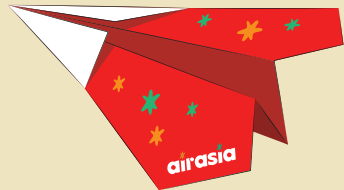


DOING
MORE
WITH
LESS



**AirAsia's Guide to
Aviation Sustainability**





Our Sponsors



Foreword

The idea for creating this guide came about after I participated in a sustainability conference. In the audience were economists, corporate leaders, sustainability professionals and business writers, all keen to know what AirAsia is doing to address our environmental footprint.

The high level of interest is understandable. Aviation has received heavy scrutiny for its greenhouse gas emissions and AirAsia is a prominent representative of the sector. However, what was generally lacking was a broader understanding of the challenges and opportunities that airlines face to decarbonise.

For an industry that is recovering from the devastating impact of Covid-19, any sustainability initiative has to be consistent with the practical realities of operating under constrained budgets. Our approach at AirAsia is to strengthen our efforts in what we are good at - doing more with less and building greater efficiency so that we cut out unnecessary consumption. There remains much that all stakeholders - airlines, airports, ground handlers and regulators - can do to improve operational efficiencies, streamline

flight paths, and decarbonise on ground.

The technologies to do this are already accessible, and when implemented, deliver both cost savings and emissions reduction. It makes sense to tackle the low hanging fruits even as we explore new solutions.

This guide serves several purposes: to demystify aviation jargon, to give our stakeholders a better understanding of developments in the industry and to share some of the secrets of our success in being the airline with the lowest cost and lowest carbon intensity in Asia. Other than our environmental initiatives, we also feature some of our social and governance priorities. They give a more complete picture of how we view sustainability at AirAsia.

I hope that this guide will serve as a useful aid to those keen to make a difference in the aviation industry. To send us your feedback and comments, please email sustainability@airasia.com.

Yap Mun Ching
Chief Sustainability Officer
Capital A

Acknowledgement

The entries in this guide were selected by the Capital A Sustainability team. In crafting layman definitions, we relied on official publications, industry best practice, and the internal knowledge and experience of AirAsia's technical teams. We thank colleagues from our Flight Operations, Communications and Branding departments for feedback and editorial support. Any errors and omissions are ours alone.

We especially wish to thank AirAsia's long-term business partners for supporting this endeavour. We are grateful for partnerships with like-minded organisations in our bid to make aviation sustainability more accessible.

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First edition

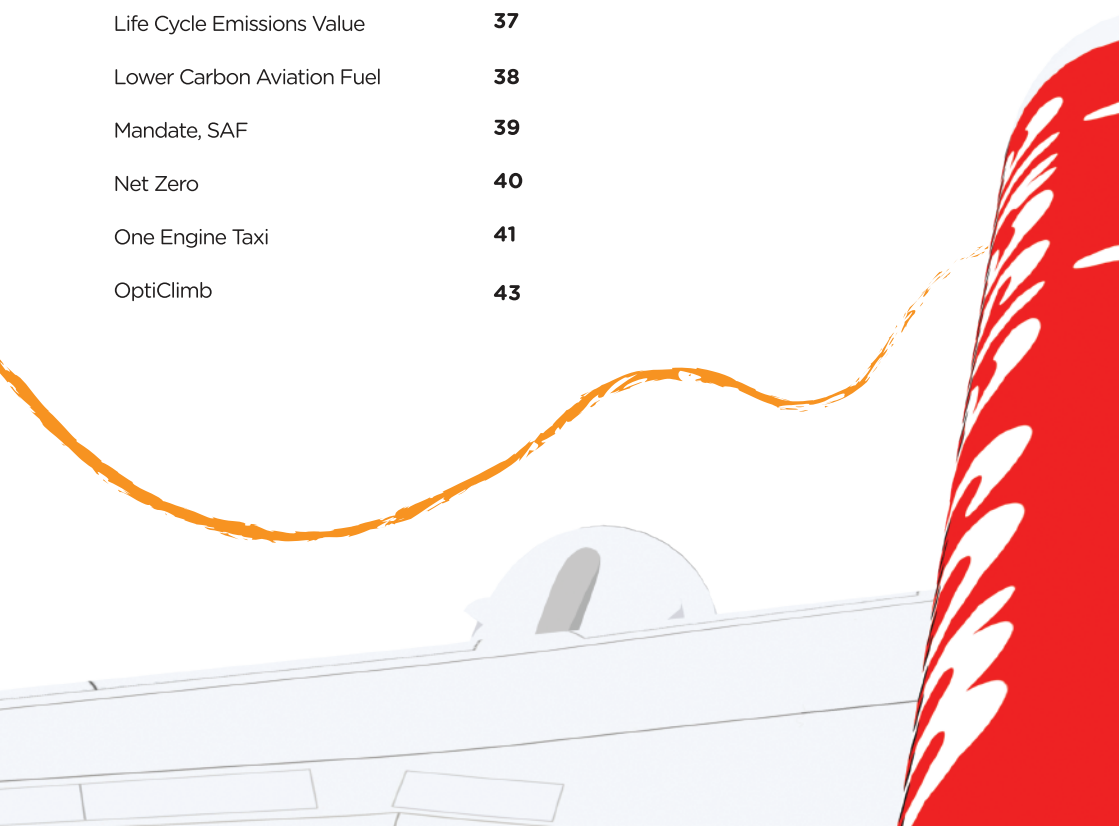
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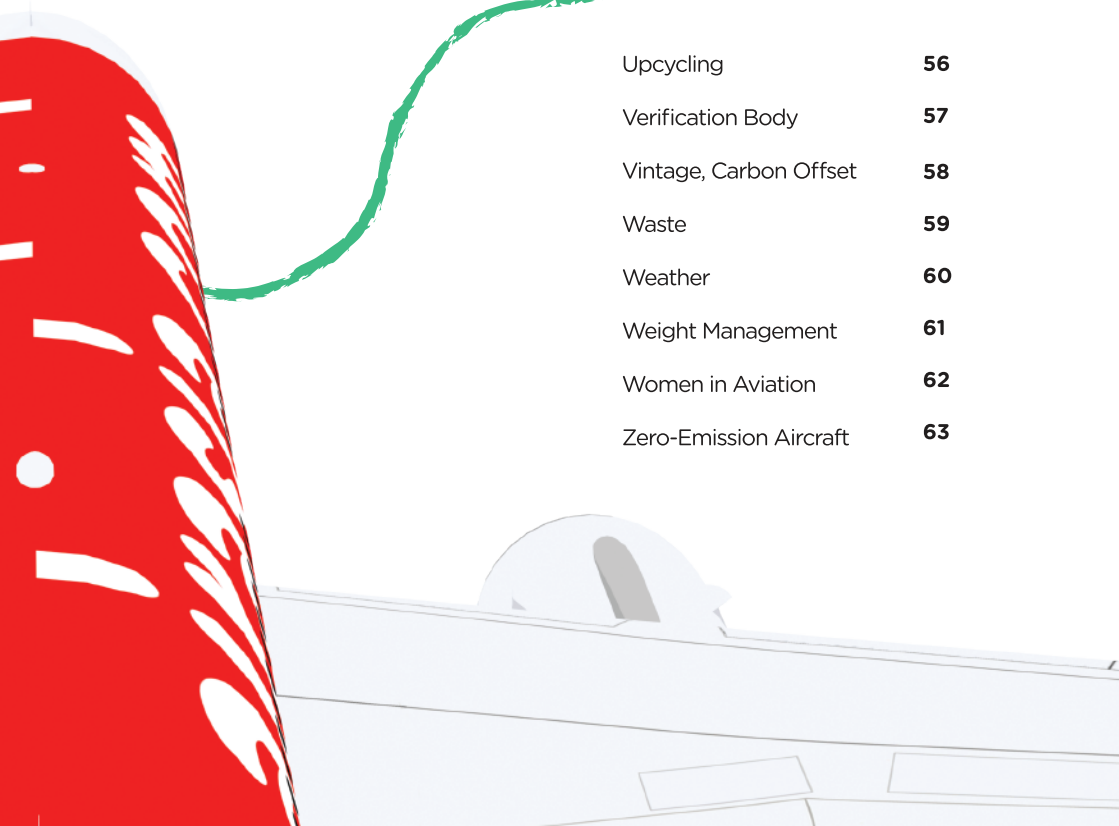
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Glossary

Allstars	AirAsia employees
APU	Auxillary Power Unit
ASK	Available Seat Kilometre
CISM	Critical Incident Stress Management
CO ₂	Carbon Dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DPO	Descent Profile Optimiser
EFB	Electronic Flight Bag
ESG	Environmental, Social and Governance
GHG	Greenhouse Gases
GPU	Ground Power Unit
ICAO	International Civil Aviation Organization
LCAF	Lower Carbon Aviation Fuels
LSf	Life Cycle Emissions Factor
NO _x	Nitrogen Oxides
OET	One Engine Taxi
RNP-AR	Required Navigation Approach - Authorisation Required
RPK	Revenue Passenger Kilometre
SAF	Sustainable Aviation Fuel
SO _x	Sulphur Oxides
UN	United Nations

How to use this guide

Here is how you can navigate your way through this booklet and learn more about sustainability in the aviation industry:

1) Cross-Referencing

To link relevant topics, cross-references have been added at the bottom of each page.

- * **GREENHOUSE GASES**  **Environmental** related topics are in green
- * **WOMEN IN AVIATION**  **Social** related topics are in orange

2) Page References

For each cross-reference, you can find your way to the topic through the page numbers.

- * **HUMAN TRAFFICKING**  (PG 10)

3) Icons



Fuel Savings



Carbon Dioxide Savings

A A321neo



With a 240 single-class seating layout, each Airbus A321neo emits 24% less carbon emissions per seat compared with a classic A320 model. It also produces 50% less nitrogen oxide and noise. The A321neo is the latest model in its category and the most fuel-efficient narrowbody aircraft on the market today.

