FORSYTH BARR

Transport Sector

Counting Carbon Emissions

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The New Zealand transport sector accounts for ~20% of New Zealand's emissions profile, however, the listed NZX transport players represent only a small proportion of this. Most transport sector emissions stem from personal vehicle use. Airlines are heavy emitters, but still only represent ~5% of total New Zealand emissions. Air New Zealand (AIR) is most exposed to emissions among listed transport companies, albeit we believe its immediate financial risk is not material.

Air New Zealand (AIR) most exposed to carbon

AIR has the largest direct exposure to greenhouse gas emissions of any NZX company. Jet fuel accounts for ~99.5% of its emissions. From 1 January 2019, it has offset 100% of domestic emissions. From 2021 it will offset all international emissions growth. However, its overall financial burden will be limited at least in the near to medium term.

Mainfreight (MFT) yet to measure

MFT's emissions largely stem from third party airlines, shipping lines and owner-drivers across its global network. Its ability to pass on cost increases in relation to carbon is high and therefore it earnings risk is limited, in our opinion. MFT does not yet disclose its carbon footprint, therefore, we estimate it in this report.

Auckland Airport's (AIA) risk a function of airlines

AIA's disclosed emissions profile is relatively small. However, the risk to its business from the broader sector's emissions profile is high. It is actively working with airlines to help lower their emissions. Any demand implications from higher airfares or "flight shaming" consumer responses, will have an impact on AIA.

Freightways (FRE) perception high; reality low

FRE's emissions are relatively low despite the fuel burn across its owner-driver fleet and parcel carrying aircraft. However, the perception of couriers being heavy emitters poses a risk. Its NZ Couriers and Kiwi Express brands both offset 100% of emissions with verified New Zealand carbon credits.

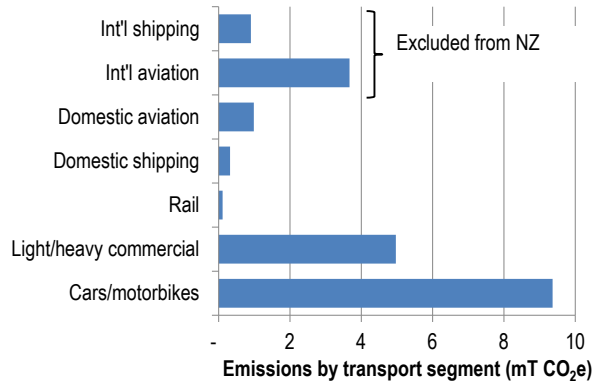
Transport's emissions exposure

The transport sector accounts for ~20% of New Zealand's total gross emissions. It is a sector heavily reliant on fossil fuels as the key source of energy. This excludes international aviation emissions for flights departing New Zealand, and bunker fuel related emissions for international shipping vessels departing New Zealand ports, which in combination add a further ~5% on to New Zealand's gross emissions.

A large proportion of transport sector emissions reflect private vehicle journeys as illustrated in Figure 1. A material proportion of these will be recorded within Z Energy's Scope 3 emissions, given its ~45% share of the liquid fuel market.

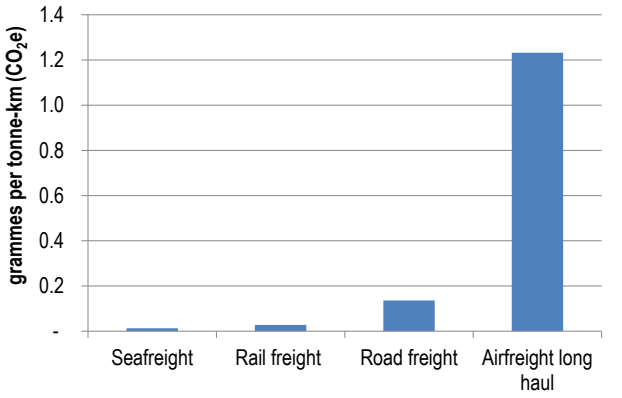
The transport segment most exposed to carbon is aviation, given the high proportion of fuel within its cost base and the limited use of low-carbon technologies, at least over the near term.

