enhancing overall network efficiency. The use of all-electric aircraft operating a feeder flight has been determined to have approximately 10% lower direct cost compared to an ATR (Klingenberg & Hujer, 2024). The ES-30 for example, could be utilised to establish these connections, make it ideal for establishing connections between smaller regional airports and major domestic hubs, ensuring these communities can access international flights.

5.3.2.6 REDUCTION IN TOURISM EMISSIONS

The New Zealand Tourism Environment Action plan identifies decarbonisation as a major focus in New Zealand's tourism sector, with aviation contributing 60% of the tourism sector's emissions. Among emerging technologies, SAF is currently the most viable option. Investments into the development of domestic SAF could therefore contribute to building the New Zealand tourism sector create flow-on economic benefits such as job creation (MBIE, 2023). With 90% of international arrivals to New Zealand arriving by air, it is evident that aviation technological developments can significantly shape New Zealand's tourism industry. Without intervention, global aviation emissions are projected to quadruple by 2050 (MBIE, 2023).

5.3.2.7 POSITIVE IMPACT ON OTHER TRANSPORT MODES

SAF, electric, and hydrogen technology not only reduces aviation emissions but can also lower emissions from ground transportation at and around airports, including emissions from shuttles, ground vehicles, and aircraft tugs. As a result, such approaches to decarbonisation can significantly reduce all transportation emissions. Wellington Airport for example, have started trialling hydrogen energy to power Air NZ's electric tugs and service vehicles (Wellington Airport, 2024).

5.4 OTHER FUTURE INFRASTRUCTURE CONSIDERATIONS FOR AIRPORTS

5.4.1 GENERAL (APPLICABLE TO ALL AIRPORTS)

5.4.1.1 REGULATORY COMPLIANCE

This section outlines, at a high level, the regulations and standards airports face to operate in New Zealand. It does not explore the "regulatory barriers" or challenges in the current "regulatory environment" that were highlighted as key threats to the industry by airlines and airports during engagement for this report.

That feedback indicated barriers and challenges include:

- compliance with existing regulations adding cost and complexity.
- the Civil Aviation Authority's approach to Runway End Safety Areas preventing efficient and cost-effective infrastructure upgrades.
- desiring that airport operations and infrastructure be protected and enhanced under the government's RMA reforms.

AIRPORT INFRASTRUCTURE COMPLIANCE

- Part 139 covers the certification, operation, and use of aerodromes, ensuring they meet stringent safety and operational standards.
- Non-certified airports in New Zealand should strive to adhere to CAA guidelines as much as practicable. This helps ensure safety, operational efficiency, and alignment with best practices, even if full certification is not required.

UPCOMING REGULATORY GUIDELINES (EXPECTED IN THE NEXT 5 YEARS)

Changes to OLS guidelines (ICAO, 2023a)

The current guidance on the Obstacle Limitation Surface (OLS) concept in Annex 14 is changing as it is overly conservative. The new requirements provide a tailored approach to suit individual airport requirements and open development areas around airports.

The proposed changes to OLS safeguards surfaces depending on the aircraft type and runway operations in the following manner:

a) Type of runway (departure or arrival).
b) Aeroplane Design Group (categorization is based on the indicated airspeed at the threshold and aircraft wingspan).
c) Flight procedures available for the runway (non-instrument, instrument, precision, and non-precision).

The proposed changes to the OLS concept are expected to come into effect on 21 November 2030 (ICAO, 2024e) for all airports. Therefore, airport operators (located in the ICAO member states) must be able to comply with the new regulations by November 2030.

Changes to airport pavement strength reporting (ICAO, 2024c)

ICAO has changed the system for reporting Airport Pavement strength (effective since 28th November 2024). The current ACN-PCN is replaced by the Aircraft Classification Rating – Pavement

Classification Rating (ACR-PCR) system (ICAO, 2023b). The change to the ACR-PCR brings with it new methods and criteria to define the strength of airport pavements and their compatibility with aircraft types.

The Civil Aviation Authority of New Zealand has traditionally adopted guidelines from the ICAO and is expected to incorporate the upcoming changes soon.

5.4.1.2 INFRASTRUCTURE RESILIENCE (CLIMATE CHANGE)

Airports should incorporate nature-based solutions and future-proof airport infrastructure to withstand the growing risks posed by climate change, ensuring long-term operational sustainability.

Some key initiatives airports can focus on to adapt to climate change include:

a) **Upgrading marine defences** – Major airports in New Zealand are situated along the coast. To safeguard against sea level rise and storm surges during extreme weather events, it is essential for these airports to enhance their marine defences.

b) **Stormwater management** – Airports should enhance stormwater infrastructure to handle extreme rainfall and prevent surface flooding.

c) **Climate Scenario Analysis** - Consider future climate scenarios for new developments and upgrades at the airport.

d) **Increased protection of critical assets and priority areas**.

5.4.1.3 SUSTAINABILITY AND RENEWABLE ENERGY GENERATION

SUSTAINABILITY

Airports should ensure that sustainability is integrated into every development phase, from planning to construction and daily operations, focusing on reducing waste, emissions, and noise pollution. It is recommended that they use measurable sustainability benchmarks to ensure transparency and accountability (ACA, 2020).

Airports could explore opportunities to implement advanced technologies that minimise environmental impact, such as electric ground support equipment, renewable energy sources, and energy-efficient designs.

Airports may want to conduct an energy audit (i.e., identify the largest uses of power at an airport, and any energy/fuel transformations happening on site). This can help an airport operator understand its energy usage and be strategic about investments in energy efficiency technologies. For example, swapping the traditional Airfield Ground Lighting (AGL) lights in the airfield with LED or solar AGL (solar lights are applicable for smaller airports).

