

## SUSTAINABILITY REVIEW

# ENVIRONMENT

**As one of the world's largest airport operator groups, Malaysia Airports has taken steps to embrace sustainability initiatives that are environmentally conscious in its airport operations. The world's resources are finite, and the consumption of these resources in our business activities has an impact on the environment and therefore, our Sustainability Policy reiterates the need for prudence in managing these resources.**

Operating within an airport ecosystem alongside other stakeholders, we engage our stakeholders to work together towards greater resource efficiency and jointly implement key initiatives to protect the environment. In 2023, we made progress on several fronts, in particular launching the Environmental Masterplan 2.0, making a commitment to net zero carbon emissions by 2050 and expanding renewable energy capacity.

## OUR APPROACH AND PROGRESS IN 2023

### We launched our Environmental Masterplan 2.0

In FY2023, Malaysia Airports launched its Environmental Masterplan 2.0 which sets out the Group's environmental policies, targets and roadmaps from 2023 until 2030. This initiative is in line with the Twelfth Malaysian Plan and marks Malaysia Airports' firm commitment toward a lower carbon future.

The Environmental Masterplan 2.0 covers the eight key environmental aspects which are most relevant to the Group's business activities, and to which the Group has the greatest potential to bring positive impact, namely:

Carbon Emissions	Energy	Water	Waste
Air Quality	Noise	Wildlife	Land and Water Contamination



To streamline initiatives, reporting and engagement with relevant stakeholders, an Environment Task Force has been activated to cover each of the eight areas of the Environmental Masterplan 2.0.



## SUSTAINABILITY REVIEW

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One of the key features of the Environmental Masterplan is Malaysia Airports' roadmap towards Net Zero Carbon Emissions by 2050. The roadmap is a long-term pathway from that spans the period of 2023-2050 to reduce the Group's Scope 1, Scope 2 and Scope 3 carbon emissions in a phased and systematic manner. The roadmap includes targets and milestones for each phase which cumulates in net zero Scope 1 and Scope 2 emissions by 2040 and net zero Scope 3 emissions by 2050.

# Malaysia Airports' Journey towards Net Zero Carbon Emissions 2050

Long-term pathway to reduce TCO<sub>2</sub>e for Scope 1, Scope 2 & Scope 3

2040



Target to achieve Net Zero for Scope 1 & 2 KUL and MASB

2050

Long Term Target



Target to achieve Net Zero for selected Scope 3 KUL and MASB

2016 - 2020

### ENVIRONMENTAL MASTERPLAN 1.0

- Achieved 16% CO<sub>2</sub>e reduction for KUL (as at 2019)\*
- 2016 was selected as the baseline
- Focusing on KUL for 8 performance areas

2023 - 2026

### ENVIRONMENTAL MASTERPLAN 2.0

#### PHASE 1 (INTERIM) Scope 1 & 2

- 25% CO<sub>2</sub>e reduction target for KUL
- 15% CO<sub>2</sub>e reduction target for MASB
- Maintain 8 performance areas
- Establishment of MASB GHG Data Inventory

2027 - 2030

### ENVIRONMENTAL MASTERPLAN 2.0

#### PHASE 2 (REDUCTION) Scope 1 & 2

- 45% CO<sub>2</sub>e reduction target for KUL
- 30% CO<sub>2</sub>e reduction target for MASB
- KUL & MASB (GHG Data Inventory Review)

MASB refers to Malaysia Airports Sdn Bhd, which manages the international and domestic airports of the Group in Malaysia, other than KUL.

## WHAT ARE SCOPE 1, 2 AND 3 EMISSIONS?

### Scope 1 emissions

Greenhouse Gas (GHG) emissions from sources that Malaysia Airports owns or controls directly, e.g. from running air conditioning at airports and company vehicles.

### Scope 2 emissions

GHG emissions that Malaysia Airports causes indirectly from the energy we purchase and use, e.g. from electricity that we buy for our business activities.

### Scope 3 emissions

GHG emissions that Malaysia Airports is indirectly responsible for, up and down its value chain e.g. employee commuting and travel, airside activities at our airports by airlines and other airport stakeholders.



