



FORGING A SUSTAINABLE CHANGI

Sustainability Report
2021 – 2022



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INTRODUCTION

Changi Airport Group (Singapore) Pte Ltd (CAG) was formed on 16 June 2009 and the corporatisation of Changi Airport followed on 1 July 2009. As the company managing Changi Airport, CAG undertakes key functions focusing on airport operations and management, air hub development, commercial activities, engineering and airport emergency services.

This report communicates CAG's sustainability vision, approach and outcomes from financial year 2021/22. It is intended to capture and measure progress, as well as drive overall sustainability actions across Singapore Changi Airport, as we work with our stakeholders to build a sustainable Changi together.

Reporting Scope

This report covers the assets and operations under CAG's business control at Singapore Changi Airport for the period of 1 April 2021 to 31 March 2022, unless otherwise stated. The scope covers our activities across the four passenger terminal buildings, Changi Airfreight Complex and the aircraft operating areas of Changi Airport. The four terminal buildings will be referred to as Terminal 1 (T1), Terminal 2 (T2), Terminal 3 (T3) and Terminal 4 (T4) in this report.

Reporting Framework

This report has been prepared with reference to the Global Reporting Initiative (GRI) Standards. CAG has selected the GRI Standards as they are a leading global standard for sustainability reporting. Where relevant, we have also applied disclosure requirements and the guidance set forth by GRI Airport Operators Sector Disclosures, to offer more comprehensive and relevant information.

CAG also continues to map and report Changi Airport's contributions to the United Nations Sustainable Development Goals (UN SDGs), which seek to address the most significant challenges facing our world today. Reference has been made to two guidance documents, namely (i) Business Reporting on the SDGs, published by the GRI and UN Global Compact; and (ii) Aviation: Benefits Beyond Borders, published by the Air Transport Action Group, to show how the aviation industry can support and achieve the SDGs.

No external assurance was sought on this report.

CAG'S SUSTAINABILITY APPROACH

CAG believes that sustainability is a key enabler and an integral part of

our business and long-term success. Sustainability principles are integrated and practised across all levels of the organisation. Every individual in CAG plays an important role in contributing to sustainable development.

Board of Directors

The Board sets the tone from the top of the organisation and holds ultimate accountability for integrating sustainability efforts across CAG.

Management Committee

Our Management validates CAG's material sustainability matters and directs our sustainability strategies, policies, practices and targets. They monitor CAG's sustainability performance and provide periodic updates to the Board.

Environment Steering Committee

Chaired by Managing Director, Engineering & Development, the Environment Steering Committee (ESC) comprises senior representatives across CAG's Clusters and Divisions.

The ESC endorses sustainability initiatives, reviews CAG's sustainability performance and drives improvements to CAG's sustainability processes. The ESC also oversees and provides key sustainability updates to senior management regularly.

1



MATERIALITY ASSESSMENT

Material sustainability issues are defined as matters that significantly impact CAG and our key stakeholders. The Materiality Assessment enables us to identify and prioritise our critical sustainability matters.

The Materiality Assessment is a three-step process:

Identification

An extensive list of potential material sustainability topics was determined through the following means:

Stakeholder Engagements

- Internal focus group discussions provided insight into the sustainability impact of CAG's various business activities.
- Daily interactions and corporate engagements identified the needs and expectations of airport stakeholders.

Industry Scan and Peer Evaluation

- CAG's peers in the global aviation industry, as well as local companies and sustainability leaders, reported broad sustainability topics.

Value Chain Review

- Identified CAG's sustainable value drivers based on its business model and core competencies, from a value chain perspective.

Media Analysis

- Identified emerging sustainability risks, opportunities and hotbed trends.
- Monitored CAG-specific and aviation-related developments.

2



Prioritisation

CAG's Management Committee prioritised sustainability matters with the greatest impact to CAG and its stakeholders.

A materiality workshop, involving a focus group discussion, ranked material sustainability matters based on their significance to CAG on a strategic level and relevance to stakeholders and society. These encompass economic, environmental, social and corporate governance matters that influence the assessments and decisions of stakeholders.

3



Validation

The Management and Environmental Steering Committees validated 10 Sustainability Matters as material to CAG. They ensure that CAG's clusters validate, communicate and embed sustainability priorities at all levels.

SUSTAINABILITY HIGHLIGHTS

ENVIRONMENTAL



Zero carbon growth until 2030, capping absolute carbon emissions at 2018 levels



5.9% decrease in overall water consumption



CAG's inaugural climate resilience study mapped climate impacts up to 2050.



11% of waste diverted from incineration

SOCIAL



Ranked **Top 3**

most attractive employer by Randstad for the 8th consecutive year



Recipient of **Community Chest Volunteer Partner Award 2021**



Won Gold Award in HR Excellence in Crisis Management and Recovery



Winner in Aviation, Transport & Supply Chain Category in S100 Leading Graduate Employers Awards

GOVERNANCE



0 work-related fatalities amongst employees



Anti-Bribery Management System (ISO 37001) Certified



CHAIRMAN & CEO'S MESSAGE

Amidst another year of ongoing change brought about by the Covid-19 pandemic, CAG sustainability framework continued to guide the airport community to focus on keeping Changi Airport safe and fully operational.

Working closely with our airport partners, CAG advanced our environmental, economic and social goals, as well as delivered on our mission to safely and sustainably connect Singapore to the world. Underpinning our efforts were bold commitments to cap carbon emissions, prepare the airport for climate impacts, and leverage technology to promote a digital-ready work environment. CAG's spirit of innovation extended to our community engagements, as we enabled our employees to transition from face-to-face to virtual volunteering with our community partners. We were heartened that Changi Airport continued to create positive customer and community experiences.

Leading the charge to reduce Changi's environmental footprint

CAG has reaffirmed our commitment to reduce carbon emissions and increase resource efficiency in our processes. We have committed to capping CAG's absolute carbon emissions at 2018 levels until 2030 whilst aspiring to net-zero carbon emissions by 2050, even as we prepare to welcome greater passenger volumes than before the pandemic.

Making aviation more sustainable is, at its core, an energy issue. In this regard, CAG has

upgraded and replaced our air-conditioning systems with best-in-class energy efficient models. We have also trialled technologies that reduce building heat loads, as well as installed automated building control and sensor systems to manage our air-conditioning and lighting. To transition to cleaner energy, we are evaluating additional solar deployment.

With our aviation partners, CAG initiated operational and commercial assessments on the uplift of Sustainable Aviation Fuel (SAF). We are facilitating operational trials of SAF by Singapore Airlines and Scoot this year. We have also progressively installed electric vehicle chargers on the airside and are engaging our partners on developing the next phase of vehicle electrification infrastructure at Changi Airport.

Enhancing Changi's resilience to climate impacts

Enhancing our airport infrastructure and adapting our operations continue to be a priority for CAG as we adjust to the impact of climate change. CAG's climate resilience strategy employs an adaptive climate risk-based management approach, maintaining a balance between incremental adaptation changes and strategic step changes in asset investments.

To further bolster our climate resilience, CAG embarked on a detailed assessment of the

CHAIRMAN & CEO'S MESSAGE

impacts of evolving climate factors, such as rising ambient temperatures and greater rainfall intensity. We have mapped our risks up to 2050 for airport-wide adaptation and are developing solutions to address them. For instance, in response to increased rainfall, we have expanded our drainage network and installed sensors linked to a real-time data dashboard for better flood risk management.

Enhancing the connectivity and capabilities of the Changi Aviation Hub

We remain focused on growing Changi's air connectivity and ensuring safe air travel.

In the past financial year, we welcomed four new passenger airlines (Gulf Air, HK Express, STARLUX, and ZIPAIR), one new freighter operator (Tasman Cargo Airlines) and established two new city links to Bahrain and Vancouver. To enhance our air cargo hub capabilities, we have adopted industry best practices in transporting special cargo such as perishables. A significant achievement for CAG was attaining the International Air Transport Association (IATA) Centre of Excellence for Independent Validators (CEIV) Fresh certification in partnership with key stakeholders in Southeast Asia.

The Covid-19 pandemic has highlighted the importance of continued vigilance over cross-border travel, especially as passenger traffic steadily recovers. To ensure safe air travel during the peak of

the Delta variant spread, we implemented measures to limit the inter-mingling of inbound passengers, such as zonal segregation within the transit area and differentiated measures for local visiting the airport. We worked with Singapore's health authorities to ensure our staff were well-trained on safe management protocols and were equipped with personal protective equipment to work safely in the airport.

CAG's Airport Emergency Service invested in new firefighting vehicles to augment its contingency response capabilities. They also conducted 5G technology trials for sea operations, to improve the timeliness and quality of information transmitted to decision-makers.

CAG will continue to find new solutions and evolve our measures to ensure that Changi Airport remains well-positioned to serve our customers and strengthen our competitive edge globally.

Empowering our people to drive change

We recognise that CAG's continued success is built upon our people, extending from employees to workers across the airport community. Not only do we seek to attract and retain talent dedicated to creating innovative and sustainable solutions, we also empower them to achieve their fullest potential.

To emerge stronger from this crisis, CAG continued to build agile mindsets and prepare them for the future of work. Named FutureReadyMe, the programme focuses on embedding new digital skillsets

to enable innovation and transformation within the organisation. Employees were guided to translate learning into direct application to their work by developing in-house apps through applying the tools they have learnt. This applied learning focus accelerates professional growth of our people and brings about tangible value-adding outcomes for the individuals, their teams and CAG.

To ensure continual focused efforts in our employees' professional growth while making a purposeful impact to CAG's effort to grow Singapore's air hub, CAG established the Airside Professional Shift Team, a specialised unit trained to respond to contingencies, drive efficient resource allocation for optimising aircraft movements and promote airside safety. A 6-month upgrading programme was launched to equip our employees with the skillsets and competencies to make real-time decisions in an increasingly complex airside environment, ensuring they are well placed to meet Changi Airport's challenges in the next phase of air traffic recovery and growth.

Despite the challenges of Covid, CAG remained steadfast in cultivating an organisation that cares for the community by creating opportunities for employees to give back to society via its philanthropic arm, Changi Foundation. To build on our longstanding partnership with Metta Welfare Association, CAG volunteers developed programmes and helped their special needs artists expand their public speaking skills, which they displayed through a virtual art fair and a textile donation drive. We look forward

to expanding our efforts to support even more needs in our community.

To ensure that Changi is an inclusive workplace for employees and airport for travellers, CAG introduced the CARE@Changi Programme to better serve our customers with health conditions or disabilities that may not be outwardly visible. A Care Ambassador Training Programme was set up to equip frontline staff to recognise and offer support to customers with specific needs across our passenger terminals.

Forging a Sustainable Changi

We would like to thank all CAG employees, our airport community and industry partners in the public and private sectors who have supported and contributed to Changi Airport's sustainability, operational, and community endeavours this past year.

As global travel recovers, we look forward to working with our aviation community on innovative and collaborative solutions to address the complex environmental challenges facing our world. We are confident that we will have even greater opportunities to achieve shared success.

Let's move forward together to forge a stronger culture of sustainability across Changi Airport by championing our goals of protecting our environment, touching lives and connecting communities.

TAN GEE PAW
Chairman

LEE SEOW HIANG
Chief Executive Officer

STAKEHOLDER ENGAGEMENT

STAKEHOLDER GROUPS	INTERESTS	ENGAGEMENT METHODS
<p>CAG EMPLOYEES</p> 	<ul style="list-style-type: none"> • Employee Well-Being • Employee Development • Innovation • Occupational Health and Safety • Corporate Governance • Compliance with Statutory/ Legal Requirements 	<ul style="list-style-type: none"> • Recognition schemes (e.g. Core Value Awards) • Employee engagement and pulse surveys • Participatory dialogue – Townhall • Wellness programmes • In.Touch Mobile App – Intranet • Employee orientation sessions • Formal skills training • Annual performance & development reviews • Self-directed online learning • In.Touch Mobile App and electronic direct mailers • Innovation workshops and in-house talks • Safety Management Systems • Emergency drills (e.g. Exercise Northstar, Exercise Bobcat) • Safety audits • Key and ad-hoc committees and working groups • Internal audits and inspections • Anti-Bribery Management System • External audits
<p>CONTRACTORS & SUPPLIERS</p> 	<ul style="list-style-type: none"> • Compliance with Legal Requirements and CAG's Standards • Supply Chain Management 	<ul style="list-style-type: none"> • Procurement policies and tendering procedures • Compliance audits • Quality Service Management training • Recognition awards (e.g. Annual First Class Service Act) • Supplier evaluation

STAKEHOLDER ENGAGEMENT

STAKEHOLDER GROUPS

INTERESTS

ENGAGEMENT METHODS

AIRPORT BUSINESS PARTNERS 	<ul style="list-style-type: none"> • Airport Planning and Development • Business Continuity Planning 	<ul style="list-style-type: none"> • Forums and conferences (e.g. Changi Aerodrome Operational Safety Forum, Sustainable Changi Conference) • Regular and needs-based meetings (e.g. Changi Airport Airside Operational and Safety Committee meetings) • Consultations (e.g. Singapore Changi Airport Operations Committee)
	<ul style="list-style-type: none"> • Airport Safety and Security 	<ul style="list-style-type: none"> • 24/7 in-house Airport Emergency Services • Online safety reporting and incursion apps (In.Touch, iFeedback, SWEETmini, RIPPLE) • 24/7 hazard reporting hotline
	<ul style="list-style-type: none"> • Customer Feedback 	<ul style="list-style-type: none"> • Sharing of survey results and findings
	<ul style="list-style-type: none"> • Recognition of Airport Community Contributions 	<ul style="list-style-type: none"> • Annual Airport Celebration • Airport Safety Awards • Extra Mile Awards
	<ul style="list-style-type: none"> • Collaborative Innovation 	<ul style="list-style-type: none"> • Trials to test new technologies
	<ul style="list-style-type: none"> • Compliance and Corporate Governance 	<ul style="list-style-type: none"> • Airport orientation programmes • Control centres • Aerodrome safety audit
PASSENGERS & VISITORS 	<ul style="list-style-type: none"> • Passenger Experience and Satisfaction 	<ul style="list-style-type: none"> • Customer service (e.g. information counters, mobile Changi Experience Agents) • Real-time Instant Feedback system • iChangi one-stop app for flight, airline and airport information • Fault reporting hotline
	<ul style="list-style-type: none"> • Airport Attractions 	<ul style="list-style-type: none"> • Festive and themed events • Retail and F&B offers and incentives • Web and social media platforms (Changi Media Centre)

STAKEHOLDER ENGAGEMENT

STAKEHOLDER GROUPS

INTERESTS

ENGAGEMENT METHODS

GOVERNMENT & REGULATORS 	<ul style="list-style-type: none"> • Airport Planning and Development • Compliance • Contribution to Singapore's National Objectives 	<ul style="list-style-type: none"> • Dialogue with government ministries and agencies • Participation in regional groups • Reporting to CAAS and statutory agencies in compliance with regulatory requirements • Consultative meetings and briefings with CAAS, the Ministry of Transport and relevant government agencies
NON-GOVERNMENTAL ORGANISATIONS 	<ul style="list-style-type: none"> • Networking • Collaboration and Partnerships 	<ul style="list-style-type: none"> • Forums and conferences • Joint exhibitions and meetings
MEDIA 	<ul style="list-style-type: none"> • Airport Developments and Features 	<ul style="list-style-type: none"> • Media briefings and airport visits • Meetings with key media outlets • Press releases and publications (e.g. Annual Report, Sustainability Report)
COMMUNITY 	<ul style="list-style-type: none"> • Contributions to the Wider Community 	<ul style="list-style-type: none"> • Changi Foundation programmes • Employee volunteerism and collaborative CSR via partner engagement • Curriculum advisory support for tertiary institutions and the Singapore Aviation Academy

CONTRIBUTION TO THE UN SDGS

CAG mapped each of its material sustainability matters to the SDG targets. This exercise enables CAG to identify area where its activities have a direct or indirect impact on the SDGs, and CAG's priorities in the short, medium and long-term.

KEY PRIORITY AND IMPACT AREAS



HIGH PRIORITY AND IMPACT AREAS



CAG'S SUSTAINABILITY TARGETS

MATERIAL MATTERS	TARGETS	PERFORMANCE FY21/22
Energy and Emissions Management	Achieve zero carbon growth until 2030, capping absolute emissions at 2018 levels	On Track
	Maintain Airport Carbon Accreditation (ACA) Level 3 certification	Achieved
Energy and Emissions Management	Maintain ISO 14001:2015 certification	Achieved
Waste Management		
Water Management		
People Development	All employees to attend at least one training programme yearly	On Track
Community Investment	Achieve 25% staff volunteerism rate by FY 2025/26	On Track
	Achieve 3000 volunteer hours yearly by FY 2025/26	On Track
	Offer at least 80 job attachments to youth beneficiaries from FY 2025/26 onwards	4
	Engage 35 airport partners in Changi Foundation programme by FY 2025/26	1
Passenger Experience	Achieve good yearly performance for the Customer Satisfaction Index of Singapore (CSISG)	81.7 out of 100 (Year 2020)
Contribution to the Economic Development of Singapore	Complete Terminal 2 expansion project	On Track
	Build capacity ahead of growth with Terminal 5 planning and development	Ongoing effort
Airport Safety	Achieve zero employee work-related fatalities yearly	Achieved
	Achieve yearly deficiency-free rating from the International Federation of Air Line Pilots' Association (IFALPA)	Achieved
Corporate Governance	Zero employee work-related fatalities	Achieved
	Zero tolerance for non-compliance with laws and regulations	Existing policy

COMMITTED TO CREATING A SUSTAINABLE FUTURE

ENVIRONMENTAL
SUSTAINABILITY
AND RESILIENCE



Our Environmental Policy

Proactive engagement and open communication across the airport community are key to CAG's sustainable development efforts. To successfully implement our environmental policy, CAG continually integrates environmental developments into the guidelines and policies for all Changi Airport stakeholders, including tenants, contractors and suppliers. Stakeholder events and regular circulars provide timely updates about our environmental goals, policies and best practices.