Figure 1. Split of transport sector emissions



Source: Ministry for the Environment, Forsyth Barr analysis

Figure 2. Unit emissions for different freight modes



Source: Ministry for the Environment, Forsyth Barr analysis

Aviation has the highest emissions intensity

Until aviation biofuels are readily available and/or electric aircraft technology developed for commercial use, the aviation sector is unlikely to deliver significant carbon emissions savings through existing operations beyond further introduction of more fuel efficient aircraft. Consequently, to achieve lower overall net emissions airlines will need to purchase carbon units and invest in projects that can generate emissions savings.

Domestic aviation

Carbon emissions from domestic aviation are incorporated into the NZ ETS.

International aviation

Carbon emissions from international aviation are excluded from New Zealand's target within the Paris Agreement and are dealt with separately by the International Civil Aviation Organization (ICAO). The international aviation industry (through IATA) has committed to several targets, including:

- 1.5% annual fuel efficiency improvements between 2009–2020 (AIR will comfortably achieve this target)
- Achieving carbon neutral growth from 2020
- Halving 2005 emissions by 2050

The global mechanism for achieving carbon neutral growth in the international aviation sector is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Airlines are to monitor, verify and report their emissions on all international flights from 1 January 2019. Moreover, operators will be required to purchase "emissions units" from 1 January 2021, to offset the growth in CO_2 emissions covered by the scheme.

The implementation of CORSIA is phased. The pilot phase (2021–2023) and first phase (2024–2026) are voluntary. The second phase (2027–2035) is mandatory with exemptions for some smaller emitters, which can join voluntarily.

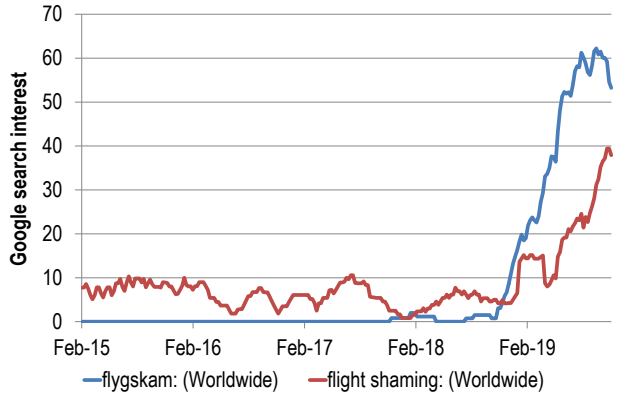
Currently 81 countries, representing ~77% of international aviation activity, intend to voluntarily participate in CORSIA from the outset. Notably China, Argentina, Hong Kong, Taiwan, the Cook Islands, Samoa, Tonga and Fiji are not signatories or are exempt. Although China has not stated that it intends to participate in the initial phase, it is actively monitoring aviation emissions.

The cost of emissions

There are a number of implications for the airline industry given its emissions profile:

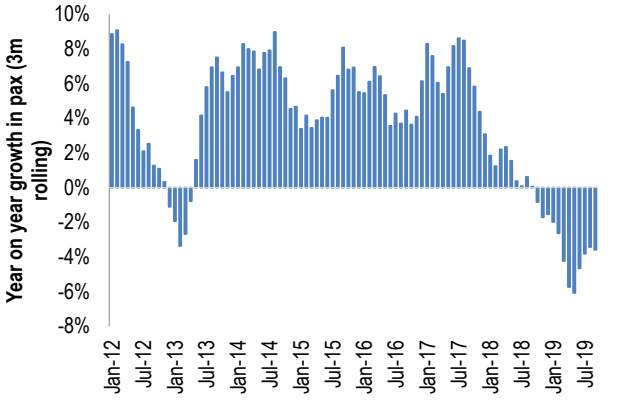
- **Direct financial cost** — Airlines will have a direct financial cost of their carbon emissions in New Zealand given the NZ ETS and through CORSIA from 2021 for flights between New Zealand and other volunteer nations. The added cost to an airline ticket will have elasticity implications on demand.
- **Flight shaming** — "*I think it's our biggest challenge*" says the CEO of Air France recently. The movement, which first gained momentum in Sweden where it is known as "*flygskam*", has pushed individuals to reassess the necessity of flying and consider alternatives, like the train. The impact on an island nation (i.e. New Zealand) with no alternative access is likely to be less pronounced than in Europe, however, it cannot be ignored and is likely to have some negative impact on longer term demand. We suspect the impact will be greater on corporate travel than consumer travel given the former will increasingly be keen to impress upon their stakeholders that they are carbon neutral.

