2022 Response to the
recommendations of the Task Force on

Climate-Related Financial Disclosures

Building resilience to climate change

Sydney Airport operates Australia's major gateway airport. We recognise that we serve an essential piece of regional and national infrastructure supporting our communities' mobility and economic growth.

Our operations deliver high levels of availability, reliability and resilience, and we recognise that climate change can potentially affect our business through physical and transition risks.

We are committed to net zero emissions by 2030 for emissions under our operational control (Scope 1 and 2) and we have been working to better understand our scope 3 (value chain) emissions. To achieve our net zero goal and our commitment to understanding and managing climate-related risks, we are working to reduce our emissions footprint, improve our operational resilience and adapt to the predicted effects of a changing climate now and into the future.

Our 2022 achievements

After two years impacted by the Covid-19 pandemic, in 2022, we significantly strengthened our understanding and response to climate change.

Our key achievements over the last year are:

Governance

- We established a new Environmental, Social and Governance (ESG) Steering Committee (SteerCo)
- We further integrated climate considerations into planning with the ESG leads from our new owner groups
- We conducted more deep dive sessions on climate change (Board Safety, Security and Sustainability (SSS) Committee in August 2022 and Executive Committee (ExCo) leadership presentation in November 2022)

Strategy

- We updated our climate scenario analysis to draw on advances in climate science and scenario development by the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) and the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) and expanded the scope and depth of analysis
- We used findings to generate and update actions to build business resilience
- We socialised results and key findings of our scenario analysis across the business and with our owner groups

Risk management

- We reviewed and updated our climate risk register in preparation for updating our Group Risk Profile in 2023
- We enhanced our flood studies and modelling
- We identified the more strategic and capital-intensive measures needed to meet our net zero commitment for inclusion in our Corporate Plan in 2023
- We updated and socialised our climate action plans to manage transition and physical climate risks

Metrics and targets

- We investigated the measurement of inflight emissions in our scope 3 emissions footprint

Reporting against TCFD recommendations

We have been supporters of the Taskforce for Climate-related Financial Disclosures (TCFD) since 2017 and report annually in line with its framework.

TCFD recommended disclosure	Disclosure	Location
Governance		
Board oversight of climate-related risks and opportunities	2022 TCFD Report – Governance and oversight of climate change	Page 3
Management's role in assessing and managing climate-related risks and opportunities	2022 TCFD Report – Governance and oversight of climate change	Page 3
Strategy		
Risks and opportunities identified in the short, medium and long term	2022 TCFD Report – Strategy	Pages 3-8
Impact of climate-related risks and opportunities on the organisation's strategy and financial planning	2022 TCFD Report – Strategy	Pages 3-8
Describe the resilience of the organisation's strategy under different climate scenarios	2022 TCFD Report – Strategy	Pages 3-8
Risk management		
Processes for identifying and assessing climate-related risks, and integration of climate-related risks into the overall risk management framework	2022 TCFD Report – Climate-related risk management	Pages 9-12
Processes for managing climate-related risks	2022 TCFD Report – Climate-related risk management	Pages 13-14
Metrics and targets		
Metrics used to assess climate-related risks and opportunities	2022 TCFD Report – Metrics and targets	Pages 15-16
GHG emissions and related risks	2022 TCFD Report – Metrics and targets	Pages 16-17
Targets used to manage climate-related risks and opportunities and performance monitored against those targets	2022 TCFD Report – Metrics and targets	Page 18

Meeting our TCFD roadmap

Progress against our TCFD roadmap can be seen in the table below. Next year, we will continue to implement our TCFD Roadmap.

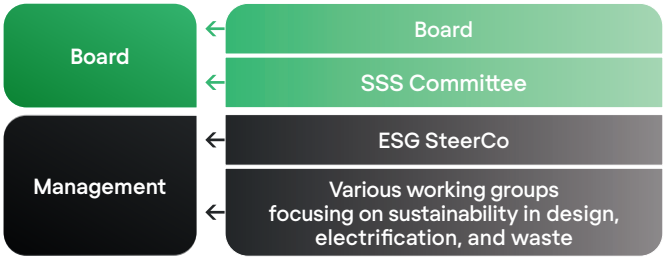
TCFD pillar	Actions	2021	2022
Governance	Further integrate climate considerations into strategic planning	◑	◕
	Conduct Board and leadership deep dives on climate change	◑	●
Strategy	Implement a climate change resilience strategy	◑	◑
	Continue to integrate climate change considerations into business strategy	◑	◕
	Review climate risks and integrate into department risk plans	◑	◕
Risk management	Develop signposts to monitor changes in scenarios	⚙	◑
	Understanding potential financial impacts	◑	◑
Metrics and targets	Develop medium and long-term climate targets	●	●

○ Not achieved ◑ In progress ◕ Significant progress ● Achieved ⚙ Impacted by Covid-19 pandemic

Governance and oversight of climate change

The Board's Safety, Security and Sustainability (SSS) Committee is responsible for overseeing and reviewing the effectiveness of Sydney Airport's policies, strategies, initiatives and systems in relation to sustainability performance and reporting. The first committee meeting under the new ownership structure occurred in April 2022. Throughout the year, the SSS Committee met five times to assist the Board in overseeing sustainability performance and reporting.

In 2022, a new Environmental, Social and Governance (ESG) Steering Committee (SteerCo) was established by Management to oversee and provide direction to the business on Sydney Airport's sustainability strategy and targets. Various working groups support the ESG SteerCo across the business, which delivers the initiatives to achieve the sustainability strategy and targets.



Sydney Airport now has four levels of ESG governance (see above).

The culture element of our short-term incentive plan for Executive Remuneration includes continual improvement in sustainability and environmental performance.

Strategy

This section presents key elements of Sydney Airport's 2022 scenario analysis and the implications of the analysis for our business strategy. It includes an overview of the risks and opportunities we have identified, which are presented in more detail in the subsequent section, Climate-Related Risk Management.

Sydney Airport's approach to climate-related scenario analysis

Scenario analysis is an important tool we use to identify climate risk over time and build our understanding of the resilience of our assets and our business to a changing climate.

In 2022, we updated our climate scenarios, using four divergent scenarios against which to test our resilience, adding a "Delayed Action" scenario to mature the analysis. Our scenario analysis was facilitated by climate risk and energy transition consultancy Energetics.