RENEWABLE ELECTRICITY GENERATION

There is increasing demand for electricity to power Ground Service Equipment (GSE) vehicles and potentially for aircraft too. Airports may want to accommodate this demand by generating renewable electricity on-site.

On-site renewable electricity generation provides multiple benefits for an airport including electricity independence (not having to rely on the external electric grid), lowering electricity costs, providing additional revenue opportunities with surplus electricity sold to external markets and potentially building the airport's reputation within the community.

Several renewable electricity generation options exist for airports such as solar, wind, biomass, hydro, and geothermal (ICAO, 2024d). Airports can determine the most feasible renewable electricity generation pathway based on their specific geography, geology, and climate conditions.

5.4.1.4 COMMUNITY INTEGRATION

Airports should engage with local stakeholders in the planning and development process, ensuring their voices are heard and their concerns are addressed. Involving the community in the decision-making is key to any infrastructure project.

Enhancing public transport and landside access and facilities makes it easier for the community to use and benefit from the airport.

- **Shared benefits:** Ensuring that the airport's growth and development bring tangible benefits to the local community, such as increased business opportunities and improved quality of life.
- **Partnerships with Iwi:** Building the involvement and endorsement of Iwi in all aspects of the airport and its development to enable innovation that supports the development of Māori.

5.4.1.5 LIGHTING AND POWER ASSETS

A process is currently underway to transfer ownership of lighting and power assets at New Zealand airports from Airways (New Zealand's air navigation service provider) to airports. This will provide long term asset management opportunities nationally for these assets.

5.4.1.6 AVIATION SECURITY

In 2024, the Government has undertaken consultation on the delivery of aviation security services. Whilst at the time of writing, decisions have not been made, there may be a future opportunity in the delivery of Aviation Security at NZ airports if the government were to permit airports and airlines to take responsibility for security screening.

5.4.2 LARGE AND SMALL INTERNATIONAL AIRPORTS

5.4.2.1 AIRPORT TECHNOLOGY INTEGRATION

Improving Efficiency within the Terminal

FRICTIONLESS TRAVEL WITH SMART TECHNOLOGY

Below are some examples of technologies that create a high-quality travel experience for passengers:

- **Facial recognition/Biometrics:** The use of biometrics across the airport brings greater interoperability between airports, airlines, and border control authorities. For passengers, this means checking in, opening security gates, and boarding the plane with biometric information, reducing the need to repeatedly show paper documentation (Buckman. R, 2024).
- **Self-service kiosks:** allow travelers to check in, select seats, print boarding passes, and drop off luggage, help to reduce wait times, and free up airport staff.

AI-POWERED BAGGAGE MANAGEMENT

This AI-driven system (successfully implemented by Japan airlines (OAG, 2024)) aims to streamline the boarding process by efficiently monitoring carry-on luggage carried by passengers.

- Cameras installed at boarding gates capture images of passengers' carry-on items as they prepare to board.
- The AI system analyzes the quantity and type of baggage, estimating the space each item will occupy in the overhead bins in real time.
- The system alerts gate personnel when the aircraft's preset storage capacity is approached or exceeded, ensuring efficient use of space.

Improving Efficiency Airside

AIRPORT COLLABORATIVE DECISION-MAKING (A-CDM)

A-CDM enables aerodromes, airlines, air traffic controllers, ground handlers, pilots, and air traffic flow managers to share operational information and collaborate effectively to manage airport operations efficiently. Investment in this technology improves predictability (ICAO, 2023c) and reduces operating costs for everyone involved (i.e., stakeholders such as airline and ground support), leading to better turnaround times and more productivity with the same infrastructure.

A-CDM technology is currently being used at Auckland and Wellington airports (Gentrack, 2016).

ADVANCED SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM (ASMGCS)

ASMGCS improves airport efficiency and safety by better managing aircraft and vehicles on the ground. It makes operations smoother in all weather conditions using set procedures. It consists of four basic functions: surveillance, control, planning/routing, and guidance (Eurocontrol, 2024).

AI-POWERED SMART STAND TECHNOLOGY

Gatwick has started a pilot project using "smart-stand technology" (OAG, 2024) to improve aircraft turnaround management. This project uses AI to optimize operations at one of Europe's busiest airports.

- The technology allows turn coordinators to oversee several aircraft turnarounds at once, greatly decreasing manual work and minimizing the risk of human error.
- AI-driven insights allow for early identification and resolution of issues during the turnaround process, potentially speeding up operations and reducing delays.

5.4.2.2 REMOTE/DIGITAL TOWER TECHNOLOGY

The concept of remote aerodrome Air Traffic Service (ATS) enables the provision of aerodrome ATS from locations/facilities without direct visual observation (otherwise known as out-of-the-window observation). Instead, the provision of aerodrome ATS is based on a view of the aerodrome and its vicinity through means of technology, utilizing a visual surveillance system (i.e. cameras at the aerodrome) (FAA, 2024).

The remote digital tower comprises the following components:

- The Video Surveillance System at the aerodrome; and
- The Control Room in a remote location.

This technology has been adopted by several airports around the world including New Zealand (Airways, 2019). Scandinavian Mountains Airport is one of the first in the world with a remote tower (RTC) which is already in use (SMA, 2024).

5.4.3 *REGIONAL AIRPORTS AND SMALL AERODROMES*

5.4.3.1 IMPROVE COMMERCIAL VIABILITY

Some options for improving the commercial viability of an airport/aerodrome include:

- **Business Park development (non-aeronautical):** Establishing a business park on or near airport grounds to attract companies that benefit from proximity to the airport, thus creating a new, stable revenue stream while enhancing the airport's role as a commercial center.
- **Freight operations expansion (aeronautical):** Enhancing the airport's logistics capabilities to support regional industries, drive economic growth, and provide a steady revenue stream through increased freight traffic.