Figure 3. Google searches for flight shaming has increased



Source: Google Trends, Forsyth Barr analysis

Figure 4. Air passenger numbers are declining in Sweden



Source: Swedavia, Forsyth Barr analysis

Road has the highest footprint

The majority of road transport emissions stem from private car use, where carbon costs are reflected in fuel pump prices.

Emissions from road freight largely reflect the burning of diesel. ~70% of the emissions from the road transport sector, excluding cars, stem from light commercial vehicles (i.e. courier drivers, tradies). The remainder is from heavy trucks and buses.

The cost of carbon is unlikely to be a driver of switching to electric or other low carbon technology vehicles. At the current NZ$25/T carbon cost the impact on a litre of diesel is just 7.7 cents per litre.

Sea is the least intensive

As highlighted earlier the shipping industry has very low unit emissions when measured on a per tonne-km basis. However, the carbon footprint of the sector as a whole is large as ~90% of world trade is carried by sea. Container shipping represents ~70% of total maritime trade by value.

Figure 5. Carbon reduction strategies by transport mode

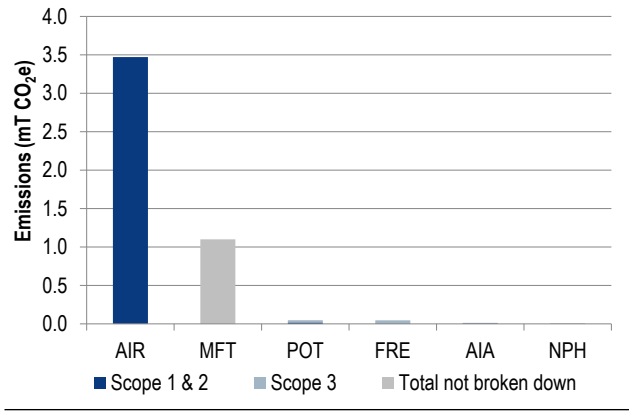
Strategy	Air	Road	Rail	Sea
Electric potential	Short haul only	Battery size issue for large trucks	Only 506km of 4,128km network electrified in New Zealand	Hybrid only given battery size, cost (although there are some short-haul ferry operations going fully electric)
Alternative fuels	Biofuels, hydrogen	Biofuels, LNG, hydrogen, ammonia	Biofuels, LNG, hydrogen, ammonia	Biofuels, LNG, hydrogen, ammonia, nuclear
Renewable energy	No	Solar for battery recharging	No	Solar, wind
Operational	More point-to-point routes, larger aircraft, changing consumer behaviour	"Feebate" scheme/government incentives, loading efficiency and truck utilisation	Greater back-haul	Ship size, lower speeds, localised supply chains
Technological	Lower weight aircraft	Engine efficiency	Hyperloop?	Slender design, propulsion efficiency, air lubrication