To encourage environmental action within CAG, we promote green procurement decisions and conduct staff engagement activities on environmental conservation.

CAG participates actively in various global airport working groups which focus on sustainable development, including the:

- **Airports Council International (ACI) World Environment Standing Committee**, which interfaces with the International Civil Aviation Organisation on environmental issues across the aviation industry;
- **ACI Asia-Pacific Regional Environment Committee**, where CAG's Vice President of Environment & Sustainability is currently serving as Vice-chair; and
- **ACI Airport Carbon Accreditation Taskforce**.

To ensure that our environmental policy translates into action, CAG uses our

Environmental Management System to monitor the Changi Airport community's environmental performance and progress.

Our Environmental Management System

CAG's Environmental Management System (EMS) is a systematic and robust process that uses a **risk-based approach** to ensure environmental risks are identified, managed and controlled holistically within the airport and across our supply chain.

CAG's EMS is ISO 14001:2015 certified and follows the ISO 'Plan-Do-Check-

Act' management principle. As this continual system improvement process incorporates the latest innovative developments, CAG is able to remain robust in its environmental management.

CAG strongly advocates instilling a culture of sustainability awareness and shared ownership amongst employees and airport stakeholders to effectively manage and minimise the impact of environmental risks across its operations. In line with this, CAG employees are given the responsibility to source for and procure more sustainable systems and products as detailed in subsequent chapters.

CAG's Environment Steering Committee

CAG's Environment Steering Committee drives the integration of environmental efforts into Changi's core mainstream operations, in line with our sustainability targets. Chaired by Managing Director, Engineering & Development, the working group comprises representatives from every CAG Cluster. The group meets every quarter to track CAG's progress, conduct long-term environmental strategic planning and provide regular sustainability updates to senior management.



FEATURE STORY

GREEN PROCUREMENT

CAG adopts a lifecycle approach in our green procurement. We prioritise sustainable design, reuse of materials, environmentally-sound operational procedures and green waste management.

To drive green procurement at an enterprise level, CAG introduced a new **Price-Quality-Environment scoring criterion** for evaluating procurement categories that cover more than half of CAG's overall expenses. A minimum weightage for this environmental criteria has been mandated for selected categories. This signals to suppliers the demand for green alternatives and encourages a shift towards more holistic procurement decision-making.

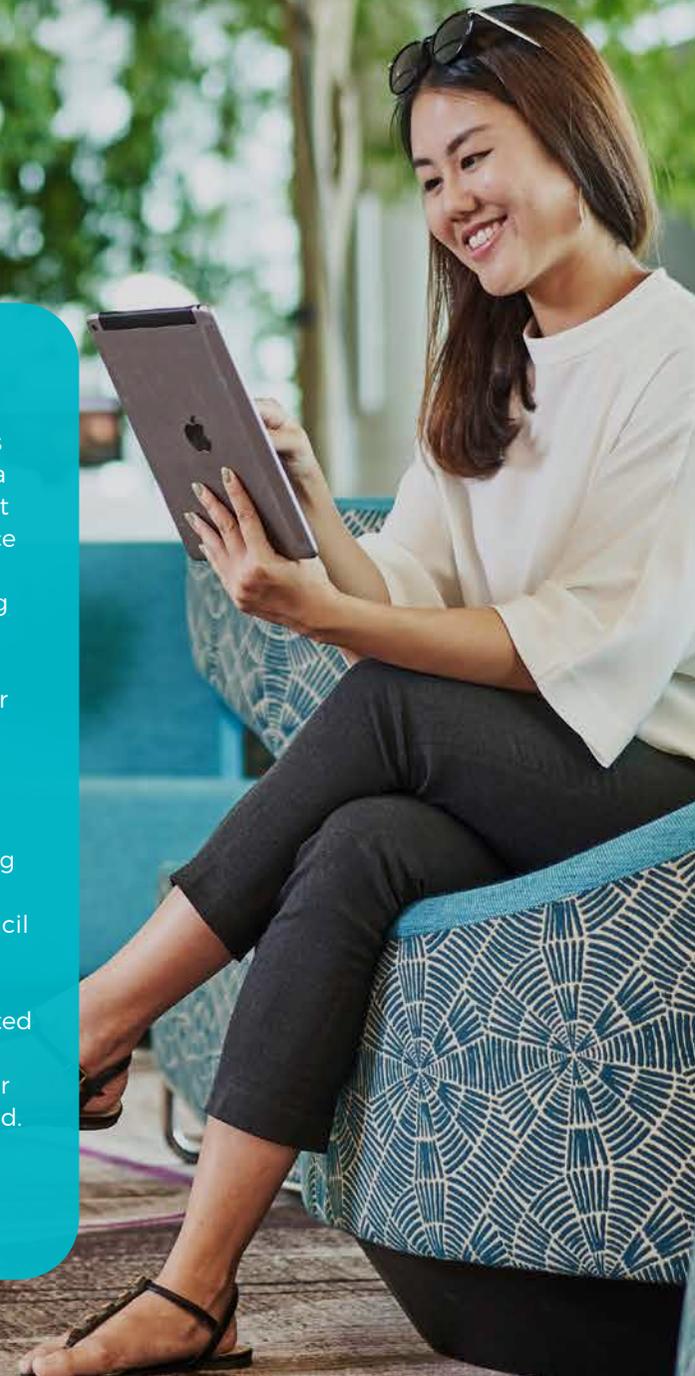
CAG's Green Procurement Policy specifies a preference for:

- Suppliers who are able to demonstrate how their product/service is sustainable throughout its life cycle;

- Energy-efficient equipment with low greenhouse gas emissions;
- Design, operation, maintenance and disposal methodologies that minimise resource consumption, increase manpower productivity and reduce pollution;
- Suppliers who can collaborate with CAG in the innovation for low-cost green alternatives; and,
- Suppliers, products, works and services which are **certified** to be environmentally friendly.

CAG's green procurement efforts to date include:

- **Building Design:** We work with Environmental Sustainability Design Consultants to incorporate sustainable design principles in terminal buildings with procurement implications.
- **Lighting:** We procured the latest energy-efficient lighting technology to reduce emissions and appointed a supplier with a take-back programme to collect and recycle light bulbs to reduce waste.
- **Certifications:** CAG Engineering appointed suppliers certified in ISO 14001, an internationally-recognised standards system for environmental management.
- **Energy Efficiency:** In our procurement of chiller replacements, we specified for Energy Performance Contracting firms had been certified by the Singapore Green Building Council and accredited by the Energy Services Company.
- **Building Materials:** We mandated that 50% of the concrete from demolished infrastructure in our aside repaving works be recycled.



Community Engagement

Sustainable Changi Conference 2022

On 17 March, more than 140 representatives from 60 companies – including airport partners, such as airlines, ground handlers, tenants and suppliers – attended the Sustainable Changi Conference 2022. Discussions were centered on strategies for the airport community to build a more sustainable and resilient Changi as the industry recovers.

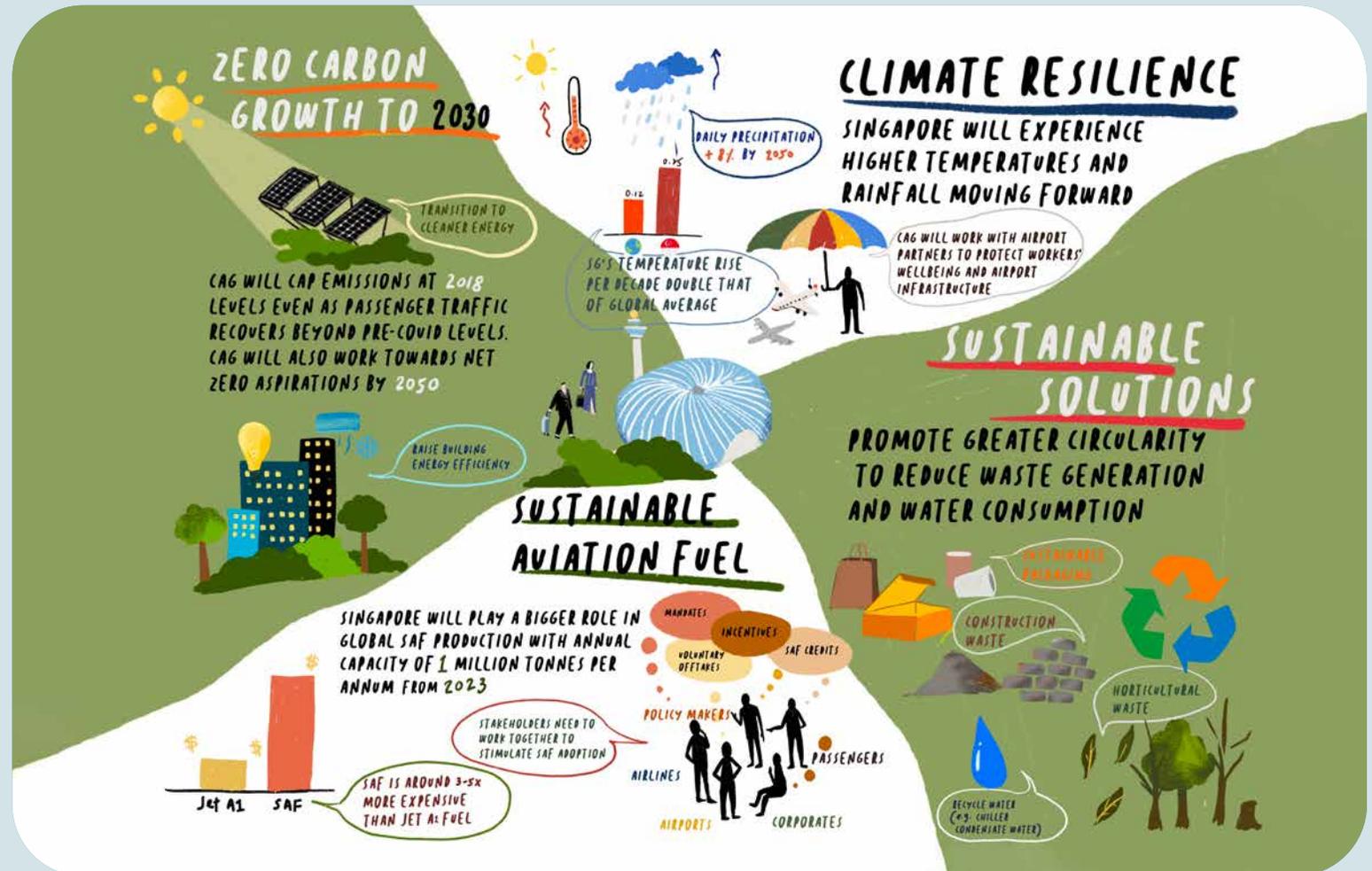
Our CEO, Mr Lee Seow Hiang, reiterated CAG's commitment to sustainability in his opening address. The keynote address was delivered by the National Climate Change Secretariat – the Strategy Group responsible for coordinating Singapore's domestic and international climate change policies under the Prime Minister's Office. Guest speakers from SkyNRG, Netherlands Airport Consultants and Mandai Wildlife Group shared insights on sustainable aviation fuel, climate resilience and sustainable waste and water solutions.

Supplier Days

During the year, CAG's Legal & Compliance, Engineering and Development, and Corporate Information Technology teams hosted several Supplier Days to enhance our partners' understanding of CAG's legal and compliance requirements. We engaged over 50

of our partner firms. Our tenants and concessionaires also attended regular CAG retail and F&B Quality Service Management training. We continue to liaise closely with our contractors and suppliers to improve the environmental performance across our supply chains.

CAG looks forward to continued collaboration with our airport partners to realise our common vision of building a Sustainable Changi.



BUILDING CHANGI AIRPORT'S CLIMATE RESILIENCE

Foresight and early planning are critical to foster long-term climate resilience for Changi Airport, a critical component of Singapore's infrastructure. CAG proactively seeks to bolster Changi Airport's resilience to Climate Change, and minimise potential vulnerabilities and operational continuity risks. CAG's Climate Resilience strategy is based on international standards and employs an adaptive climate risk-based management approach.

CAG maintains a balance between implementing incremental adaptation changes and making strategic step changes in asset investments. We define adaptation pathways to ensure timely, informed decision-making and reduced transition costs and exposures. We have comprehensively mapped our risks for airport-wide adaptations. Climate projections for Singapore are factored into operational procedures, design criteria and future procurement of systems identified at risk.

We developed risk thresholds and mitigation measures in five focus areas. Beyond these, government-led district-wide measures will help mitigate against natural impacts, such as rising sea levels.



BUILDING CHANGI AIRPORT'S CLIMATE RESILIENCE

CONT'D

1 INCREASING RAINFALL INTENSITY



To handle projected increases in rainfall intensity and sea levels, we enhanced Changi Airport's drainage network design by incorporating flood prevention measures around critical infrastructures. These included:

- Widening of drainage networks and building of water detention ponds and stormwater tanks;
- Increased capacity of stormwater tanks and pumping stations
- Building of flood barriers and raising of road levels, before and after underpasses; and
- Installation of flood monitoring systems for early preventative warnings.

Active maintenance ensures that Changi's runways are properly grooved to provide sufficient friction for safe aircraft landings and movement.

Although the groundwater table is expected to rise in tandem with sea levels and rainfalls, Changi's runways, taxiway pavements, baggage tunnels, airfield lighting and buoyancy of underground structures have been deemed resilient. Given future projections, continued monitoring is critical

2 RISING SEA LEVELS



To protect Changi Airport against the combined effects of rising sea levels and storm surges, CAG installed a series of tidal gates and barriers. Terminal 5 at Changi East is being built on a higher platform, 5.5 metres above mean sea level.

Government-led efforts include raising Nicoll Drive's road level, which will act as a levee for flood protection. The PUB-led City-East Coastline protection study will also provide additional district-level measures.



BUILDING CHANGI AIRPORT'S CLIMATE RESILIENCE

CONT'D

3 HIGHER AMBIENT TEMPERATURES



Changi Airport's air-conditioning systems have sufficient built-in buffers to cope with rising ambient temperatures. We have also located temperature-sensitive equipment, such as baggage screening machines, in climate-controlled environments. Climate change projections on temperature are factored into our design of future airport equipment and systems.

As higher temperatures pose greater risks to our outdoor

workers, CAG will continue to work with our partners to automate our processes to reduce heat stress. The use of proper sun protection for workers will also be strongly encouraged.

The impact of Singapore's temperature projections on aircraft performance during landing and take-off was analysed and deemed low. Changi's runway lengths are sufficient to provide the aircraft lift needed for normal operations.

4 INCREASING LIGHTNING FREQUENCY



To conduct lightning away safely and protect personnel working in the aircraft stands, we have implemented the following measures:

- Lightning shelters
- Lightning masts on apron flood lights
- Mandatory connections of earthing pits to aircrafts on arrival at the parking stands
- Bonding devices on passenger-loading bridges
- Wireless headsets to protect personnel communicating with the control tower
- Underground wire mesh at aircraft stands

Ground handlers subscribe to NEA's lightning warning system that sends alerts to their mobile phones. CAG will continue to work closely with our partners to train and enhance our personnel's awareness of lightning safety procedures.

5 WIND SPEED AND DIRECTION



Wind speeds and direction are not expected to change significantly in Singapore. Pilots have been trained and aircraft are designed to withstand the thresholds experienced in Changi.

FEATURE STORY

MITIGATING FLOOD RISKS AT CHANGI AIRPORT

As Changi Airport is a critical infrastructure for Singapore's global connectivity and economy, one of our top priorities is climate resilience.

The increasing prevalence of extreme weather events brought about by climate change has been a growing concern. 2021 was Singapore's second wettest year on record. Annual total rainfall was reportedly 33% higher than the long-term average, with January recording the most rain in over a century. Heavy rainfalls can have dire impacts on airport operations and safety as they can cause overflowing drains and flash floods. These, in turn, disrupt aircraft, parking stand and runway operations, potentially causing moving planes to skid.

In recent years, Changi Airport has implemented various anti-flood measures to boost climate resilience. Airport facilities are built

on higher ground above mean sea level and its drainage system, which has been around since the 1970s, has undergone upgrades. In 2016, a 540,000m³ detention pond – equivalent to 216 Olympic-sized swimming pools – was constructed to better regulate the discharge of water collected from the Changi North catchment areas into the sea.

New sensors provide real-time 24/7 drain monitoring in real-time

In 2021, CAC's Engineering and Development (E&D) team installed 11 new solar-powered monitoring sensors at strategic drainage network locations to boost flood protection. This especially critical as air traffic returns to pre-pandemic levels.

Fitted with closed-circuit television cameras, these sensors use radar to enable real-time tracking of water levels and water build-up rates in the

drains and detention pond. Particular attention is also paid to an outlet drain located south of the airport's aerodrome, as its narrowly-spaced grilles trap debris more easily, which impedes water flow and presents greater flood risks.

When water level in a drain exceeds 60%, its security grilles are automatically lifted to release water like a dam. An alert is also sent to the E&D team to assess the situation and direct specific action to alleviate flood risks.

"Google-styled" drainage map enables quick action

With its growing network of sensors and need to deploy rapid remedial action very quickly especially during the monsoon season, the E&D team challenged themselves to design a dashboard that would allow its team members to more effectively monitor

drain water levels.

Drawing inspiration from Google Maps, which uses colour coding to reflect road congestion severity, the team developed CAC's very own "Google-styled" drain monitoring map. As drains with water levels that exceeded 70% would appear red on the digital map, this would allow the team to identify and assess critical drain conditions at a glance.