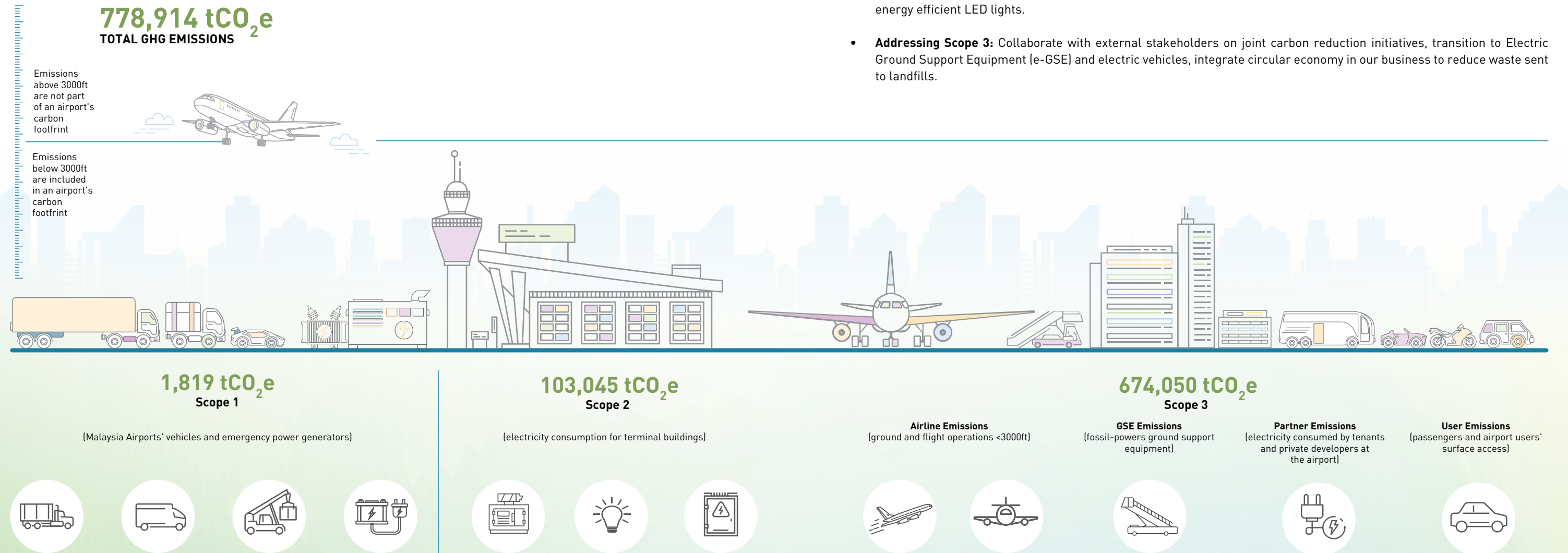
## SUSTAINABILITY REVIEW

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Based on Greenhouse Gas (GHG) Emission data gathered at the Group's main hub at KUL for 2023, Scope 1 and Scope 2 emissions form 0.2% and 13.2% of total emissions while Scope 3 emissions form 86.5% of total emissions, with the biggest source of Scope 3 emissions being aircraft landings and take-offs. This is a clear indication that in order to reduce Scope 3 emissions, the collaboration and cooperation with other airport stakeholders is critical.

In Phase 1 of the journey towards net zero emissions which covers the period from 2023 - 2026, and addresses primarily Scope 1 and Scope 2 emissions, Malaysia Airports has set targets to reduce these emissions for KUL by 25% and for all other airports in Malaysia by 15%. Among the strategies employed to kickstart Phase 1 are:

- **Addressing Scope 1 and Scope 2:** Purchase green energy where available, install renewable energy equipment such as solar photovoltaic panels, install additional electric vehicle charging stations, replace and upgrade existing lighting with energy efficient LED lights.
- **Addressing Scope 3:** Collaborate with external stakeholders on joint carbon reduction initiatives, transition to Electric Ground Support Equipment (e-GSE) and electric vehicles, integrate circular economy in our business to reduce waste sent to landfills.