Source: Forsyth Barr analysis

Implications for transport companies

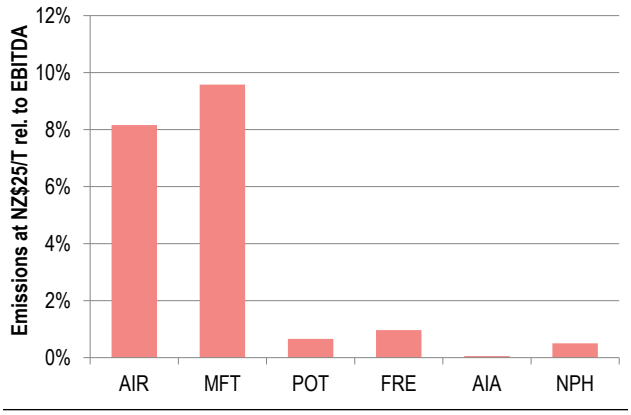
The high level of unit emissions and consolidated nature of aviation mean Air New Zealand (AIR) is New Zealand's highest emitter of Scope 1 and 2 emissions. Mainfreight (MFT) is also a large emitter of greenhouse gas emissions, albeit its use of third party owner-drivers, shipping carriers and airlines will mean most of its exposure is Scope 3.

Figure 6. Latest annual carbon emissions for transport companies



Source: Company reports, Forsyth Barr analysis Note: MFT's emissions are estimated

Figure 7. Profit exposure to carbon costs



Source: Forsyth Barr analysis

Air New Zealand (AIR): heavy emitter but economic cost limited

Jet fuel currently comprises ~99.5% of Air New Zealand's (AIR) total Scope 1 and 2 emissions. AIR's carbon footprint leads the NZX in Scope 1 emissions. In FY19 it emitted ~3.5m tonnes CO_2e from its global operations with ~84% of emissions from jet fuel for its international operations.

Figure 8. AIR's split of emissions (FY19) — CO_2e in tonnes

	Domestic	International	Group	Total
Scope 1	556,404	2,903,146	9,162	3,468,712
Scope 2	-	-	3,098	3,098
Scope 3	n/a	n/a	n/a	n/a
Total	**556,404**	**2,903,146**	**12,260**	**3,471,810**
Split	16%	84%	0%	100%

Source: AIR, Forsyth Barr analysis

Domestic emissions cost <1% of revenue

AIR participates in the NZ ETS; as a result it must surrender 1 NZU for every tonne of CO_2 emitted from fuel purchased for domestic operations. Prior to 1 January 2019, it had to surrender units for 87% of its domestic emissions. This percentage has been steadily increased in recent years by the New Zealand Government.

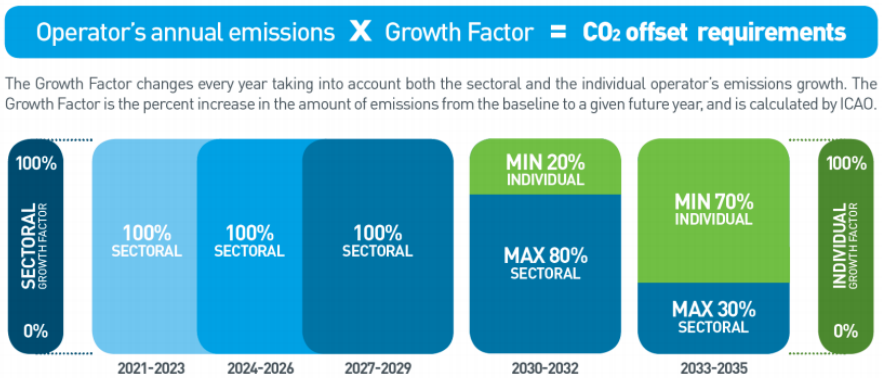
In CY19, for example, we estimate AIR's domestic emissions to be 550,000T CO_2e. This will equate to a cost on the business of ~NZ$14m. Not overly material on a domestic revenue base of NZ$1.6bn.

International emissions cost will grow from 2021

The financial cost for AIR will increase from 1 January 2021, given its participation in CORSIA, but not materially. While AIR's services to Shanghai, Hong Kong, Taiwan, the Cook Islands, Samoa, Tonga and Fiji are not subject to the CORSIA requirement, we estimate that ~80% of AIR's international business (by ASK or available seat km) will be, including its growing North American operations.