These opportunities are discussed in greater detail in other sections of this report.

5.4.3.2 AIRFIELD IMPROVEMENT AND LIFETIME ASSESSMENT

AIRFIELD IMPROVEMENTS

- Most regional airports in New Zealand lack the infrastructure required to handle different types of aircraft. In most cases, the biggest aircraft the regional airports can handle are the smaller turboprops. Enhancing infrastructure to accommodate various aircraft types and boosting capacity to manage high traffic during peak seasons is important for regional airports.
- The small aerodromes should focus on providing at least the basic infrastructures such as runways (typically a kilometre), terminals, and essential services to ensure connectivity for remote communities and to accommodate air ambulances during emergencies.

AIRFIELD ASSET LIFETIME ASSESSMENT

Regional airports should revisit their airside asset conditions when looking to service new aircraft as new aircraft types (mainly narrow-body jets) have gotten much heavier. For example, when comparing the A321-200 with its Neo counterpart (much more efficient in terms of fuel consumption), the wingspan is similar, but the weight of the aircraft has increased by 30% (see below). This may put too much strain to the pavement and requires proper reassessment and strengthening to accommodate new (efficient) aircraft types or variants.

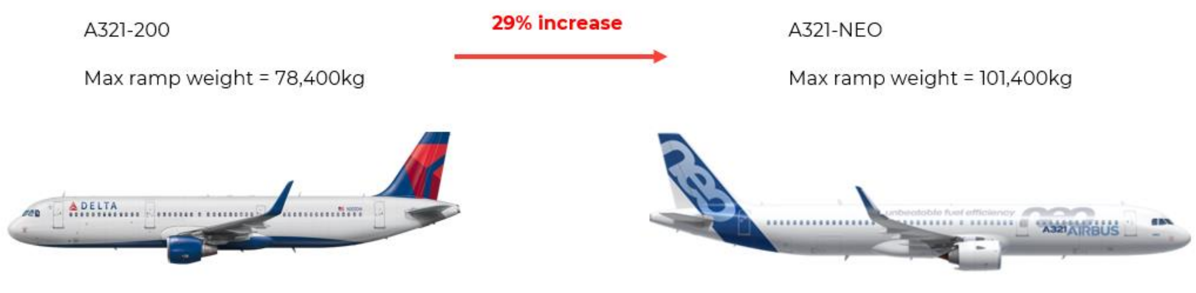

Figure 22 Weight Comparison between A321-200 and A321-NEO

5.4.3.3 IMPROVING CONNECTIVITY TO MAJOR HUBS AND ACCESSIBILITY FROM THE AIRPORT

- Regional airports need to maintain strong connections to major domestic hubs and other regional locations, as this is crucial for bolstering local economies and promoting tourism.
- Improving connections with external transportation networks streamlines travel and enhances the overall efficiency of airport operations, contributing to a more integrated regional transport system. The regional airport operator can collaborate with local government and transport agencies to improve transportation options to and from the airport.

5.5 ADVANCED AIR MOBILITY

Global advancements in Advanced Air Mobility (AAM), including innovations from Airbus, Joby Aviation, Volocopter, and Lilium Jet, offer significant opportunities to connect New Zealand's geographically dispersed airports. Future aviation technologies, such as eVTOLs, align well with New Zealand's unique landscape, providing development in aviation technology by 2030. This prediction has proven accurate, as many AAM concepts are currently in the test phase. If adopted in New Zealand, such technology could bring valuable opportunities and solutions for passenger transport, emergency response, tourism, and cargo movement.

5.5.1 EXAMPLES OF AAM TECHNOLOGY

Examples of AAM aircraft technology, with its capability of eVTOL operation are discussed below. While this technology continues through test, evaluation and certification programmes, firms are closing on commercial operations, with Archer Aerospace targeting 2025 as its entry-into-service milestone (Archer, N.D).

5.5.1.1 AIRBUS

The CityAirbus NextGen is an all-electric, 4-seater eVTOL aircraft. It boasts a range of 80 km and a cruising speed of 120 km/h, making it efficient for AAM operations such as shuttle services, eco-tourism, and emergency first response. The CityAirbus features an architecture of fixed wings and eight electric-powered propellers. As part of Airbus' plan to integrate AAM aircraft into the aviation ecosystem, Airbus in Germany is leading the Air Mobility Initiative, establishing research projects on airport and city integration of eVTOL aircraft, including vertiports (Airbus, 2024a). Recently, Airbus partnered with Avinics, a world-leading Aerial Emergency Services operator, to explore opportunities to operate eVTOL aircraft throughout Europe. The fully electric CityAirbus is now undergoing testing at Avinics' test centre in Germany prior to its initial flight later this year (Airbus, 2024b).

5.5.1.2 JOBY AVIATION

Joby Aviation's aircraft is an all-electric VTOL aircraft, powered by six electric motors. It can carry four passengers with one pilot and boasts a top speed of 320 km/h and a range of 240 km. Joby Aviation's aircraft began flying its prototypes in 2017 and, to date, has completed over 1,000 flight tests. Its eVTOL aircraft is designed to move passengers within congested metropolitan areas as a fast, clean, and quiet alternative to ground transportation (Joby Aviation, 2022a). In 2023, its eVTOL aircraft successfully demonstrated the first-ever electric air taxi flight in New York City, taking off from Downtown Manhattan Heliport (Joby Aviation, 2023a). Most recently, in 2024, Joby Aviation applied for its aircraft to be certified for use in Australia with Australia's Civil Aviation Safety Authority (CASA), in anticipation of launching emissions-free air taxis in Australia (Joby Aviation, 2024).