Sydney Airport based three scenarios on the reference scenario frameworks published by the Intergovernmental Panel on Climate Change (IPCC) in the Sixth Assessment Report (AR6). These scenarios were defined primarily by selected Shared Socio-economic Pathways (SSPs) and Representative Concentration Pathways (RCPs).[1] They are broadly consistent with the scenarios we analysed in 2018 and provide a range of physical and transition risk settings. Selection of the "bookend" scenarios ("Route to 1.5C" and "Climate Crisis") was also consistent with guidance from the Climate Measurement Standards Initiative.[2] For the fourth scenario ("Delayed Action") we drew on the framework provided by the "Delayed Transition" scenario developed by the Network of Central Banks and Supervisors for Greening the Financial System (NGFS).[3] This scenario allows companies to examine the risks associated with a delayed switch from the world's current decarbonisation pathway to a pathway consistent with the Paris Agreement goals.

1. The Shared Socioeconomic Pathways and their energy, land use, and greenhouse gas emissions implications: An overview, Riahi et al. 2017.
2. CMSI, 2020. Scenario analysis of climate-related physical risk for buildings and infrastructure: climate science guidance. Earth Systems and Climate Change Hub Report 21.
3. NGFS, 2022. NGFS Climate Scenarios for central banks and supervisors | Banque de France.

Key characteristics of selected climate-related scenarios for analysis by Sydney Airport, 2022

1. Route to 1.5°C (1.5°C)	2. Current Trends (2-3°C)	3. Delayed Action (<2°C)	4. Climate Crisis (>4°C)
Core reference			
SSP1-1.9	SSP2-4.5	NGFS Delayed Transition	SSP5-8.5
Description			
Immediate, sustained decarbonisation driven by ambitious policies and high technological innovation, resulting in net zero global emissions around 2050	**Current policy, social, economic and technological trends continue.** The rate of increase in global emissions begins to decline post 2050	Delayed action creates a **shock transition in 2030** to a net zero emissions pathway. This results in net zero emissions around 2050, with higher costs, more technology constraints and higher temperature rise than in Scenario 1	Ongoing fossil **fuel-driven economic growth** and resource-intensive consumer choices turbo-charge emissions
Paris Agreement			
Achieves Paris Agreement goal of limiting global warming to 1.5°C	Paris Agreement temperature goals are not achieved	Achieves Paris Agreement goal of limiting global warming to well below 2°C	Total failure to achieve Paris Agreement goals
Transition risk profile			
High	Medium	Very high	Low
Physical risk profile			
Low	High	Low-medium	Very high

These framework scenarios were supplemented with industry-specific and Australia-specific information from multiple sources, including:

- International Energy Agency World Energy Outlook 2022 (IEA WEO 2022)
- Air Transport Action Group (ATAG) Waypoint 2050
- Australian Energy Market Operator (AEMO) Integrated System Plan (ISP) 2022
- IPCC Sixth Assessment (AR6): Climate Change 2022: Impacts, Adaptation and Vulnerability, Working Group II report
- CSIRO and Bureau of Meteorology 2015, Climate Change In Australia – East Coast Cluster Report
- World Bank Climate Change Knowledge Portal, Australia CMIP6 Climate projections
- Energetics Fireline tool, which draws from data produced by the Electricity Sector Climate Information (ESCI) project (a collaboration between CSIRO, the Bureau of Meteorology and the Australian Energy Market Operator (AEMO).

Key scenario parameters and sources utilised in the scenario analysis are summarised in the table on the following page.

Key scenario parameters and their sources

Scenario parameters	1. Route to 1.5°C (1.5°C)	2. Current Trends (2-3°C)	3. Delayed Action (<2°C)	4. Climate Crisis (>4°C)
Physical characteristics				
Global temperature increase by 2100	~1.4°C	~2.7°C	~1.6°C	>4°C
Representative concentration pathway (IPCC AR6)	RCP1.9	RCP4.5	RCP2.6	RCP8.5
Socio-economic characteristics				
Shared socio-economic pathway (IPCC AR6)	SSP1	SSP2		SSP5
Economic dynamics (drawn from corresponding NGFS scenarios as well as SSP narratives[1])	Short-term inflationary impact of carbon policies Overall strong economic growth maintained (NGFS "Net Zero 2050" scenario)	Economic indicators maintain historical trends, but are increasingly undercut by physical climate change impacts (NGFS "NDCs" scenario)	Inflation and unemployment will rise significantly just after 2030 peaking around 2035 The disorderly nature of transition affects financial asset valuations (NGFS "Delayed Transition" scenario)	Strong growth in the short term, eventually overwhelmed by physical climate change impacts (NGFS "Current Policies" scenario[1])
Economic impacts of climate change (corresponding NGFS scenarios, NIGEM, Remind model inputs[1])	Material negative impacts on annual GDP by 2050	Strong negative impacts on annual GDP by 2050	Strong negative impacts on annual GDP by 2050	Catastrophic impacts on annual GDP by 2050
Carbon price/costs of carbon regulation (IPCC, IEA WEO 2022, NGFS price curves for corresponding)	Rapid increase to 2030 and thereafter, with the increase slowing each decade slightly	Slow, gradual increase	Same as the Current Trends scenario until 2030, when prices will rise steeply until 2050	No carbon costs
Industry characteristics				
Demand for air travel (IEA WEO 2022, corresponding scenarios[1])	A large segment of business travel shifts to teleconferencing; a large segment of leisure travel shifts from long-haul to short-haul (IEA's "Net Zero Emissions 2050" scenario (NZE2050))	Business travel demand growth is flattened, but overall travel continues to rise (IEA's "Stated Policies" scenario (STEPS))	Same as the Current Trends scenario until 2030, where demand falls more than in Route to 1.5°C scenario due to high carbon costs, regulations and social concerns (STEPS, switching to NZE2050)	Strong demand growth in the short-medium term
Aviation decarbonisation technology development (ATAG Waypoint 2050)	Major investment in airport infrastructure for storage and delivery of hydrogen. Widespread adoption of alternative propulsion options	Slow progress towards the adoption of alternative propulsion options	Same as the Current Trends scenario until 2030, after which investment increases rapidly, but supply constraints push up costs of technology deployment	Fuel efficiency gains achieved with natural advancement in current technologies

1. The IEA and NGFS scenario sets do not include scenarios for the >4°C of global warming considered in "Climate Crisis". The NGFS "Current Policies" scenario considers temperature risk of >3°C, in which the negative impact of physical climate change on global GDP is modelled to reach nearly 8% per year by 2050.