AIR's carbon emission offset requirement will be, at least for the next 10 years, a function of its own annual emissions and the growth in emissions for the global airline industry (the "growth factor"), as illustrated in Figure 9. The growth factor represents the global average growth in emissions in a given year, relative to the base line year (the average of 2019 and 2020 emissions).

Figure 9. Offsetting requirement for AIR



Source: CORSIA, Forsyth Barr analysis

For example if the global emissions increase by +4% in 2021, and AIR's international emissions for CORSIA affected services are around 2.3m tonnes, we estimate its additional carbon offset requirement at NZ$25/T will amount to just ~NZ$2m.

In future years this annual cost will increase incrementally given likely growth in global aviation emissions.

Figure 10. AIR's potential CORSIA offset requirement cost in 2021

	mT/CO_2	Growth factor	Carbon offset
Total international emissions - 2021	3.0		
CORSIA impacted emissions as proportion of total	80%		
CORSIA related emissions	2.3		
Growth factor		4%	
Carbon offset requirement (T/CO_2)			92,800
Carbon offset cost (NZ$m)			2

Source: Forsyth Barr analysis

Carbon related initiatives

AIR has two key carbon related goals: (1) generating carbon neutral growth from 2020, and (2) reducing emissions to 50% of 2005 levels by 2050. Although with Qantas joining IAG (owner of British Airways plus other airlines) in targeting net zero emissions by 2050, we expect AIR may follow suit.

In the meantime AIR is pursuing a number of initiatives to meet its goals:

- **FlyNeutral** — AIR has a voluntary carbon offsetting function within its online booking engine, so customers can identify the emissions associated with their travel and then purchase certified carbon emissions units. In FY19 183,624 retail customer journeys were covered by the scheme, up by +41% from FY18. In tandem with corporate and government customers, total carbon offsets amounted to 52,000 tonnes of carbon, or ~1.5% of total emissions. This voluntary programme reduces AIR's direct cost exposure to its emissions.
- **New Zealand Native Forest Restoration Trust** — AIR's voluntary contributions currently support permanent forestry sink initiative projects with the New Zealand Native Forest Restoration Trust. The non-profit trust has purchased >7,000 ha of land to restore with native trees, and covenants the land in perpetuity via Queen Elizabeth II Trust.
- **Hybrid aircraft** — AIR is collaborating with aircraft manufacturer ATR on hybrid aircraft, which would be used within its regional network. Currently its regional fleet contribute around 40% of its domestic emissions, or 6% of total emissions.
- **Biofuels** — AIR is working with Z Energy, Refining NZ, SCION and Auckland International Airport to investigate how it could transition aviation fuel into biofuel and whether setting up an aviation biofuel plant in New Zealand is feasible.
- **Drylandcarbon** — AIR is one of the investors in the Drylandcarbon abatement investment vehicle.

Mainfreight (MFT): modest exposure but limited financial risk

Mainfreight (MFT) does not yet measure its carbon emissions across its global business. While it does measure them in New Zealand and Europe, it doesn't publish the results. We, therefore, estimate its emissions based on (1) its freight tonne km footprint across its key business segments, and (2) its size relative to other freight forwarding businesses that do. Consequently, we estimate that its Scope 1-3 emissions total ~1.1mTCO_2e (shown in Figure 11), though recognise that >90% of its emissions will be Scope 3 relating to airfreight, shipping lines and owner-drivers.

Currently MFT incurs a financial cost for emissions in New Zealand and Europe.

As more jurisdictions impose carbon pricing mechanisms, MFT's carbon related cost will increase. However, given its cost is largely third party related, we expect it to be passed onto customers within its pricing mechanisms. Therefore, the direct financial implications will be limited, in our opinion.