Where required, maintenance crews are rapidly deployed in a highly targeted and efficient manner across the airport to clear chokage or debris, such as leaves, grass cuttings and plastic waste trapped in the grilles, that may be preventing water from flowing out to sea.

FEATURE STORY

MITIGATING FLOOD RISKS AT CHANGI AIRPORT

CONT'D

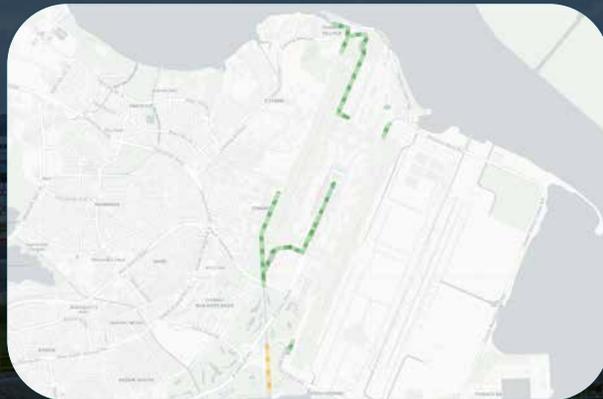


Image from top:

"Google drains" map

The dashboard and key indicators

Incorporating analytics to predict and reduce flood risks

In addition to real-time monitoring and management, the innovative web-based dashboard consolidate and analyse critical data collected by the sensors, as well as other relevant information, such as weather conditions, rainfall and tide levels.

The Engineering team utilises these real-time parameters to better manage a range of volatile weather events. An example is their use of actual rainfall data to compute drain water levels – this has proven to be useful for predicting water levels in drainage sections that do not have sensor coverage.

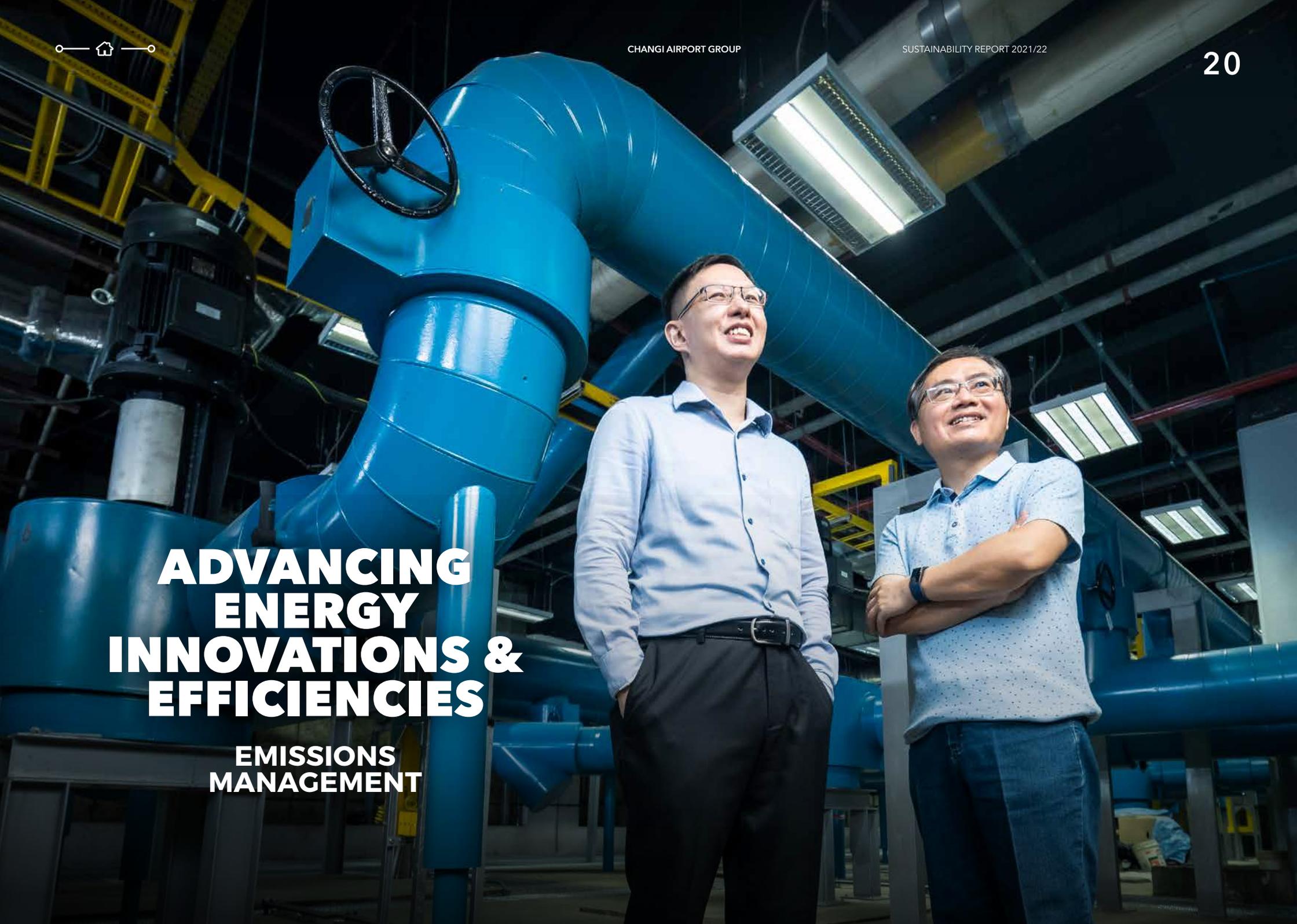
CAG also obtained insights to develop sound strategies that will enhance Changi Airport's long-term climate resilience.

Preparing our infrastructure for intensifying rainfall

The expansion of Changi's drainage monitoring system has also been accompanied by infrastructural

upgrades to abate the effects of intensifying rainfall. Some of these measures include:

- Expanding drains progressively to accommodate 1-in-100-year rainfall intensity.
- Raising road humps before and after the Terminal 2 and 3 underpass along Airport Boulevard to reduce the risk of excessive rainwater entering and accumulating along the depressed stretches of road. Storage tanks collecting rainwater runoff from these underpasses will be expanded to comply with the latest Public Utilities Board (PUB) requirement to hold at least 6 hours of rainwater.
- Building redundancy into the drainage-related pumping systems, with two independent sets of water level probes and n+2 number of pumps to increase the system's resilience against breakdowns.
- Increasing frequency of sweepings of foliage and debris to minimise choking in the network.

A photograph of two men standing in an industrial facility. They are surrounded by large, bright blue pipes and machinery. The man on the left is wearing a light blue long-sleeved shirt and dark trousers, and is looking upwards with a smile. The man on the right is wearing a light blue short-sleeved polo shirt and jeans, and is also smiling. The background shows a complex network of pipes, valves, and industrial equipment under bright overhead lights.

ADVANCING ENERGY INNOVATIONS & EFFICIENCIES

EMISSIONS
MANAGEMENT

OUR PRIORITIES

CAG recognises that climate change is a major threat to our planet and is committed to reducing our carbon footprint. We have developed ambitious goals, such as seeking Zero Carbon Growth in Scope 1 and 2 emissions until 2030 and capping absolute emissions at 2018 levels. CAG stands with airports globally in our long-term commitment to slow climate change.

CAG is committed to collaborating with partners and suppliers who prioritise the innovation and development of sustainable alternatives. This will enable Changi Airport and our wider community to reduce emissions, adapt to climate change and emerge more resilient.

OUR PROCESSES

Policies

- CAG's Environment Policy
- CAG's Environmental Management System

Practices

- CAG's Carbon Management Plan
- Airport Carbon Accreditation (ACA)
- Quarterly and Annual Energy Reporting
- Carbon Reduction Initiatives
- Internal Assessment and Auditing
- Training And Awareness

OUR TARGETS

- Zero carbon growth until 2030, capping absolute emissions at 2018 levels: **On Track**
- Maintain ACI Airport Carbon Accreditation Level 3 certification: **Achieved**
- Maintain ISO 14004:2015 certification: **Achieved**

OUR SDGS



OUR CHANGE AGENTS

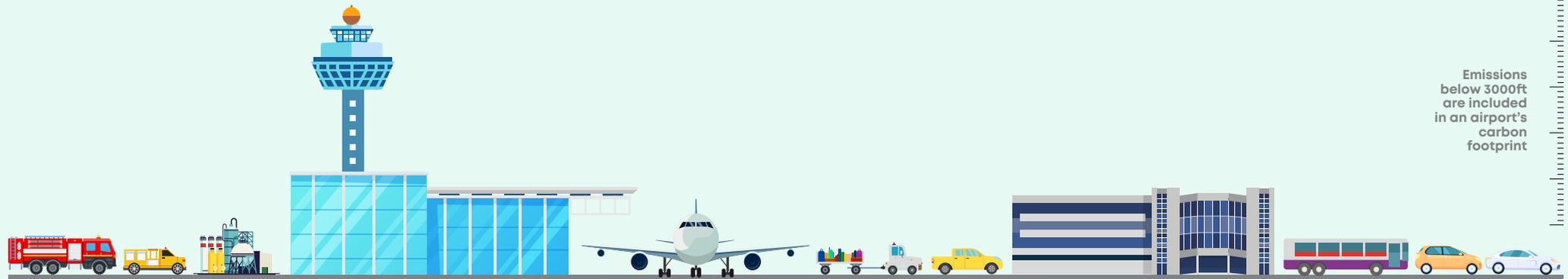


CAG'S CARBON FOOTPRINT ¹

582,414 tCO₂e
TOTAL GHG EMISSIONS

Emissions above 3000ft are not part of an airport's carbon footprint

Emissions below 3000ft are included in an airport's carbon footprint



773 tCO₂e
SCOPE 1 (0.1%)

(CAG vehicles and emergency power generators)



106,154 tCO₂e
SCOPE 2 (18.2%)

(electricity consumption for terminal buildings)



475,487 tCO₂e
SCOPE 3 (81.6%)²

Airline Emissions
(ground and flight operations <3000ft)



GSE Emissions
(fossil-powered ground support equipment)



Partner Emissions
(electricity consumed by tenants and private developers at the airport)



User Emissions
(passengers and airport users' surface access)



1. CAG's overall carbon footprint includes significant emission sources and have been prepared in accordance with ISO 14064, GHG Protocol and ACA guidelines, verified by an independent, third-party accredited verifier. The full methodological approach can be found in Appendix A. FY21/21 GHG emissions is subject to validation, and excludes Jewel in accordance to the Airport Carbon Accreditation methodology
2. These are non-exhaustive examples of key Scope 3 carbon emissions categories.

CAG's Carbon Targets

CAG commits to Zero Carbon Growth until 2030 in our Scope 1 and 2 emissions by capping our absolute emissions at 2018 levels. This target takes into consideration the growing number of passengers that Changi Airport will be serving in the years ahead. We will continue to strive towards a Net Zero aspiration by 2050 through the use of new technologies and increased adoption of renewable energy, while being further enabled by national grid decarbonisation.

This target affirms CAG's continued commitment to the environment as we push ahead with innovations and partnerships to support Singapore's overall goal to achieve Net Zero around the middle of the century. We will work closely with the aviation community to achieve our goals and progress as an industry. We are adopting a four-pronged approach to reduce our carbon emissions collectively with our partners:



Measurement

- Carbon Footprinting in accordance with the ISO14064-3:2006 standard, the Greenhouse Gas Protocol (GHG Protocol) and the ACI Airport Carbon Accreditation (ACA) methodology
- Quarterly energy consumption management reporting



Reduction

- Emissions reduction target-setting and measures
- Annual emissions monitoring and management reporting



Self-Assessment and Auditing

- CAG's annual carbon footprint is externally reviewed by a 3rd party verifier and accredited by ACI ACA
- CAG's EMS is ISO 14001:2015 certified. It is externally audited annually and certified on the standard 3-year cycle
- CAG's energy usage and its Energy Efficiency Improvement Plan are submitted to government authorities annually in accordance with Singapore's Energy Conservation Act



Awareness and Training

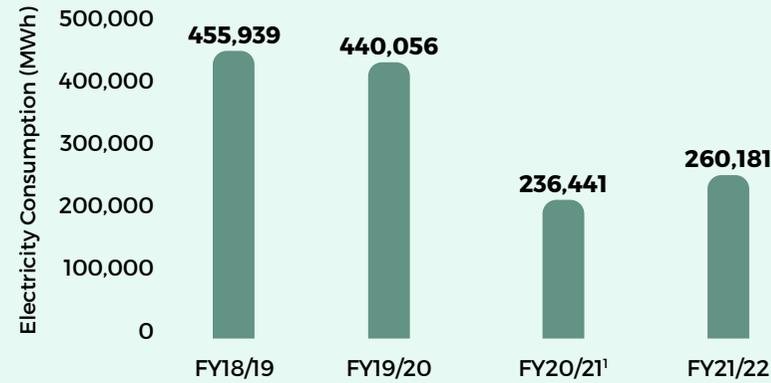
- ISO 14001 training for CAG staff
- Climate change workshops
- Long-term carbon goal-setting ACI webinars
- Regular employee engagement activities to increase environmental awareness and action



Electricity Consumption

Electricity consumption constitutes 99.3% of CAG's Scope 1 & 2 emissions. In FY21/22, CAG consumed 260,181 MWh of electricity, a 10% increase over FY20/21 due to increased business activity with progressive travel re-opening. Nonetheless, this was still 43% lower than our pre-Covid consumption of 455,939 MWh in FY18/19 as Terminals 2 and 4 remained closed.

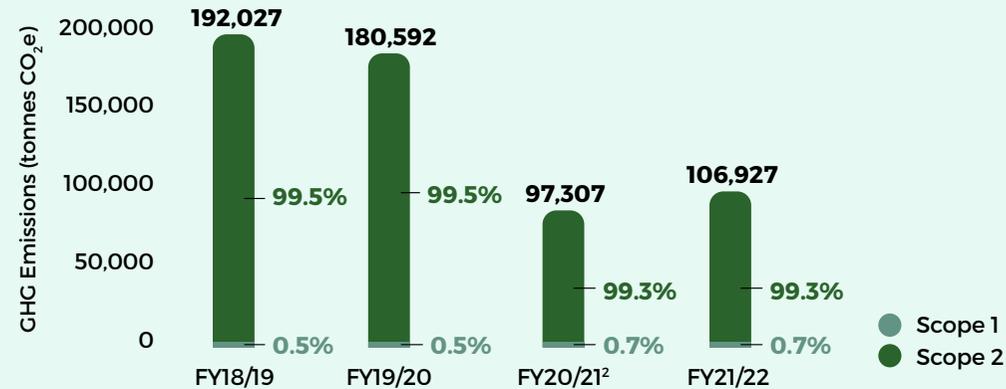
ELECTRICITY CONSUMPTION



GHG Emissions

A total of 582,144 tonnes CO₂e of GHG emissions was recorded in FY21/22, with Scope 1 and 2 accounting for 0.1% and 18.2% respectively. Scope 3 emissions form the largest proportion of our footprint at 81.6%.

GHG EMISSIONS



1. The FY20/21 electricity data has been restated due to retrospective adjustments of 674 MWh (0.3% difference) in the amount of electricity resold to third parties.

2. Emissions data for FY20/21 has been restated according to the adjustment made to electricity consumption (see Footnote 1).

Carbon Reduction Measures

'Control, Guide and Influence' Approach

CAG has adopted a control, guide and influence approach to effectively reduce our carbon emissions. Our priority is to reduce Scope 1 and 2 emissions, since these are within CAG's direct control and influence. We will also guide our partners through contracts and agreements, such as our sustainable procurement guidelines, to support the appointment of energy-efficient suppliers. We will make provisions in our planning to help our airport community reduce their emissions.

Strategies for 'Zero Carbon Growth until 2030' Target

CAG is taking active steps to minimise additional electricity consumption from automation and new airport activities. Measures include:

- Undertaking **asset replacement and upgrades** to build more energy-efficient systems;
- Actively monitoring and exploring new technologies to boost **building energy efficiencies**;
- **Reducing reliance** on fossil fuels through electrification;
- Progressively increasing our share of renewable energy; and
- **Increasing employee communications and engagement** to raise awareness of energy reduction measures.

As 99.5% of our carbon emissions are drawn from the electricity grid, national grid decarbonisation efforts will be a key

lever to drive significant reductions in CAG's carbon footprint. Singapore's grid emission factor is expected to further decline with its four switches to transform our energy supply – comprising:

- Natural gas;
- Solar power;
- Regional power grids (to expand Singapore's access to renewable energy); and
- Low-carbon alternatives (such as hydrogen power and carbon capture, utilisation and storage).

CAG will actively monitor developments on all fronts and pursue opportunities to advance our emissions reduction efforts.

Supporting our Partners' Decarbonisation Journeys

Beyond our own Scope 1 and 2 emissions, CAG is also committed to partnering our airport community to address Scope 3 emissions.

A significant part of the aviation industry's carbon footprint comes from the consumption of jet fuel. To support our partners' efforts to reduce aircraft emissions, we have been exploring several initiatives. One of the most promising pathways the industry has identified for the medium term is the use of sustainable aviation fuel (SAF).

Together with Singapore Airlines, Temasek Holdings and other government agencies, we conducted a study examining supply and demand considerations for SAF in Singapore. We are also supporting a one-year trial at

Changi Airport, which will see Singapore Airlines and Scoot purchase 1.25 million litres of neat SAF that will be delivered through the airport fuel hydrant system.

Ensuring Good Ambient Air Quality

A key priority of CAG is ensuring a safe and healthy work environment for our

airport employees. We conduct annual Industrial Hygiene Monitoring checks on air quality in the baggage handling areas. This year, results obtained were well within the Permissible Exposure Limits stipulated by Singapore's Ministry of Manpower.



CAG'S EMISSIONS TARGET:

CAG commits to zero carbon growth until 2030, capping our absolute emissions at 2018 levels.