AirAsia's fleet renewal strategy will see us replace our entire fleet with our order of 362 A321neos that will be delivered between 2024 and 2035. With a younger and more fuel-efficient fleet, we will be able to reduce carbon

emissions whilst growing capacity in congested airports without adding flights. It will also help us retain our competitive edge if more airports and cities begin imposing penalties on carriers operating older aircraft models.





Air Traffic Control

Contrary to what many believe, aircraft do not fly in a straight line from one destination to another but along a series of paths that may involve zig zag routes or multiple arcs. The majority of these flight paths were developed to cater for old aircraft with outdated navigation specifications. However, with advancements in air traffic control technology and aircraft navigational performance, many of these paths can be shortened.

According to technical experts, a redesign of Asean airspace has the ability to reduce flight distances, and therefore, fuel and CO₂ emissions, by up to 15%. Thus, by improving air traffic control alone, CORSIA participating States can remain within emission caps even with the lowering of baselines to 85% of 2019 levels from 2024.

One way that airlines and air traffic control can redesign flight paths to be more direct and efficient is by using an airspace analytical solution. In 2018, AirAsia began using this innovative tool to compute optimal paths for our flights based on aggregate data of all flights operating the same routings. The tool has also enabled AirAsia to propose air traffic procedure changes to air navigation service providers, track the impact of the changes and quantify the outcomes.

Auxiliary vs Ground Power Unit

An Auxiliary Power Unit is a small engine that uses the aircraft's fuel to generate electrical power while the aircraft is stationary on the ground.

A Ground Power Unit is an external portable diesel generator that can be connected to an aircraft as an alternative power source.

Since APUs generate more CO₂ emissions and are more expensive to operate, AirAsia can reduce fuel consumption and cost by connecting GPUs to aircraft during each 25-minute transit. Although this is not widely applied now due to a limited supply of GPUs, it will feature as one of our targeted approaches to reduce ground emissions. AirAsia is in the process of acquiring more GPUs and estimates that each GPU unit can deliver 862 tonnes of CO₂ savings per year.



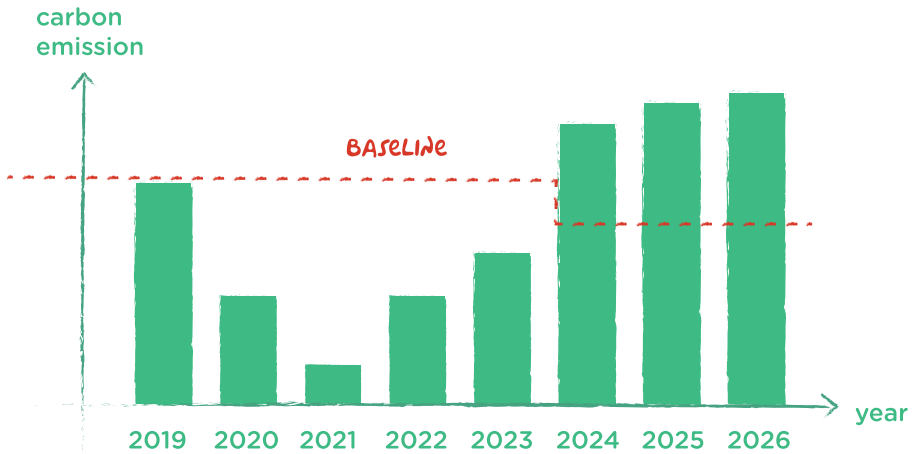
Avg savings per transit:  244kg

B Baseline, CORSIA

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) baseline is the cap set for international flight carbon emissions by the ICAO General Assembly. Emissions exceeding the baseline are required to be reduced or offset by airlines in participating countries.

This baseline is reviewed every three years. From 2021 to 2023, the applicable baseline is equivalent to emissions in 2019. From 2024 to 2027, the baseline is lowered to 85% of 2019 emissions.

Based on current recovery trends, airlines are expected to commence offsetting from the year 2024 onwards.



* CORSIA (p6 13)

* ICAO (p6 34)

Biodegradable Inflight Packaging



AirAsia's Santan inflight catering division and restaurant chain is on a continuous mission to reduce single-use plastics and replace current packaging with biodegradable alternatives. The team is actively exploring the use of materials that naturally decompose whilst retaining the taste of its signature meals.

In 2022, Santan experimented with the use of cornstarch cutlery that contain 70% plant-based materials and sugarcane meal tray boxes.

* WASTE (PG 59)

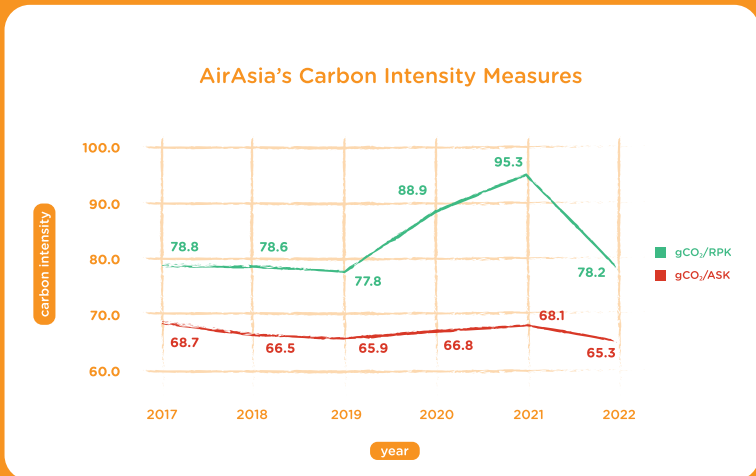
C Carbon Intensity

The carbon intensity of an airline can be expressed in terms of its emissions per seat or emissions per passenger; commonly known in the industry as carbon emissions per available seat kilometre (gCO₂/ASK) and carbon emissions per revenue passenger kilometre (gCO₂/RPK).

The former provides an indication of how carbon-efficient an airline is based on the number of seats it has on an aircraft. The

latter shows emitted carbon per the number of passengers carried. An airline that operates a full flight has the same gCO₂/ASK and gCO₂/RPK while one that has a low gCO₂/ASK and high gCO₂/RPK is operating with many empty seats.

Increasingly, airlines are beginning to display the carbon intensity of each flight so that guests can take their carbon footprint into consideration when making a selection.



Case Study

Carbon Intensity of a Kuala Lumpur to Singapore Flight

Full vs Single Passenger Flight

FULL

65
gCO₂ / ASK

65
gCO₂ / RPK

SINGLE

55
gCO₂ / ASK

12,886
gCO₂ / RPK





Carbon Offsetting

Carbon offsetting happens when companies or individuals purchase carbon credits from organisations whose activities remove or avoid CO₂ emissions such as reforestation or renewable energy generation.

Offsetting is one of four pathways in AirAsia's decarbonisation strategy. Under CORSIA, airlines can only offset their emissions using high quality offsets accredited by an approved emissions unit programme.

In the early stages of our net zero journey, we expect carbon offsetting to deliver a higher proportion of emissions reduction, before tapering down as in-sector solutions become more accessible.

*** EMISSIONS UNIT PROGRAMME (PG 22)**



Cloud Technology



Cloud technology is pivotal in modern day businesses to remain agile, improve collaboration, and ensure business continuity. AirAsia's decision to undergo a digital transformation and become a data-first business by leveraging cloud technology is all in efforts to better deliver personalised products and services.

Here are some of the benefits from our cloud migration:

- **Environmental Sustainability:** Our cloud service provider offsets carbon emissions and utilises renewable energy. Our carbon footprint is reduced through the minimisation of physical infrastructure and energy consumption associated with on-premise data centres.
- **Workforce Flexibility:** Employees can access work data and applications from anywhere. This flexibility enables remote work, collaboration across geographies, and improves overall workforce productivity and efficiency.
- **Enhanced Information Security:** Cloud service providers implement robust security measures, such as encryption, access controls, and regular security updates, to protect data. They often have dedicated security teams focused on monitoring and mitigating emerging threats.
- **Cost Savings:** The shift to the cloud brings approximately 30% cost savings as compared to on-premise infrastructure.

Contactless Check-In



From our early beginnings, AirAsia pioneered ticketless travel in Asia. Since then, we have continued to innovate and introduce many other contactless check-in touchpoints.

These digital enhancements were integral to helping us safeguard the health and safety of our guests and staff during the pandemic. They include upgraded features on airasia Superapp for guests to check-in on their personal devices and obtain e-boarding passes. We also introduced self check-in kiosks at the airport and developed our own Fast Airport Clearance Experience System (FACES), a biometric technology, to minimise personal interaction and time at security, airport counters and boarding gates.

Through these measures, we reduced queues, check-in duration and paper utilisation. In 2022, approximately 16.8 million guests utilised AirAsia's self check-in function, saving 200,000 paper boarding passes per day.

* **PAPERLESS OPERATIONS (PG 44)**

CORSIA

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the first global scheme that offers a harmonised approach to emissions reduction in a single industry. Adopted by ICAO in 2016, it proposes a cap on total emissions from international flights and mechanisms to reduce and offset any excess emissions.

CORSIA is divided into two distinct phases. In its current phase, Member States can volunteer to participate and subject their airlines to CORSIA timelines and targets. The scheme will become mandatory to all ICAO Member States in 2027.

As of January 2023, 115 countries including Malaysia, Indonesia, Thailand and the Philippines are Member States of CORSIA. China and India are expected to join in 2027. AirAsia's current obligation is to report our annual carbon emissions to regulators. As global emissions from international aviation remain well below the 2019 baseline, there is no current requirement for AirAsia to undertake any offsetting.

- * **BASELINE (PG 05)**
- * **ICAO (PG 34)**



Credit, SAF

One way that governments can boost the production of SAF is by providing incentives in the form of tax credits to airlines or fuel suppliers.