5.5.1.3 VOLOCOPTER

The Volocopter, based in Europe, is an all-electric eVTOL aircraft designed for UAM or AAM operations, such as air taxis or emergency rescue vehicles. The Volocopter has 18 rotors and seats two people (one pilot and one passenger). To date, the Volocopter has conducted over 2,000 test flights (Volocopter, 2024a). It aims to simplify life by bypassing congested roads and providing quick connections for people in urban and suburban areas. In August 2024, the Volocopter took flight in

Paris, marking the conclusion of its operational validation test campaign at the Aerodrome of Saint-Cyr-l'Ecole and Versailles (Volocopter, 2024b).

5.5.1.4 LILIUM JET

The Lilium Jet is an eVTOL aircraft featuring 30 battery electric motors within the main wings and flaps. Unlike other eVTOL aircraft, the Lilium Jet utilizes aerodynamics for more efficient flight, with wings and flaps that tilt downwards during hover and align flush during cruise, allowing it to glide for longer distances. The Lilium Jet seats six passengers and has a separated cockpit to ensure pilot situational awareness while providing privacy for passengers in the cabin. It is designed to operate with conventional and existing heliports, avoiding the need for infrastructure upgrades and ensuring cost-effectiveness in its adoption (Lilium Jet, 2024a). The Lilium Jet is currently undergoing various tests, with the most recent successful gear drop test conducted in Naples, Italy (Lilium Jet, 2024b).

5.5.2 CONNECTIVITY OPPORTUNITIES WITH THE INTRODUCTION OF AAM TO NEW ZEALAND AIRPORTS

5.5.2.1 ENHANCE REGIONAL CONNECTIVITY

Aircraft such as Airbus' CityAirbus NextGen and Joby Aviation's eVTOL, with operational ranges of 80 km and 240 km respectively, are ideal for connecting regional airports and urban cities in New Zealand (Airbus, 2024a; Joby Aviation, 2022). For example, the heavy traffic congestion in Queenstown, exacerbated by the region's rapid population growth and limited road infrastructure due to land constraints, could be alleviated with the introduction of AAM (Otago Regional Council, 2018). A survey conducted by WSP on airports' perspectives regarding eVTOL aircraft opportunities revealed that many airports view AAM positively to enhance regional connectivity. Taupo Airport highlighted that eVTOL AAM aircraft could provide new opportunities for operations departing from Taupo, connecting passengers to regional airports that currently lack direct flights. For example, routes such as Taupo to Rotorua or Hamilton could benefit. Currently, flights from Taupo Airport to Rotorua Airport require connecting flights on Air NZ, resulting in an inefficient and lengthy travel time of approximately 4.5 hours, including layover time (Air NZ, 2024g). In contrast, a direct flight using Joby Aviation's eVTOL aircraft, which travels at a speed of 320 km/h, would reduce the travel time to approximately 1 hour. Given the range of eVTOL aircraft, such operations are feasible. It is crucial to note that, successful implementation requires that safety and regulatory measures keep pace with technological advancements.

5.5.2.2 AIRPORT TRANSFERS

AAM aircraft offers efficient solutions for inter-city airport transfers. Joby Aviation's demonstration flight as an air taxi in New York outlines its potential to operate in a similar manner for Auckland city. For instance, if a business passenger requires quick transport between Auckland International Airport and Auckland city, an eVTOL aircraft could follow the state highways, covering approximately 21 km. Both Airbus and Joby Aviation's aircraft have sufficient range to complete this journey safely. With top speeds of 120 km/h for the CityAirbus and 320 km/h for Joby Aviation's eVTOL, these aircraft offer a valuable solution for time-sensitive passengers, such as corporate travellers needing to attend business meetings, allowing them to bypass Auckland's typically congested traffic (Airbus, 2024a; Joby Aviation, 2022). This concept can also be applied in reverse for passengers living further from major airports. For instance, a passenger based in the North Shore of Auckland could use an eVTOL aircraft for a faster commute to the airport, avoiding the long drive and increased commute time due to road traffic. Lilium Jet's aircraft can also be utilised for AAM due to its ability to integrate with existing heliports, allowing for cost-effective deployment and fast adoption at New Zealand airports.

5.5.2.3 EMERGENCY AND FIRST AID RESPONSE

The deployment of eVTOL aircraft for emergency operations could significantly enhance New Zealand's disaster management capabilities, particularly in remote regions. These aircraft can deliver medical personnel and supplies to isolated communities during natural disasters. AAM also offers the potential for immediate evacuation services, like the role helicopters play today. An example of such collaboration can be seen with Germany's ADAC Luftrettung emergency response service and the eVTOL manufacturer Volocopter. In 2018, ADAC Luftrettung launched a feasibility study to evaluate Volocopter's eVTOL aircraft for rescue operations, becoming the first air rescue organisation globally to test crewed eVTOLs for medical services (Volocopter, 2023). In the New Zealand context, insights from WSP's survey at Tuuta Airport (Chatham Islands) suggest that remote communities like the Chatham Islands could benefit greatly from AAM, particularly in emergency response services. However, due to the Chatham Islands' distance from mainland New Zealand (1,080 km from Auckland), current eVTOL models lack the range and battery capacity for direct service. Instead, using the Chatham Islands as a base, AAM could provide flights between the Chatham and Pitt Islands. This connectivity would not only support emergency services but also promote tourism and economic development, as many visitors travel between the two islands. This leads into the next section on AAM opportunities in New Zealand (Chatham Islands, 2022).

5.5.2.4 TOURISM

For the year ending March 2023, tourism contributed $13.3 billion directly to New Zealand's GDP (3.7% of total GDP) and an additional $8.8 billion indirectly (2.5% of GDP) (NZ Tourism, 2024). A key aspect of New Zealand's tourism appeal is its scenic flights, an area where AAM could play a transformative role. For instance, eVTOL aircraft could be utilised for scenic flights in iconic locations such as Milford Sound and Mt Cook. Feedback from Rotorua Airport, as part of WSP's survey, highlights their view that AAM presents a significant tourism opportunity for the region. By incorporating AAM technology, New Zealand can offer premium tourism experiences, attract high-value visitors, and further enhance the country's appeal as a top-tier tourism destination.