## SUSTAINABILITY REVIEW

Indicators	Measurement Unit	2019	2021	2022
(a) Scope 1 emissions	tonnes of CO <sub>2</sub> e (tCO <sub>2</sub> e)	2,366	1,857	<b>1,819</b>
(b) Scope 2 emissions	tCO <sub>2</sub> e	116,250	64,622	<b>103,045</b>
(c) Scope 3 emissions	tCO <sub>2</sub> e	1,198,953	318,487	<b>674,050</b>
(d) Carbon emissions avoidance from solar energy generation (tCO <sub>2</sub> )	tCO <sub>2</sub>	14,635	12,916.38	<b>14,915.42</b>

Note:  
Emissions data is up to FY2022 and is independently verified as part of the renewal of KUL's Airport Carbon Accreditation (ACA) at Level 3 : Optimisation FY2023

The latest audited carbon emissions data which is available is only for KUL in FY2022; the data is verified by an independent assessment under the Airport Carbon Accreditation programme. In FY2022, total carbon emissions for KUL amounted to 778,914 tonnes of CO<sub>2</sub>e, an increase of 102% YoY as aircraft and passenger movements at KUL increased following the reopening of Malaysia's borders in April 2022.

Scope 1 and Scope 2 emissions amounted to 0.2% and 13.2% respectively, while Scope 3 emissions formed 86.5% of our carbon footprint. This is somewhat similar to 2021 in which Scopes 1 and 2 emissions formed 0.5% and 16.8% respectively, while Scope 3 emissions formed the bulk of KUL's carbon footprint accounting for 82.7% of emissions.

Based on the strategies for Phase 1 of the journey towards net zero emissions, Malaysia Airports launched several initiatives in 2023.

### Scope 2

#### Expansion of Solar Power Capabilities

In 2022, Malaysia Airports sustained its solar power programme with a total solar power capacity of 19.1 MWp. This has the potential to reduce Scope 2 carbon emissions by 14,915.42 TCO<sub>2</sub>e or 15% of Malaysia Airport's Scope 2 emissions. In 2023, Malaysia Airports has further extended its Solar Power Programme from 19.1 MWp to 22.5 MWp by completing the Solar Project at BKI.

#### Green Electricity Purchase

Despite very limited supply, Malaysia Airports bid and secured a six-month subscription for February-July 2023 for low carbon or 'green electricity' from Tenaga Nasional Berhad (TNB) under TNB's Green Electricity Tariff programme. Under the programme, TNB supplies customers with electricity derived from renewable energy resources such as solar power plants, hydropower stations and other renewable energy plants.

### Scope 3

#### Electric Ground Support Equipment (e-GSE)

We engaged with Malaysia Aviation Group Malaysia and jointly launched the nation's first e-GSE infrastructure. This initiative is a major step forward towards reducing carbon emissions and noise pollution within the aviation sector by replacing traditional diesel-powered Ground Power Units with Electric Ground Power Units (e-GPU). The impact of the e-GPU is significant; it reduces emissions by 50,000kgs of CO<sub>2</sub> emission and produces less than 65db(A) of noise emissions compared to the diesel-powered option.

#### SAF and CORSIA Task Force

Malaysia Airports is also a participant in the Civil Aviation Authority of Malaysia's (CAAM) taskforce on Sustainable Aviation Fuel (SAF) and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which are a part of the industry-wide global initiatives to reduce emissions produced by the international aviation sector.