Under the US Sustainable Skies Act passed in August 2022, fuel suppliers are eligible to receive a tax credit of between US\$1.50 to US\$2.00 per gallon of SAF that achieves at least 50% lifecycle emissions savings. The scheme is expected to increase US SAF produc-

tion to at least 3 billion gallons per year and contribute to a 40% reduction in CO₂ emissions by 2030.

Positive policies such as these help expand SAF production while lowering its cost to airlines as end users. This makes it more accessible to airlines still recovering from the impact of the pandemic.

- * **SUSTAINABLE AVIATION FUEL (PG 53)**

Critical Incident Stress Management

Airline crew members can experience occasional stressful events when flying. In 2009, AirAsia set up our first Critical Incident Stress Management (CISM) team of pilots and cabin crew to provide peer support services to co-workers.

CISM members are trained to provide crisis counselling, stress debriefings and other interventions. By providing early

and effective support, CISM can help reduce the likelihood of long-term mental health problems, and promote resilience and recovery.

In 2020, we expanded the peer support programme across our entire group to help Allstars cope with the uncertainty brought on by the Covid-19 pandemic. The Allstars Peer Support network continues to perform this crucial function today.



D Descent Profile Optimiser



Software modifications to an aircraft's flight management system is the cutting edge in airline performance innovation to reduce fuel consumption at every phase of a flight.

The Descent Profile Optimiser (DPO) is an example of this type of innovation that allows aircraft to minimise the amount of time spent at inefficient levelling off. Since October 2022, AirAsia

has installed DPO on 35 aircraft, with nine more scheduled to be installed in 2023. From this modification, AirAsia has been able to reduce CO₂ emissions by 0.75% per aircraft, equivalent to 100 kg of CO₂ per flight.

In 2023, AirAsia expects to save 1,886 tonnes of fuel and avoid 5,943 tonnes of CO₂ emissions through the implementation of DPO.

Avg savings per flight:



32kg



101kg

- * FUEL EFFICIENCY SOLUTION (PG 26)
- * GREEN OPERATING PROCEDURES (PG 30)



Diversity

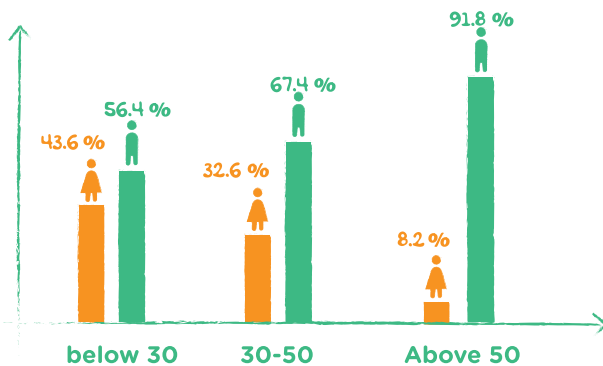
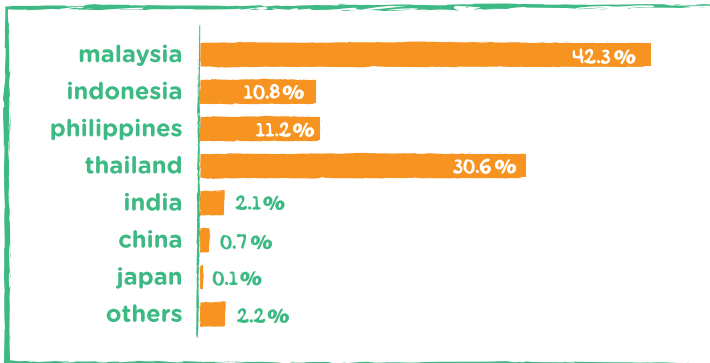
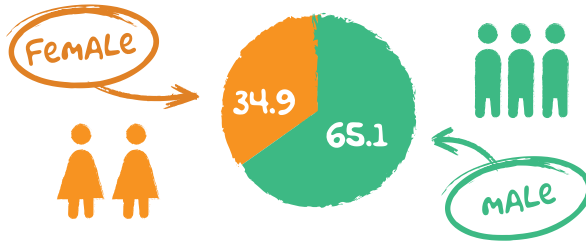
The right to work with dignity as well as the right to equal treatment and access to opportunities are universally recognised human rights. AirAsia is committed to ensuring a safe and equal workplace for all Allstars to meet the aspirations of the United Nations' Sustainable Development Goals, in particular, Goal 5 on Gender Equality and Goal 8 on Decent Work for All.

'Celebrate All Individuals' is one of our five core values which promises each Allstar an equal opportunity to succeed irrespective of gender, nationality, race, religion, sexual orientation, age or ability.

As a leading airline in Asean, we champion diversity in all forms and recruit Allstars without discrimination from across the region.



WORKFORCE PERCENTAGE





Drop-in Fuel



Sustainable aviation fuel is often described as a drop-in fuel. This means that it can be used interchangeably with jet fuel, and supplied with existing fuel storage and distribution infrastructure.

AirAsia's Airbus fleet is certified to fly with up to 50% blend of SAF without requiring modifications. We do not have to invest in aircraft or engine upgrades to introduce biofuels into our fuel mix. Similarly, fuel suppliers and airports can utilise available equipment and facilities to supply SAF at regional airports.

* [Jet A-1 \(pg 36\)](#)

* [Sustainable Aviation Fuel \(pg 53\)](#)

E Electronic Flight Bag



In the past, each aircraft cockpit typically carried up to 32kg of paper manuals and charts that served as reference materials for pilots.

In 2017, AirAsia replaced these manuals with tablet computers known as electronic flight bags (EFBs) which store not only the latest versions of manuals but also aeronautical charts and applications to calculate aircraft weight, balance and performance. EFBs have enabled a reduction in pilots' flight preparation time and workload while also reducing paper utilisation and aircraft weight.

From this initiative alone, AirAsia saved 208 tonnes of fuel and avoided 657 tonnes of CO₂ in 2022.

Avg savings per flight:



1.1kg



3.5kg

★ PAPERLESS OPERATIONS (PG 44)

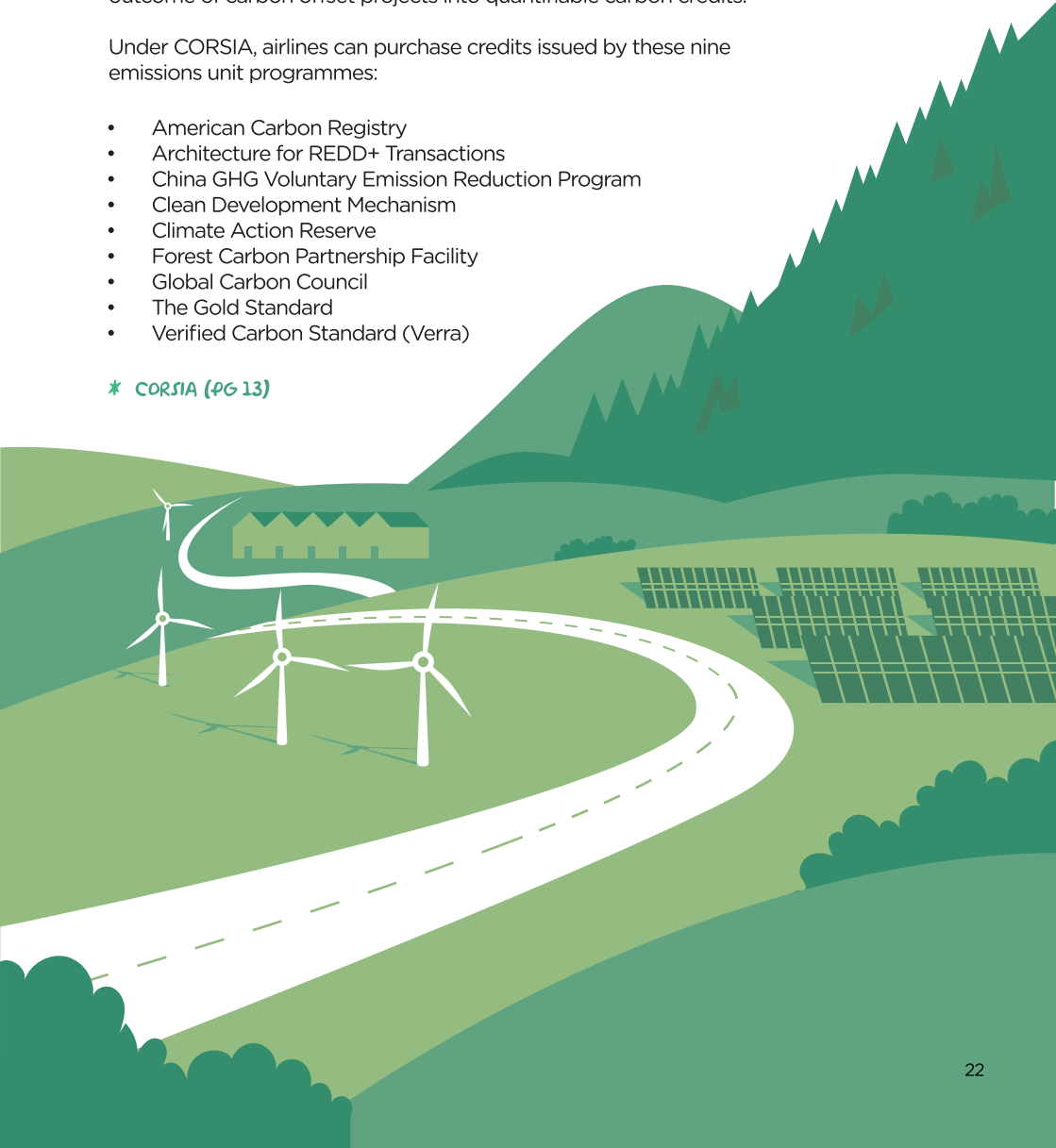
Emissions Unit Programme

An emissions unit programme sets a standard for converting the outcome of carbon offset projects into quantifiable carbon credits.