5.5.3 COLLABORATION REQUIRED FOR AAM TO BE SUCCESSFUL

Global advancements in AAM technology present unique opportunities for New Zealand airports, including enhanced connectivity, improved emergency response capabilities, and the potential to drive tourism and economic growth. By embracing AAM innovations, New Zealand can position itself as a leader in advanced aviation technology, fostering a more efficient and environmentally sustainable transport system.

However, the successful implementation of AAM will require extensive collaboration between aviation regulators, infrastructure developers, and other stakeholders. Critical challenges include obtaining regulatory approvals and certifications, addressing weather-related constraints, and establishing the necessary charging and maintenance infrastructure at airports. Additionally, social barriers related to safety perceptions must be carefully evaluated and addressed. Government and industry cooperation will be essential to overcoming these obstacles.

While the timeline for AAM adoption must be approached pragmatically, its long-term potential to decongest road networks, reduce travel times, lower emissions, and enhance urban mobility for both passengers and cargo is transformative. With strategic planning and collaboration, AAM can play a pivotal role in shaping New Zealand's future transport landscape.

5.5.4 CHALLENGES MOVING TO VERTICAL AVIATION

Advanced Air Mobility aircraft are just one aspect of a functioning AAM system. Designated areas for the aircraft to take off and land at (such as helipads or vertiports) need to be planned and constructed. This will involve time and cost to acquire land or rooftop space and develop this infrastructure.

Furthermore, AAM will be new technology and pilots of AAM aircraft will need to be trained to operate them. Currently, pilots of conventional aircraft are used to landing and taking off on conventional runways. Unless they are trained helicopter, operating VTOL aircraft will not be in the skillset of these pilots.

In the future there is also the potential for pilotless aircraft. However, pilotless aircraft will require both future technology development and social licence to operate. Currently, the New Zealand public is likely to be resistant to this change. (New Zealand Herald, 2024).

5.6 ELECTRICITY GENERATION

5.6.1 ALTERNATIVE AIRCRAFT FUEL TECHNOLOGIES ALL REQUIRE GREATER ELECTRICITY DEMAND

The introduction of future fuel technologies will lead to greater electricity demand from the aviation industry in New Zealand. All three forms of alternative fuel will require electricity (to varying degrees), particularly if they are to be generated using their most decarbonised process.

For SAF, the development of eSAF (SAF derived from renewable energy) can happen through using renewable energy to generate liquid fuels which can be used as SAF. If companies in New Zealand wanted to produce eSAF, then they will require electricity supply to do so.

The production of general SAF will also require electricity as one of the inputs to generate it. With SAF likely to be the most viable and impactful alternative aircraft fuel technology in the medium term, and with the right policy framework and incentives, businesses in New Zealand could look to produce SAF domestically to serve the aviation industry.

For Hydrogen, the production of green Hydrogen is derived through converting renewable electricity into hydrogen. Electricity is thus an input to generate green Hydrogen fuel for planes. If green Hydrogen were to be produced in New Zealand, this will generate additional demand for electricity too. Further, the storage of liquid hydrogen requires storage in cryogenic tanks at -253˚C, so will require energy to maintain these temperatures.

Finally, for electric/battery powered aircraft, the recharging of these planes will require electricity. As noted in previous sections, electric planes are being developed that may require up to 2-3MW for fast recharging (IATA, 2023). This would create significant additional draw on the electric network in New Zealand.

5.6.2 NEW ZEALAND'S FUTURE ELECTRICITY DEMAND

Regardless of the type of fuel used by future aircraft in New Zealand, it is evident that greater electricity generation will be required to help produce fuel for next-gen aircraft.

New Zealand's future electricity demand is projected to grow between 35.3% to 82.0% by 2050 (MBIE 2024b). These numbers, generated by MBIE, do not make allowance for the generation of fuel or charging of next-gen aircraft. To help support the introduction of next-gen aircraft into New Zealand, investment in additional electrical generation and electrical transmission infrastructure to New Zealand's airports is required.

The cost of electricity transmission can be significant. For electricity costs to be reasonable, the source of electricity generation should be located as close to the location where it is to be used. For airports, electricity to be used onsite either should be either generated at the airport or transmitted from the national electricity grid.

For airports, it may be worth investing in on-site generation through methods such as solar power. This allows for the airport to reduce their costs of electricity transmission and usage, as they can generate some of their electricity demand on site.

5.7 AIR SPACE MANAGEMENT

Introducing Advanced Air Mobility (AAM) into airspace involves several key considerations to ensure safety, efficiency, and integration with existing air traffic. Here are some important factors to be considered (NASA, 2021) (NASA, 2022):

1. **Airspace Integration**: AAM will require new air traffic management technologies to allow different types of aircraft to communicate and operate safely together. This includes automated navigation systems and vehicle-to-vehicle communication
2. **Automation and Safety**: Increased automation in both airspace management systems and vehicles is crucial. These systems need to handle tasks like avoiding bad weather and other aircraft, and ensuring safe take-offs and landings
3. **Infrastructure Development**: New infrastructure, such as vertiports for electric vertical take-off and landing (eVTOL) aircraft, will be necessary. These facilities need to be strategically placed and designed to handle the unique requirements of AAM vehicles
4. **Regulatory Framework**: Developing a regulatory framework that addresses the unique challenges of AAM is essential. This includes setting standards for vehicle performance, airspace usage, and safety protocols
5. **Community Integration**: Engaging with communities to address concerns such as noise, privacy, and environmental impact is important for the successful adoption of AAM
6. **Collaboration**: Effective collaboration between government agencies, industry partners, and other stakeholders is necessary to develop and implement these new systems and technologies

These considerations will help ensure that AAM can be safely and efficiently integrated into our current airspace system.