Key scenario parameters and their sources continued

Scenario parameters	1. Route to 1.5°C (1.5°C)	2. Current Trends (2-3°C)	3. Delayed Action (<2°C)	4. Climate Crisis (>4°C)
Industry characteristics				
Sustainable Aviation Fuel (SAF) availability and uptake **(Derived from technological development characteristics of SSPs, NGFS scenarios)**	An accelerated switch to low-carbon fuels. Investment in SAF production facilities scales up rapidly with government support	Some growth in SAF production capacity, with some developed countries implementing SAF fuel mandates. SAF production capacity will increase by 2050. However, there will be minimal economies of scale, and SAF costs will remain high	Same as the Current Trends until 2030, after which all economies accelerate investment in SAF and other biofuels	Minimal changes in SAF availability today, and SAF costs remain high. Uptake remains niche
Electricity decarbonisation (drawing on corresponding scenarios in AEMO ISP 2022)	Rapid grid decarbonisation and development of the hydrogen industry (AEMO's "Hydrogen Superpower" scenario)	Gradual decarbonisation (AEMO's "Progressive Change" scenario)	Same as the Current Trends scenario until 2030, after which rapid grid decarbonisation is implemented	Decarbonisation is not prioritised but happens gradually as high-carbon generators are replaced with lower-carbon options (AEMO's "Slow Change" scenario)

The IEA and NGFS scenario sets do not include scenarios for the >4°C of global warming considered in "Climate Crisis". The NGFS "Current Policies" scenario considers temperature risk of >3°C, in which the negative impact of physical climate change on global GDP is modelled to reach nearly 8% per year by 2050.[1]

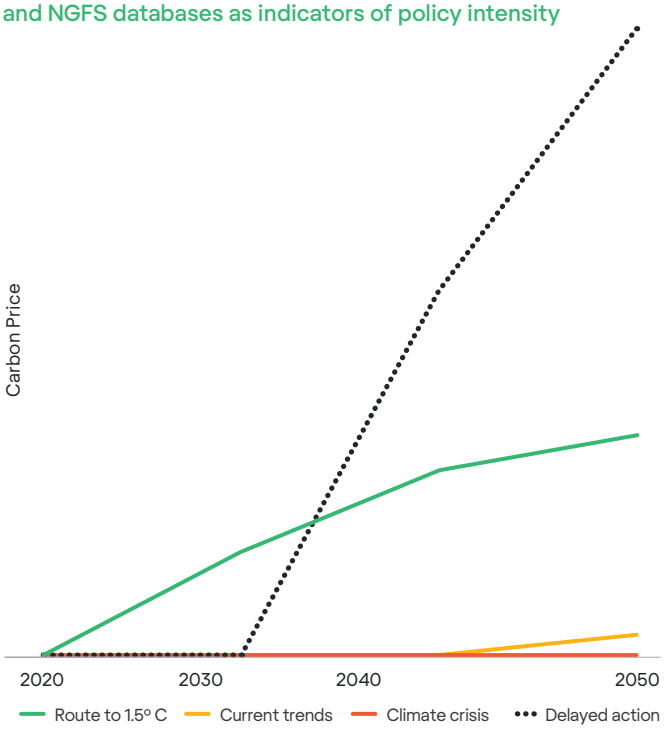
Although we conducted qualitative scenario analysis, where available, quantitative inputs were considered as illustrative indicators of the scale of impacts. For example, illustrative carbon price trajectories for each scenario were considered as plausible projections of the costs of unabated emissions. Illustrative carbon price trajectories, supplemented with information on carbon price curves produced by a range of models, were presented as summarised in the figure below.

Use of illustrative carbon price ranges and trajectories to consider carbon policy costs by scenario[2]

- Scenarios consider **carbon prices as proxies for policies** that may not be explicit prices, but impose equivalent carbon costs
- Decarbonisation policies could be levies, taxes, regulations, subsidies, restrictions, etc. **Each one imposes an explicit or implicit cost on emissions**
- Prices at right are **illustrative of the trend in carbon costs** for each scenario
- Modelled carbon prices vary significantly, but in general prices in advanced economies in 2030 are:
  - Above US$200/$tCO_2e$ for scenarios achieving 1.5°C
  - US$10-90/$tCO_2e$ for scenarios based on current trends
  - Rising to US$80-770/$tCO_2e$ by 2035 in delayed action scenarios

(Based on IEA, SSP, NGFS modelled carbon prices).

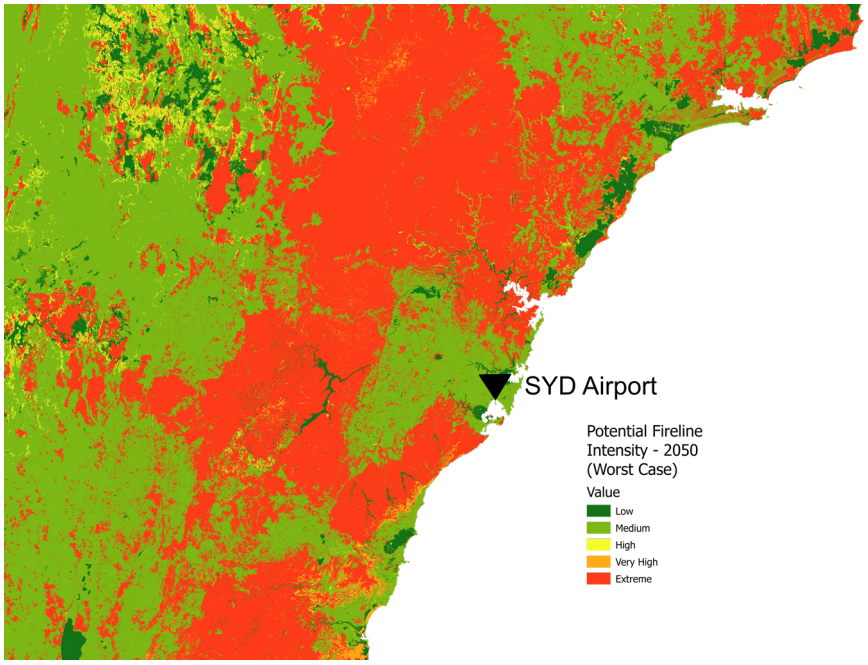
Projected global carbon prices from SSP and NGFS databases as indicators of policy intensity



1. NGFS, 2022. Climate Scenarios for central banks and supervisors
2. Based on IEA, SSP, NGFS modelled carbon prices

Similarly, physical impacts across each scenario were assessed with reference to the 10th and 90th percentile of climate projection data sourced from the IPCC's Sixth Assessment Report (AR6) and downscaled data produced as an outcome of CSIRO, BOM and AEMO's ESCI project, acknowledging that this data could provide indications of hazard only (rather than exposure and vulnerability). For example, bushfire hazard data for regions surrounding Sydney Airport allowed qualitative consideration of our direct and indirect exposures and vulnerabilities, as presented in the figure below.

Regional bushfire risk and implications for SYD



Fire weather across Australia is projected to intensify under all climate scenarios.