FEATURE STORY

COOLING OUR ENERGY CONSUMPTION

STARTING WITH T1

Like many large buildings in Singapore, our terminal buildings rely on chiller plants to provide air conditioning. These plants consist of multiple parts, such as the chiller to provide cooling, cooling towers for heat rejection and pumps to circulate water into the system.

As the air-conditioning equipment had reached the end of its lifespan, CAG's Engineering Management and Systems Planning team decided it would be more efficient to overhaul the system in the long-run, rather than merely carrying out a one-to-one replacement of these assets. A key improvement feature was replacing two chiller plants with a single high-efficiency plant. By consolidating the chiller plants, we simplified our maintenance

processes and minimised the load on pumps to reduce energy costs.

Our new market-leading chiller features advanced technologies such as a magnetic bearing, and a vibration-free compressor that is quieter and more robust than previous chillers. It is also equipped with a management system that offers comprehensive data analytics and predictive maintenance functions for continuous operation at optimal levels.

Through this retrofitting exercise, we managed to tackle the inefficiencies of each individual component while ensuring a holistic system design that works seamlessly together using smart controls.

Air-conditioning is the largest source of energy consumption in our terminal buildings. Given its considerable contribution to our carbon footprint, CAG is always on the lookout for ways to improve the energy efficiency of Changi Airport's air-conditioning equipment. As we began replacing Terminal 1 and 2's air-conditioning systems, we retrofitted our systems with the latest energy-saving technologies.

HIGHLIGHTS OF T1 AIR-CONDITIONING RETROFITTING EXERCISE



ENERGY CONSUMPTION

Reduced by
~25%

from **0.87 (kW/RT¹)**
to less than
0.65kW/RT²



ENERGY SAVINGS

Over
7 GWh
per year

enough to power
**nearly 1,500 4-room
HDB flats for a year**



WATER CONSERVED

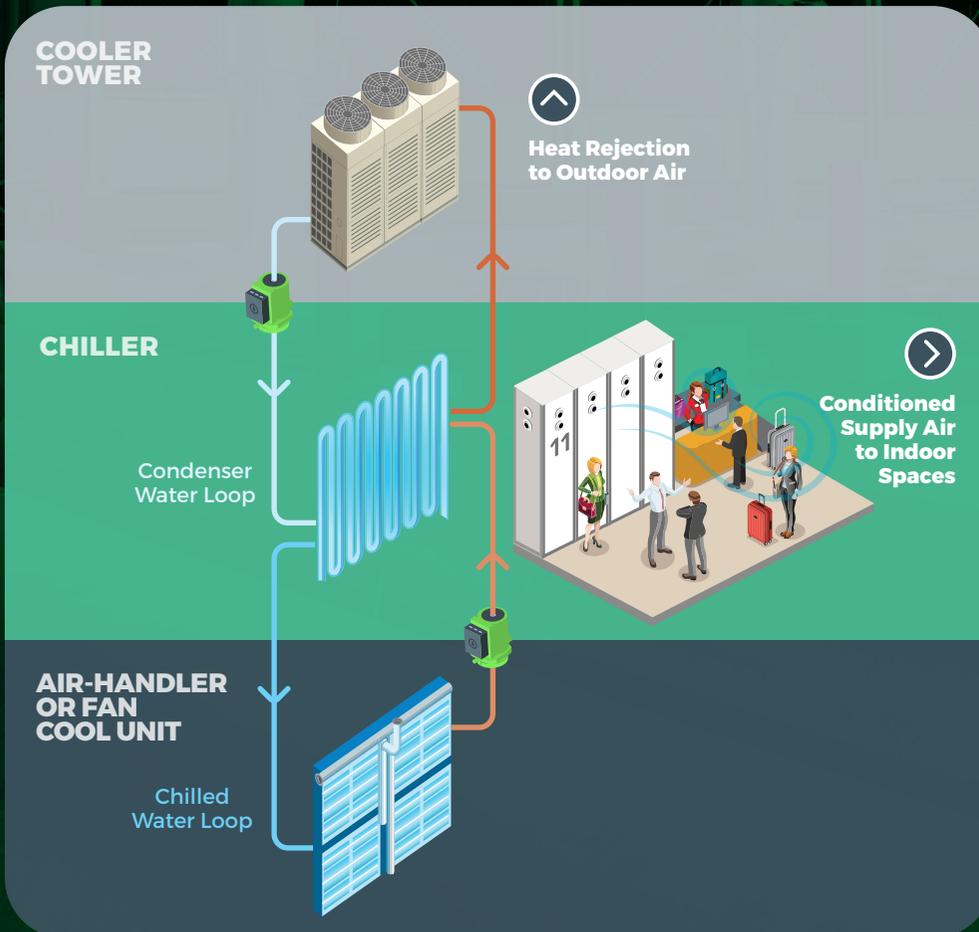
Over
11,000m³
per year

1. kW/RT – kilowatts per tonne of refrigeration
2. Building and Construction Authority's (BCA) Green Mark Platinum standard

FEATURE STORY

COOLING OUR ENERGY CONSUMPTION

CONT'D



BOOSTING OUR EFFORTS AT T2

The success of the T1 chiller plant retrofits prompted us to adopt a similar approach with T2, but on an even larger scale. We took the opportunity to revamp the entire system, including the chiller plants as well as air handling systems and units (AHS and AHUs).

We began by conducting a system-wide audit to evaluate the overall design of our air-conditioning system. We also considered factors such as the system's energy efficiency, the demands of long-term maintenance, as well as how the new system would benchmark against current best practices.

Rather than working with different vendors to separately design and supply the chiller plant and AHS/AHUs, we realised that we could achieve greater synergy by holistically designing the entire system. Such an approach would allow the overall design to be streamlined for optimal energy performance. It would also provide insights into how we could tweak parameters to achieve the highest efficiency, be it lowering the chiller plant supply water temperature or increasing fan speeds.

This exercise ensured that the final system design would meet the Green Mark Platinum standards stipulated by the Building and Construction Authority of Singapore (BCA). It also suggested ways to overcome existing limitations and scale up future capacity, as we look towards implementing this more broadly across the airport.

PROJECTED RESULTS OF T2 AIR-CONDITIONING UPGRADING EXERCISE (TO BE REALISED IN 2023)

**ENERGY
SAVINGS**

Over
12 GWh
per year

enough to power
nearly 2,500 4-room
HDB flats for a year

Ready for the Future

To manage rising manpower costs required in maintenance, we have invested heavily in smart technologies. For example, by using intelligent sensors for condition monitoring, we are now able to pick up performance trends and tell-tale signs of impending failure to enable more targeted maintenance efforts.

Even as we strive toward greater efficiency, we are also taking conscious steps to reduce our impact on the environment. One of the ways we are doing this is by transitioning to environmentally-friendly refrigerants in our new chiller plants.

To ensure sustained efficiency, we have adopted BCA's recommended approach on energy performance contracting. In our procurement exercises, vendors are now required to guarantee efficient performance of the entire chiller plant over its life span.



Even as we strive toward greater efficiency, we are also taking conscious steps to reduce our impact on the environment.



INNOVATIONS FOR RESPONSIBLE WASTE MANAGEMENT

WASTE
MANAGEMENT

OUR PRIORITIES



CAG strives to achieve Zero Waste by managing waste efficiently through continually exploring innovative technologies and collaborating with partners to improve waste recycling rates. CAG

implements various practices to close the waste loop, minimising waste sent to incineration plants.

OUR PROCESSES

Policies

- CAG’s Environment Policy
- CAG’s Environmental Management System

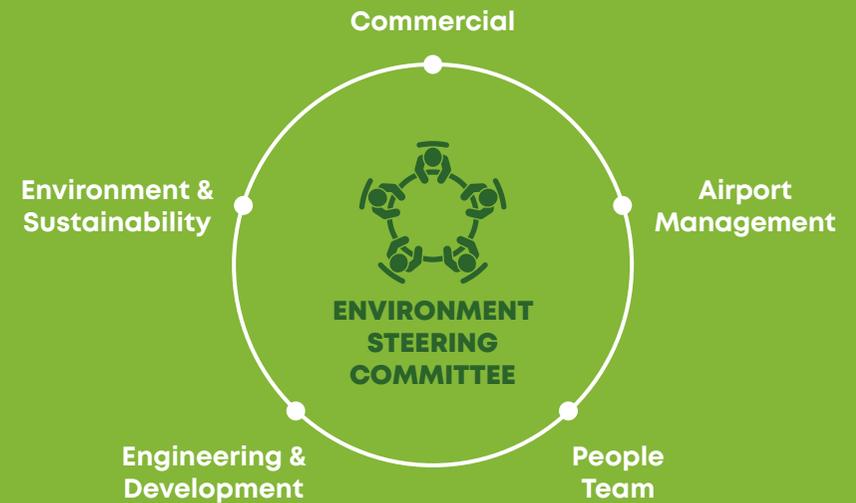
Practices

- Operational Control Procedures for Proper Waste Management and Resource Conservation
- Onsite Food Waste Digestion
- Monitoring Technologies to Reduce Waste Volumes and Raise Recycling Rates
- Regular Communications and Collaborations with Stakeholders
- Upcycling of Used Materials for Newly Refurbished Areas

OUR SDGS



OUR CHANGE AGENTS



At CAG, we optimise waste management by reducing waste at source, encouraging good recycling practices and implementing effective waste collection systems. Close collaboration and communication with licensed contractors, airport partners and cleaners have enabled CAG to identify opportunities to use our resources more efficiently. Projects we embarked on over the past year included the upcycling of old building materials and composting of horticultural waste.

Regular tracking and monitoring of different waste streams and volumes enhance our understanding of how we can further reduce, reuse and recycle waste materials. Our waste control procedures are also reviewed annually to align with statutory requirements and mitigate any environmental risks.

To achieve our aspiration of becoming a Zero Waste airport, CAG continues to

reduce the amount of waste generated as passenger traffic recovers. We are also reviewing our waste reduction goals to align with national targets.

Bringing Recycling Points Closer to Office Tenants

To build a culture of sustainability amongst the airport community, CAG continually explores ways to foster better recycling practices.

A recent observation that shorter distances between offices and recycling points encouraged more regular recycling habits led the Facilities Management team to position recycling collection points closer to office locations. This resulted in more office supplies, such as paper and electronic waste, being recycled.

In early 2022, we partnered with SGRecycle, which runs a nationwide network of reverse vending machines for paper recycling, to install one of their machines at the south-east pier of Terminal 1. The bin incentivises recycling by awarding users with points that can be redeemed for cash.

An e-waste collection bin was also placed beside the SGRecycle machine to encourage the recycling of unwanted electronic items. Within the first two months of operation, more than 1300 kg of paper and 100 kg of e-waste were recycled. This positive response affirms our longer-term plan to install more bins across the airport to manage waste more responsibly.

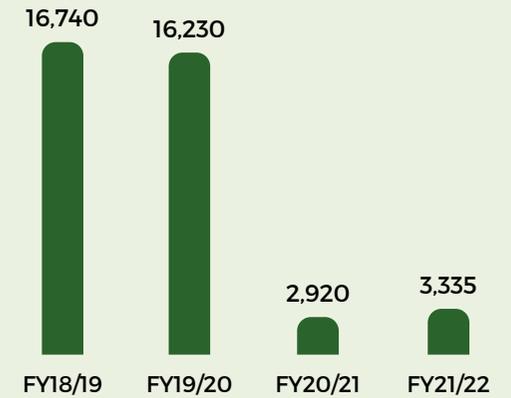


Upcycling Old Building Materials: Turning Trash into Treasure

The ongoing T2 Expansion works involves the demolition of large parts of the existing terminal and the replacement of old building materials. To promote waste conservation, CAG mooted "Project Upcycling", a collaboration with local institutions of higher learning to explore how old building materials might be reused or transformed into new products or art pieces for the airport.

"Project Upcycling" was also a way to celebrate and preserve T2's heritage. The project officially kicked off in the later half of 2021, as CAG partnered with students from the National University of Singapore, Singapore University of Technology and Design, and the Laselle College of the Arts to create products and art pieces out of salvaged building materials including floor tiles, wooden cladding and even baggage belts. The students were also briefed on the history and features of

TOTAL WASTE GENERATED (TONNES)



* Waste volumes in FY20/21 and FY21/22 decreased due to global impact on air travel.

the old T2 to give their creations richer context.

The project is still ongoing as parts of T2 are still being upgraded. Shortlisted creations will be produced and enjoyed by our passengers in the newly-renovated T2!

% OF WASTE DIVERTED FROM WASTE STREAMS



*Includes FY21/22 horticultural waste

HORTICULTURAL COMPOSTING - PUTTING OUR WASTE TO GOOD USE

Every year, the CAG Horticulture team works to beautify Changi Airport by maintaining our garden spaces and filling the airport with greenery specially grown in our airport nursery. In an effort to close the waste loop, the team has been actively diverting waste from our nursery and gardens to be used as compost.

the incinerator, they are given a second life as compost. Sunflowers are especially suitable due to their high nutrient content and relatively short rate of composting.

An example of garden waste that we recycle are the withered stems of sunflowers. Instead of sending them to

Over the next few years, we plan to expand our waste recycling efforts to include more waste from our gardens as well as the trees and plants along Airport Boulevard.

CLOSING THE WASTE LOOP



1

Sunflower stalks are shredded manually with a woodchipper to enable optimal mixing and aeration. This creates a greater surface area to break down the organic matter, speeding up the decomposition process.



2

Shredded waste is piled up and left in the sun for one to two weeks before soil and an eco-friendly sodium bicarbonate treatment mixture are added to eliminate pests and sanitise the waste. The heap is then ploughed and left untouched for the decomposition process to occur.



3

New compost is ready for use after two to three months. The compost provides enriching nutrients to support plant growth. This organic compost is not only more sustainable, but also safer than man-made chemical fertilisers that may leach and cause harm to both the environment and nursery workers. Our reduced dependence on chemical fertilisers has also resulted in cost savings.



INNOVATIONS FOR WATER CONSERVATION

WATER
MANAGEMENT

OUR PRIORITIES

CAG endeavours to improve our water management across all terminals for a more water-resilient future. Our goal is to reduce water

consumption and strengthen our wastewater recycling capabilities by harnessing new systems and technologies for greater water efficiency.

OUR PROCESSES

Policies

- CAG's Environment Policy
- CAG's Environmental Management System

Practices

- CAG's Water Optimisation Strategy
- SMART Metering of Water Consumption
- Certified Water Efficient Building by the Public Utilities Board (PUB)

OUR SDGS



OUR CHANGE AGENTS



CAG endeavours to improve the management of water across all terminals for a more water-resilient future, especially as traveller and public footfalls increase in the coming years. Our goal is to strengthen our chiller condensate and waste water recycling capabilities by harnessing new systems and technologies for greater efficiencies.

CAG's Water Optimisation Strategy

We have adopted a water optimisation strategy to aid us in achieving our water management goals. This strategy directs CAG's focus towards reducing water consumption and increasing water usage efficiencies. We are reducing our use of potable and non-potable water across all areas, ranging from toilets and building cooling systems to irrigation and cleaning.

Examples of Water-Saving Measures Implemented at Changi Airport



POTABLE WATER

- Retrofitted water taps with water-efficient devices, such as water thimbles
- Established highly-responsive leakage reporting and repair management systems to enable more timely fault reporting
- Engaged the public and airport community with water conservation messages

Did you know?

We replaced **more than 170 manual taps** with contactless taps in terminal buildings' airside washrooms. Each contactless tap discharges just **two litres of water a minute**, compared with five litres for manual taps!



OTHERS

- To reduce water usage, purified alkaline water is used to rinsing off cleaning chemicals

Did you know?

Purified pH12.5 ionised alkaline 'Z Water' is produced onsite at the airport using advanced Japanese technology.



NON-POTABLE WATER

- Monitoring and maintaining cooling towers, including water treatment system and controls
- Adopted high water efficiency cooling towers and chiller plant designs, where feasible
- Exploring technologies to reduce building cooling load and reliance on air-conditioning systems, which in turn lowers water usage in the cooling towers
- Harvesting rainwater for irrigation at our nurseries
- Using recycled condensate water in cooling towers
- Incorporating rainwater recycling in building designs

Did you know?

T1 chiller plant upgrades will help Changi Airport **conserve over 11,000 m³ of water annually**, equivalent to the annual water consumption of over 600 HDB flats.

Did you know?

Jewel's iconic Rain Vortex features harvested rainwater, which is **purified and re-used** in the waterfall.

Water Consumption

	FY18/19	FY19/20	FY20/21	FY21/22
Potable water	1,050,000 m ³	818,000 m ³	448,000 m ³	463,000 m ³
NEWater	2,176,000 m ³	2,454,000 m ³	861,000 m ³	783,000 m ³
Total Consumption	3,226,000 m ³	3,272,000 m ³	1,309,000 m ³	1,245,000 m ³
Water Discharge	2,273,000 m ³	2,064,000 m ³	904 000 m ³	815,000 m ³

* In FY20/21, CAG adopted a new methodology to compute water discharge. The historical discharge data for FY18/19 and FY19/20 have been adjusted accordingly for a like-for-like comparison.



BUILDING AN EXCELLENT WORK CULTURE

FAIR EMPLOYMENT PRACTICES

OUR PRIORITIES



Our people play vital roles as value creators within and outside the airport community. By supporting them with the right people strategies, we drive employee morale,

engagement and retention, while grooming future leaders to secure CAG's continued growth.