Under CORSIA, airlines can purchase credits issued by these nine emissions unit programmes:

- American Carbon Registry
- Architecture for REDD+ Transactions
- China GHG Voluntary Emission Reduction Program
- Clean Development Mechanism
- Climate Action Reserve
- Forest Carbon Partnership Facility
- Global Carbon Council
- The Gold Standard
- Verified Carbon Standard (Verra)

* CORSIA (PG 13)



ESG Financing

Green, social, sustainability and sustainability-linked bonds and loans are debt instruments that are becoming increasingly important to investors seeking better Environmental, Social and Governance (ESG) outcomes.

In aviation, these products may include preferential terms upon the meeting of emission reduction targets, fleet renewal targets and/or volume of SAF

utilisation. They may also include penalties if ESG targets are unmet. Proceeds of these instruments have funded the building of eco-friendly facilities, purchase of new and more fuel efficient aircraft, as well as energy efficiency projects.

ESG financing remains a greenfield area in Asean and is one that AirAsia is keen to tap into as one of several avenues to fund our green transition.



ESG Rating

As sustainability becomes the latest business buzzword, Environmental, Social and Governance (ESG) ratings have emerged as a core way to measure how organisations are executing their goals while providing a quantitative metric that allows the management of progress, validation of claims, peer comparison and benchmarking.

These ratings are generated by assessment agencies based on multiple indicators spread across the environmental, social and governance spectrum. A practical application of ESG ratings is for stock exchanges to set a minimum score, above which public-listed companies are listed in their sustainability indices.

Listed on:

Thailand Sustainability
Investment Index

Benchmarked against:

FTSE4Good Bursa Malaysia Index
Dow Jones Sustainability Index

Scored above threshold:

Bloomberg Gender-Equality
Index

E-Waste

As modern day businesses heavily depend on the use of electrical and electronic devices for their operations, electronic waste (e-waste) poses a growing challenge that requires proper management to ensure they do not end up in landfills. E-waste is harmful to the environment due to toxic chemicals that leach from metals in the devices when buried.

As a business at the forefront of adopting new technology for better efficiency and cyber security, AirAsia has shifted from the use of desktops and on-premise servers to laptops, tablets and cloud servers. In tandem, we adopted a circular economy approach to our e-waste management by establishing a programme to return outdated laptops to our vendors so that their parts can be reused, repurposed and recycled. This helps us reduce our environmental impact and extend the life cycle of the products.



F Feedstock

Sustainable aviation fuel is produced from raw materials that are referred to as feedstock. Depending on the type of feedstock used, the resultant SAF can be categorised as first, second or third generation biofuels.

First generation SAF is produced from edible crops such as sugar cane, corn oil and palm oil while second generation alternatives are developed from non-food plant residues such as agricultural waste and used cooking oil. Animal fats are also considered a second generation raw material. Third generation biofuels are typically produced from algae.

SAF produced from the latter two categories are generally associated with lower life cycle emissions values.

- * SUSTAINABLE AVIATION FUEL (PG 53)
- * LIFE CYCLE EMISSIONS VALUE (PG 37)



Flight Shame Movement

Flygskam was selected as the Financial Times' 2019 Year in a Word. Swedish for 'flight shame', it was popularised by climate change activist Greta Thunberg to describe a feeling of guilt associated with air travel.

However, in regions where rail and road networks are not well developed, flying remains one of the most efficient ways to travel as it can mean the difference between a one-hour flight and a two-day journey by land and sea.

To strike a balance, AirAsia operates a young and efficient fleet so that we can offer flights with the lowest carbon intensity in Asia.

Fuel Efficiency Solution



One of the most important sources of data to an airline is captured by its fuel efficiency software. These solutions are customised in accordance with each airline's fuel policy to enable post-flight analysis of individual performance.

AirAsia's introduction of our first fuel efficiency solution in 2015 marked an important milestone in the expansion of our fuel efficiency programme. The software enabled us to monitor

implementation rates of green operating procedures across our network and introduce measures to address gaps through training and awareness building.

In 2022, AirAsia implemented the Honeywell Flight Efficiency solution to make further gains. With Honeywell, we are able to ensure the right amount of fuel is planned for every flight, to meet operating requirements while minimising excess weight.

* **CARBON INTENSITY (pg 07)**

* **GREEN OPERATING PROCEDURES (pg 30)**

G Gender Pay Gap

A major indicator of gender inequality in the workplace is the gender pay gap, or the difference between the wages earned by men and women doing the same or similar work. According to the International Labour Organization, women earn on average 20% less than men globally.

Since conducting our first annual pay gap analysis in 2021, AirAsia has detected no systemic gender-based bias in our pay scales. Although aggregate mean and median hourly pay in AirAsia appear to favour men, this is primarily due to male dominance in technical roles such as pilots and aircraft engineers, which are higher in pay. When adjusted to exclude pilots, cabin crew and aircraft engineers, women are found on average to earn slightly more and represent almost half of uppermost quartile jobs.

Notwithstanding the fact we have trained and employed more women pilots than any other airline in Asean, AirAsia will continue our efforts to lower the barriers for women to break into technical roles.

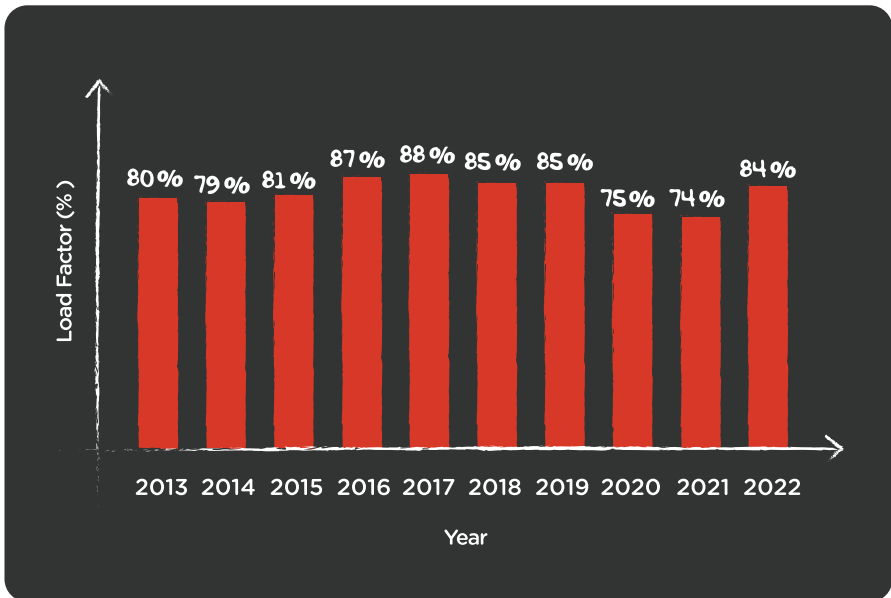


- * [DIVERSITY \(PG 17\)](#)
- * [WOMEN IN AVIATION \(PG 62\)](#)

Ghost Flight

In high traffic airports, some airlines have been known to operate empty or with only few passengers to avoid losing their landing slots. These flights are colloquially referred to as 'ghost flights'.

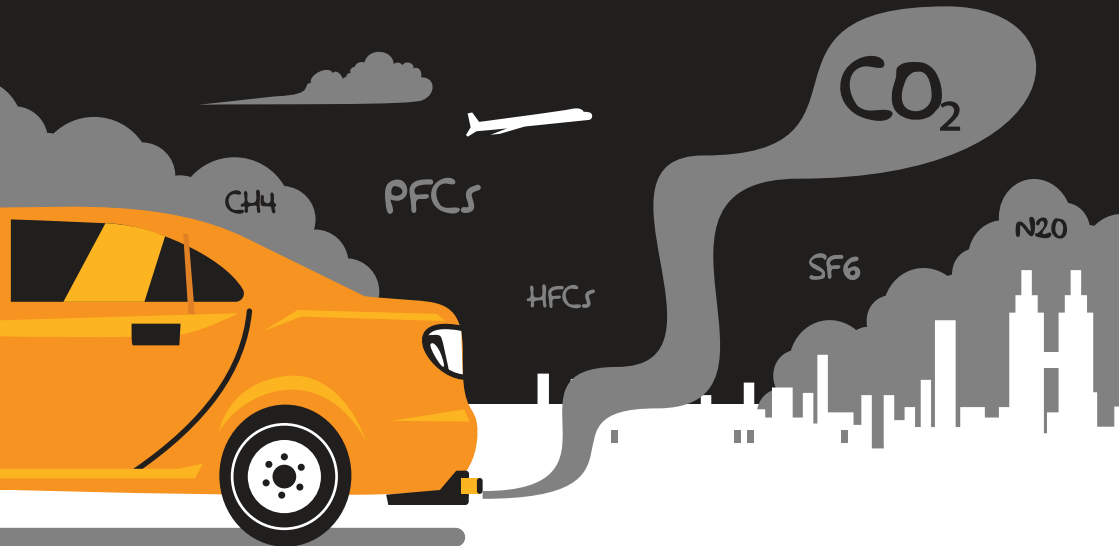
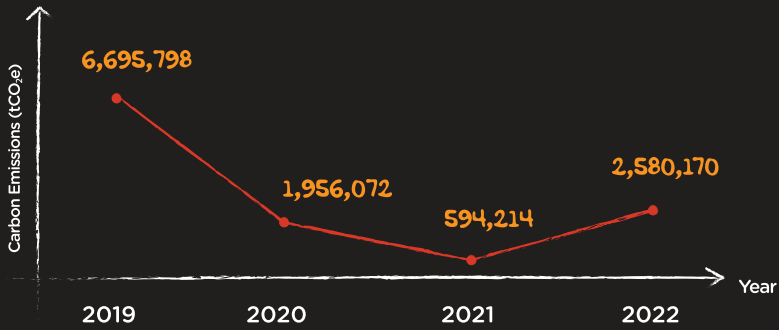
However, this is not a problem we face at AirAsia. Since 2001, AirAsia's load factors have been consistently high, exceeding 75% on average, except for the two pandemic years of 2020 and 2021. Refer to historical load factors below.



