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2-4 Environment

HIGHLIGHTS

5th Time selected in DJSI, and got highest scores in environmental reporting and policies, management systems, and climate strategies

Five consecutive times selected in DJSI emerging markets index and got highest score in environmental reporting and policies, management systems, and climate strategies of DJSI in 2020.

1st Taiwanese airlines to publish TCFD disclosures

First airline in Taiwan to publish climate related financial disclosures (TCFD).

7th Time in TCSA Climate Leadership Award

Awarded in TCSA Climate Leadership Award for seven consecutive years since 2014.

1st Airlines in Taiwan to receive Carbon Label and Carbon Reduction Label

Mandarin Airlines of CAL group passed the 3rd party carbon footprint verification again, and became the first airlines to receive the Taiwan EPA "carbon label" and "carbon reduction label" with over 30% carbon reduction.

9th consecutive year in response to CDP

The Company has actively participated in the CDP climate questionnaire for nine consecutive years since 2012 and actively communicates with stakeholders.

Buying Power — Special Environmental Sustainability Award

Worked with Zen Zhou to develop "CAL Foldable Platinum Silicone Cups", which was awarded a special prize in the environmental sustainability category and a first prize in the procurement category of the Buying Power Awards by SMEA of Taiwan MOEA.

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Management Approach

GRI 103-1, 103-2, 103-3

Importance of Material Issues

Extreme weather events, changes in consumer awareness, and increased global awareness of air pollution, waste, and noise derived from climate change continue to challenge the operating environment of the aviation industry. As a leading airline in Taiwan, China Airlines is committed to providing passengers and cargo clients with high-quality products and services while fulfilling its commitment to environmental sustainability.

Commitment and Long-term Goals

- **Commitment**

CAL is committed to abiding by relevant regulations in civil aviation, environmental protection, and energy, strengthening risk management mechanisms, actively participating in and responding to environmental sustainability-related organizations and initiatives at home and abroad, continuing to strengthen and optimize its own environmental sustainability as its momentum, reducing environmental impact, and cherishing the limited resources on the planet while creating sustainability. With its own role, CAL will lead the aviation industry to jointly protect our home planet for future generations.

- **Long-term Goals**

2023

1. Improving annual aviation fuel efficiency by 1.5% and achieving CORSIA carbon-neutral growth from 2020 (CNG2020)
2. Reducing carbon emissions from ground operations by 41% compared to 2009
3. Strengthening decision-making mechanisms to integrate climate-related financial disclosure (TCFD) information
4. Reducing general waste production from ground operations by 5% compared with 2018
5. Achieving a recycling and reuse rate of industrial waste by 43%
6. Reducing paper consumption by 14% compared with 2018
7. Reducing water consumption from ground operations by 3.6% compared with 2018
8. Embargoing illegal wildlife species and prohibiting use of illegal species as food ingredients

2025

1. Improving annual aviation fuel efficiency by 1.5% and achieving CORSIA CNG2020
2. Reducing carbon emissions from ground operations by 44% compared with 2009
3. Implementing and optimizing internal carbon pricing operations
4. Reducing general waste production from ground operations by 7% compared with 2018
5. Achieving a recycling rate of industrial waste of 45%
6. Reducing paper consumption by 20% compared with 2018
7. Reducing water consumption from ground operations by 5% compared with 2018
8. Embargoing illegal wildlife species and prohibiting use of illegal species as food ingredients

2030

1. Improving annual aviation fuel efficiency by 1.5% and achieving CORSIA CNG2020
2. Reducing carbon emissions from ground operations by 50% compared with 2009
3. Facilitating Taiwan's sustainable aviation fuel strategy
4. Reducing general waste production from ground operations by 12% compared with 2018
5. Achieving a recycling rate of industrial waste of 50%
6. Reducing paper consumption by 30% compared with 2018
7. Reducing water consumption from ground operations by 7% compared with 2018
8. Embargoing illegal wildlife species and prohibiting use of illegal species as food ingredients

Unit in Charge

Corporate Sustainability Committee —
Environmental Task Force (Corporate Environmental Committee)