OUR PROCESSES

Policies

- CAG's Employment Philosophy

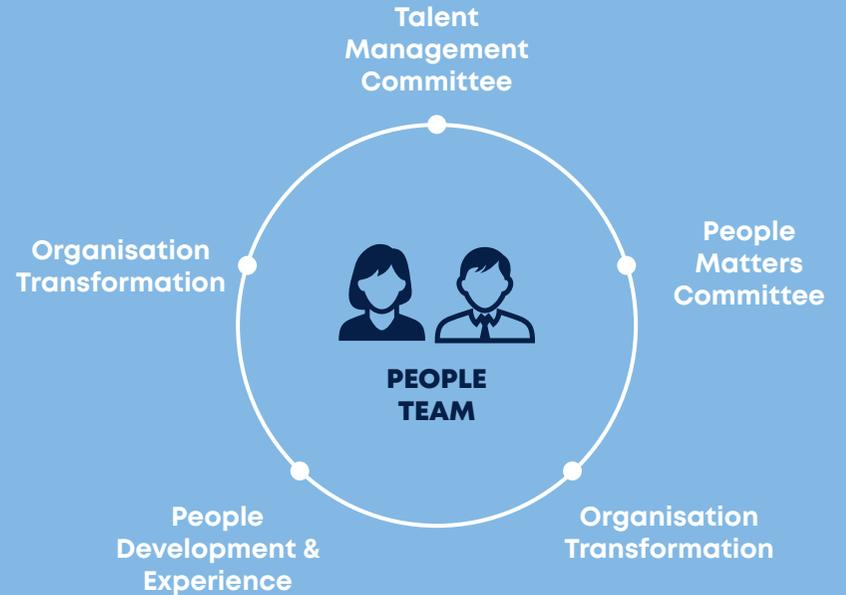
Practices

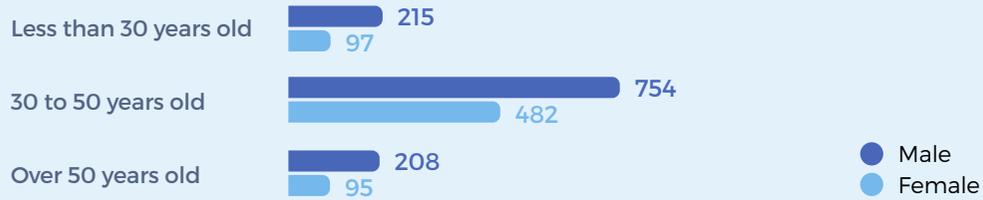
- Freedom of Association and Collective Bargaining
- Grievance Mechanisms and Non-Discrimination
- Employment Benefits and Welfare

OUR SDGS



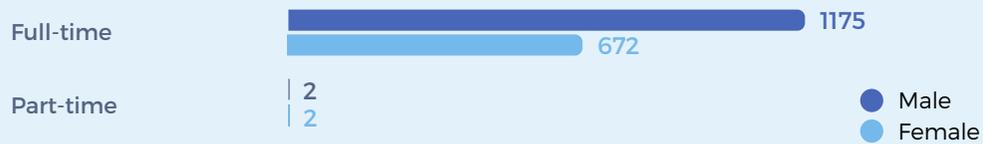
OUR CHANGE AGENTS



TOTAL EMPLOYEES BY GENDER AND AGE GROUP


In FY2021/22, 25.8% of CAG's employees were from Airport Emergency Services (AES). A sizeable portion of CAG's employees comprises the AES team; due to the nature and physical expectations of these careers, the AES profile has predominantly been younger men.

TOTAL EMPLOYEES BY GENDER AND EMPLOYMENT CONTRACT

TOTAL EMPLOYEES BY GENDER AND EMPLOYMENT TYPE

NUMBER OF NEW HIRES BY GENDER AND AGE GROUP

EMPLOYEE TURNOVER BY GENDER AND AGE GROUP

Methodology

Employee numbers are reported by headcount. Contractors and workers who are not employees make up about 8% of CAG's workforce, working mainly in administration and operations.

There were no reported instances of workplace discrimination in FY 21/22.

COLLECTIVE BARGAINING AGREEMENTS


PERCENTAGE OF TOTAL EMPLOYEES COVERED BY COLLECTIVE BARGAINING AGREEMENTS

58%



PERCENTAGE OF CAG'S EMPLOYEES THAT ARE PART OF THE SINGAPORE MANUAL AND MERCANTILE WORKERS' UNION (SMMWU)

31%

At CAG, we are committed to cultivating a work environment that is conducive for our employees' professional growth and well-being.

Freedom of Association and Collective Bargaining

Ensuring fair and equal terms and opportunities for all employees is a priority for CAG. 31% of CAG's workforce are members of the Singapore Manual and Mercantile Workers' Union (SMMWU) – a National Trades Union Congress (NTUC) affiliate. Moreover, 58% of CAG's employees are covered by Collective Bargaining Agreements pertaining to their general employment terms and conditions. The strong relationship between CAG and our unions enabled us to retain our employees' jobs during the Covid-19 pandemic.

Recognising that CAG's success is fuelled by efforts of the entire airport community, we actively engage and partner with airport unions and the NTUC Aerospace and Aviation Cluster on initiatives to improve airport workers' welfare.

Regular dialogues with key unions are integral to uncover and resolve operational challenges. These, in turn, enable CAG to develop safer and more welcoming workplace conditions for our airport community.

Grievance Mechanisms and Non-Discrimination

As a Human Capital Partner of the Tripartite Alliance for Fair and Progressive Employment Practices (TAFEP), CAG's corporate policy is aligned with the 5 Principles of Fair Employment Practices, endorsed by TAFEP.

In line with this, CAG's commitments extend from honing our employees' skills and knowledge at all stages of their career to establishing proper channels for managing employee grievances. A fair and objective grievance mechanism has been established to manage each incident with due process and reason across the Group. As an equal opportunity employer, we take a firm stance against all forms of workplace discrimination, including those that impact our stakeholders. An open channel of communication is available for all employees to provide feedback directly to CAG's CEO.

CAG also supports the sharing of best practices with TAFEP's community of employers.

FEATURE STORY

CAG'S AIRSIDE PROFESSIONAL SHIFT TEAM TRANSFORMATION PROGRAMME

Projections of strong growth in aircraft and passenger traffic, increasing complexity of airside processes, and shifts in employee demographics and profiles were key factors that led CAG to plan a holistic review of Changi Airside's concept of operations. A project team – comprising representatives from its People Team (PT) and Airport Operations Planning & Airside (AOP&A) unit – was set up to re-design this concept of operations and drive a manpower transformation effort aimed at ensuring a high-functioning airside.

The team embarked on a joint study on the concept of airside operations and job re-design in 2020. The new concept of operations entailed an Airside Professional Shift Team taking overall command on the ground and realigning areas of responsibilities, to harness synergies and optimise manpower deployment on the airside. The team would be empowered to make real-time decisions for airside incidents and work closely with stakeholders to achieve the highest levels of safety, capacity and efficiency.



In defining the Airside Professional Shift Team's role, CAG recognised that our incumbent employees possessed many of the skills and experience that the team needed. From their long track record, performance and contributions, it was clear that an upskilling programme would not only enable CAG to retain valuable talent, but also enable us to quickly build up a skilled team who would enjoy enhanced career progression opportunities.

Yeo Kia Thye, Managing Director
Airport Operations Planning and Airside

Training and Growing the Airside Professional Shift Team

CAG embarked on professionalising the shift team and multi-skilling employees to execute effective command and make critical judgement calls on the ground. Extensive staff and union engagements were held in tandem to support Airside Operations' operational and team transformation.

The project team worked with a team of consultants and experts from

different stakeholder groups to develop a comprehensive training programme to train more than 80 officers in four batches by 2023. Training was undertaken in batches to ensure business continuity and support recovering aircraft and passenger traffic. The first batch of trainees completed their six-month training in April 2022 and were deployed successfully to their new roles. The second batch of trainees is undergoing training and will be deployed in October 2022.

AIRSIDE PROFESSIONAL SHIFT TEAM'S KEY AREAS OF RESPONSIBILITY



Runway and Taxiway Management

- Manage runway and taxiway operations, including coordinating required closures and safe reopening with Air Traffic Control
- Pre-empt and mitigate runway issues
- Provide strategic decision-making support in real-time to effectively manage critical situations, such as runway closures and airside incidents
- Ensure the operational safety of infrastructure and airside environment by conducting regular inspections, supported by surveillance tools to pick up potential hazards



Airside Flow Management

- Ensure efficient resource allocation through effective use of technology and tools to optimise aircraft flow, aircraft stand and gate planning
- Effectively manage stand compatibility (with aircraft type), flight schedules, terminal operations, ongoing construction/upgrading works
- Work with internal and external stakeholders to monitor ground situations, and to coordinate follow-ups to operational incidents/issues



Apron Management

- Ensure serviceability of our airport infrastructure through regular inspections
- Oversee the safety of turnaround activities, and proactively detect ground service provider infringements
- Promote safe work behaviour by engaging with ground service providers



NURTURING PEOPLE, MAXIMISING TALENTS

PEOPLE
DEVELOPMENT

OUR PRIORITIES



At CAG, we understand that learning and development is a continuous journey. To ensure every knowledge milestone remains fun, refreshing and relevant, our People Team scans

the corporate training landscape and explores new learning platforms that go beyond the classroom.

OUR PROCESSES

- Policies**
- CAG's Learning Policy
- Practices**
- Training Programmes
 - Performance Management Framework
 - Annual Potential Assessment Exercise

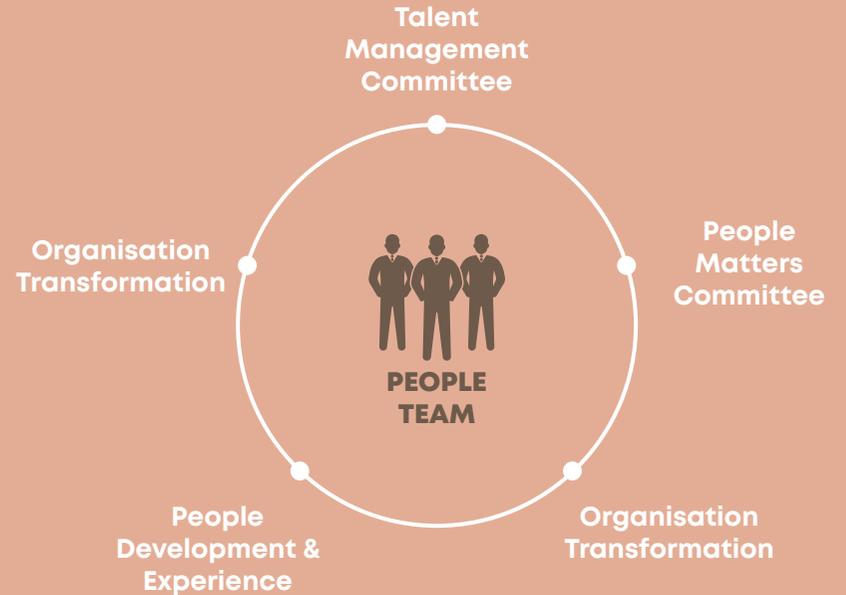
OUR TARGETS

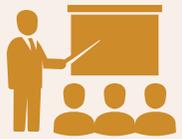
- Employees who attended at least 1 training programme during the year: 96%

OUR SDGS



OUR CHANGE AGENTS





TOTAL NUMBER OF TRAINING EVENTS

182



PERCENTAGE OF EMPLOYEES ATTENDING AT LEAST ONE TRAINING EVENT

96%

PERCENTAGE OF LEARNING AND DEVELOPMENT PROGRAMMES, BY CATEGORY



SOCIAL

1.5%



FORMAL LEARNING

98.5%

CAG categorises learning and development programmes into 3 categories - Experiential, Social and Formal Learning.

- **Experiential Learning** provides hands-on experiences to better connect real-world situations. Due to Covid-19 restrictions, we were unable to implement onsite experiential learning activities.
- Social Learning aims to provide learning through observation of behaviours, such as through brownbag talks or LearnFest.
- Formal Learning refers to focused and structured learning programmes identified and defined by the organisation.

AVERAGE YEARLY TRAINING HOURS, BY EMPLOYEE CATEGORY



MALE

37.64



FEMALE

3.77



SUPPORT STAFF

25.31



PROFESSIONAL STAFF

9.44

BREAKDOWN PERFORMANCE AND CAREER DEVELOPMENT REVIEWS



MALE SUPPORT STAFF

384



FEMALE SUPPORT STAFF

93



MALE PROFESSIONAL STAFF

793



FEMALE PROFESSIONAL STAFF

579

** Higher average training hours among male employees is due to the inclusion of mandatory annual AES training - AES consists of predominantly younger males owing to the nature and demands of the job.

Moreover, as a result of Covid-19, CAG has also moved to learning programmes on LinkedIn Learning and other virtual programmes for non-AES employees, which are of shorter duration.

To support a culture of excellence, CAG continues to invest in developing a dynamic and motivated workforce that believes in and supports our corporate and sustainability objectives.

Performance Management Framework

CAG has carefully designed a structured Performance Management Framework that supports both our employees' professional aspirations and our organisational goals. Our employees benefit from a three-part annual review process that equips them with guidance and resources to achieve their potential.

At the start of each financial year, employees and their reporting officers engage in Performance and Development Planning to uncover developmental needs, as well as to define their performance and career goals, in close alignment with CAG's business objectives.

We conduct a mid-year review to monitor progress and provide support for employees to stay on track in attaining their targets. A year-end

performance review evaluates each individual's achievements and areas for development, with a longer-term view on career development goals and opportunities.

Developing Digital-Ready Employees: From Learning to Applying

In FY2021/22, FutureReadyME continued to take centre stage as CAG focused on developing and upskilling our employees to succeed in the digital world. In addition to the series of FutureReadyME programmes to equip all employees with fundamental of digital literacy skills, we encouraged employees to tap on the FutureReadyME Fund to advance their digital skills and knowledge.

To further cultivate a strong mindset for digital innovation within CAG, we also purposefully embedded 'Growth Mindset' initiatives into our day-to-day work, such as through meetings and conversations. The impact of these initiatives is evident as employees are increasingly applying Growth concepts and incorporating innovative approaches to their projects and areas of responsibility.



In FY2021/22, FutureReadyME continued to take center stage as CAG focused on developing and upskilling our employees to succeed in the digital world.

My digital learning journey started at a 3-day Hackathon, organised by Low Code Centre of Excellence (CoE) under the FutureReadyME umbrella of programmes. The event showcased two Microsoft applications – “Power Automate” and “Power Apps” – for boosting productivity through automating and streamlining work processes.

My primary goal for attending had been to learn about automating processes using Power Automate. As it turned out, the Power Apps demonstration was what caught my attention. Its ability to collect and display information easily in a structured manner piqued my interest and I decided to learn more about it from available online resources.

Having to learn something from scratch presents many challenges. The nagging thought I had was “What if after spending so much time and effort, I am still unable to learn or apply the skills?” I finally overcame this by choosing to adopt a growth mindset and found motivation by reminding myself that I can become better at a new skill and the key was to continue putting in effort and trying.

My team and I began creating the Vendor Management App that would

replace the existing system and resolve two key procurement issues.

The first issue was procurement process delays brought about by system limitations - CAG employees were not able to check if a vendor had been successfully created in the system nor verify a vendor’s details before a Purchase Order was ready to be created. The second was the extra time needed for the Enterprise Performance Procurement team to seek out missing vendor information when employees submitted incomplete requests for creating or editing vendor details.

During the app development process, we encountered many different issues. We were able to resolve most issues by using the vast resources available on Google, YouTube and online forums where other developers shared creative solutions and perspectives to address the issues on hand. These small wins we experienced, helped to keep us going!

We developed multiple iterations of the app as more functionalities were added to make it a one-stop shop for all vendor-related matters. After three months, the Vendor Management app was finally ready. The new app allows CAG staff to view vendor details in the Enterprise Resource Planning (ERP)

accounting system. When submitting requests to create and edit vendor details, staff are guided by automated validations to ensure that the required information is properly entered, reducing the need for additional follow up from the Procurement team.

The launch of the app marked the first time an app-based solution had been developed entirely in-house at CAG. Thankfully, no major issues were reported. As a team, we were very encouraged by the positive feedback received.

Looking back on my journey, I never thought that someone like me, without any formal IT training, would be capable of developing an app from scratch, let alone creating complex approval workflows. The trust and support from my team and Reporting Officer, along with the FutureReadyME learning resources made available by the People Team, made all this possible.

We are very excited to continue on our digital journey. We hope to further enhance our existing apps and roll out more user-friendly apps as well as automation to streamline more finance-related processes.



WENDY HENG
Manager, Procurement, Enterprise Performance team

FEATURE STORY

DIGITAL LEARNING JOURNEYS



OUR PRIORITIES



We believe in the importance of investing in people. Whether through employee volunteerism, corporate philanthropy or

stakeholder partnerships, we are committed to making a difference in the young lives within our community.

OUR PROCESSES

- Changi Foundation (CF) Framework

OUR TARGETS

- Airport partner engagement
- Corporate philanthropy
- Employee volunteerism
- Stakeholder partnerships

OUR SDGS



OUR CHANGE AGENTS



A dedicated corporate social responsibility (CSR) unit within the People Team champions our Community Investment efforts.

CURRENT COMMUNITY INVESTMENT TARGETS**EMPLOYEE
VOLUNTEERISM****VOLUNTEER
HOURS****ENGAGING AIRPORT
PARTNERS TO JOIN CHANGI
FOUNDATION PROGRAMME****OFFER ANNUAL JOB
ATTACHMENTS TO
YOUTH BENEFICIARIES****25% by**

FY25/26

**3000 by**

FY25/26

**35 by**

FY25/26

**80 by**

FY25/26

4.9%

FY 21/22

719.5

FY 21/22

1

FY 21/22

4

FY 21/22

** In view of the disruption brought about by COVID-19, we have adjusted the timeline from FY 20/21 to FY 25/26.

Changi Foundation

Anchoring our quest to better lives is CF – CAG’s philanthropic arm and the main conduit for our philanthropic efforts. CF invests in the lives of disadvantaged youths, and seeks to surround them with positive role models and good support systems, enabling them to thrive and contribute to society when presented with the right opportunities. In addition to advancing our vision for the less fortunate, our initiatives also provide employees and airport partners with meaningful opportunities to leverage Changi’s operational service excellence, and to realise the service ideal of working together to enhance lives in our community.