The region surrounding Sydney Airport is densely vegetated, raising fire risk in these areas.

Impacts to Sydney Airport include:

- dense smoke obstructing visibility
- outdoor worker health and safety
- reduced attractiveness of Sydney/New South Wales as a travel destination

Bushfire risk in 2050 under Climate Crisis (>4°C) – 2050
Source: Energetics proprietary bushfire risk tool, built in collaboration with CSIRO

Following the development of the detailed scenarios, we held two workshops for internal representatives across the business to discuss how each scenario would, directly and indirectly, impact Sydney Airport. A workshop focused on physical risk was held on 15 December 2022 and included participants representing operations, resilience, facilities, planning and design, environment, and safety teams.

The transition risk workshop was held on 16 December 2022 and included participants from aviation, commercial, finance, strategy, technology, environment, corporate affairs, internal audit and risk, and legal teams. We also held additional workshops focusing on physical and transition risk on the 6th and 10th February 2023 for key aviation, facilities, development and finance team representatives who could not attend the December 2022 workshops.

The transition risk workshop considered key risks and impacts as follows, acknowledging that these would occur within the context of physical climate change impacts and economic conditions affected by both physical and transition risk drivers:

- **Policy** – carbon pricing, regulations to reduce emissions
- **Market** – consumer and airline preferences, competitors, low-carbon alternative transport options, energy pricing
- **Technology** – innovation and deployment of sustainable aviation fuel (SAF), hydrogen, low emission aviation technologies (e.g., electric aircraft), infrastructure investment and constraints
- **Reputation** – financial appetite for emission-intensive sectors, social view of emissions-intensive activities, climate litigation

The physical risk workshop stepped through several levels of physical risk consideration:

- **Individual climate hazards** that Sydney Airport had analysed previously, both chronic and acute: extreme rainfall and flooding, sea level rise, storm surge, increased average temperatures, extreme temperatures
- **Additional individual climate hazards:** bushfires
- **Compounding climate events:** focusing on "wet and windy" and "hot and dry" combinations of climate hazards
- **Indirect impacts via climate risks to systems:** climate risks to aviation interdependencies, environmental assets (focusing on those that drive tourism), and broader economic activity

Scenario analysis: key insights

The workshops prioritised exploring a range of risks and possible actions rather than drilling down deeply into key risks or actions. This was addressed in follow-up work after the workshops, to refine proposed actions and determine how they should be integrated into Sydney Airport's climate action plan. Key insights from the workshops include:

Transition risks

- Sydney Airport's most material sources of transition risk are outside its direct control. Whilst decarbonisation of the aviation industry is primarily in the control of the airlines, Sydney Airport has taken the view that global warming is a shared challenge that requires action from all. Sydney Airport will therefore use its sphere of influence and every available mechanism to support the industry to decarbonise.
- Sustainable aviation fuel appears to be essential for transition risk reduction across all scenarios. Sydney Airport can participate in SAF advocacy efforts and investigate opportunities
- Reputation risks form some of the most material risks to Sydney Airport. Keeping abreast of stakeholder expectations regarding climate risk and ensuring Sydney Airport is capable of meeting or responding to these is necessary.

Physical risks

- In the years to 2030, there is no material difference in physical risk profile across the scenarios, as historic emissions have already locked in global warming over this time period. Differences beyond this date will emerge, but many decisions may need to be made before the world's future warming pathway can be determined
- Flood adaptation measures are already being investigated to enhance Sydney Airport's resilience to future intense rainfall and storm surge events. Further investigation is required to assess the effectiveness of resilience measures against future hot/dry events
- As with transition risk, much of Sydney Airport's exposure to physical risk is outside its direct control. Sydney Airport can improve the physical and financial resilience of its own operations – and is doing so through its flood risk management work – but will also need to deal with the cascading consequences of climate impacts throughout its value chain

Integration of scenario analysis into business strategy

Findings and proposed actions resulting from the scenario analysis are integrated into Sydney Airport's climate action plans and discussed in more detail in the following section, Climate-Related Risk Management.

Climate-Related Risk Management

In this section, we set out Sydney Airport's priority transition and physical risks and the actions we are undertaking to address them. Priority risks are risks with a medium or high residual risk rating.

We are committed to improving our understanding and management of climate-related transition and physical risks. This commitment is further outlined in the Sydney Airport Master Plan 2039. Throughout 2022 and early 2023, we continued this focus by reviewing and updating our physical and transition risk register, and our climate risk mitigation and adaptation plan.

Transition Risks

As the Climate Crisis scenario assumes no action to reduce emissions and a resurgence of fossil-fuelled energy consumption, transition risk analysis focused on the other three scenarios (Route to 1.5 °C, Current Trends, and Delayed Action). Risks were evaluated against a 2050 time horizon.

Transitional risks evaluated against a 2050 time horizon

Driver	Risk	Existing and future controls
Policy and legal	Carbon offset costs rise significantly as policy affects both supply and demand	• Implementation of Net Zero 2030 Roadmap to eliminate Scope 1 and Scope 2 emissions as far as possible • Carbon offset and hedging strategy • Establishment of new nature based carbon removal solutions
	Growth in application and levels of carbon pricing increases costs of airfares, dampening demand and growth	• Engagement with airline partners on low emissions infrastructure requirements • Sustainable aviation fuel advocacy program
	Australian government carbon policy increasingly regulates airports and airlines, leading to reductions in development capacity and growth	• Implementation of Net Zero 2030 Roadmap to eliminate Scope 1 and Scope 2 emissions as far as possible • Scope 3 ground operations emissions reduced as far as possible • Policy engagement and advocacy
	More sustainable building standards increase total capital plan portfolio costs (2030 timeframe)	• Implementation of the Sustainable Design Guidelines • Sustainability in design review of construction portfolio to identify opportunities • Recycling construction and demolition materials onsite to avoid landfill disposal costs and reduce raw material costs • Inclusion of shadow/internal carbon price in the commercial investment review framework • Internal financial approvals process to ensure future projects incorporate sustainability targets/KPIs
Market	Energy pricing becomes increasingly volatile leading to increased operating costs	• Energy efficiency measures and onsite renewables installed to reduce grid electricity consumption • Long term renewable power purchase agreements in place • Internal financial approvals process incorporates sustainability targets
	Reduced return on invested capital due to inadequate shadow carbon price	• Shadow internal carbon price developed, informed by climate scenario analysis and embedded in commercial investment framework
	Consumer preferences to reduce flight emissions leads to a reduction in demand	• Implementation of Net Zero 2030 Roadmap to eliminate Scope 1 and Scope 2 emissions as far as possible • Scope 3 ground operations emissions reduced as far as possible • Sustainable aviation fuel advocacy program
	Increased cost of raw materials for capital projects due to limited local and global supply	• Implementation of Procurement Framework • Whole of life costs considered in project evaluations