Total  
**Solar power capacity of 22.5 MWp**  
reduces Scope 2 carbon emissions by **15%**

Subscribed **TNB's Green Electricity Tariff** programme for low carbon or 'green electricity'

Engaged with **Malaysia Aviation Group Malaysia** and jointly launched nation's first **e-GSE infrastructure**

## ENERGY

Indicators	Measurement Unit	2021	2022	2023
(a) Total energy consumption	kWh	350,463,164 48,463,751	423,131,586 50,202,040	<b>517,296,408</b> <b>53,789,047</b>
(b) Energy Intensity Per Passengers	KWH/Passengers	32.6 1.9	8.0 1.6	<b>6.3</b> <b>1.4</b>
(c) Total solar energy generation (MWh)	MWh	16,686.56	19,122.34	<b>27,725.39</b>

Electricity consumption for airports in Malaysia for 2023 amounted to 517.3 million kWh, an increase of 22.3% YoY. Electricity intensity per passenger reduced by 21.3%. By comparison, passenger movements for airports in Malaysia had increased by 55.5% YoY in 2023.

At SAW, electricity consumption for 2023 was 53.8 million kWh, an increase of 7.1% YoY, despite passenger movements expanding by 20.5% YoY in 2023.

Malaysia Airports also has put in place programmes to reduce energy consumption.

#### Expansion of solar power capabilities

In 2023, Malaysia Airports further expanded its solar power programme to achieve a total solar power capacity of 22.5 MWp. The installation of solar photovoltaic panels at the rooftop and carpark buildings of KUL Terminal 1 combined with the existing solar power infrastructure at KUL Terminal 2 brings the airport's total solar capacity to 14 MWp. Apart from KUL, the installation of solar panels at BKI was completed in January 2023 while work remains in progress at IPH and AOR. Together with prior completed installations at KUA, LGK, MKZ and PEN, the total solar power capacity at these airports is 8.5 MWp. In 2023, the Group saved RM2,139,513.49 through the use of solar energy.

#### Energy saving initiatives

In 2023, at SAW, the use of LED lighting has saved 44,018 kWh representing savings of 132,054 TL.

#### Proof of Concept Battery Energy Storage System

KUL signed a collaboration agreement between MA Sepang and TNB Research Sdn Bhd to implement Proof of Concept Battery Energy Storage System for the capacity of 500 kW/1 MWh for the period of 1 September 2022 till 31 August 2023. This initiative is to store electricity energy during off peak time to shave the Maximum Demand based on load profile which manages energy more efficiently.

#### Electric vehicle charging stations

Electric vehicle charging stations have also been installed at short-term car parks at KUL for public use to encourage the use of electric vehicles to ferry passengers to and from the airports. In supporting the electrification of the airside and landside area, in 2024 KUL will start to develop the KUL Electric Vehicle Transformation Plan which provides more infrastructure on EV Charging Stations and engagement with Ground Handlers on their fleet transformation.

Electricity intensity per passenger was  
**21.3% lower**  
YoY in 2023





















The Group saved  
**RM2.1 million**  
through the use of solar energy

Implemented  
**Proof of Concept Battery Energy Storage System**  
for the capacity of 500 kW/1 MWh

To develop  
**KUL Electric Vehicle Transformation Plan** in 2024

SUSTAINABILITY REVIEW

WATER

Indicators	Measurement Unit	2021	2022	2023
(a) Total volume of water used	million cubic metres	 7.7  0.25	 9.3  0.33	 <b>10.4</b>  <b>0.41</b>
(b) Water Intensity Per Passengers	liters/Passengers	 718  9.8	 177  10.8	 <b>127</b>  <b>10.8</b>
(c) Total rainwater harvested and savings in consumption	cubic meters	 41,933	 39,594	 <b>38,568</b>
(c) Total savings in value	RM	 95,744	 99,842	 <b>110,304.48</b>

At MY, a total of 10.4 million cubic meters of water was used in 2023. This resulted in water consumption intensity of 127 litres per passenger, which was 28% lower than the consumption intensity in 2022.

At SAW, a total of 0.41 million cubic meters of water was used in 2023 resulting in water consumption intensity of 10.8 litres per passenger, unchanged from 2022.

Malaysia Airports also has put in place programmes for alternative water supply.

Water harvesting

KUL Terminal 2 features an on-going harvesting system that collects rain water as well as condensation from air handling units. The collected water is channelled for use for flushing toilets and landscape watering. In 2023, a total of 38,568 m<sup>3</sup> of water was collected for this purpose, translating to RM110,304.48 of savings based on prevailing water tariff rates. The water harvesting system was implemented at MKZ where the collected water is used to fill the tanks of the airport's fire engines.