Volunteer Service Leave (VSL) Policy

To encourage our people to serve the less fortunate, CAG offers its employees five days of VSL each year.

Collaboration with Arts@Metta

Arts@Metta is a youth employment initiative by the Metta Welfare Association (MWA), Changi Foundation’s long-time partner, to provide special-needs youths with training and employment opportunities. After last year’s successful virtual art programme, Changi Foundation decided to continue its efforts by introducing a series of training sessions for young artists on public speaking and communication skills.

The ‘Art of Storytelling’ and Virtual Art Fair

Daniel Foo, CAG’s Senior Manager of Design Management and Changi Airport’s Art Custodian, and the person behind last year’s virtual art programme, took the lead in developing the training contents. In the first part of the online programme, titled ‘Art of Storytelling’, eight special needs artists from Arts@

Metta learnt about the elements of a good presentation, as well as how to storytell their art creations. Daniel was assisted by 14 CAG volunteers, who coached the artists through one-on-one practice sessions before their actual presentations to a larger group.

The six-week programme culminated in a virtual art fair on 10 December 2021, which was held in conjunction with SG Cares Giving Week. Through this event, which attracted more than 100 attendees, the artists were able to showcase and sell their art pieces. They also entertained the audience with musical acts which included live piano, song and dance performances.

Arts@Metta’s first-ever virtual corporate event was a success. Eight unique paintings, various other postcards, coasters, mask purses and baked goods

from Metta Café were sold. The event and post-event sales garnered more than S\$4,000 for MWA. MWA products, including their ceramic pieces, are also sold at the “Gift by Changi Airport” retail shop in Jewel, creating business opportunities for MWA.



Arts@Metta’s first-ever virtual corporate event was a success. Eight unique paintings, various other postcards, coasters, mask purses and baked goods from Metta Café, were sold.



LI HONG YI
Senior Manager, Air Hub Strategy
at CAG, and one of the volunteers of
this year's Arts@Metta programme

FEATURE STORY

SUPPORTING CAG'S ARTS@METTA PROGRAMME

Given the Covid-19 safe management measures, I was pleasantly surprised to learn that the Changi Foundation team was able to continue with their meaningful volunteering initiatives virtually. Having previously participated in the Tele-Med and School-to-Work Transition Programmes with Metta School students, I was keen to work together with the artists from Arts@Metta programme this time around. Of course, I also wanted to support my colleague, Daniel Foo, who had painstakingly spent time and effort to create the programme.

Honestly, I did not feel any apprehension about volunteering for this programme, and this was due to the trust that had been built up with the Changi Foundation team over the years. From the detailed briefing prior to the sessions to simply knowing that Daniel would be there to answer any difficult questions, I felt completely at ease. So much so, I even encouraged a relatively new teammate of mine to join the programme. I felt that this would be a good opportunity for her to meet more people, and also do something really meaningful.

I believe I made the right decision. Not only were we constantly entertained by the spontaneous singing and dance performances put up by the MWA artists at every session, we also got to witness the artists grow

increasingly confident in their presentations of the stories behind their artworks. To facilitate my one-on-one breakout sessions with artists Yan Min and Namira, I printed out the 5Ws and 1H (Who, What, When, Where, Why and How) on cue cards which I flashed onscreen, and I was glad this helped them remember what to say during the big group presentation.

Everyone's efforts paid off culminating in a very successful, and dare I say, competitive, virtual art fair on 10 December 2021. I was on leave that day but I certainly do not regret making time to attend it. I even exercised my fastest fingers to bid for some of the beautifully handmade mask pouches, which I knew would make excellent Christmas gifts.

Worth even more than the fun I had watching the artists perform, was the chance to witness Yan Min strutting confidently across the screen! This was truly a heartening moment for me because I had seen how shy she was during our initial one-on-one interactions. Yan Min even surprised me by personally coming down to CAG on another day to pass the purchases to me. This was the first time I got to meet with her face-to-face after all the virtual sessions. I could feel her sincerity, and this has certainly motivated me to continue making a difference.

Photo Hunt at Jurassic Mile and Textile Donation Drive

Arts@Metta's artists depicted iconic Changi attractions, such as the Sunflower Garden, Jurassic Mile dinosaurs and the HSBC Rain Vortex at Jewel Changi Airport as the subject of their artworks. Their references were, however, based off pictures from the

internet. Hence, once government-imposed safe distancing measures permitted so, Changi Foundation promptly arranged for a physical photo hunt around the Jurassic Mile on 26 and 27 January 2022 to give the artists an opportunity to experience it in person. Each artist was accompanied by an employee volunteer who befriended

the artist to get them comfortable in conversations.

To bring added meaning to the excursion, the artists joined in the collecting of clothes, shoes, bedsheets, belts and soft toys from employees at CAG's Terminal 2 office. Combined with contributions from the Civil Aviation Authority of Singapore, over 900 kilograms worth of items was collected. These textile items were subsequently passed over to Metta Welfare Association for resale to a second-hand dealer - the proceeds of which were directed to their youth employment programmes.

Not only did this event give the artists a chance to join CAG on our sustainability efforts, it also provided them with a further opportunity to exercise their newfound public speaking skills through interactions with CAG employees.

Looking Ahead: CAG's Philanthropic Direction

Through these two years of running virtual events, the Changi Foundation has garnered much experience in optimising our philanthropic efforts in the online arena. As we gradually return to in-person events, we intend to continue using what we have learnt to fully leverage the different avenues of engagement for maximum philanthropic impact.



MAKING TRAVEL SAFE AND STRESS-FREE

PASSENGER
EXPERIENCE



OUR PRIORITIES

Each day, we work hard to create the best experience for all our passengers coming through our terminals. As the gateway to Singapore, we understand the importance of creating good memories and lasting impressions via a strong

commitment to service excellence, operational efficiency and inclusivity in all we do. As travel re-emerges after the Covid-19 pandemic, we remain dedicated to delivering a safe journey for all passengers.

OUR TARGETS

Good yearly performance for the Customer Satisfaction Index of Singapore (CSISG)

Achieved: 81.7 out of 100 in 2020

OUR SDGS



OUR CHANGE AGENTS

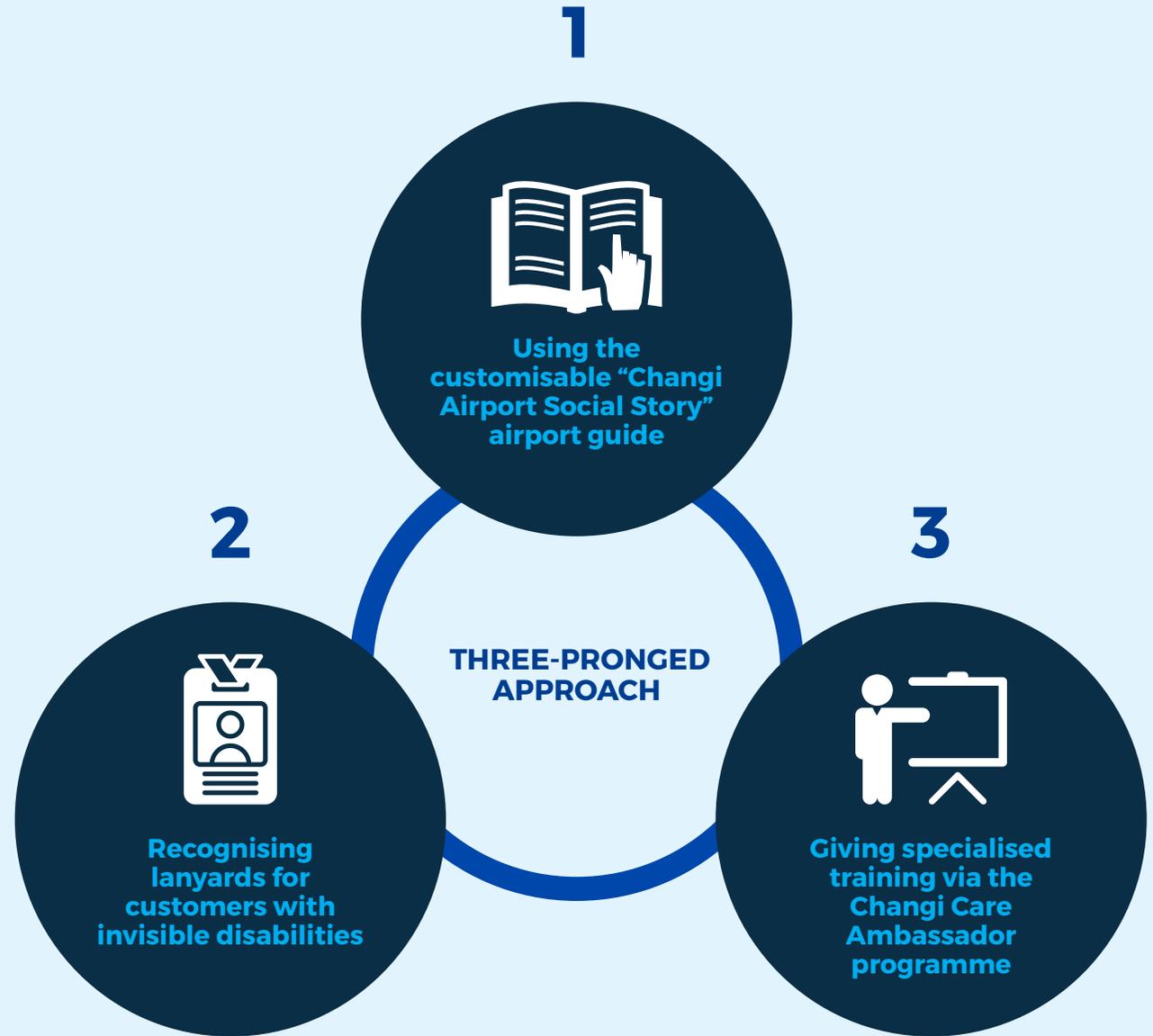


AIRPORT OPERATIONS AND MANAGEMENT

**Serving Every Customer:
The CARE@Changi Programme**

At CAG, we are committed to going the extra mile to ensure all our customers receive quality service and enjoy a stress-free travel experience. Hence, when air travel volumes dipped during the pandemic, we capitalised on the opportunity to upskill our customer-facing employees to better serve passengers who have reduced mobilities and invisible disabilities, such as dementia and autism spectrum disorder.

The CARE@Changi Programme aims to improve passengers' travel experience and enable staff to recognise and better serve them by using a three-pronged approach:



“ ” Passengers with invisible disabilities needing assistance can easily identify and approach our trained staff by their Changi Care Ambassador gold pin.



The Changi Airport Social Story

A collaborative effort between CAG and experienced educators from Rainbow Centre Training and Consultancy (RCTC), the Changi Airport Social Story is a guide for caregivers to help people with invisible disabilities cope with potentially stressful situations during their airport journey. The guide presents the entire airport journey, from check-in to boarding, as a collection of visual aids accompanied by short descriptions that can be used by caregivers to acquaint passengers with the key processes.

Available on Changi Airport's website, the downloadable guide can be customised and printed by caretakers and users to address passengers' specific needs.

Identification Lanyards

The programme involves enabling Changi Airport staff to recognise

established identification used by people with invisible disabilities. Examples include the Hidden Disabilities Sunflower lanyard and the Land Transport Authority's "May I Have A Seat Please?" lanyard. This insight equips staff to extend help and services that are aligned to support their customers' needs.

Specialised Changi Care Ambassador Training

To date, more than 300 customer-facing staff have benefitted from the specialised training programme jointly designed by CAG's Quality Service Management team and RCTC. Passengers with invisible disabilities needing assistance can easily identify our trained staff by their Changi Care Ambassador gold pin. We are committed to training more staff in this ongoing programme.

FEATURE STORY

NAVIGATING THE PANDEMIC SAFELY



Ensuring the health and safety of passengers, airport staff and visitors will always be the top priority for Changi Airport. We are committed to work with our airport partners to maintain best practices in hygiene and protective measures. By doing so, we aim to instil a high sense of confidence among passengers and visitors alike. With these efforts, Changi Airport will emerge stronger when air travel eventually resumes.

LEE SIOW HIANG,
CEO

As Changi Airport reopens in tandem with the recovery of global air travel, our top priority continues to be safeguarding the health and safety of our passengers, visitors and airport workers.

Changi Airport successfully renewed our ACI Airport Health Accreditation in September 2021 and subsequently became the first airport in Asia Pacific to be certified under the ACI Airport Health Measures Audit Programme. This external audit is developed by ACI World in partnership with Bureau Veritas, a world leader in testing, inspection and certification.

Changi Airport also achieved a score of 4.3 out of 5 on the Safe Travel Barometer's Score system, placing it among the best in ensuring the safety of passengers and the airport community.

Our collective efforts have enabled Changi Airport to operate safely and sustainably through the pandemic. By connecting travellers safely around the world and instilling a high sense of confidence among visitors and staff, Changi Airport is well-positioned to emerge stronger as air travel resumes.

Safety measures implemented by CAG in FY2021/22 that have contributed to these achievements include:

-  • **Segregating terminals** into different zones based on risk profiles to minimise cross interactions of passengers and employees
-  • Introducing **Safe Travel Concierge**, a one-stop online portal minimising traveller stress during the pandemic by allowing arriving passengers to book on-arrival PCR tests and check various pre-travel requirements.
-  • Implementing **BluePass**, where staff working in higher-risk zones were issued contact tracing devices to expedite the identification of close contacts and support ringfencing among employees. This allowed contact tracing operations at Changi to scale up accordingly when nationwide cases increased significantly.
-  • Working with Changi General Hospital and the National Centre for Infectious Diseases to train our 18,000 airport staff on **proper Personal Protective Equipment (PPE) use and handling** to protect against Covid-19. 3M certified community leaders also fit-tested 4,000 airport staff for N95 masks to support their work in higher risk zones.
-  • Issuing staff with **different types of PPE** to match the relative risk levels of their work zones.

COLLABORATING TO DRIVE SINGAPORE'S GROWTH

CONTRIBUTION TO THE
ECONOMIC DEVELOPMENT
OF SINGAPORE



OUR PRIORITIES



One of Singapore’s key infrastructure assets, Changi Airport is critical to the nation’s economic development. As its manager and operator, CAG partners government agencies and the private sector to design the airport’s future-ready strategies. From enhancing Changi’s connectivity and attractiveness, to strengthening passenger

and cargo traffic development as well as airport capacity, we plan to secure Changi Airport’s future competitiveness as a leading global air hub. As Singapore continues to navigate through the pandemic, we remain committed to keep Singapore connected with the rest of the world.

OUR PROCESSES

CAG works actively with airline partners to drive global connectivity, and partners trade counterparts to enhance Singapore’s appeal as a leisure destination, cargo hub and gateway to the rest of the world.

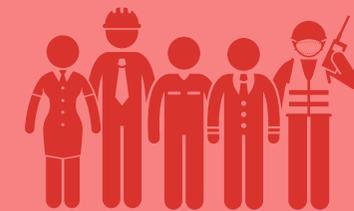
OUR TARGETS

- Completion of T2 Expansion Project: **On Track**
- Terminal 5 planning and development to build capacity to meet projected growth: **Ongoing Effort**

OUR SDGS



OUR CHANGE AGENTS



ACROSS ALL CAG DIVISIONS

FY 21/22 SAW A PROGRESSIVE RECOVERY OF AIR TRAFFIC VOLUMES



**PASSENGER
MOVEMENTS**

FY 21/22

1.1

MILLION

FY21/22

5.2

MILLION



**AIRCRAFT
MOVEMENTS**

FY 21/22

71,850

FY21/22

123,000

**AIRCRAFT LANDINGS
AND TAKE-OFFS**



**AIRFREIGHT
MOVEMENTS**

FY 21/22

1.52

MILLION TONNES

FY21/22

1.98

MILLION TONNES

FEATURE STORY

ENSURING FOOD SECURITY THROUGH CHANGI

Ensuring food security is a priority for Singapore as more than 90% of our food supply is imported. Perishables accounted for almost 14% of Singapore's overall air import volumes by weight in 2021.

To enhance Changi air cargo hub's cold chain handling capabilities, CAG successfully formed the first the Centre of Excellence for Independent Validators in Perishable Logistics (CEIV Fresh) certified community in Southeast Asia with our partners, dnata and Singapore Airlines, in 2021.

Based on IATA's Perishable Cargo Regulations, the CEIV Fresh certification aims to improve the community's perishable handling capabilities through standardised procedures and the adoption of industry best practices.

Given Singapore's reliance on imports for perishables, and our geographical location at the crossroads of major perishables production and consumption markets, our CEIV Fresh community enhances Changi Airport's position as a preferred regional cold chain hub for time- and temperature-sensitive cargo.



Ensuring food security is a priority for Singapore as more than 90% of our food supply is imported.



Reinforcing Singapore's Air Cargo Hub Competitiveness

In FY 2021/22, Changi Airport strengthened its competitive edge as a global air cargo hub. Several industry commendations recognised its service capabilities and excellence, including:



HIGHLY COMMENDED CARGO HUB OF THE YEAR (Air Cargo News Awards 2021)



ASIA PACIFIC AIRPORT OF THE YEAR (Payload Asia Awards 2021)



BEST AIRPORT – ASIA IN THE OVER 1 MILLION TONNES CATEGORY (Asian Freight, Logistics and Supply Chain Awards 2021)

CAG continued in our efforts to enhance our air cargo connectivity and capacity to boost Singapore's supply chain agility and resilience. We welcomed a new freighter operator, Tasman Cargo Airlines, Changi's first Australia-based freighter operator. We also worked closely with passenger airlines such as Fiji Airways and Garuda to facilitate Passenger Aircraft for Cargo Conveyance (PACC)

flights to support global trades and the flow of essential goods into Singapore and onwards to the surrounding region.