Management Mechanism

- The Board of Directors and its Risk Management Committee convene a meeting every quarter
- The Corporate Sustainability Committee convenes a meeting at least twice every year
- The Corporate Environmental Committee convenes a meeting every quarter on a regular basis
- CAL conducts ISO 14001, ISO 50001, and ISO 14064-1 3rd party audit and verification every year
- CAL responds to DJSI, FTSE and CDP on a regular basis

Grievance Mechanism

CSR — E-Mail: csr@china-airlines.com

Stakeholder Contact

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Objectives and Plans

Task	2020			2021 Objectives
	Objectives	Performance	Achievement	
Optimizing Corporate Environment and Energy Management	Updated the energy management system and obtained ISO 50001:2018 certificate	Implemented transition to ISO 50001:2018 and updated relevant SOP	100%	• Optimizing energy and resource information management for outstations • Continuing to getting involved external evaluation and policy engagement • Implementing 69 action plans for environment and energy management
	• Optimizing energy and resource information management for outstations • Continuing to getting involved external evaluation and policy engagement	• Completed the environmental risk and opportunity assessment, data compilation, and amendment of questionnaires for outstations • Responded to DJSI, CDP, and customers on environmental issues • Completed six external evaluations	100%	
	Implementing corporate environmental management and launching 69 environmental protection and energy conservation action plans	Completed 73 environmental protection and energy conservation action plans	106%	
Consolidating Climate Risk Management and Carbon Reduction	Improving fuel efficiency to 0.2349 ton / 1,000 RTK	Achieved fuel efficiency of 0.2586 ton / 1,000 RTK	90%	• Improving fuel efficiency to 0.2547 ton / 1,000 RTK • Target for ground operations Scope 1 GHG emissions 4,334 tons of CO_2e • Target for ground operations Scope 2 GHG emissions 17,545 tons of CO_2e • Improving the Company's TCFD disclosure capacity and operation skills • Promoting CORSIA, EU ETS, and UK ETS compliance • Completing ISO 14064-1:2018 transition • Expanding the ECO Travel Carbon Offsetting Program
	Target for ground operations Scope 1 GHG emissions 4,745 tons of CO_2e	Actual ground operations scope 1 GHG emissions 3,051 tons CO_2e	135%	
	Target for ground operations Scope 2 GHG emissions 17,308 tons CO_2e	Actual ground operations scope 2 GHG emissions 17,572 tons CO_2e	98%	
	Building capacity for TCFD Promoting CORSIA and EU ETS compliance Implementing ISO 14064-1 transition	• Completed the climate opportunity and impact assessment and published climate-related financial disclosures • Completed the EU ETS and CORSIA MRV works • Formulated the MRV mechanism under CORSIA • Completing ISO 14064-1 transition training and amendment of procedures	100%	
Building Capacity for Value Chain Environmental Management	• Constructing the first stage of environmental management mechanism for value chain • Setting goals for value chain environmental management • Organizing value chain environmental management training programs and meetings • Promoting carbon reduction label for domestic flights	• Helped important affiliates establish environmental protection policies • All core subsidiary companies have set two goals for environmental management • Organized two value chain environmental management training programs and meetings • MDA Received the carbon label and carbon reduction label from the EPA	100%	• Improving the environmental management mechanism for value chain • Promoting core subsidiary companies to disclose and communicate the environmental management policy and performance • Organizing value chain environmental management training programs and meetings
Strengthening Awareness and Brand Image of Corporate Environmental Protection	• Organizing corporate environmental and energy- management training • Organizing annual environmental training and satisfaction survey for all employees in 2020 • Continuing to encourage employee for environmental proposal • Promoting diversified channels of customer communication of environmental protection • Joining and implementing environmental protection initiatives	• Organized three sessions of environmental and energy management training • Organized environmental seminars, environmental education quizzes, and satisfaction surveys for all employees • Supported three environmental experience-sharing meetings organized by external associations / foundations • Published environmental news and articles in the inflight magazine • Broadcasted eco-friendly videos on board • Shared three push notifications on Facebook • Implemented cross-industry exchange	100%	• Organizing corporate environmental and energy- management training • Organizing the 2021 annual environmental training and satisfaction survey for all employees • Continuing to encourage employee for environmental proposal • Promoting diversified channels of customer communication of environmental protection • Joining and implementing environmental protection initiatives

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2020 Environmental Performance