Transitional risks evaluated against a 2050 time horizon continued

Driver	Risk	Existing and future controls
Technology	Low emissions aviation technologies (e.g., electric ground support equipment) require significant infrastructure investment and agreement between stakeholders on needs, location and timing	• Engagement with airline partners and ground handlers on low emissions infrastructure requirements • Infrastructure costed in annual corporate planning
	Insufficient Australian and global investment in sustainable aviation fuels and low emissions aviation technologies creates supply/price shocks, affecting demand for air travel	• Engagement with airlines, sustainable aviation fuel producers, manufacturers, and research organisations • Sustainable aviation fuel advocacy program
	Delayed deployment of low emissions aviation technologies leads to mismatch between infrastructure investment and infrastructure needs	• Engagement with airline partners and ground handlers on low emissions infrastructure requirements • Infrastructure costed in annual corporate planning • Jet Fuel Infrastructure storage and bridger requirements to enable safe and efficient transfer of small-scale sustainable aviation fuel deliveries
	Disorderly transition increases costs of decarbonisation opportunities	• Implementation of Net Zero 2030 Roadmap • Inclusion of shadow internal carbon price in commercial investment framework • Internal financial approvals process incorporates sustainability targets
	Reduced short haul passenger volumes driven by an increase in alternative low carbon options (e.g., high speed rail, vertical take off and landing (VTOL) aircraft)	• Infrastructure that connects into multi-modal transport options • Future VTOL operations considered in strategic planning and airspace design consultation
Reputation	Access to affordable finance that meets debt investors' decarbonisation expectations	• Maintain current level of sustainability disclosures, ratings and benchmarks • Regular engagement with investors • Implementation of Net Zero 2030 Roadmap • Credible approach for sustainable capital investment and management • Scope 3 decarbonisation plan

Physical risks

Physical risk impacts are projected to worsen across all scenarios due to the impact of historical emissions. Whilst actions are applicable to all or multiple scenarios, the level and speed of adaptation required differ across scenarios. Risks were evaluated against a 2050 time horizon.

Physical risks evaluated against a 2050 time horizon

Driver	Risk	Existing and future controls
Greater rainfall and storm frequency and intensity	Temporary airside disruptions due to flooding and damage on airport	• Sydney Airport Flood Model • Upgrades for flood resilient infrastructure costed into Corporate Planning • Airport design and location of critical infrastructure • Efficient stormwater drainage systems • Regular inspections of airfield and lighting • Maintenance teams to repair damage and/or drainage failures • Thunderstorm Warning System • Fog certified equipment deployment • Satellite landing systems deployment • Airfield management, e.g., temporary closure of taxiways and aprons • Airport Emergency Plan and conducting desktop emergency scenarios
	Compound events (when bad weather and climate drivers combine) resulting in frequent and severe operational disruption, infrastructure damage and reduction in airport capacity with not much time in between to recover	• Sydney Airport Flood Model • Upgrades for flood resilient infrastructure costed into Corporate Planning • Airport design and location of critical infrastructure • Efficient stormwater drainage systems • Regular inspections of airfield and lighting • Maintenance teams to repair damage and/or drainage failures • Fog certified equipment deployment • Satellite landing systems deployment • Airfield management e.g., temporary closure of taxiways and aprons • Airport Emergency Plan and conducting desktop emergency scenarios
	Higher insurance premiums and requirements due to coverage for flood and storm damage, and more frequent insurance claims	• Sydney Airport Flood Model • Airport design and location of critical infrastructure • Efficient stormwater drainage systems
	Increase in physical safety risk to workers in low points in the event of extreme rainfall	• Efficient stormwater drainage systems • Safety procedures • Evacuation procedures and training
Sea level rise and tidal intrusion	Temporary operational disruptions, increased frequency and duration of repair and maintenance activities	• Sydney Airport Flood Model • Airport design and location of critical infrastructure • Inspections of airfield, lighting, and sea walls • Infrastructure costed into corporate planning • Efficient stormwater drainage systems • Maintenance teams in place to repair damage and/or drainage failures
	Reduced land for future development	• Sydney Airport Flood Model • Considered in strategic planning • Infrastructure needs included in corporate planning • Stormwater improvements / tidal barriers to ensure flood resilience

Physical risks evaluated against a 2050 time horizon continued

Driver	Risk	Existing and future controls
Higher temperatures and more severe heatwaves	Increased staff and/or passenger medical incidents due to heat exposure	• Safety procedures • First aid training • Heat mitigations on the ramp e.g., shade
	Aircraft turnaround delays at off-peak times (midday) from extreme heat causing slot constraints at peak times	• Aircraft ground handling procedures • Staffing responses and resilience plans in place for heatwaves • Heat mitigations on the ramp e.g., shade
	Aircraft load restrictions increase over time impacting the commercial viability of some routes. Additional aviation fuel may be required as the number of hot days per year increases, reducing seating and cargo	• Early engagement with airlines on aircraft load restrictions • Maximise aircraft movements at off-peak times
Widescale economic shocks from extreme weather	Acute or chronic extreme weather events cause widescale economic shocks leading to reduced demand for air travel	• Policy engagement and advocacy • Diversifying aviation routes
Decline in local and international environmental assets	Decline in environmental assets leads to reduced services to affected locations and lower tourism passenger volumes	• Policy engagement and advocacy • Diversifying aviation routes

Climate-related opportunities

Sydney Airport's contribution to climate change solutions will also present new opportunities. These include:

- supporting airline partners with electrification, low emission fuels infrastructure, use of fuel-efficient aircraft and solutions to improve industry emissions
- lower operating costs by reducing energy consumption through energy efficiency measures and onsite solar PV, and reducing water consumption through water efficiency measures and water recycling and storage
- designing and constructing sustainable buildings to attract high value tenants
- integrating climate adaptation opportunities into community investment strategies to support the resilience of our communities
- developing credible programs for carbon neutral facilitation of passengers
- enhancing our industry's response to climate change by engaging with stakeholders

Managing climate-related risks and opportunities through our Climate Resilience Strategy

Sydney Airport's climate-related risks and opportunities are addressed through our Climate Resilience Strategy, which has four components. These are:


Energy efficiency and carbon reduction


Asset adaptation and future proofing


Business resilience and carbon neutral growth

Advocacy for a low carbon economy

Energy efficiency and carbon reduction

This year, we completed lighting upgrades to P6 and P7 car parks, Blue Emu car park, T1 international terminal departures, arrivals, staff screening, T2 domestic terminal baggage hall and Regional Express screening, and some T3 domestic terminal gates. Energy efficiencies will be gained by the replacement of existing fluorescent lighting with almost 7,300 LED lights, saving approximately 3,586,000 kilowatt hours of electricity consumption and more than 2,600 t CO_2e per annum.[1]

This year, we also commenced a heating, ventilation, and air conditioning (HVAC) optimisation project at T1 international terminal. Opportunities to reduce energy consumption will be identified through this project.