Recycling water from KUL's Southern Balancing Pond

This project began in 2021 to produce potable water for usage at KUL by recycling water from the airport's Southern Balancing Pond. The preparatory works for this project remains on track for completion in 2024.

Initiatives at SAW

At SAW, rainwater is collected and used in garden irrigation systems, with amounts varying seasonally. In addition, the airport's toilets and sinks are equipped with faucets and other devices which aim to save water usage.

Water consumption intensity per passenger was **28% lower** YoY in 2023



















A total of **38,568 m<sup>3</sup>** of water was collected **RM110,304.48 of savings**

Produce **potable water for usage at KUL**



**Rainwater is collected and used in garden irrigation systems at SAW**

WASTE

Indicators	Measurement Unit	2021	2022	2023
(a) Total waste generated	million kg	 2.9  8.8	 6.39  9.2	 <b>10.77</b>  <b>11.20</b>
(b) Total recycled waste	million kg	 0.2  2.9	 0.28  3.7	 <b>0.37</b>  <b>4.4</b>
(c) Total waste sent to landfill	million kg	 2.7  5.9	 6.11  5.5	 <b>10.4</b>  <b>6.8</b>

In terms of waste generated, measurements are made only for KUL. In 2023, a total of 10.4 million kg of waste was sent to the landfill with 369,792 kg sent for recycling. This resulted in a recycling rate of 3.4%. In addition, a total of 14 tonnes of scheduled waste was collected and disposed of according to applicable regulations.

At SAW, a total of 6.8 million kg of waste was sent to the landfill while 4.4 million kg was sent for recycling, while a further 56.6 tonnes of scheduled waste was collected and disposed of according to applicable regulations. This has resulted in a recycling rate of 7.7% for non-hazardous recyclable waste, while a recycling-recovery rate of 0.75 was achieved for hazardous waste.

Further developments at KUL

In 2023, KUL conducted a workshop to engage with tenants at KUL Terminal 1 and Terminal 2 and increase their awareness and support for recycling waste. We also engaged with our employees at KUL through the airport's Safety, Health and Environment (SHE) committee and participated in the SHE Carnival 2023. One of the activities during the carnival was a staff initiative to gather 3R items to inculcate a culture of recycling. In 2024, the Group plans to audit the waste at KUL to streamline the recycling policies and procedures.

Conducted a workshop to **increase awareness** and **support for recycling waste**

SUSTAINABILITY REVIEW

AIR QUALITY

Sustainability Matters	Indicators	Measurement Unit	2021	2022	2023
Emissions – Air Quality/ Pollution	(a) Amount of air emissions of pollutants and particulate matter	Air Pollution Index	<b>KUL T1</b> PM : 46 m <sup>3</sup> SO <sub>2</sub> : 0 ppm CO : 0 ppm NO <sub>2</sub> : 0 m <sup>3</sup>  <b>KUL T2</b> PM : 19 m <sup>3</sup> SO <sub>2</sub> : 0 ppm CO : 0 ppm NO <sub>2</sub> : 0 m <sup>3</sup>	<b>KUL T1</b> PM : 28 m <sup>3</sup> SO <sub>2</sub> : 0 ppm CO : 0 ppm NO <sub>2</sub> : 0 m <sup>3</sup>  <b>KUL T2</b> PM : 19 m <sup>3</sup> SO <sub>2</sub> : 0 ppm CO : 0 ppm NO <sub>2</sub> : 0 m <sup>3</sup>	<b>KUL T1</b> PM : <b>46 m<sup>3</sup></b> SO <sub>2</sub> : <b>7 ppm</b> CO : <b>11 ppm</b> NO <sub>2</sub> : <b>0 m<sup>3</sup></b>  <b>KUL T2</b> PM : <b>9 m<sup>3</sup></b> SO <sub>2</sub> : <b>0 ppm</b> CO : <b>0 ppm</b> NO <sub>2</sub> : <b>0 m<sup>3</sup></b>

Note:  
i. The results were based on Q4 monitoring only

At KUL, we measure our impact on air quality with reference to four pollutant indicators that are components of Malaysia’s Air Pollution Index as determined by the Department of Environment. They are particulate matter (PM), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO) and nitrogen dioxide (NO<sub>2</sub>). In each of the four parameters, Malaysia Airports meets the permitted limits set by the Department of Environment.