Greenhouse Gases

Gases that trap heat in the Earth's atmosphere are called greenhouse gases because they mimic the effect of the glass structures that let in sunlight to warm air and plants inside. The 1997 Kyoto Protocol identifies six main GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

At AirAsia, CO₂ makes up the vast majority of our GHG emissions. However, we also track and disclose our nitrogen oxides (NO_x), sulphur oxides (SO_x) and volatile organic compounds (VOC) emissions.



Green Operating Procedures

(also known as eco-efficiency measures)

Green operating procedures or eco-efficiency measures are innovations that allow pilots to reduce fuel burn at different stages of a flight. Examples in this guide include reduced flaps landing, idle reverse landing, one engine taxi, and RNP-AR.

All AirAsia pilots are trained to apply green operating procedures as standard procedure. Our Fuel Efficiency team continuously monitors the performance of over 20 green procedures for all pilots, ensuring we minimise fuel burn and carbon emissions. This dedication to efficiency has enabled us to earn our place as Asia's greenest airline.

“

The key to a successful efficiency strategy is to recognise that small fuel and carbon emissions savings on each flight adds up to significant annual savings.

These small savings can be achieved either by reducing the weight carried onboard or reducing fuel consumption at every phase of the flight.

”



H



Harassment

Workplace harassment comes in many forms of offensive behaviour. This can include jokes, slurs, name-calling, assaults, threats, insults and display of offensive objects or pictures.

Unwelcome sexual advances is one of the most common forms of harassment. As the #MeToo movement gave courage to victims of past harassment to speak out, more countries have progressively updated laws to provide better protection and prosecutions. In Malaysia, this led to the passing of the Anti-Sexual Harassment Bill 2021.

AirAsia's Anti-Harassment Policy was updated in the same year to re-emphasise our zero tolerance to all forms of inappropriate or offensive behaviour. Introduced in 2022, AirAsia's anti-harassment e-learning course has since been completed by over 4,000 Allstars.

Human Trafficking

Human trafficking is the second largest and fastest growing transnational crime in the world after drug trafficking. Here are some facts: According to the UN, one in four victims originate from Asean. More than 70% of them are women and children. Only 1% are ever rescued.



**# KNOW
THE
SIGNS**

To deter traffickers from exploiting AirAsia's network, AirAsia Foundation introduced its #KnowtheSigns Anti-Trafficking Programme in 2017. Since the programme began, over 10,000 Allstars have completed classroom and/or online training to understand the latest trends in trafficking, recognise its signs and take appropriate action.

Humanitarian Relief

AirAsia has long been at the forefront of humanitarian relief efforts in the region. Our contribution dates back to the 2004 Asian tsunami when we helped transport aid workers and relief supplies.

Through AirAsia Foundation, we raised over US\$4 million to fund post-disaster resilience programmes following the devastation wrought by Typhoon Haiyan (2013), Gorkha earthquake (2015), Palu tsunami (2018) and Malaysian floods (2014 and 2021). In 2019, AirAsia Foundation, BigPay and Ikhlas raised over US\$1 million to provide food and medical aid to vulnerable communities impacted by the Covid-19 pandemic.

Check out our relief efforts here:
<https://www.airasiafoundation.com/>



ICAO

The International Civil Aviation Organization (ICAO) is the specialised agency of the United Nations that is responsible for promoting the safe and orderly development of international civil aviation throughout the world.

In 2016, ICAO introduced the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to address the increase in CO₂ emissions from transnational flights. The ICAO General Assembly, comprising 193 Member States, convenes once every three years to receive updates on progress in meeting CORSIA targets and adopting incremental steps to advance the scheme's objectives.



ICAO



Idle Reverse Landing

Ever noticed that some flight landings are followed by the sound of a loud gush of air from the engines? This is caused by pilots applying full reverse thrust whereby air is deflected in the opposite direction to decelerate the aircraft. Idle reverse thrust is an alternative procedure for pilots to land without applying full thrust but allowing the aircraft to decelerate gradually using the length of the runway.

AirAsia pilots are trained to operate idle reverse landings when conditions permit, as this procedure allows them to utilise less fuel, generate less CO₂ and create less noise when landing. Idle reverse landings also slow down engine deterioration and reduce the engine cool down period required before pilots can operate one engine taxi on arrival, another green operating procedure.

In 2022, AirAsia saved 1,137 tonnes of fuel and 3,582 tonnes of carbon emissions by performing idle reverse landings.

- * GREEN OPERATING PROCEDURE (PG 30)
- * ONE ENGINE TAXI (PG 41)



Avg savings per transit:



5.4kg



17.1kg

J

Jet A-1

The most common fuel used for civil aviation in Asia is Jet A-1, a kerosene type fuel used by commercial airlines to power turbojet engines. This fuel is refined from crude oil in accordance with tightly controlled specifications, primarily ASTM D1655. Jet fuels typically account for around 6% of total fuel production worldwide.

The combustion of 1 kg of jet fuel in an aircraft engine produces an average of 3.16 kg of CO₂. The actual volume emitted per flight is influenced by numerous factors such as aircraft efficiency and maintenance, implementation of green operating procedures, distance travelled, aircraft load and weather conditions.

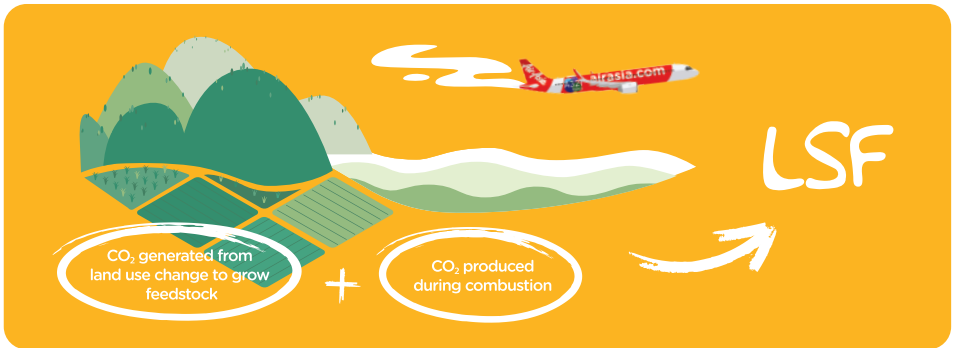


L Life Cycle Emissions Factor

Did you know?
LSf values also differ according to the fuel conversion technology utilised.

Whether an aircraft uses jet fuel or sustainable aviation fuel, actual emissions generated during a flight do not differ significantly. The real difference is in the production of the two types of fuel. Jet fuel is produced from an energy-intensive extraction process while SAF is produced from processing crops or waste products.

Life cycle emissions values are used to express the benefits of using SAF. They are derived from adding up total GHG generated from the fuel combustion in an aircraft engine, and emissions generated from land use change in feedstock cultivation. To enable comparison, Life Cycle Emissions Factor, LSf, uses a common standard unit of gCO_{2e}/MJ.



Since aviation fuel carries a LSf of 89 gCO_{2e}/MJ, airlines will compete to secure a SAF supply with the lowest LSf. Here are examples of ICAO default LSf values for SAF made using a Hydroprocessed Esters and Fatty Acids (HEFA) fuel conversion process.

Feedstock Type	LSf (gCO _{2e} /MJ)
Used Cooking Oil	13.9
Corn Oil	17.2
Palm Fatty Acid Distillate	20.7
Tallow (Animal Fat)	22.5
Soybean Oil	66.2
Palm Oil	76.5

Source: ICAO document - CORSIA Default Life Cycle Emissions Values For CORSIA Eligible Fuels. Fourth Edition. June 2022.

Lower Carbon Aviation Fuel

While the supply of sustainable aviation fuels builds up globally, ICAO allows airlines to claim emissions reduction by using jet fuels produced in methods that are less polluting, such as by reducing gas flaring during extraction.

Jet fuels that include a minimum 10% reduction in lifecycle emissions may be certified as CORSIA-eligible fuels.

Although LCAF cannot deliver the emissions savings that aviation requires to reach net zero, it can be used as a complementary measure alongside SAF and carbon offsets as the latter two mature and become more accessible.

M Mandates, SAF

To boost sustainable aviation fuel utilisation, the European Commission's ReFuelEU proposal includes a requirement for EU airports to supply fuel with a minimum SAF blend. This SAF mandate starts at 2% in 2025, 6% by 2030, 20% by 2035 and up to 70% by 2050.

Although SAF mandates have not been announced in Southeast Asia, AirAsia's SAF utilisation policy aims to track European SAF mandates based on availability at regional airports.

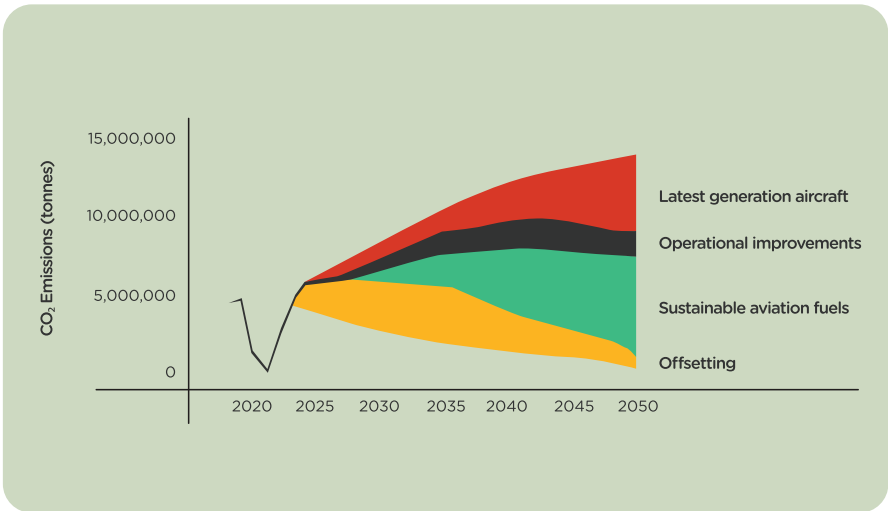
*** SUSTAINABLE AVIATION FUEL (pg 53)**



N Net Zero

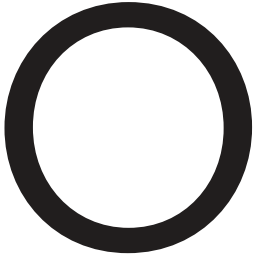
AirAsia has four pathways to achieve net zero by 2050: (1) upgrade our planes to newer, more efficient models, (2) step up our green operating procedures, (3) introduce SAF into our fuel mix, and (4) purchase carbon offsets.