Asset adaptation and future proofing

We recognise physical impacts of climate change may present risks to our assets now and into the future. Adaptation measures focus on our physical risk response. Asset adaptation and future proofing can lower our exposure to climate hazards and extreme weather.

Our Physical Risk Adaptation Plan was updated in late 2022 and early 2023 and outlines our physical climate risk management:

- Sydney Airport's most material physical climate risks which have been stress-tested in 2022 through qualitative scenario analysis
- Key adaptation actions for the most material physical risks, both currently implemented as well as planned for the future.

To better understand flooding risk across the airport, Sydney Airport's flood model was updated in 2021. The flood model assessed a range of climate change scenarios (RCP2.6, 4.5, 8.5) to quantify the risks to Sydney Airport. Additional studies continued this year to supplement the outputs, including the development of:

- flood mapping animations from the flood model under different climate scenarios
- a flood risk management and resilience plan to guide flooding and stormwater management activities and operational responses in preparation for and after significant storm events
- a flood planning development framework to ensure flooding is considered in future developments under current and future climate change scenarios
- detailed modelling to quantify the tidal and storm surge impacts over a 100-year period to provide seawall overtopping flood maps and inform priorities

During 2023, we will undertake a stormwater infrastructure assessment to identify the short and longer-term solutions needed to address flood issues and risks identified in the 2021 flood model. For example, small interventions that can immediately improve existing flooding issues, such as the installation of one-way tidal valves, and macro interventions, such as strengthening of sea and canal walls, and upgrades to Sydney Airport's stormwater network to improve drainage.

Upon completion of the additional studies, we will develop a flooding/stormwater masterplan for Sydney Airport that summarises the outputs from the 2021 flood model and additional studies undertaken in 2022.

Business resilience and carbon neutral growth

We also undertook the next stage of planning for the delivery of our net zero 2030 roadmap (Scope 1 and 2 emissions). The more strategically significant and capital-intensive measures were assessed this year. During 2023 we will undertake detailed feasibilities of the additional measures and incorporate into our annual corporate planning process.

Refer to the Metrics and Targets section of this report for further information.

1. Calculated using the New South Wales grid emission factor, February 2023.

Advocacy for a low carbon future

Low and zero emissions energy solutions will play a critical role in the decarbonisation of the aviation sector.

Sydney Airport continued its advocacy efforts for sustainable aviation fuels (SAF) in 2022. We are members of Bioenergy Australia's Sustainable Aviation Fuel Alliance for Australia and New Zealand (SAFAANZ) working group alongside aviation industry peers and fuel producers.

We engaged with the Department of Infrastructure regarding the form and structure of the proposed Australian Jet Zero Council, which was included in the October 2022-2023 Federal Budget. This council will bring together governments, airports, airlines, aircraft manufacturers, fuel suppliers and distributors and others to ensure policy settings are right for deployment of SAF in Australia. Sydney Airport applauds the Australian Government's decision to establish a jet zero council in Australia and looks forward to ongoing participation.

We also undertook constructive engagement with airlines, research consortiums, and SAF producers this year to build relationships and share knowledge on the topic.

Sydney Airport maintains focus on investigating and progressing options to address Scope 3 emissions in line with our current commitments and will continue this work through 2023. Our efforts to manage Scope 3 emissions consider both the magnitude of emissions and the degree of influence we have.

The majority of Sydney Airport's scope 3 emissions that have been quantified, come from the landing and take-off (LTO) cycle of aircraft and surface access emissions (emissions from passengers and workers travelling to and from the airport). Collectively, these account for approximately 84 per cent of our Scope 3 emissions footprint measured to date.

In 2022, we commenced a study to investigate quantification of our inflight emissions.

The remaining Scope 3 emissions come from airport ground operations. These include emissions from our tenants' electricity use, ground support equipment (GSE), aircraft Auxiliary Power Units (APU), waste, engine testing and fire training at the airport.

In 2021, we set a target to reduce emissions from airport ground operations by 50 per cent by 2025.

This year, to drive progress towards this target, we conducted a comprehensive study focused on the reduction of Scope 3 emissions from APUs and GSE used for aircraft loading and unloading during turnarounds. As an outcome of the study, it determined that the greater utilisation of fixed ground services (i.e., 400Hz fixed electric ground power and pre-conditioned air) and eGSE on a higher number of turnarounds has the potential for annual emissions savings of more than 40,000 tCO2e relative to Sydney Airport's 2019 emissions.

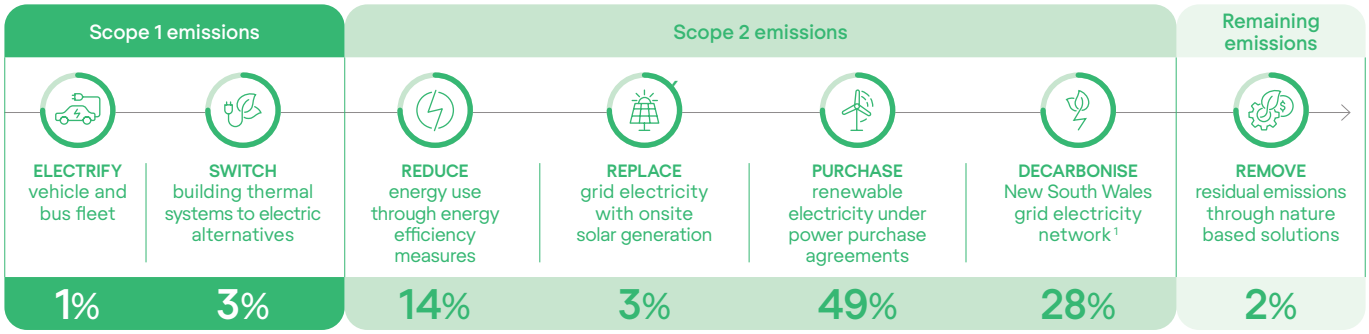
As an outcome of this work, we will continue to work with ground handlers to progress GSE fleet electrification and determine the investment in charging and metering infrastructure that will be required. We will also provide renewable electricity to tenants purchasing electricity from Sydney Airport, and continue to work with airlines and ground handlers to increase the use of ground power and pre-conditioned air, instead of running the APU while on gate.