Item		Unit	Emissions / Consumption / Generated	Amount Saved / Recycled	Percentage of Savings / Recycling
Category 1 GHG Emissions (ORIG Scope 1)		Tons CO_2e	5,790,802	-	-
Category 2 GHG Emissions (ORIG Scope 2)		Tons CO_2e	17,572	-	-
Category 3-6 GHG Emissions (ORIG Scope 3)		Tons CO_2e	3,109,822	-	-
Air Pollutants (SOx)	Passenger Aircraft	Ton	30.41	-	-
	Cargo Aircraft	Ton	14.58	-	-
Air Pollutants (NOx)	Passenger Aircraft	Ton	317.03	-	-
	Cargo Aircraft	Ton	152.04	-	-
Aviation Fuel (Non-Renewable Energy)		Ton	1,829,328	-	-
Electricity		MWh	34,523	-	-
Renewable Power (Solar Photovoltaic)		MWh	117	-	-
Elevator Power Regeneration		KWh	-	1,177	-
Water Resources		Thousand tons	126.77	8.64	6.8%
Wastewater (Organic & Heavy Metals)		Thousand tons	19.34	2.32	12%
Cabin Waste		Kg	1,285,318	341,366	26.56%
Ground Waste (Excluding Hazardous Industrial Waste)		Kg	647,317	229,971	35.53%
Ground Waste (Including Hazardous Industrial Waste)		Kg	659,974	229,971	34.85%

2-4-1 Governance of Environmental Sustainability

Improving the Policy and Structure of Environmental Governance

CAL has established the environmental and energy management principles (compliance with environmental laws and regulations, resource conservation, improvement in eco-efficiency, and fulfillment of corporate social responsibility) and the Environmental and Energy Policy Statement according to the China Airlines Corporate Social Responsibility and Sustainable Development Best Practice Principles promulgated by the Board of Directors; in addition, CAL has integrated UN SDGs into its instructional strategies to align future business operations with the sustainable development concepts of environmental friendliness, low-carbon emissions, and energy conservation for a better future.

CAL was the first Taiwanese airlines to establish the Corporate Environmental Committee in 2011. The President represents the top management, and the Corporate Safety Office acts as the executive secretary. Five environmental management committees were established under the Corporate Environmental Committee to take charge of environmental, energy, and climate risk and opportunity management pertaining to inflight service, maintenance, and cargo operations as well as the administration and operation of the headquarters and branches based on the risk management system established in line with the international standards. The Corporate Environmental Committee coordinates and integrates countermeasures and resources for environmental, energy, and climate risks and opportunities in the management meetings held every quarter and reports key resolutions to the Board of Directors in routine meetings of the Board and its committees. For specific issues, functional task forces, including the Carbon Management Task Force, the Sustainable Aviation / Alternative Fuels Task Force, and the TCFD Task Force (Note), have also been set up for cross- departmental cooperation and flexible deployment of resources.

The Company continues to uphold the six major strategies for sustainability including "Fleet and Network" and "Brand Awareness". CAL is committed to the creation of an efficient fleet network and resilient operations to combat extreme weather and changes in the business environment. We seek to create a sustainable brand that protects the environment and improves internal and external brand awareness. Overall, CAL has built a sound corporate environment and energy management model in the aspects of policy, organization and management system based on international trends and risk management practices. From a life cycle perspective, CAL takes into account the context of the organization operations (including day-to-day operations of the Company and existing or new products and services), internal / external issues, and needs and expectations of stakeholders and manages environmental, energy, and climate risks and opportunities appropriately. CAL aims to lead affiliate companies of the Group, suppliers, contractors, and other value chain partners to work together in promoting environmental protection operations and ensure that the environmental sustainability policy is implemented. In the future, CAL will introduce TCFD step by step to strengthen the connotation of environmental management. For more information, please refer to Environmental Governance - China Airlines Corporate Sustainability Site.

Note: TCFD refers to Task Force on Climate-related Financial Disclosures.