Preparing for Travel Resumption

As the pandemic recedes and travel restrictions ease globally, air travel demand is seeing a steady recovery around the world. As a leading global air hub, Changi Airport continues to prepare itself to handle growing volumes of passenger and cargo traffic, while maintaining high standards of safety and security. By the end of March 2022, Changi Airport had established over 120 city links in 47 countries, served by more than 80 airlines.

To support these efforts, CAG has continued to engage our airline partners closely by keeping them updated on developments at Changi Airport and in Singapore. Our commitment to maintaining airline and trade agreements has enabled our airline partners to quickly and seamlessly resume services to Changi Airport.

Vaccinated Travel Lanes and Making New Connections

On 8 September 2021, Singapore launched its first Vaccinated Travel Lane (VTL) with Brunei and Germany to enable quarantine-free travel. In the months following, Singapore continued to establish VTLs with another 32 countries, including our key pre-Covid passenger markets such as Indonesia,

Malaysia, Australia, and India. In March 2022, Changi achieved 1.14 million passenger movements, crossing the one-million mark for the first time since the pandemic started in March 2020.

CAG organised welcome events for the arrival of the first VTL flights from each destination and appreciate our airlines for their continued confidence in the Changi air hub.

To facilitate the seamless rollout of the VTLs within short timeframes, CAG collaborated closely with our partners to work out sustainable travel protocols for each destination, and engaged with airlines and the trade to provide clarity

on Singapore's entry requirements and airport arrival processes.

The VTLs with selected markets allowed Singapore and the airport community to prepare for travel resumption in a safe and controlled manner, paving the way for larger scale recovery as the world looks towards living with Covid-19. During the year, CAG also welcomed four new passenger airlines, namely, Gulf Air, STARLUX, ZIPAIR and HK Express, and established new city links with Bahrain and Vancouver. With the complete re-opening of Singapore's borders to all fully vaccinated travellers on 1 April 2022, we look forward to welcoming back passengers from all over the world.



INVESTING IN INDUSTRY- LEADING SAFETY STANDARDS

AIRPORT
SAFETY



OUR PRIORITIES



We are committed to making safety a basic right for every employee and individual at CAG. Accordingly, we are taking conscious

steps towards incorporating a strong culture of safety across CAG, to ensure a safe environment and workplace for all.

OUR PROCESSES

- CAG's Safety Policy
- CAG's Safety Management System Practices
- Safety Hazard Reporting
- Airport Safety Awards
- Safety Briefings / Induction Training

OUR TARGETS

- Zero employee work-related fatalities, yearly: **Achieved**
- Deficiency-free rating from the International Federation of Air Line Pilots' Associations (IFALPA), yearly: **Achieved**

OUR SDGS



OUR CHANGE AGENTS



OPERATIONAL RISK AND SAFETY COMMITTEE

Risk Committee

CAG's Safety Management System

Safety is one of our core values at CAG. Safety is paramount, especially as the Covid-19 pandemic posed severe challenges to the aviation industry. Strict safety standards must be upheld to maintain confidence in the aviation sector.

To build a culture that prioritises safety, CAG works closely with our airport partners, including ground handling agents, airlines, and the Civil Aviation Authority of Singapore, to ensure proactive and effective implementation of our Safety Management System (SMS). The SMS seeks to continually improve safety performance and safety risk management, encourage an open and learning culture, provide

necessary resources and training, and foster close teamwork with our partners.

The Aerodrome Safety Unit (ASU) takes the lead in conducting periodic reviews and assessments of the SMS to ensure that it remains relevant and aligned with CAG's mission and values.

Aerodrome Safety

The International Federation of Air Line Pilots' Association (IFALPA) recognises CAG as a dependable airport operator based on our ability to provide and manage aviation infrastructure and services safely, in line with international guidelines. In 2022, CAG received the IFALPA deficiency-free rating, maintaining our track record from 1981.

This affirms Changi Airport's reputation as one of the safest airports in the world.

Workplace Safety and Health

The safety and health of our Changi community are of utmost importance to CAG. In line with our commitment, the SMS for Workplace Safety and Health provides the framework for preventing work-related injuries and illnesses. CAG has set a target of zero workplace fatalities. This past year, we continued to actively monitor our operations for potential occupational risks. We also implemented risk mitigation measures such as safe work practices, and relevant staff training. CAG undergoes yearly external management system audits to

verify that our work practices are aligned with international standards. In FY21/22, line divisions at CAG successfully achieved or maintained the ISO 45001 certification for our Occupational Health and Safety Management System.

Safety Hazard Reporting

CAG is committed to the proactive identification and management of safety hazards that may compromise safe operations. The airport community is encouraged to report hazards through multiple voluntary and confidential reporting channels managed by the ASU. These include:

- 24/7 safety hotlines;
- "iFeedback" in CAG InTouch, OneChangi and SWEET applications;
- Aerodrome Safety Unit's e-mail;
- Changi Airport online hazard reporting application; and
- CAG e-Services portal

Hazards which require immediate attention can be reported via the 24/7 hotlines and SWEET (Service Workforce Empowerment and Experience Transformation) mobile application.

To date, more than 27,000 users have subscribed to the app. This 'many eyes' approach to hazard identification, coupled with prompt action to avert potential consequences, has contributed to a safer airport environment for travellers and airport staff.

WORK-RELATED INJURY RATE**0.75*****WORK-RELATED EMPLOYEE FATALITIES****0****NO. OF INCIDENTS OF NON-COMPLIANCE WITH REGULATIONS/VOLUNTARY CODES CONCERNING THE HEALTH AND SAFETY IMPACTS OF PRODUCTS/SERVICES IN FY 21/22****0**

* per million man-hours worked. For work-related injuries that resulted in more than three days of medical leave or 24-hour hospitalisation.

FEATURE STORY

AIRPORT SAFETY AWARDS

ANNUAL AIRPORT SAFETY AWARDS 2020

SAFETY TAKES YOU FURTHER



In FY21/22, the airport community came together to honour close to 400 deserving individuals and teams at CAG's annual Airport Safety Awards event. These awards recognise members of the airport community for their exceptional safety contributions. The celebration event was also an opportunity to appreciate the efforts of our partners, in particular the National Centre for Infectious Diseases, Ministry of Health and 33 other airport agencies, who were instrumental in supporting Changi Airport in its fight against Covid-19 and the proliferation

of the Delta variant. Many had demonstrated gumption by going beyond the call of duty when faced with potentially unsafe situations.

Individuals and teams received awards based on three broad categories: Safety Awareness & Courageous Act; Innovation & System Thinking; and Safety Promotion & Culture Building.

The event tagline "Safety Takes You Further" was specially chosen to reflect CAG's commitment to instilling a strong safety culture at our airports.



These awards recognise members of the airport community for their exceptional safety contributions.



Maintaining Operational Readiness

No matter the season or challenge, CAG's in-house aviation rescue and firefighting team – Airport Emergency Service (AES) is committed to ensuring runway fire coverage is not compromised.

AES's vigilance ensured the high volumes of air cargo flights and Covid-19 vaccines could resume safely. To mitigate the threat of operational disruption due to the pandemic, AES relied on a strategy consisting of vaccinations, proactive testing, stringent ringfencing and regular disinfections, in compliance with ongoing safe management measures (SMMs).

Furthermore, AES continued to maintain their operational readiness by participating in annual aircraft incident exercises, such as Exercise Bobcat and Exercise Bear. These exercises were not only critical in validating Changi Airport's emergency plans but also provided a prime opportunity for AES to maintain optimal response and coordination with key partners, such as the Singapore Civil Defence Force (SCDF), Singapore Police Force (SPF), Ministry of Health (MOH) and Airline carriers.

Beyond our main operational responsibilities, our colleagues from AES also showed their OneChangi spirit by coming together to support counter-drone operations, wildlife patrols and terminal building patrols, as well as man the AES Experience Event held at the Changi Festive Village.



Enhancing Our Firefighting Capabilities

As part of continuous improvement plans to ensure runway safety, AES Changi and Seletar commissioned a new fleet of Panther Water Tenders by Rosenbauer to replace the old fleet of Scania Water Tenders.

The main purpose of our Water Tenders is to support the primary response 12,000-litre dual-turret Foam Tenders in extended firefighting situations, by providing additional water and fire safety equipment. These new Panther Water Tenders are equipped with a 12,000-litre water capacity, which is significantly

more than the 9,000-litre capacity of the outgoing Scania Water Tenders. This essentially doubles AES' firefighting limit in responding to a situation. They also feature enhanced firefighting features and systems, including better maneuverability and a chassis suited for off-road applications, such as when a plane veers off the runway.

To further improve our fire response competencies, we also operationalised runway emergency access roads to give our AES vehicles quicker access to emergency situations.



The new Rosenbauer Panther Water Tenders (left), next to the outgoing Scania Water Tenders (right).

PLANNING AHEAD WITH TECHNOLOGY

Strengthening Partnerships at Exercise Bobcat 2021

To ensure that CAG maintains the highest possible safety standards, Changi Airport holds a major aircraft emergency exercise every year, codenamed Exercise Bobcat, to validate our emergency plans and coordinate with key stakeholders. Through simulating realistic aircraft emergencies, either in the form of tabletop or actual ground deployment exercises, “Exercise Bobcat” takes a proactive approach to identify areas for improvement before they become an issue during an actual emergency.

One of the highlights of the Exercise Bobcat 2021 Tabletop Exercise (TTX) was a sharing session by Changi General Hospital on casualty management workflow and processes during a national mass casualty event. This equipped CAG to finetune our best practices and redefine our casualty management procedures.



Partnering with Changi General Hospital to explore the usefulness of robotics in runway safety applications.

Through this exercise, we were also able to strengthen the ties between AES and our partners, which will in turn enable us to better serve survivors, of airport accidents.

Moreover, we constantly monitor the latest technological developments in the field of runway safety.

Robots and Autonomous Technologies

Among the projects in the pipeline is a partnership with Changi General Hospital’s Centre for Healthcare Assistive and Robotics Technologies (CHART). We jointly conducted a series of robot trials to explore how autonomous technologies can complement existing roles played by humans during an aircraft incident. So far, promising use applications identified include deployment at crash sites and Casualty Clearance Stations (CCS).

We are also examining and trialling the usefulness of 5G technology at sea. At present, one of the limitations of 4G

technology is the poor-quality video feeds that AES’s on-land Command Centre receives from sources at sea, which hinders the decision-making ability of our monitoring team.

Through this trial, however, we were able to see how 5G’s increased bandwidth and network splicing capability allowed for improved quality and reduced latency of the video feeds. Coupled with improved clarity of the Voice over Internet Protocol (VoIP), decision makers can potentially receive a more accurate depiction of incidents at sea in real time.

Beyond video streaming applications, this 5G trial also opens up the pathway for CAG to consider other 5G-enabled technologies that can enhance our capabilities to manage future crises.

ADVANCING GOVERNANCE FOR GREATER ASSURANCE

GOOD CORPORATE
GOVERNANCE



OUR PRIORITIES

With an eye on the future, we seek to build a thriving, sustainable business – one that safeguards our brand and reputation and makes our stakeholders proud. We work hard to achieve and uphold high standards of corporate governance,

professionalism and integrity. At the same time, we resolve to remain accountable to those in our immediate business and regulatory environment as well as the global community.

OUR PROCESSES

Policies

- CAG’s Risk Management Policy
- CAG’s Enterprise Risk Management Framework
- CAG’s Code of Conduct
- CAG’s Anti-Bribery Policy
- CAG’s Whistle-Blowing Policy

Practices

- Training and Awareness (e.g., Anti-Bribery Awareness training)

OUR TARGETS

- Compliance with anti-corruption laws and regulations
- No significant fines for non-compliance with applicable laws and regulations

OUR SDGS



OUR CHANGE AGENTS



The foundation of our brand, reputation and sustainability efforts is integrity is vital to everything we do at CAG. To uphold the highest standards of professionalism and integrity, we operate and conduct business in accordance with CAG's Code of Conduct and policies, covering key areas such as whistle-blowing, anti-bribery and enterprise risk management. Increased focus on cyber security and data protection is critical for supporting continued digitalisation across CAG's operations.



Code of Conduct and Whistle Blowing Policy

CAG's Code of Conduct sets out the principles and standards expected of all employees in their day-to-day activities and decision-making across all areas of business operations. The Code is to be followed in conjunction with local laws and regulations.

To ensure that the principles are clearly understood and consistently applied across all roles and responsibilities, every employee is required to complete all mandatory training and receive regular updates on CAG's Code of Conduct, Anti-Bribery Management System and Data Protection policies and guidelines.

CAG has established a confidential whistle-blowing channel for employees of CAG and its subsidiaries, as well as external parties to report any suspected misconduct. We are committed to protecting any person, who makes a report in good faith, from any form of retaliation.



Anti-Bribery Management System (ABMS)

CAG has zero tolerance for bribery and we have operationalised this commitment via the CAG Anti-Bribery Management System (ABMS). CAG obtained the International Organisation for Standardisation (ISO) 37001 certification in 2019 to provide assurance that the ABMS incorporates international best practices. We continue to maintain this through annual external audits. To ensure that the ABMS is adequate and effectively embedded in business operations, the CAG Audit Committee, a sub-committee of the CAG Board, provides strategic guidance to, and receives regular updates from the Management Committee and the Legal & Compliance team.

The ABMS Steering Committee, made up of senior representatives from all Clusters, monitors the operationalisation of the ABMS. The ABMS Working Committee, comprising representatives from each of the CAG Clusters ("ABMS Champions"), works on the effective implementation of policies and procedures. All Clusters

conduct regular assessments to identify potential bribery risks in their operations, evaluate the effectiveness of controls to mitigate such risks, and determine if further action needs to be taken to mitigate residual risks. Employees who are deemed to be in roles that face higher risks of bribery are required to submit an annual Declaration of Anti-Bribery Compliance.

We recognise that whilst third-parties, such as suppliers, vendors, consultants and partners, bring significant value to CAG, they may also introduce bribery risks. As such, we have published CAG's Supplier Code of Conduct on our website to set out our expectations of third parties. In particular, they are to uphold a zero tolerance of bribery, comply with applicable laws and regulations, and promptly report suspected misconduct. In addition to incorporating the Code into all signed terms with suppliers, CAG also implements pre-contract reputational due diligence on significant third-party engagements to identify and appropriately remediate potential risks.



Risk Management

At CAG, we define risk as anything that might prevent us from achieving our business goals and objectives. We have developed an Enterprise Risk Management (ERM) framework that guides us in mitigating the impact and likelihood of risks through the identification and analysis of risks, implementation of mitigation measures, and monitoring of the effectiveness of these mitigating measures.

CAG's ERM framework is adapted from ISO 31000 Risk Management, Committee of Sponsoring Organizations of the Treadway Commission (COSO) ERM Framework and the Risk Governance Guidance for

Listed Boards. Stakeholders can use the available tools and enablers to categorise their findings and develop appropriate risk matrices and registers to steer CAG's ERM activities. We seek to mitigate any risk materialisation and damage impact by:

- a. Identifying the risk as early as possible
- b. Analysing and prioritising the risk
- c. Planning the necessary measures to mitigate the risk
- d. Implementing the appropriate measures
- e. Monitoring the risk

The key risks and risk indicators are reported to CAG's Risk Committee and CAG's Board-level Operational Risk & Safety Committee.



Building Cyber Security, Safety & Resilience at CAG

At Changi Airport, we continue to accelerate our digitalisation efforts to enhance operational efficiencies and passenger experience. To realise the full benefits of a connected, digitalised world, CAG recognises the critical importance of, firstly, identifying and understanding current and emerging cyber threats; secondly, recognising the susceptibility of our digital infrastructure, systems and assets, including personal data to these threats; and thirdly, establishing effective cyber risk and data protection management frameworks to mitigate and manage these risks to ensure business continuity.



Cyber Security

Cultivating a cybersecurity-aware workforce is critical to CAG's risk management strategy. To this end, CAG has adopted a three-pronged approach to raise staff awareness of cyber-threats.

Firstly, employees are inoculated with cyber hygiene best practices to be incorporated into their day-to-day job processes through a through a mandatory e-learning programme. Secondly, employees are constantly reminded to exercise vigilance and report any sighting of anomalies through prescribed reporting channels. Finally, we conduct tabletop exercises to validate our business continuity plans and standard operating procedures. These exercises ensure our stakeholders are conversant with their roles and expected response during and to recover from a cyber event.

Looking ahead, we will continue to work closely with industry partners, regulatory bodies and government agencies to maintain cyber-preparedness across Changi's extended community.



Data Protection

CAG is committed to protecting the personal data that we collect and process, including that of our customers, partners and employees. To ensure accountability and compliance with relevant data protection laws, including Singapore's Personal Data Protection Act 2012 (PDPA), CAG has established a Data Protection Governance Framework that consists of a set of governance principles, a governance structure, and the CAG Data Protection Management Programme (DPMP).

The CAG Management Committee receives regular updates from the Group Data Protection Office (DPO) on key risk indicators, emerging risks and evolving laws. The Information Assurance Committee for Personal Data (IAC-PD), made up of representatives from key functions and Clusters, oversees and provides strategic guidance to the DPMP. The DPO, in partnership with Division Data Protection Officers who are Division representatives responsible for personal data handling, ensure that our policies and procedures are implemented effectively.