At SAW, the airport has complied with all regulations for air quality as determined by HEAS, which manages airside operations at the airport. Measurement of the air quality at the terminal is determined with reference to several paraments namely, persistent organic pollutants (POP), volatile organic compounds (VOC) namely CO, NO, CO<sub>2</sub> and O<sub>2</sub>, hazardous air pollutants (HAP) and particulate matter (PM). In addition, the terminal’s Trigeneration Facility is subject to further regulations which require the measurement of NO<sub>2</sub>, SO<sub>2</sub>, NO, CO and particulate matter. In all aspects, the regulations for air quality have been complied with.

In efforts to improve air quality at SAW, electrostatic and carbon filters are used in ventilation systems throughout the terminal. In addition, at the trigeneration plant, an exhaust filtering system is used to reduce air pollution.

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NOISE

Sustainability Matters	Indicators	Measurement Unit	2021	2022	2023
Noise	(a) Compliance with regulatory noise limits	dBA	47.7 - 70.3	49.3 - 70.1	<b>42.0 - 79.7</b>

Note:  
i. The results were based on Q4 monitoring only  
ii. The results for N11 points in Q4 were based on C5 Bus lounge as per management directive

Noise levels are measured in and around the vicinity of KUL, as our busiest airport. Based on an Environmental Impact Assessment, the Department of Environment has set a Demarcation Area within the vicinity of KUL. Noise levels are measured at 20 points in the Demarcation Area in the day time and at night to ensure compliance with the noise limits set by the Department of Environment. For 2023, noise levels measured at 17 out of the 20 points for day time, and 15 out of 20 points for night time complied with the Department of Environment’s set limits.

At SAW, airport noise control is managed by HEAS. In accordance with applicable occupational safety and health legislation, in-terminal noise measurements in 2023. In addition, the Trigeneration Plan needs to comply with the terms of environmental permit granted by the Ministry of Environment, which include noise limits. The noise levels at SAW were within the limits set by the authorities.

SUSTAINABILITY REVIEW

WILDLIFE

Sustainability Matters	Indicators	Measurement Unit	2021	2022	2023
Wildlife strikes	(a) Incidents of wildlife strikes within airport inner boundary	Numbers	KUL : 37 *MASB : 61	KUL : 64 MASB : 109	KUL : <b>83</b> MASB : <b>79</b>

\*MASB refers to Malaysia Airports Sdn Bhd, which manages the international and domestic airports of the Group in Malaysia, other than KUL.

Wildlife strikes in which wildlife (usually birds) collide with aircraft pose a serious hazard at airports. In 2023, 83 wildlife strikes were recorded under 300 feet within the inner boundary of KUL and 79 wildlife strikes at MASB airports. In addition, KUL incidents are measured against each 1,000 aircraft movements resulting in an incident rate of 0.26 for 2023. This is a reduction of 50% compared to 2022 during which an incident rate of 0.56 was recorded. This is slightly above the annual Safety Performance Target of 0.200 set by the Civil Aviation Authority of Malaysia.

In 2023, several new measures were introduced while existing measures were beefed up to reduce wildlife hazards.

Bird profiling studies

In 2023, KUL participated in studies to identify and prioritise risks by Bird Profiling through hazards and species identification. The studies were also conducted at LGK and AOR.

Increased frequency of regular wildlife dispersal

KUL and other airports also conduct regular maintenance as pre-emptive measures to lower wildlife strikes. The frequency of the regular dispersal of wildlife was increased from twice daily to three times daily. In addition, dispersal measures were carried out whenever required by Air Traffic Control (ATC) authorities due to requests by ATC staff or pilots or upon sighting of bird activity in the vicinity of the airport.