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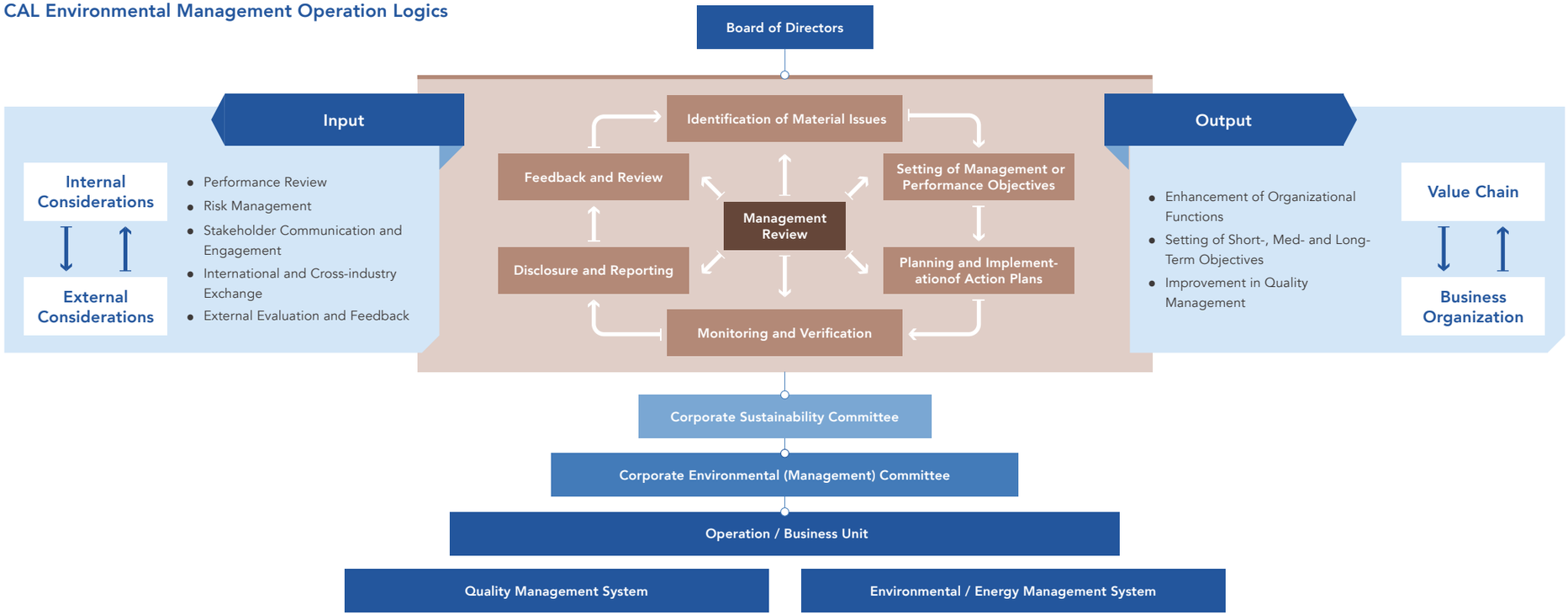
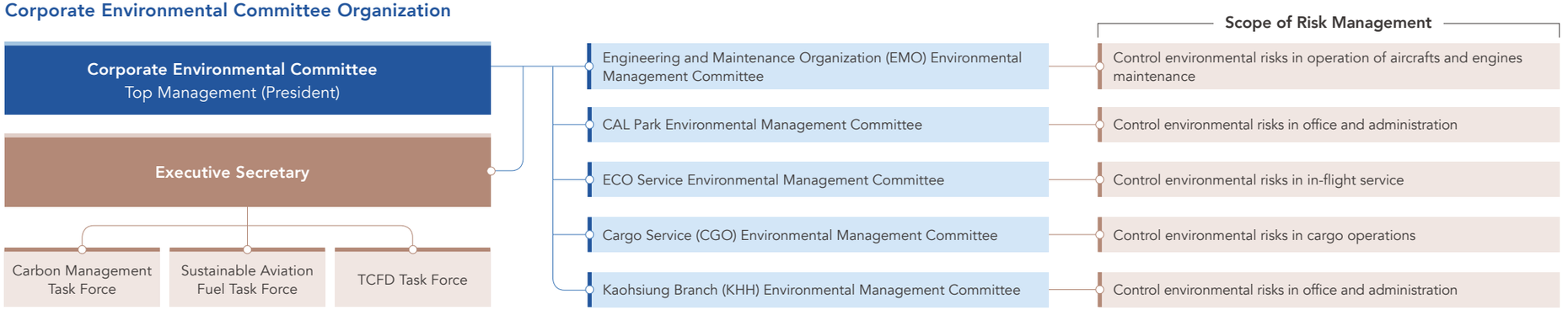
CAL Environmental Management Operation Logics



Corporate Environmental Committee Organization



Implementing Environmental and Energy Management Systems

CAL has introduced many international standard management systems since 2009 to establish a sound corporate environmental management mechanism covering GHG, environmental management, and energy management. In addition, to fully integrate the benchmarking conceptualization for sustainable development of international enterprises, CAL has continued to introduce the life cycle perspective since 2017 to fully understand the context of corporate, take stakeholders' concern into account and strengthen the identification and operational control of various environmental impacts and energy use.