6 INVESTMENT OPPORTUNITIES

6.1 ATTRACTING AIRPORT INVESTMENT

Airport planning, futureproofing and resilience will remain as critical factors for success of the New Zealand airport sector in the decades ahead. With the identified risks and potential gaps widening in air service connectivity, and high barriers to entry for both existing airlines and new entrants, focusing the industry on required areas of investment is needed.

When considering investment appeal, it is necessary to consider both aeronautical and non-aeronautical hemispheres of the airport campus. At a basic level, both must work in concert for an airport to be an attractive investment case, as solid passenger growth forecasts may act as the backbone for investments in parking, retail, visitor industry facilities, and commercial development. This balanced approach will allow airports, regardless of size, to diversify their asset base, strengthen their balance sheet and entrench the infrastructure as community assets and those of national importance.

Larger airports, which in the New Zealand context we consider as Auckland, Wellington, Christchurch and Queenstown, are generally able to attract investment, seek funding and develop their campuses continually. This report highlights the opportunity for regional and smaller internationally capable airports to also plan and develop their assets in a way which create legacy opportunity for both existing shareholders and potentially for outside investment.

6.1.1 AERONAUTICAL INVESTMENT

For any Airport operator, asset owner or investor, passenger forecast is a downside risk which is ever-present due to the volatility of aviation, uncertainties around long-term demand profile and, perhaps most importantly given feedback received for this project, supply-side risk of airline seat capacity production.

Historically in New Zealand the cost of attracting and maintaining new and/or strategically important airline services has been borne by Airlines (as the operator) and Airports (waived or discounted passenger service charges, incentives, marketing, operational support), with pockets of support from industry bodies including Tourism New Zealand, and Regional Tourism Organisations to drive visitor growth. The inherent challenge for Airports is the risk-sharing of attracting and maintaining this growth, as airports must over time recover reasonable aeronautical revenue to maintain and upgrade airfield infrastructure, and it is unreasonable to extend landing and passenger fee discounts in perpetuity. Ideally, markets will grow and fill airline services to an extent that aeronautical discounts are not required. However, that cannot always be guaranteed in a highly seasonal visitor market like New Zealand. Further, the challenge of the demand profile is not just at international Airports, but those in the regions with less ability to deeply discount revenues to attract services.

From the almost universal feedback from Airport members' into this study, we propose that **a nationally coordinated, contestable aviation attraction investment fund** be considered. The objective of such a fund would be to elevate New Zealand's Airport sector's work in attracting new airline services, as well as maintaining and seeking increases on existing city pairs. Furthermore, it would position New Zealand in a collaborative and appealing way on the international stage, in line with many of our neighbouring competitors.

In an international comparison, New Zealand would be able to better compete with Australian states, European and Asian markets to attract new routes, and strengthen existing ones, and would share the risk profile beyond the current state of Airlines and Airports. An example of this being done successfully in recent times is the post-Covid19 support mechanisms most Australian states created, in partnership with their key Airport operators. In Queensland for example the $200m Attracting Aviation Investment Fund (Queensland Government, 2024) brought together state government and four key international airports, with applications sought for funding distribution.

In a domestic sense, the model may facilitate growth, but of joint importance would be supporting the retention of airline routes which this study has highlighted are at risk following stakeholder insights. The model may seek lessons learned from regional subsidy schemes in New South Wales, Western Australia and the Essential Air Service programme in the USA (U.S. DoT, 2024). It should be a balanced approach to risk supporting small Airports and 'thin' routes with provision of year-round capacity and frequency, the latter being crucial for reasons of non-discretionary travel including medical, education, government and business.

Investment Opportunity: Centralised Aircraft procurement and funding

With all airlines, and acutely those operating smaller aircraft but often on critical regional routes, under pressure to modernise and capitalise new fleet purchases, an investment opportunity for government may be to offer centralised aircraft financing and procurement. This may serve a dual purpose in that government agencies may be able to leverage economies of scale with manufacturers which the airlines at an individual level are unlikely to, as well as to provide access to capital in an affordable way for industry to upgrade and update fleets to ensure service continuity to regional areas.

With regional airlines telling this report that compliance with avionics and navigation standards, maintenance costs and unfavourable economics of many current aircraft types, this procurement option may provide a level of support in a strategic way instead of, or in parallel to route or passenger service financial stimulus to maintain, and ultimately grow regional connectivity.

6.1.2 REVIEW OF AIRPORT INVESTMENT MODELS

While there is a low level of private ownership in regional airports in New Zealand, nearby examples, particularly in Australia, suggest that attracting investment into regional airports is possible, and may add value to the New Zealand airport market.

We know that airports are strategic assets for their communities, but inherently need to derive and strengthen commercial returns to remain viable, but also to invest in both aviation and non-aeronautical projects. The Australian example in recent years is of interest, with particular focus on how regional airports of varying sizes have attracted outside investment.

When considering relevant examples, the following groups and operators are noteworthy:

1. Airport Development Group (ADG)

   ADG is a Darwin-based company with diverse assets across the Northern Territory including Airports (Darwin, Alice Springs and Tennant Creek), tourism assets such as hotels and property development on airport. ADG's ownership is made up of a majority shareholder (IFM Investors with 77.4%) and mid-market infrastructure investor Palisade Investment Partners (22.6%), with these investors representing the interests of Australian superannuation funds as well as other institutional investors.

2. Queensland Airports Limited (QAL)

   QAL is an Australian-owned operator or several Airports across various size categories, from Gold Coast Airport to Townsville, Mount Isa and Longreach in Central Queensland. Like ADG, the group is a privately-owned company with shareholders including superannuation and investment funds.