We are prioritising the first three in-sector pathways to minimise emissions before eventually neutralising all remaining CO₂ through offsetting. We will be investing billions to ensure flying creates minimal impact on the climate.



Note: CO₂ emissions for years 2018-2022 are based on actual data. Figures for 2023 onwards are based on AirAsia's projections.

- * A321neo (pg 01)
- * CARBON OFFSETTING (pg 09)
- * GREEN OPERATING PROCEDURES (pg 30)
- * SUSTAINABLE AVIATION FUEL (pg 53)



One Engine Taxi

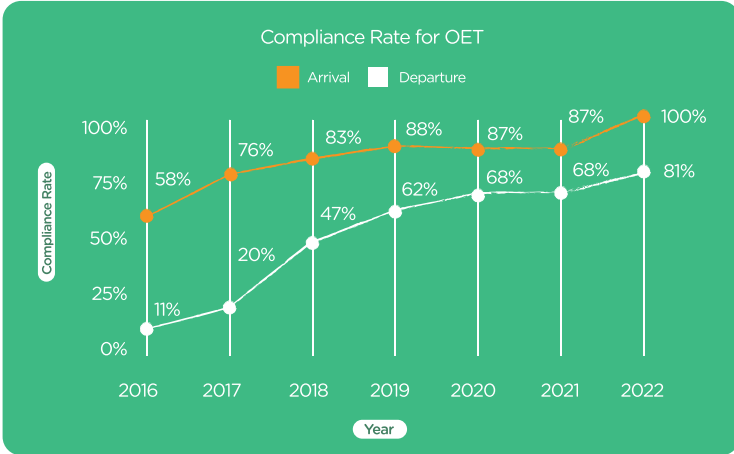
(also known as Single Engine Taxi)

With airports growing in size and complexity around the world, turning off one engine while on the ground enables airlines to cut thousands of tonnes of fuel and emissions each year. This procedure where an aircraft taxis in and out of an airport parking bay using one engine instead of two is known as one engine taxi (OET) or single engine taxi.

AirAsia is among the earliest Asean airlines to implement OET, leading engagement with regulators in Malaysia, Thailand, Indonesia and the Philippines. With continuous investment in training, we have achieved among the highest OET compliance rates in the industry.

* **GREEN OPERATING PROCEDURES (PG 30)**

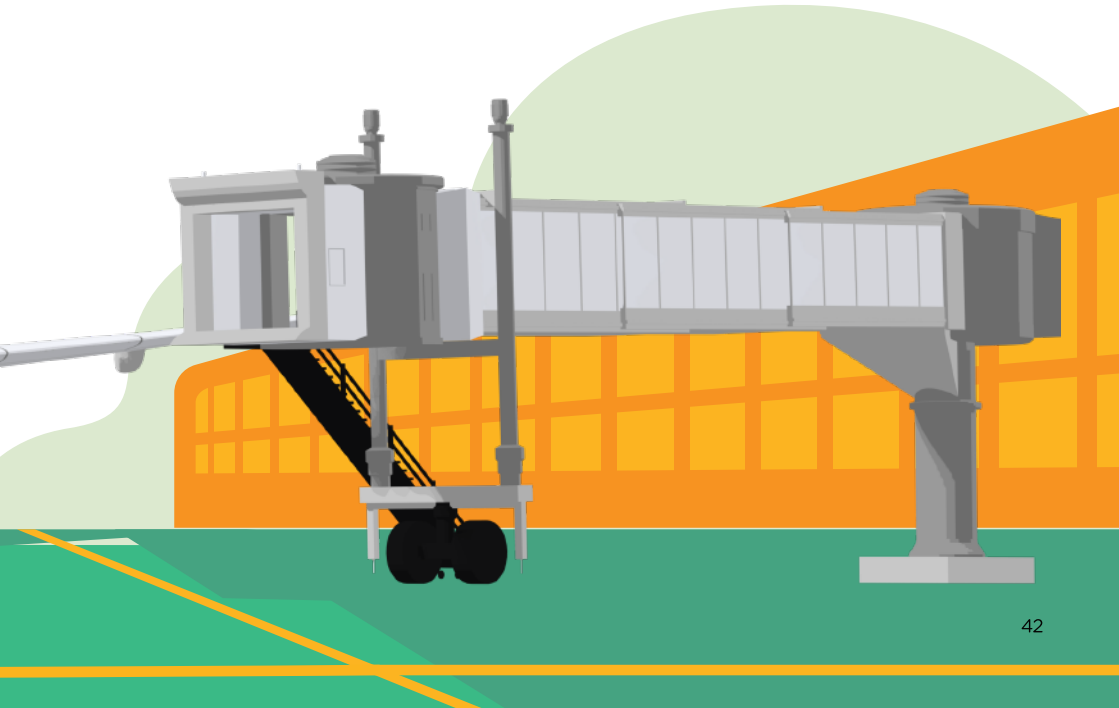


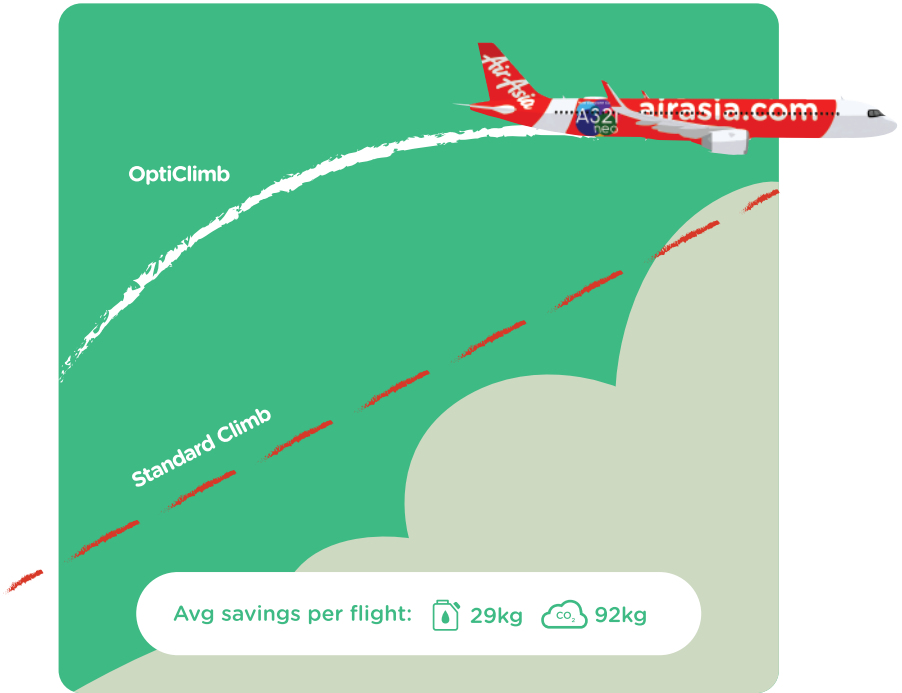


In 2022, OET enabled us to avoid emitting 12,571 tonnes of CO₂.

Avg savings per flight:

-  9kg
-  28kg





OptiClimb

Typically, an aircraft burns more fuel per minute during the take-off and ascending phases of a flight compared to during cruise and descent. To reduce our fuel consumption during the climb phase, we introduced SITA OptiClimb in 2019, an artificial intelligence optimiser that analyses historical aircraft performance, flight plan information and 4D weather forecasts to recommend optimal speed changes at different altitudes to pilots.

In 2022, SITA OptiClimb enabled us to avoid emitting 20,713 tonnes of CO₂.

* [GREEN OPERATING PROCEDURES \(PG 30\)](#)

P

Paperless Operations

Since 2001, AirAsia has introduced multiple digital innovations to reduce paper used by travellers from e-tickets to e-boarding passes. In addition, we have slashed administrative paperwork by digitising our documents and securing civil aviation authorities' approval to accept e-filing and manuals across the region.

In a major project, AirAsia's ground operations team introduced the Digital Trip Files initiative in 2022 to halve the number of printed documents required for each flight. With this, we can save up to 15 million sheets of paper per year, taking us a step closer to our goal of a fully paperless operation.



15M sheets



= 1,500 trees



= 38 tonnes CO₂ absorbed



Pre-booked Meals



The option to pre-book flight meals was first introduced by AirAsia in 2007 to reduce wastage of non-purchased meals, and to ensure guests do not miss out on their favourite dishes.

By having a higher percentage of guests pre-book, we have been able to cut food wastage from as high as 40% to under 25%. Fewer meals carried onboard also mean a lighter aircraft and lower fuel burn.

* WASTE (PG 59)

Q

Quality Assurance

AirAsia's Group Operational Quality Assurance (GOQA) department ensures that all our airlines comply with applicable regulations, operational safety standards and recommended best practices.