Metrics and targets

Net zero by 2030

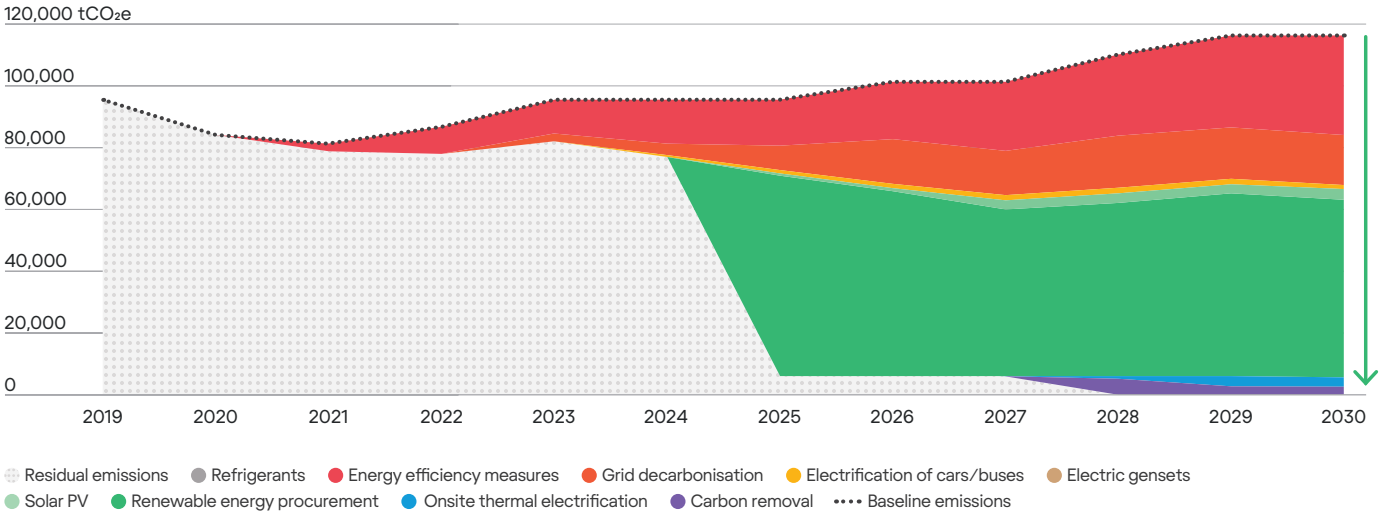
Our strategic roadmap to net zero Scope 1 and 2 emissions is illustrated below. This roadmap shows the percentage each measure is anticipated to contribute towards target achievement, although it will be refined over time as the more capital intensive measures are fully costed.

Net Zero 2030 roadmap



Layered Net zero 2030 roadmap — Scope 1 and 2 emissions (tCO_2e)

Our trajectory towards net zero is outlined in our layered roadmap below.



To achieve net zero by 2030, Sydney Airport's Scope 2 emissions, which represent 92 per cent of emissions under our operational control, will be eliminated by switching to 100 per cent renewable energy, reducing electricity use through energy efficiency measures, and installing additional onsite solar PV.

Scope 1 emissions account for 8 per cent of the emissions under Sydney Airport's operational control and will be reduced by transitioning diesel/petrol vehicles and buses to electric, replacing natural gas boilers with electric alternatives, and substituting diesel back up generators with electric alternatives where feasible.

As there will be a small, residual proportion of Scope 1 emissions that will not be eliminated by alternative technologies or management practices prior to 2030, these emissions will be offset by the procurement of carbon removal credits and the establishment of new nature-based carbon removal solutions.

Our commitment to achieving carbon neutral certification by 2025 in line with the Airport Carbon Accreditation scheme is a major milestone on our pathway to net zero by 2030.

Read more about our 2022 emissions performance and how we will achieve net zero by 2030 in the Environmental Management section of our 2022 Sustainability Report.

1. Whilst the rate of grid decarbonisation is outside Sydney Airport's control, it is included in the roadmap as it results in a loss in effectiveness of the other measures which is offset as the grid decarbonises.

Greenhouse gas emissions

Scope 1 and Scope 2 emissions

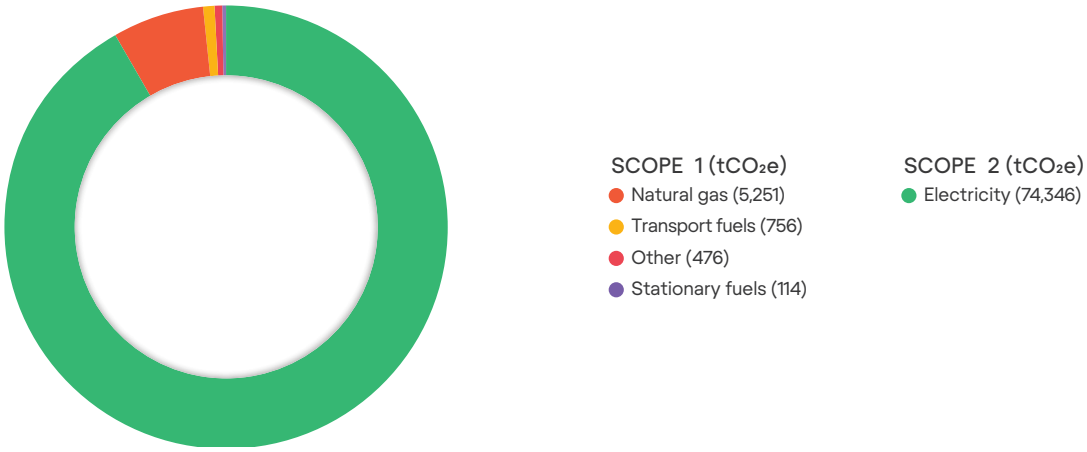
This year, emissions under our operational control (Scope 1 and 2 emissions) increased by 13 per cent to 80,949 tCO_2e in comparison to the previous year. This increase reflects the ongoing recovery as passenger numbers continue to increase to near pre-pandemic levels.

Electricity use was again the largest contributor to our carbon footprint in 2022, accounting for 92 per cent of Scope 1 and 2 emissions. Refer to the table below for Sydney Airport's Scope 1 and 2 footprint in 2022.

In 2021, we set a target to achieve year-on-year reductions in emissions per m2 from a 2019 baseline. As our emissions intensity this year was 105 kg/m2 CO_2e in comparison to 111 kg/m2 CO_2e in 2019, we achieved the target. However, we acknowledge that Sydney Airport has not achieved full recovery in passenger numbers post-pandemic, achieving a 66 per cent passenger recovery to 2019 levels.