3. Agilis Airports Group / Palisade Investment Partners

   The Agilis brand was created to provide a neutral platform for Palisade Investment Partners and partnered investors who had acquired the Sunshine Coast Airport on a 99-year operating lease in 2019, and subsequently acquired a similar agreement to operate Coffs Harbour Airport in New South Wales.

These groups operate nine regional airports in total, and of interest and relevance to the New Zealand market is that each is anchored by a single, larger regional airport (Darwin for ADG, Gold Coast for QAL and Sunshine Coast for Palisade). This has then allowed each group's expansion into smaller regional airports, suggesting that potential investment may be either at an individual asset level, or a grouped approach, where airports with similar characteristics may be brought together as a tranche.

While these investors are Australian-based, and with Australia's superannuation industry constantly looking for stable long term asset classes to invest in, there is no reason why the New Zealand investment community, iwi and other funders may not be interested in a similar model should airports, communities and councils be willing to engage.

The key aspect for airports is the long run valuation model which generally supports 49 or more commonly a 99-year operating lease. These agreements can be made attractive to local government and communities by a transaction model including up-front payment, commitment to infrastructure investment, and an annual payment based on a percentage of revenue or operating profit. Where aviation revenue growth is generally the central pillar to valuation growth, especially in smaller airports, non-aeronautical development as described throughout this report will increasingly become value accretive, serves to diversify the Airport's balance sheet and creates resilience against airline capacity volatility.

6.1.3 NON-AERONAUTICAL INVESTMENT

If greater certainty is achieved for the aeronautical side of airports, derivative revenue via terminal retail, car parking and other volume-driven sources, airports can have greater confidence moving from operational management to a strategic unlocking and of non-aeronautical developments on campus.

Airports throughout this study have overwhelmingly identified developing non-aeronautical income streams as crucial to their long-term planning, and this area is often the critical value-accretive activity which makes airports most appealing for additional investment, and which generates strong returns for shareholders. The key aspect of non-aeronautical development is to not be limited to industry, which is related to passenger movements, but to develop in a staged way which creates a campus of complementary business activities utilising existing or available land holdings.

If we consider the attributes of airports which were commercially resilient during recent shocked trading periods such as the Covid-19 pandemic, those with existing and mature property portfolios, key retail offerings and supply chain logistics were more resilient and traded successfully despite aeronautical revenues decreasing markedly. Conversely, those without such development or who were in the planning and investment phase found the period much more difficult to endure without support from shareholders.

Airports must ensure that they have developable land, appropriate regulatory and planning instruments in place, availability of capital, and for Airports with local government ownership, engagement and endorsement from the electorate.

The type of developments at airport which are successful in many markets including New Zealand include:

- Supply chain logistics including multi-modal freight and materials handling
- Visitor accommodation and food and beverage outlets
- Retail and food service including supermarkets, fast food, fuel
- Vehicle maintenance and servicing facilities
- Pet care and accommodation

Several common characteristics appear across this group, most important being that these activities are not noise-sensitive, cater to airport campus workers and neighbouring communities, as well as favouring common airport locations on or close to transport arterial links including roads and railways (in some locations).

Investment Opportunity – New Zealand as a hub for eVTOL Production and Flight Testing

The ongoing investment and development of eVTOL aircraft, as discussed elsewhere in this report presents an ideal opportunity for New Zealand to become a regional manufacturing facility and test environment for these aircraft. The nexus of this opportunity is interaction between airports which have developable land near their aeronautical infrastructure (ideally with taxiway access to runways), as well as New Zealand's renewable energy generation opportunities and leveraging its relatively low air traffic movements in controlled airspace.

The test and evaluation programme, airspace management and ultimately growing production to scalable levels for each EVTOL manufacturer being a market development which may revolutionise the aviation industry, the need for a collaborative approach to attracting manufacturing facilities seems ideal for New Zealand. These industries are ideal to be located on airport, will attract high skilled jobs, and has the potential to create a new export industry for the country by exporting these aircraft to Pacific Rim countries.

If we consider recent global examples, American eVTOL company Archer Aviation is set to complete construction of a 400,000 square foot manufacturing facility in Covington, Georgia in early 2025 (Zag Daily, 2024), creating over 1000 jobs and investing over USD118m in the facility.

In California, Joby Aviation has broken ground on the expansion of its aircraft production line at Marina Municipal Airport, as well as acquiring an existing facility at Dayton International Airport in Ohio (Vertical Mag, 2024).

To achieve this, a contestable fund could be provided by government for local council and airport operators to use to attract a manufacturing facility to supply the Oceania region with this emerging transportation mode, in turn creating skilled jobs for a region/s by maximising existing airport infrastructure.

6.2 AIRPORTS

As stated earlier, as part of this project we have communicated with airports across New Zealand. Below are a list of projects/opportunities that they wanted highlighted (in alphabetical order):

- Auckland Airport: undertaking a once in a generation infrastructure upgrade including integrating the domestic terminal with international, adding capacity to regional stands, undertaking stormwater and runway upgrades as well as airfield expansion.
- Ardmore Airport: Non-Aeronautical Development.
    - Currently developing a 22Ha non-aeronautical development that is near completion.
    - The next development is a 35Ha both aeronautical & non-aeronautical development as a medium to long-term opportunity.
- Chatham Islands Airport: Airport expansion and reduction/exemptions in standard regulatory requirements for airports, as well as improvement in GPS technology.
    - Longer and Stronger project completion (Runway completed, Terminal and other works due April 2025).
    - Work on exemptions to Airport Rescue Fire and Security rules.
    - Reduction in the testing regime for Friction Testing.
    - Shedding the NDB and finding a nationally funded alternative.
- Christchurch Airport: Development of a future fuels strategy to support decarbonisation commitments, resilience, and supply chain security.
- Dunedin Airport: Developments in energy sector and real estate investments.
    - Feasibility studies for large-scale industrial solar investment.
    - Further development of residential housing portfolio.
- Hamilton Airport: Protecting and/or developing infrastructure for national resilience.
- Hawkes Bay Airport: Opportunities for eVTOL technology, despite infrastructure deficits.
- Masterton Airport: Application to CAA for RESA.
- North Shore Airport: Master Plan development (details available on their website).
- Taupo Airport: Completion of an apron extension to cater for large private jet charters.
- Wairoa Airport: Runway extension project (pending funding).
- West Auckland Airport: Potential for substantial expansion of landholding and facilities to become a secondary regional airport for Auckland, creating significant employment and development opportunities.