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Standards for CAL's Environmental Management Systems

Standard	ISO 14064-1 Greenhouse Gas Inventory Requirements	ISO 14001 Environmental Management System	ISO 50001 Energy Management System
Time of Introduction	Introduced ISO 14064-1:2006 in 2009 Completed ISO 14064-1:2018 transition in 2021	Introduced ISO 14001:2004 in 2012 Completed ISO 14001:2015 transition in 2017	Introduced ISO 50001:2011 in 2013 Completed ISO 50001:2018 transition in 2019
Scope	• Global Aviation Fuel • Ground Operations in Taiwan, including CAL Park, EMO, Taipei Branch, Songshan Office, and Kaohsiung Branch	• Aircraft / Engine Maintenance • Flight Operations Management • Cargo Service • Passenger Service	• Aircraft / Engine Maintenance • Flight Operations Management

Implementing Environmental and Energy Management Principles and Policies

China Airlines Corporate Social Responsibility and Sustainable Development Best Practice Principles

Environmental and Energy Principle	Compliance with Environmental Laws and Regulations	Conserving the Earth's Resource	Improving Eco-Efficiency		Fulfilling Corporate Social Responsibility	
Environmental and Energy Policy	Enforcing compliance obligations to fulfill the company's responsibilities in environmental protection and energy conservation	Establishing environmental and energy management systems, including performance indicators to verify compliance with established policies	Promoting environmental and energy conservation education to foster employees' eco-awareness	Implementing green supply chain management to raise overall eco-efficiency	Creating a low-carbon operating environment to establish continual improvement of environmental protection and energy efficiency	Supporting green design and procurement to promote sustainable development
Strategy	1. Keep abreast of the domestic and international trends and promote the channels and platforms of stakeholders' engagement 2. Participate in international cooperation and keep up with major issues 3. Improve management / monitoring mechanisms	1. Improve the quality of the environmental and energy management system 2. Plan and implement environmental performance and carbon reduction objectives	1. Create diverse channels of communication 2. Establish incentive plans to encourage employees to achieve and promote environmental protection	1. Establish a supply chain risk assessment and management system 2. Build corporate capacity for environmental and energy management	1. Optimize equipment efficiency 2. Introduced low-carbon and renewable energy-based facilities	1. Improve the awareness of environmental protection and energy conservation 2. Promote green procurement and consumption
Action Plan	1. Regularly check statutory requirements and commitments 2. Participate in domestic and international meetings at industry and government levels to keep up with regulatory trends 3. Implement management system compliance audits 4. Respond to the international benchmark ratings such as DJSI, CDP and other public and private sector recognitions and competitions	1. Keep abreast of ISO standards and improve the environmental management system 2. Improve the risk assessment and management mechanisms for environmental protection, energy, and carbon emissions 3. Establish and implement energy conservation and carbon reduction and environmental protection 4. Implement internal audit and management review mechanisms and implement third-party certification 5. Establish climate-related financial disclosures (TCFD) mechanisms 6. Establish an environmental management information system to keep track of environmental performance	1. Implement company-wide environmental protection and energy conservation training 2. Provide necessary training to ensure the competence of person(s) who may affect the environmental and energy performance 3. Organize an annual seminar and contest on environmental protection 4. Establish a knowledge-based platform to promote environmental protection and energy conservation from time to time 5. Establish a proposal incentive mechanism	1. Train seeds of environmental protection among CAL and its key suppliers 2. Organize energy conservation and environmental protection training for the value chain 3. Conduct supply chain risk assessments 4. Conduct the contractor/ supplier conference and regular meetings to communicate the sustainable and environmental requirements of CAL	1. Check and optimize energy equipment and management measures 2. Keep abreast of technology and regulatory trends and introduce renewable energy equipment in a timely manner	1. Incorporate Environmental Management System (EMS) to service processes and enhance personnel training 2. Consider environmental protection and energy conservation in the purchase of supplies 3. Establish and promote ECO TRAVEL Carbon Offsetting service 4. Provide environmentally-friendly in-flight supplies. 5. Sell environmentally-friendly duty-free products 6. Promote green consumption through diverse channels