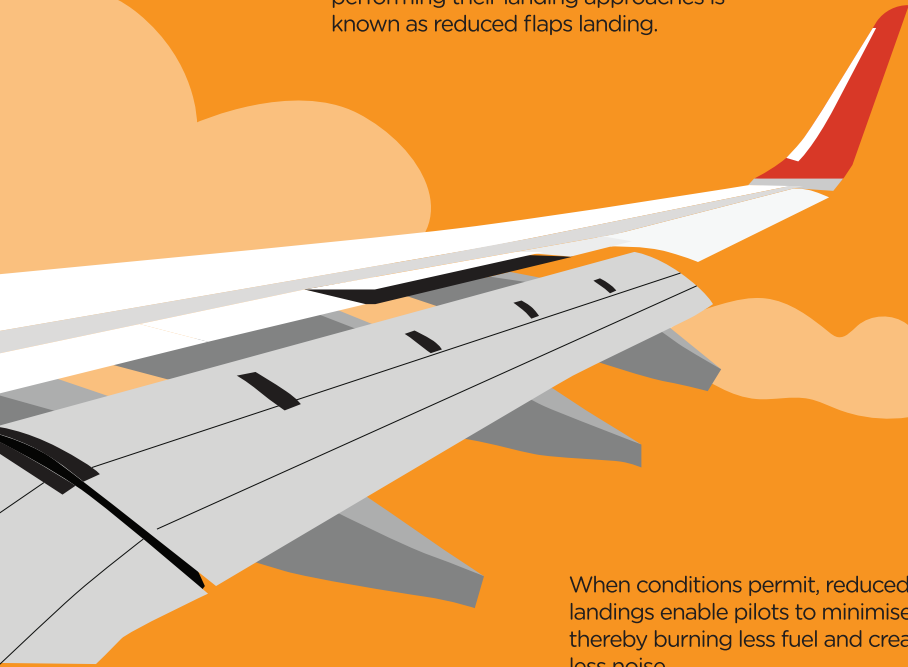
Throughout the year, the GOQA team conducts internal operations and compliance audits at all hubs and main bases. Another important function of the team is to add a second layer of oversight on the technical health of our fleet.

In 2022, AirAsia's robust safety culture and programme earned us a seven-star rating - the highest by [airlinerratings.com](https://www.airlinerratings.com) for the second year in a row. AirAsia was also named one of the safest low-cost carriers in the world.



R Reduced Flaps Landing

Aircraft wings are equipped with movable flaps that help produce lift during take-off and landing, but, as a result, also produce aerodynamic drag. A best practice that pilots can apply when performing their landing approaches is known as reduced flaps landing.



When conditions permit, reduced flaps landings enable pilots to minimise drag, thereby burning less fuel and creating less noise.

In 2022, AirAsia saved 2,197 tonnes of fuel and 6,943 tonnes of CO₂ emission through this green operating procedure.

Avg savings per flight:



10.5kg



33.2kg

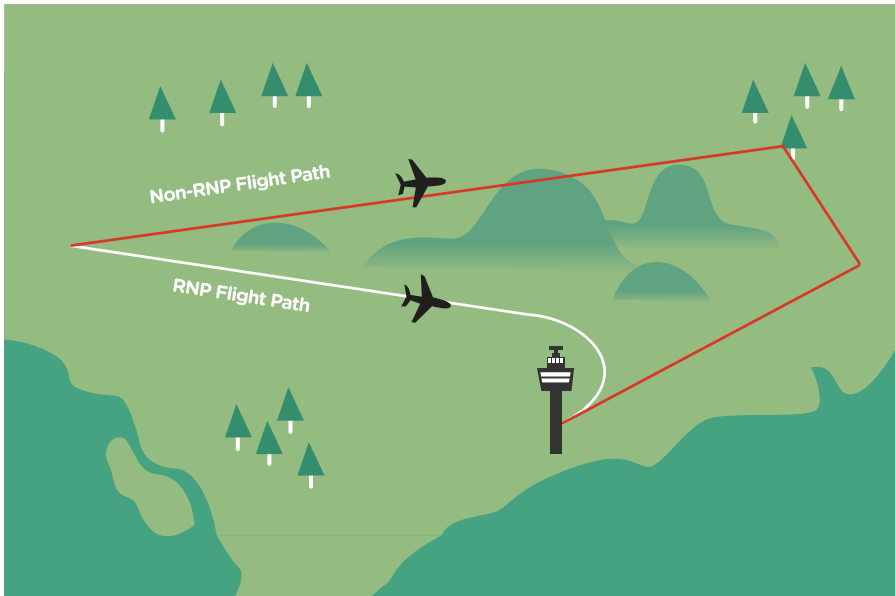
* GREEN OPERATING PROCEDURES (PG 30)

RNP-AR

As new generation aircraft become more technologically advanced, pilots now have the ability to fly shorter arrival approaches using the plane's navigation performance capability instead of traditional ground-based aids. To use the approach, known as Required Navigation Performance - Authorisation Required (RNP-AR), airlines must first obtain regulatory approval and conduct pilot training. Air traffic control units also have to design the approaches according to ICAO guidelines and train their controllers.

In Malaysia, all AirAsia pilots are trained to operate RNP-AR approaches. All major Malaysian airports have also been upgraded to allow the procedure. A standard in most North American airports, RNP-AR is identified as a key action point to help deliver emissions reductions by Malaysia and Indonesia in their respective State Action Plans.

In 2022, AirAsia achieved a utilisation rate four times higher than any other airline in Malaysia. Over 30% of AirAsia Malaysia flights landed with RNP-AR approaches, enabling us to avoid emitting 600 tonnes of CO₂.



RNP-AP approach to TWU is 43 km shorter than conventional approach.

Avg savings per flight:



85kg



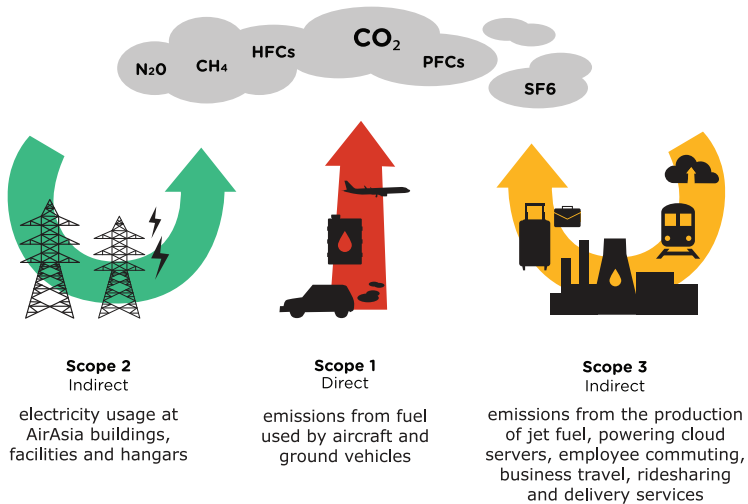
269kg

* **Green OPERATING PROCEDURES (PG 30)**

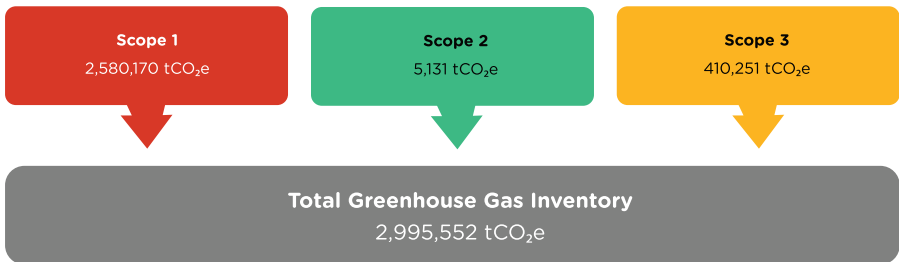
S Scope 1, 2 and 3 Emissions

Coined by The Greenhouse Gas Protocol in 2001, Scope 1, 2 and 3 is a way of categorising the different types of carbon emissions that a business generates in its operations.

Here's how we currently disclose our emissions at AirAsia:



In 2022, we emitted:



* GREENHOUSE GASES (PG 29)

Seat

The choice of cabin interior fittings play an important role to reduce an aircraft's overall weight. Seats, trolleys and carpeting made of lightweight materials can dramatically reduce aircraft weight while inbuilt-inflight entertainment units pile it on. Selection of these fittings have to also be balanced against their durability.

AirAsia has always prioritised the selection of our seats. By equipping our fleet with ergonomic leather seats, we minimise maintenance requirements and extend the lifespan of the components while ensuring that our guests travel in comfort.

In 2018, we began upgrading our cabins with the latest lightweight economy seats by Mirus Aircraft Seating. To date, we have retrofitted five A320 aircraft and received four A321neos directly from Airbus with Mirus Hawk seats, saving approximately 413 tonnes of CO₂ per year. All new AirAsia A321neos will be pre-installed with these eco-friendly seats.

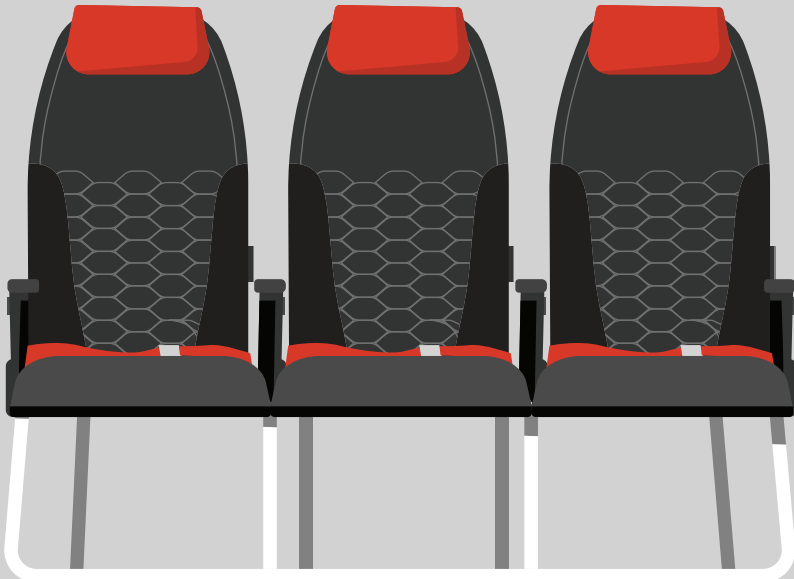
Avg savings per flight:



15kg

CO₂

47kg





Sharklets

The curved extensions at the wing tips of an A320 family aircraft are known as Sharklets. They are designed to reduce wing tip drag to boost fuel efficiency by up to 3.5% on longer routes while improving an aircraft's take-off capability.