To read more about our emissions management, see the Environment section of our 2022 Sustainability Report.

Sydney Airport's 2022 scope 1 and 2 footprint

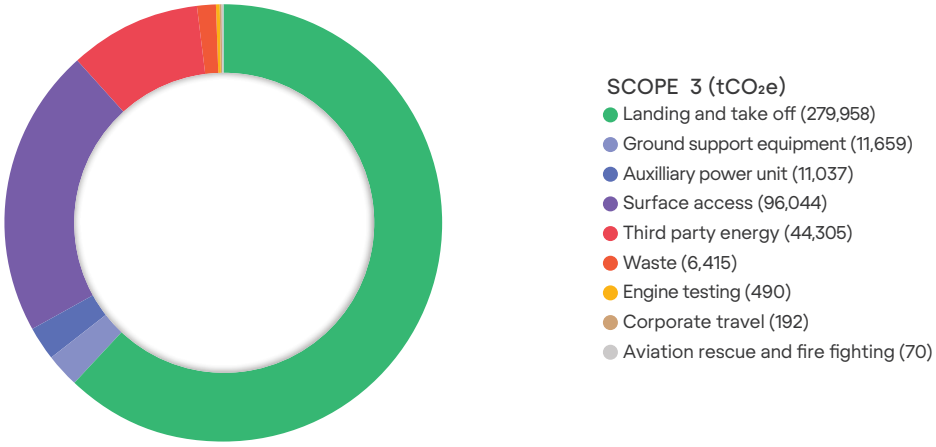


To read more about our emissions management, see the Environment section of our 2022 Sustainability Report.

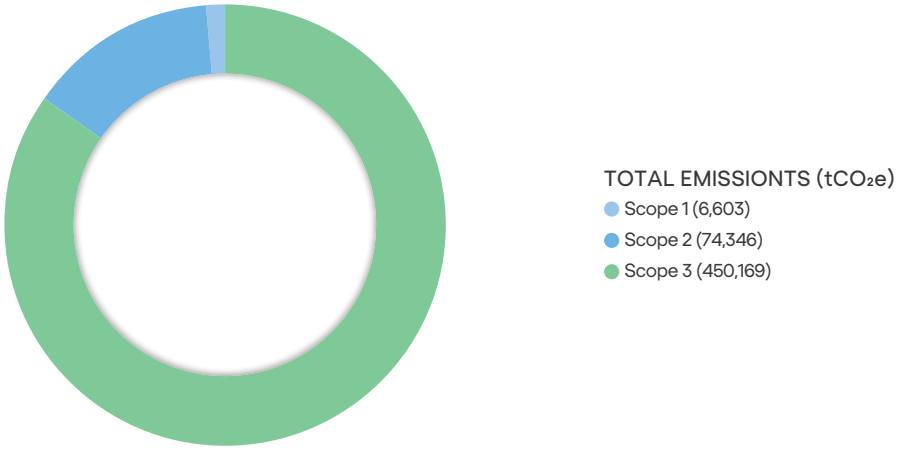
Scope 3 emissions

Scope 3 emissions increased from 2021 performance this year to 450,169 tCO_2e[1]. The 92 per cent increase in Scope 3 emissions from the previous year was largely driven by a 267 per cent increase in passenger numbers associated with the recovery post-pandemic. Overall, emissions associated with the take-off and landing cycle of aircraft (up to 1,000 metres) and surface access[2] emissions account for 84 per cent of total Scope 3 emissions. Refer to the Performance data table and figures below.

Sydney Airport's 2022 Scope 3 footprint



Sydney Airport's 2022 total carbon footprint



1. Sydney Airport's Scope 3 emissions are calculated in line with the Airport Council International's Airport Carbon Accreditation program methodology (Level 3 Optimisation)
2. Travel to and from the airport by passengers, visitors, employees and other airport staff

Performance data

	2022	2021	2020	2018-19	2017-18
Greenhouse gas emissions (tCO_2e)					
Total Scope 1 & 2 (Location based)[1]	80,949	71,382	75,854	83,620	86,916
Scope 1	**6,620**	**5,886**	**5,612**	**5,755**	**5,569**
Natural gas	5,251	4,938	4,316	4,080	3,550
Stationary fuels	114	122	140	134	167
Transport fuels	756	476	838	1,270	1,585
Other	476	350	319	271	267
Scope 2[2]	**74,346**	**65,496**	**70,242**	**77,865**	**81,347**
Electricity	74,346	65,496	70,242	77,865	81,347
Scope 3	**450,169**	**234,538***	**276,821***	**883,983**	**884,304**
Landing and take off	279,958	151,482	165,121	431,445	428,924
Ground support equipment	11,659	5,886	6,005	29,380	29,016
Auxiliary power unit	11,037	5,810	6,150	49,247	52,147
Surface access	96,044	27,226	37,594	289,583	288,985
Third party energy	44,305	41,555	58,320	74,491	25,338
Waste	6,415	2,015	3,021	8,968	9,747
Engine testing	490	488	452	696	751
Corporate travel	192	15	53	81	133
Aviation rescue and fire fighting	70	61	105	92	110
Emissions intensity					
Total emissions intensity[3] ($kgCO_2e$/ PAX)	2.75	8.9*	6.7*	2.4	2.6
Total emissions intensity[4] ($kgCO_2e$/ m2)	104.8	92.7	101.5	111.38	—
Carbon Offsetting (tCO_2e)					
Total offsets	947	1,044	785	N/A	784
Energy					
Total energy consumption (GJ)	452,802	404,825	412,564	446,544	447,635
Natural gas	101,910	95,819	83,758	79,184	68,893
Stationary fuels	1,630	1,745	1,815	1,924	2,391
Transport fuels	7,988	6,842	12,007	18,067	22,577
Electricity (excl. renewables)	338,792	297,735	312,184	344,607	352,831
Renewable	2,429	2,684	2,800	2,763	943

* impacted by the Covid-19 pandemic.

1. GHG inventory is compiled in line with the National Greenhouse and Energy Reporting Act and the National Greenhouse Accounts Factors
2. Consists 100 per cent of electricity consumption by Sydney Airport Corporation Limited
3. Calculated by dividing total Scope 1 and 2 emissions by total number of passengers. Offsets purchased for Scope 1 emissions deducted. Includes T3 domestic terminal from 2020 onwards.
4. Calculated by dividing total Scope 1 and 2 emissions by total floor area excludes transport-related Scope 1 emissions. Offsets purchased for Scope 1 emissions deducted. Includes T3 domestic terminal from 2020 onwards.

SYD