6.2.1 INFRASTRUCTURE TO ENABLE FUTURE AIRCRAFT TECHNOLOGIES

The lack of a National Aviation Strategy means that airports do not have a clear direction on what they should be investing in for the future.

It is our view that the use of SAF will become important, particularly for international flights, so the international airport cohorts (particularly the large international airports) should be making allowance for future investment into SAF facilities. Even if some 100% SAF enabled planes were to arrive or service routes in New Zealand, it would take time for the entire fleet to be converted. Thus, some form of blending facility (either on or offsite airport campuses) will be required into the medium term to enable blended SAF to be mixed for aviation use.

The idea of having regional 'Hub' airports was floated during consultation. The thought behind this being that these airports would be the ones where infrastructure investment into next generation enabling technologies being made.

6.3 AIRLINES

New Zealand's Tier 2 airlines are capital constrained. In the current operating environment, they are unable to invest in further aircraft, thus limiting their capacity and reach. The investment of Government, local or international capital into these airlines will allow them to grow their fleet, thus helping to enhance regional connectivity in New Zealand. Refer to section 6.1.1 for a further introduction to this opportunity.

6.4 POWER GENERATION

With electrical aircraft likely to be part of New Zealand's longer-term aviation fleet, additional power generation will be required for them to operate, enabling them to be recharged and powered.

As outlined in section 5.6, power generation as close to the end user is desirable, as transmission of electricity can be costly. Minimal power transmission is thus desirable.

If site constraints allow, on-site production of renewable energy is a "no regrets" investment for airports to make.

6.5 ALTERNATIVE FUEL PRODUCTION

There is the opportunity to produce alternative fuel supplies within New Zealand. The production of SAF and eSAF is something that is currently being explored. There is a lot of demand for SAF, but currently very limited global supply.

In the short term, it appears that New Zealand would need to import most of its SAF, so opportunities may exist to set up local production of this fuel.

The generation of green hydrogen is less advanced currently than other fuel types for next-gen aircraft.

6.6 ADVANCED AIR MOBILITY

Vertiports, particularly at our larger cities, or key tourist destinations will need to be constructed to allow the introduction and implementation of advanced air mobility aircraft within New Zealand.

6.7 NEW ROUTES

Areas of New Zealand are underserved by the current commercial aviation network. Recent surveys and industry data show that around 22% of air travellers are having to travel indirectly (i.e. they are unable to fly between where they plan to start and end a journey) (Lime Intelligence, 2024).

Recent studies show that direct routes between cities such as Rotorua – Queenstown, Wellington – Whangarei, Dunedin – Nelson, Kerikeri to Welington, Napier to Queenstown and Napier to Nelson are the most unserved. (Lime Intelligence, 2024). With the introduction of new and more economically palatable aircraft, there is an opportunity for airlines to initiate operating some of these routes.

There are also opportunities to open more commercial flights, targeting key travellers within the tourist market. For example, flights linking the major wine regions across New Zealand could help drive tourism in these regions (e.g. Hawkes Bay, Marlborough, Central Otago). Currently, travellers wanting to travel to the different wine regions by air need to travel indirectly via a main centre. Introducing regional flights between areas of similar strengths may be an opportunity worth investigating.

6.8 INVESTMENT OPPORTUNITIES MATRIX

Area for Investment Opportunity	Investment Opportunity
Airport – Aeronautical Investment	• Nationally coordinated, contestable aviation attraction investment fund (to attract new airline services, as well as maintaining and increasing flights on existing city pairs). • Centralised aircraft procurement and funding • Privatised investment into more airports in New Zealand, following investment models such as those seen in Queensland, Australia.

Airport – Non-Aeronautical Investment	• Non-aeronautical development on airport land, including:
	  ○ Supply chain logistics including multi-modal freight and materials handling
	  ○ Visitor accommodation and food and beverage outlets
	  ○ Retail and food service including supermarkets, fast food, fuel
	  ○ Vehicle maintenance and servicing facilities
	  ○ Pet care and accommodation
	• New Zealand as a hub for eVTOL Production and Flight Testing

Airports – specific projects/opportunities	• Please refer to page 69 of the report for a list of projects and opportunities that airports around NZ wanted highlighted.
Airports - Infrastructure to enable Future Aircraft Technologies	• Please refer to page 43/44 of the report for a list of infrastructure required for the different future fuel technologies. ○ WSP's view that SAF and Electric powered aircraft to be adopted in New Zealand
Airlines	• Capital to help airlines grow their fleet, perhaps by means of the "Centralised aircraft procurement and funding"
Power Generation	• Development of new power generation, as close to the end user as possible • On-site renewable energy production – "no regrets"
Alternative Fuel Production	• Production of SAF and eSAF in New Zealand
Advanced Air Mobility	• Development of Vertiports within larger cities and at key tourist destinations for AAM to use
New Routes	• Initiate flying on new routes where direct flights currently do not operate • Target commercial flights for tourism (for example, between different wine regions)
Policy	• Develop a National Aviation Strategy

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