Just over half of AirAsia's current fleet is equipped with Sharklets. Our incoming new generation A321neo aircraft will also be fitted with the wingtip extensions as standard.

Based on AirAsia's average flight duration of 1.32 hrs, Sharklets help shave off 127 kg of fuel and 401 kg of CO₂ emission per flight. Next time you take a flight, look out the window and see if you can spot these graceful extensions.

Avg savings per flight:



127kg



401kg



State Action Plan

State Action Plans (SAP) are national submissions to the ICAO that summarise a country's long term strategy to reduce CO₂ emission in international aviation.

Each SAP contains the country's baseline scenario, their selected emissions mitigation measures and expected results from implementation of those measures. Through this exercise, states are able to develop forecasts on whether their national efforts are sufficient to reach net zero by 2050.

All ICAO Member States are invited to update their plans every three years. Of AirAsia's four operating countries, Indonesia and Thailand last updated their State Action Plans in 2021, while Malaysia and the Philippines completed theirs in 2022.

Sustainable Aviation Fuel

The biggest contributor to an airline's carbon footprint is the emissions generated during flights from the consumption of jet fuel. To decarbonise, the industry has to transition to a new source of energy. While zero-emission technologies are being developed, sustainable aviation fuels offer an alternative that airlines can adopt over the short to medium term.

SAF are biofuels with properties similar to conventional jet fuel but with a smaller carbon footprint. Depending on the feedstock and technology used in its production, SAF can reduce life cycle GHG emissions by as much as 80% compared with jet fuel.

Although available, it is currently between two to five times the price of jet fuel, making affordability a key deciding factor in all airlines' plans to incorporate the biofuel into their fuel mix. However, as the commercialisation of SAF continues to lower its cost, AirAsia has begun exploring options to introduce SAF before 2025.

- * [GREENHOUSE GASES \(PG 29\)](#)
- * [LIFE CYCLE EMISSIONS FACTOR \(PG 37\)](#)





Sustainable Travel

Travelling sustainably means making responsible choices at every stage of a trip so that local communities are engaged while minimal to no harm comes to natural and cultural environments. It starts from booking your transport and accommodation to seeking out local experiences with social enterprises and community-based organisations.

Here are some practical tips to help you get started on your sustainable travel journey:

1. Travel off-peak
2. Select flights with low carbon intensities
3. Stay at eco-friendly accommodations
4. Use public transport
5. Pack reusable items
6. Immerse yourself in local culture
7. Support handmade arts and craft
8. Offset your trip



AirAsia's Journey D
helps communities create minimum standards for local tourism activities

AirAsia Foundation

provides grants to scale up social enterprises and retails Asean social enterprise products on destinationgood.com



**AirAsia
Foundation**



T Tax, Carbon

Carbon tax is a price imposed by governments for each tonne of GHG emitted by a company or industry.

There are now more than 50 countries that charge a carbon tax on selected sectors of the economy. In December 2022, the EU announced plans to revise its emissions trading scheme to include aviation. Non-tax measures being considered by other countries include SAF credits, SAF mandates and emissions cap schemes like CORSIA.

- * **CORSIA (pg 13)**
- * **CREDIT (pg 13)**
- * **MANDATE (pg 39)**

U

Upcycling

Did you know?

AirAsia Foundation's Soggy No-More bag are handmade by a social enterprise of Afghan refugees based in Kuala Lumpur called Nazanin.

The terms 'recycling' and 'upcycling' are sometimes used interchangeably but the two processes are quite different. Recycling is a process whereby objects are broken down into raw materials and used to recreate the same product while upcycling involves turning a waste material into something useful.

High value waste materials from AirAsia's warehouses are collected by certified waste disposal services for onward recycling. Where possible, we also upcycle and repurpose our onboard materials.

AirAsia's flagship upcycling project sees us turn expired life jackets into attractive lifestyle accessories, from pouches to pet safety vests. Since 2017, the Soggy No-More collection has diverted more than 4,000 non-biodegradable life vests from landfills and generated more than US\$50,000 in revenue to supplement AirAsia Foundation's social enterprise support programme.

Shop Soggy No-More products onboard AirAsia flights or from AirAsia Foundation's social enterprise store destinationgood.com!

* WASTE (PG 59)





Verification Body

All carbon emissions reported by airlines in CORSIA-participating states must be audited by accredited ICAO verification bodies that are compliant with ISO 14065:2013 standards. This helps ensure that all airlines report their emissions correctly following ICAO guidelines, and that offsetting obligations are fairly distributed when they come into force.

- * CORSIA (pg 13)
- * ICAO (pg 34)



Vintage, Carbon Offset

A carbon offset vintage refers to the year that the carbon credit was issued or the year in which the greenhouse gas emissions reduction took place.

For aviation offsetting, airlines must take into consideration the strict eligibility time frame of CORSIA-approved carbon credits. As of December 2022, only credits issued in the years below are accepted.

Emission Unit Programme	CORSIA-Eligible Vintages
American Carbon Registry	2016-2023
Architecture for REDD+ Transactions	2016-2023
China GHG Voluntary Emission Reduction Program	2016-2020
Clean Development Mechanism	2016-2020
Climate Action Reserve	2016-2020
Forest Carbon Partnership Facility	2016-2020
Global Carbon Council	2016-2020
The Gold Standard	2016-2020
Verified Carbon Standard (Verra)	2016-2020

* **Greenhouse Gases (pg 29)**

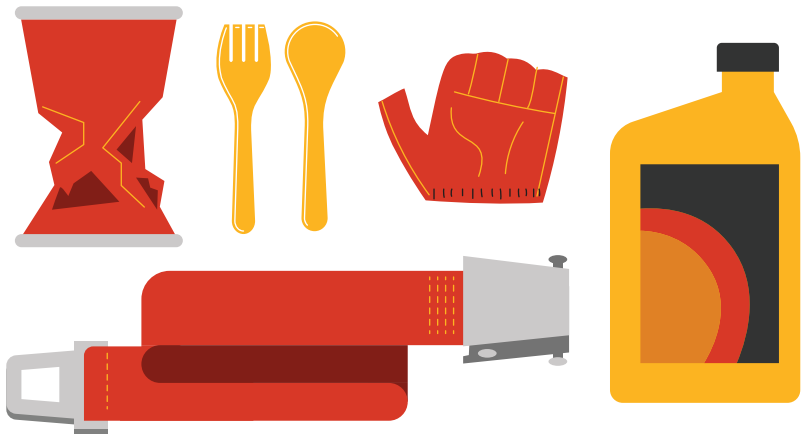
W Waste

AirAsia has three main sources of waste:

(1) cabin - recycled waste that is separated at the end of every flight by our cabin crew for recycling

(2) engineering - hazardous waste such as spent oils/fluids, absorbents, containers, gloves, rags and filters that are collected and disposed of by licensed scheduled waste contractors. Other waste materials include aircraft panels, tyres and seats that are repaired, re-traded, scrapped or returned to manufacturers.

(3) ground operations - general and recycled waste produced in our offices. Where possible, we separate office waste for recycling.



Weather

Extreme temperature changes and weather conditions can significantly affect aircraft performance. High temperatures and snow can reduce lift, thereby requiring longer runways and higher fuel burn while extreme heat can cause tyres to melt and render an aircraft inoperable. Therefore, climate change is a material sustainability issue for the industry, not only because of the risk of growing emissions regulation but also the risk of schedule disruption and real asset damage.

To manage weather conditions and avoid costly diversions, AirAsia subscribes to Japan-based Weathernews Inc. services for tailor-made forecasting as well as real-time weather advisory and risk communication. Weather News alerts us to tropical depressions, storms and typhoons three to four days in advance to help us manage bookings on affected flights, and also provides critical ash monitoring reports during volcanic eruptions.



Weight Management

Aircraft weight management is important to an airline because every kilogramme of weight carried equates to fuel burn.

Filtered water stored on the aircraft is used to dispense water in the galley and service the lavatories. Reducing the quantity of water carried onboard lightens an aircraft and lowers its fuel burn.

Since 2007, AirAsia has been analysing historical water consumption to ensure just enough water is uplifted on every flight. This ensures the airline doesn't carry excess water which would be considered dead weight.

Women in Aviation

Women have remained stubbornly underrepresented in aviation careers globally especially in leadership positions, commercial pilot and maintenance technician roles. In part, this is due to the slow pace of change in attitudes towards female participation in the industry, as well as systemic barriers that force women to make a choice between career and family life. According to IATA (2021), only 6% of airlines globally have female CEOs while the world average for female pilots stands at only 5.8% (Statista, 2021).

AirAsia is among the highest employers of women in the Asian aviation industry. In 2022, 6.6% of our pilots, 32% of our senior management, and 17% of the members of our Board are women. While we still have some way to go to reach the STEM 30% representation target across all categories, we continue to create conditions that welcome women into the sector.

* **Diversity (pg 17)**





Z

Zero-Emission Aircraft

The future of aviation lies in zero-emission aircraft, a next generation technology being developed to power flights using hydrogen and produce only water as a byproduct. These aircraft will provide the industry with a long-term pathway to achieving net zero.

With aircraft manufacturers in competition to enter this market, the first zero-emissions aircraft is expected to be commercially available by 2035.











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