New equipment for wildlife dispersal

Operations vehicles have also been equipped with amplifier hailers and propane cannons to disperse wildlife more effectively. The Group has also improved its processes on the dispersal of bees.

Stakeholder collaboration

At KUL, the issue of wildlife strikes is discussed regularly at the Airport Wildlife Hazard Management Plan twice yearly and The Runway Safety Team Meeting was carried out on quarterly basis. This includes maintaining the necessary grass level required at the airport, cutting bushes and trees that offer attractive nesting sites, removing food sources such as seed-bearing plants, pest control measures to reduce the insects that birds eat and the placement of spikes and repellents to deter the birds. A special aerodrome inspection is also conducted periodically to evaluate the effectiveness of these measures and to consider further measures. We also work closely with the local wildlife department in mitigating wildlife hazard management.

At SAW, HEAS manages the issue of wildlife strikes.

Bird Profiling

through hazards and species identification

Conduct regular maintenance

as pre-emptive measures to lower wildlife strikes

Operations vehicles equipped with amplifier hailers and propane cannons

Issue of wildlife strikes discussed regularly at the Airport Wildlife Hazard Management Plan meetings

LAND AND WATER CONTAMINATION

Sustainability Matters	Indicators	Measurement Unit	2021	2022	2023
Oil spillage	(a) Number of oil spillage cases	Numbers	KUL : 45 *MASB : 26	KUL : 97 MASB : 13	KUL : <b>45</b> MASB : <b>22</b>

\* MASB refers to Malaysia Airports Sdn Bhd, which manages the international and domestic airports of the Group in Malaysia, other than KUL.

Oil spillage at the airside is the main cause of land contamination at the airports. In 2023, there were 67 cases of oil spillage, compared to 110 incidents, this represents a reduction of 39% in terms of incidents. This also meets the CAAM's Safety Performance Target for oil spillage.

Malaysia Airport continued to implement measures to reduce oil spillage as below.

Collaboration with stakeholders

Airside Safety Committee meetings for 2023 were conducted quarterly. In each meeting, the Aviation Security Department presents the oil spillage data specifying the type of spillage (eg hydraulic, diesel, petrol), type of equipment and owner of the relevant equipment.

Identification of issues

The main issue highlighted was the repeated oil spillage by the same equipment and aging equipment used by stakeholders.

Reinspection and reissuance of permits

KUL has introduced a reinspection process by the Motor Transport Workshop Engineering department for the equipment/vehicle involved in the oil spillage. Stakeholders must rectify the defects before an Airside Vehicle Permit is issued for the resumption of operations.

Penalties

KUL has introduced the Airside Monetary Penalty System which penalises stakeholders for each oil spillage caused by their equipment in line with the Airside Demerit System.

At SAW, the issue of land and water effluents is managed by HEAS, which manages airside operations at the airport.

Standards and Certifications

Malaysia Airports has sought to certify its key businesses in accordance with applicable standards to enable leading industry best practices to be incorporated in its operations while advancing environmental considerations in business decision-making. The ISO 14001:2015 Environmental Management Systems covers Malaysia Airports' entire network of airports in Malaysia together with its facilities management business.

Standards	Certified Businesses
ICAO Annex 14 Standards, ICAO Annex 16 Standards and CAAM Aerodrome Certification	Malaysia Airports (Sepang) Sdn Bhd Malaysia Airports Sdn Bhd
ISO 14001: 2015 Environmental Management Systems	Malaysia Airports (Sepang) Sdn Bhd Malaysia Airports Sdn Bhd Urusan Teknologi Wawasan Sdn Bhd
ISO 50001: 2018 Energy Management Systems	Malaysia Airports Sdn Bhd (Site: BKI only)
MS 2530:2013 Malaysian Sustainable Palm Oil (MSPO)	MAB Agriculture-Horticulture Sdn Bhd (Site: Plantations at KUL and Sarawak regions only)
ACI Airport Carbon Accreditation	KUL - Level 3 'Optimisation'