Figure 11. Estimate of MFT's global greenhouse gas emissions

	FY19 volume (tonnes'000)	Carbon# (g/tonne-km)	Average weight (tonnes)	Average distance (km)	CO_2 (T)
Airfreight	127.4	588.5	1.0	8,000	599,799
Seafreight (kTEU)	342.7	6.1	14.0	8,000	234,160
Transport					
New Zealand	2,447		1.0		
- road	2,447	71.5	0.8	400	55,987
- rail	2,447	28.0	0.2	1,000	13,703
Australia	1,142	71.5	1.0	300	24,496
Americas	210	71.5	1.0	4,000	60,070
Europe	3,549	71.5	1.0	400	101,507
Warehousing (m^2)*	678.7				35,000
Total					**1,124,723**

Source: MFT, Forsyth Barr analysis * DHL has 6.0% share of EU215.9bn global market and emits 2.1MT of CO_2. MFT has NZ$346m of warehousing revenue globally = EU200m, or 0.1% market share # unit emissions based on DSV's 2019 disclosures rather than materially higher average data provided by the New Zealand Ministry for the Environment.

MFT's key emissions reduction strategies are:

- Maintaining modern low emissions fleets
- Improving intensification
- Ensuring contractors are well positioned to invest in new technology when they are available
- Trial small non-fossil fuel variants where it makes sense

Auckland Airport (AIA): exposure a derivative of airline demand

Auckland Airport (AIA) facilitates carbon intensive airlines to arrive and depart New Zealand but has a relatively small carbon footprint itself. Its disclosed emissions do not incorporate in-flight or surface airline emissions within its Scope 3 disclosure. However, there is an argument that AIA should include airline emissions within its Scope 3 and an interest in doing so.

AIA does acknowledge that it has a role to play in helping reduce airline emissions at the airport (along with Airways) through:

- Optimising approach and take-off
- Minimising taxi time / distance
- Providing ground power
- Providing preconditioned air

If AIA included airline emissions (surface and in flight for departing airlines) then we estimate its Scope 3 emissions would increase by 3.3mT CO_2e (see Figure 12).

While the level of its airline related emissions is largely irrelevant from an immediate financial impact perspective, AIA is heavily exposed to the longer term implications on airlines. Any reduction in air travel as a result of the industry's emissions profile could have a significant impact on AIA.

Figure 12. Estimating airline emissions for flights departing AIA (millions of tonnes)

	Air New Zealand (latest emissions disclosure)	Auckland Airport (departures only)
International services		
Capacity (ASK, 2019)	37,510,143,199	39,746,481,968
Scope 1 emissions (a)	2,903,146	3,076,230
Emissions per ASKm	77.4	77.4
Domestic services		
Capacity (ASK, 2019)	7,109,283,098	3,395,481,931
Scope 1 emissions (b)	556,404	265,745
Emissions per ASKm	78.3	78.3
Total AIA emissions		**3,341,976**

Source: OAG, Forsyth Barr analysis

Other transport companies

Freightways (FRE) has been reporting on its carbon emissions since 2014. While it has a large fleet of owner-drivers, which are on the road typically for c.12 hours per day, and uses aircraft and heavy vehicles for line-haul, its Scope 1–3 carbon emissions are relatively low (~45,000T).

Nonetheless, the perception of couriers being heavy emitters is something FRE will need to manage. In this regard its NZ Couriers and Kiwi Express operations are CarboNZero certified organisations and both offset 100% of emissions with verified New Zealand carbon credits.

Port of Tauranga's (POT) emissions largely reflect (1) diesel emissions from diesel powered container handling equipment (such as straddle carriers) and floating plant (tug vessels), (2) rail freight emissions (from Metroport trains), and (3) waste to landfill associated with disposing of contaminated log yard sweepings. Like AIA its Scope 3 emissions do not include bunker fuel emissions from vessels departing the port. POT is targeting net zero emissions by 2050.

Napier Port's (NPH) carbon footprint is small though its reported carbon emissions for Scopes 1–3 of 8,428T in FY19 exclude rail freight emissions from the rail services it facilitates for exporters.