To support CAG's data protection efforts, the DPMP encompasses key initiatives and actions, including:

- **Ensuring the transparent handling of personal data**, in compliance with applicable laws and best practices such as CAG's Privacy Policy;
- **Implementing appropriate security measures** to protect personal data in CAG's care;
- **Supporting mandatory e-learning** and regular communications to staff on policies, procedures and best practices for handling personal data;
- **Conducting risk assessments** for CAG systems and processes for handling personal data;
- **Managing third-party pre-contract due diligence**, including identifying and appropriately remediating any potential risks associated with handling personal data in CAG's care;
- **Putting in place appropriate contract terms** to ensure accountability of third-party intermediaries that handle personal data in CAG's care; and,
- **Developing a comprehensive incident response plan** for handling suspected breaches that may compromise personal data in CAG's care.

APPENDIX A: GHG EMISSIONS QUANTIFICATION METHODOLOGY

This section explains the calculation boundaries, methodologies and assumptions used in the preparation of CAG's Scope 1, 2 and 3 emissions for CAG. The carbon footprint is prepared in accordance with ISO 14064-1, Greenhouse Gas (GHG) Protocol and the Airport Carbon Accreditation (ACA) guidelines.

Reporting Scope and Period

CAG uses an adaptation of the Operational Control Approach, where the company accounts for 100% of the GHG emissions from operations over which it has control. Following requirements for Level 3 "Optimisation" Airport Carbon Accreditation, this carbon footprint takes into account the sources and activities that are controlled by CAG, namely, Scope 1 and Scope 2 GHG emissions, as well as the sources that the airport can guide or influence through effective partnership (Scope 3 GHG emissions). CAG focuses on calculating carbon dioxide (CO₂) emissions for all three scopes.

Data for GHG emission calculations includes T1 to T4, as well as emissions under CAG's direct operational control (Scope 2) in Jewel Changi Airport Trustee Pte Ltd (JCAT). Electricity on-sale to JCAT as a private developer is included in CAG's Scope 3 emissions.

Data from the following reporting periods have been included in this Sustainability Report for Scope 1, 2 and 3 emissions:

- FY18/19
- FY19/20
- FY20/21
- FY21/22
- 1 April 2021 until 31 March 2022, for Scope 1, 2 and 3 emissions.

CAG's energy and emissions data is externally verified on an annual basis. In this report, CAG's energy and emissions data for FY21/22 have been disclosed with verified FY18/19, FY19/20, and FY20/21 data for comparability.

APPENDIX A: GHG EMISSIONS QUANTIFICATION METHODOLOGY

CONT'D

Calculation Methodologies

Our methodologies are consistent with the ACI Guidance Manual on Airport Greenhouse Gas Emissions Management and the GHG Protocol. Emissions are divided according to ownership and control of the source:

Scope 1 emissions are direct GHG emissions which occur from sources that are owned or controlled by CAG. This includes emissions from both stationary sources (power generators, dynamic-uninterruptible power supply (D-UPS), water pumps, electrical switchgears and other stationary equipment) and mobile sources (company-owned cars, trucks, motorcycles and heavy duty equipment). Activities and process emissions (i.e. from firefighting exercises) contribute to less than 0.01% of total emissions are excluded.

The quantity of Scope 1 GHG emissions is calculated by multiplying the fuel usage (activity data) by their respective emission factor. The data for fuel usage was obtained from invoices of procured and/or topped up fuel.

Scope 2 emissions are indirect GHG emissions which occur from the generation of purchased or acquired electricity, heating, cooling and steam consumed by CAG. At CAG, Scope 2 emissions only relate to purchased electricity from the grid.

The quantity of Scope 2 GHG emissions is calculated by multiplying electricity usage (in kWh) by the grid emission factor. Data for electricity usage was obtained from receipts issued by the electricity supplier. The grid emission factors used in the calculation is based on the grid emission released annually by the Energy Market Authority (EMA) in accordance with the United Nations Framework Convention on Climate Change (UNFCCC) guidelines.

Scope 3 emissions are other indirect GHG emissions that are a consequence of CAG's activities, but occur at sources not owned or controlled by CAG. Due to the variety Scope 3 GHG emission sources within the scope, a range of methodologies has been used.

For emissions resulting from activities involving aircrafts (landing and take-off cycle, engine test-run and aircraft auxiliary power unit), the ACERT is used. For emissions resulting from ground activities that are carried out by our partners (ground support equipment, surface access, electricity resold, waste management), a similar calculation approach used for quantifying Scope 1 and Scope 2 emissions was used. Emissions from the shuttle bus operations was calculated with the use of the GHG Emissions Calculation Tool. Finally, for business travel, the International Civil Aviation Organization (ICAO) Carbon Emissions Calculator was used. For every calculation tool/ model used, CAG has applied suitable assumptions to the input data. Refer to the table below for the respective emission factors used.

APPENDIX A: GHG EMISSIONS QUANTIFICATION METHODOLOGY

CONT'D

EMISSION SOURCES	EMISSION FACTORS	UNIT
Scope 1 Emissions		
Stationary Sources		
Diesel stationary	2.6920	kgCO ₂ e/litre
Jet A-1 stationary	2.5060	kgCO ₂ e/litre
Motor gasoline stationary	2.2860	kgCO ₂ e/litre
Sulfur hexafluoride (SF ₆)	23,500	kgCO ₂ e/litre
Mobile Sources		
Diesel mobile	2.6760	kgCO ₂ e/litre
Gasoline mobile	2.2720	kgCO ₂ e/litre
Scope 2 Emissions		
Electricity Consumption		
2020 National Grid Emission Factor	0.4085	kg _c CO ₂ e/litre
2018 National Grid Emission Factor	0.4192	kgCO ₂ e/litre
Scope 3 emissions		
Ground Support Equipment		
Diesel mobile	2.6760	kg _g CO ₂ e/litre
Gasoline mobile	2.2720	kg _g CO ₂ e/litre

APPENDIX A: GHG EMISSIONS QUANTIFICATION METHODOLOGY

CONT'D

EMISSION SOURCES	EMISSION FACTORS	UNIT
Scope 3 emissions		
Surface Access		
Coach	0.0348	kgCO ₂ e/vehicle-km
Minibus/van	0.2933	kgCO ₂ e/vehicle-km
Motorcycle	0.2131	kgCO ₂ e/vehicle-km
Private charter	0.2131	kgCO ₂ e/vehicle-km
Private hire car	0.2131	kgCO ₂ e/vehicle-km
Private hire shared ride	0.2131	kgCO ₂ e/vehicle-km
Privately owned car	0.2131	kgCO ₂ e/vehicle-km
Taxi (Grab taxi)	0.2131	kgCO ₂ e/vehicle-km
Taxi (Phone booking)	0.0739	kgCO ₂ e/vehicle-km
Taxi (Street hail)	0.0348	kgCO ₂ e/vehicle-km
Mass Rapid Transit (MRT)	0.0739	kgCO ₂ e/passenger-km
Public bus	0.0348	kgCO ₂ e/passenger-km
Electricity Re-sold		
2020 National grid emission factor	0.4085	kgCO ₂ e/kWh
2018 National grid emission factor	0.4192	kgCO ₂ e/kWh
Waste Management		
0% load	0.6529	kgCO ₂ e/km
50% load	0.2350	kgCO ₂ e/tkm
100% load	0.1384	kgCO ₂ e/tkm

REFERENCES FOR EMISSION FACTORS

1. Airports Council International (ACI), Airport Carbon and Emissions Reporting Tool (ACERT) version 4.0
2. World Resources Institute (2015), GHG Protocol Tool for Stationary Combustion version 4.1
3. World Resources Institute (2015), GHG Protocol Tool for Mobile Combustion version 2.6
4. Intergovernmental Panel on Climate Change (IPCC) (2007), Fourth Assessment
5. Energy Market Authority of Singapore (EMA) (2018), Singapore Energy Statistics
6. Energy Market Authority of Singapore (EMA) (2017), Singapore Energy Statistics
7. United States Environmental Protection Agency (US EPA) (2015), Emission factor for greenhouse gas inventories
8. UK Government Conversion Factors for Greenhouse Gas (GHG) Reporting (2016)
9. GHG Protocol, GHG Emissions Calculation Tool version 2.6

APPENDIX B: UN SDG INDEX

CAG mapped each of its material sustainability matters to the SDG targets. This exercise enabled CAG to identify area where its activities have a direct or indirect impact on the SDGs, and CAG’s creation of alue in the short, medium and long-term.

The United Nations Sustainable Development Goals (UN SDGs)

CAG’s Material Sustainability Matter	1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS	
Energy and Emissions Management			●				●	●	●		●	●	●					
Waste Management			●			●		●	●		●	●	●					
Water Management			●			●		●	●		●	●	●					
Fair Employment					●			●		●								
People Development				●				●										
Community Investment				●						●								
Passenger Experience			●			●			●	●	●	●						
Contribution to the Economic Development of Singapore								●	●									●
Airport Safety			●								●				●	●	●	●
Corporate Governance												●					●	

APPENDIX B: UN SDG INDEX

KEY PRIORITY AND IMPACT AREAS



Ensure healthy lives and promote well-being for all at all ages

- Enhancing airport and CAG's workplace facilities to continually support the well-being of airport users and CAG employees.
- Maintaining high standards of ambient air quality at the airport through adopting leading practices and conducting annual monitoring exercises.



Ensure access to affordable, reliable, sustainable and modern energy for all

- Growing share of renewable energy consumption at the airport (e.g. use of solar energy, electric baggage handling tractors).
- Ensuring sustainable energy consumption and energy efficiency at the airport achieved through various carbon reduction initiatives.



Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

- Generating sustainable economic value through the value chain as a leading global air hub and community
- Fostering full and productive employment through integrating fair employment practices in CAG's Employment Philosophy, conducting regular performance reviews and people development programs.



Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

- Adopting a life-cycle approach in investing, developing, managing and retrofitting airport infrastructure (e.g. upgrading of existing terminals, development of Changi East).



Make cities and human settlements inclusive, safe, resilient and sustainable

- Providing a safe, secure and green airport environment for the airport community and all passengers.
- Increasing accessibility and connectivity, locally and globally such developing a new focus on becoming a trusted and reliable pharmaceutical air cargo hub.



Ensure sustainable consumption and production patterns

- Establishing and maintaining a proactive Environmental Management System.
- Measuring, monitoring and reporting sustainability indicators internally and externally (e.g. voluntary sustainability reporting).
- Implementing circular systems at the airport (e.g. food waste digester, recycling programs).



Take urgent action to combat climate change and its impacts

- Engaging in GHG emissions disclosure initiatives (e.g. Airport Carbon Accreditation, Sustainability Reporting).
- Aligning environmental targets with national and international Climate Action goals through reduction of CAG's GHG emissions.

APPENDIX B: UN SDG INDEX

HIGH PRIORITY AND IMPACT AREAS



End poverty in all its forms everywhere

- Community investment and corporate social responsibility programs (e.g. outreach to disadvantaged youths through Changi Foundation)

Reduce inequality within and among countries

- Promoting the socioeconomic inclusion of all people at the airport and in the community through engagement with airport partners and offer job attachments to disadvantaged youth.



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

- Providing equal opportunities in training and development of all CAG employees.
- Supporting the vocational development of youths (e.g. internship opportunities at CAG, partnerships with Metta School).



Achieve gender equality and empower all women and girls

- Respecting women's rights and ensuring no discrimination and harassment at the airport and CAG's workplace.
- Supporting women's leadership and their empowerment across CAG.



Ensure availability and sustainable management of water and sanitation for all

- Providing access to clean water and sanitation at the airport (e.g. availability of drinking fountains and amenities).
- Ensuring sustainable water withdrawal and water efficiency at the airport (e.g. growing share of NEWater).



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

- Working closely with stakeholders at the airport in combating terrorism, illicit arms flows, human trafficking, etc. such as enhancing total emergency preparedness through Exercise Bobcat.
- Adopting a zero tolerance stance towards corruption.

APPENDIX C: GRI CONTENT INDEX

CAG's Sustainability Report FY21/22 has been prepared in accordance with the GRI Universal Standards. This GRI Content Index is a navigation tool that provides an overview of which GRI Standards have been used, which disclosures have been made, and where these disclosures can be found. The full content of the GRI Standards is publicly available on the GRI portal (<https://www.globalreporting.org/standards>).

GENERAL DISCLOSURES

Disclosures		Reference(s) or Reason for omission (if applicable)
2-1	Organisational Details	Page 1
2-2	Entities Included in the Organisation's Sustainability Reporting	Page 1
2-3	Reporting Period, Frequency and Contact Points	Page 1
2-5	External Assurance	No external assurance was sought for this report
2-6	Activities, Value Chain and other Business Relationships	Page 1
2-7	Employees	Page 38
2-8	Workers who are not Employees	Page 38
2-9	Governance Structure And Composition	Refer to Annual Report
2-10	Nomination And Selection of the Highest Governance Body	Refer to Annual Report
2-11	Chair of the Highest Governance Body	Refer to Annual Report
2-12	Role of the Highest Governance Body in Overseeing the Management of Impacts	Page 2
2-13	Delegation of Responsibility for Managing Impacts	Pages 2, 12
2-14	Role of the Highest Governance Body in Sustainability Reporting	Page 2

APPENDIX C: GRI CONTENT INDEX

CONT'D

GENERAL DISCLOSURES

Disclosures	Reference(s) or Reason for omission (if applicable)	
2-16	Communication of Critical Concerns	Pages 6 - 8
2-22	Statement on Sustainable Development Strategy	Pages 6 - 8
2-23	Policy Commitments	Pages 39, 70 - 72
2-24	Embedding Policy Commitments	Pages 39, 70 - 72
2-25	Processes to Remediate Negative Effects	Page 39
2-26	Mechanisms for Seeking Advice and Raising Concerns	Page 39
2-27	Compliance With Laws and Regulations	There were no significant incidents of non-compliance with laws and regulations
2-28	Membership Associations	Pages 12, 39
2-29	Approach to Stakeholder Engagement	Pages 6 - 8
2-30	Collective Bargaining Agreements	Page 39
3-1	Process to Determine Material Topics	Page 2
3-2	List of Material Topics	Page 10

APPENDIX C: GRI CONTENT INDEX

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ENERGY AND EMISSIONS MANAGEMENT

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 21
GRI 302: Energy (2016)		
302-1	Energy Consumption within the Organisation	Page 24
302-4	Reduction of Energy Consumption	Page 24
GRI 305: Emissions (2016)		
305-1	Direct (Scope 1) GHG Emissions	Page 22
305-2	Energy Indirect (Scope 2) GHG Emissions	Page 22
305-3	Other Indirect (Scope 3) GHG Emissions	Page 22
305-5	Reduction of GHG Emissions	Page 22

APPENDIX C: GRI CONTENT INDEX

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WASTE MANAGEMENT

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 30
GRI 306: Waste (2020)		
306-3	Waste Generated	Page 31
306-4	Waste Diverted from Disposal	Page 31
306-5	Waste Diverted to Disposal	Page 31



WATER AND EFFLUENTS MANAGEMENT

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 34
GRI 303: Water and Effluents (2018)		
303-3	Water Withdrawal	Page 35
303-4	Water Discharge	Page 35
303-5	Water Consumption	Page 35

APPENDIX C: GRI CONTENT INDEX

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FAIR EMPLOYMENT PRACTICES

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 37
GRI 306: Employment (2016)		
401-1	New Employee Hires and Employee Turnover	Page 38
GRI 405: Diversity and Equal Opportunity (2016)		
405-1	Diversity of Governance Bodies and Employees	Page 38
GRI 406: Non-discrimination (2016)		
406-1	Incidents of Discrimination and Corrective Actions Taken	Page 38



PEOPLE DEVELOPMENT

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 42
GRI 404: Training and Education (2016)		
404-1	Average Hours of Training Per Year Per Employee	Page 43
404-2	Programmes for Upgrading Employee Skills and Transition Assistance Programmes	Page 43
404-3	Percentage of Employees Receiving Regular Performance and Career Development Reviews	Page 43

APPENDIX C: GRI CONTENT INDEX

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COMMUNITY INVOLVEMENT

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 47
GRI 413: Local Communities (2016)		
413-1	Operations with Local Community Engagement, Impact Assessments, and Development Programmes	Pages 48 - 51



PASSENGER EXPERIENCE

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 53

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CONTRIBUTION TO THE ECONOMIC DEVELOPMENT OF SINGAPORE

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 58
GRI 203: Indirect Economic Impacts (2016)		
203-1	Infrastructure Investments and Services Supported	Pages 60 - 61
203-2	Significant Indirect Economic Impacts	Pages 60 - 61
GRI-G4 Airport Operators Sector Disclosures: Market Presence (2011)		
AO1	Total Number of Passengers Annually	Page 59
AO2	Total Number of Aircraft Movements	Page 59
AO3	Total Amount of Cargo Tonnage	Page 59

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AIRPORT SAFETY

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 63
GRI 403: Occupational Health and Safety (2016)		
403-2	Types of Injury And Rates of Injury, Occupational Diseases, Lost Days, and Absenteeism, and Number of Work-related Fatalities	Page 63; injury rates and types are kept in confidence
GRI 416: Customer Health and Safety (2016)		
416-2	Incidents of Non-Compliance Concerning the Health and Safety Impacts of Products and Services	Page 63



GOOD CORPORATE GOVERNANCE

Disclosures		Reference(s) or Reasons for Omission (if applicable)
GRI 103: Management Approach (2016)		
3-3	Management of Material Topics	Page 69
GRI 205: Anti-corruption (2016)		
205-3	Confirmed Incidents of Corruption and Actions Taken	Page 69
GRI 307: Environmental Compliance (2016)		
307-1	Non-Compliance with Environmental Laws and Regulations	Page 69
GRI 419: Socioeconomic Compliance (2016)		
419-1	Non-Compliance with Laws and Regulations in the Social and Economic Area	Page 69