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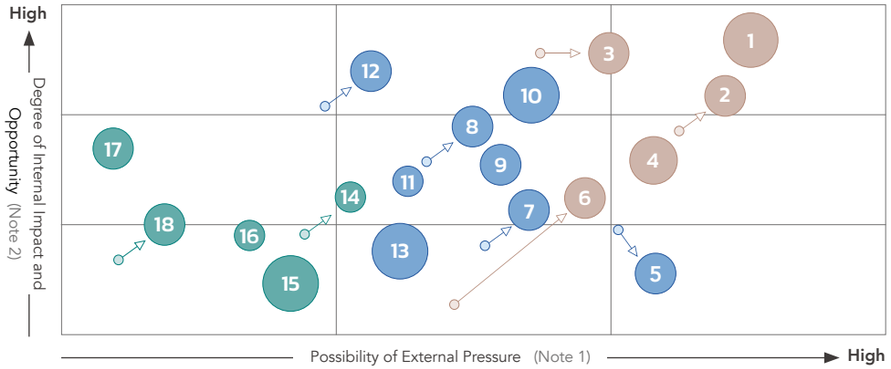
Identification of Environmental Risks and Opportunities GRI 201-2

CAL has completed the following environmental and risk opportunity matrix at the present stage through the aforesaid enterprise risk management framework and platform. CAL has included these nine issues in the scope of its key corporate environmental risk management for active control and response. Other issues will also receive attention through the operation of corporate environmental management system.

1. Aviation carbon emission management
2. Climate change adaptation
3. Aircraft energy efficiency improvement
4. Ground operations energy (carbon) management
5. Aircraft takeoff and landing noise control
6. Cabin waste control
7. Ground water resources management
8. Toxic and chemical substance control
9. Waste water and sewage control
10. Inflight drinking water management
11. New technology and energy development
12. Ground operation waste control
13. Ground operation air pollution control
14. Green supply chain management requirements
15. Illegal wildlife transport control
16. Circular economy and innovation model
17. Aircraft air pollution control
18. Passenger environmental protection awareness improvement

Material Environmental Risk Topic	Risk	Opportunity	Management Method
1. Aviation carbon emission management	Increasingly strict international carbon emissions regulations will increase the Company's operational costs	Grasp the development trend of carbon rights and manage properly to increase revenue	Actively participate in international conferences to keep abreast of latest developments; strengthen the management system and the carbon management team's response capabilities
2. Climate change adaptation	Increasing frequency of extreme weather events will impact the Company's daily operations	Proper response will strengthen corporate resilience and reputation	Continue to improve the Company's ability to predict and respond to climate change, as detailed in 2-4-2 Climate Change Mitigation and Adaptation
3. Aircraft energy efficiency improvement	Accelerate the introduction of new generation energy-efficient aircraft and fuel-saving technologies which will increase operational costs	Improve aircraft fuel efficiency while reducing fuel consumption and carbon emissions, which will reduce operational costs	Replace aircraft, introduce fuel-saving technologies / sustainable fuels, improve the passenger load factor, as well as optimize routes and air traffic management operations, as detailed in the CSR website
4. Ground operations energy management	Strict regulations on the use of renewable energy will increase costs	Improve energy efficiency in office and ground operations, which will reduce operational costs	Formulate an annual improvement plan, and its effectiveness should be evaluated by the Environmental Committee quarterly
5. Aircraft takeoff and landing noise control	Stricter regulations will increase the cost of fees	Proper response will strengthen corporate resilience and reputation	Introduce new models of aircraft to reduce noise pollution and optimize aircraft approaches
6. Cabin waste control	The use of disposable plastic products and food waste management have gained prominence in many countries while the complexity of operations has increased compliance cost and the response to the COVID-19 pandemic has created public sanitation and waste management issues	Systematic inventory and planning for alternative products and improvement of operating procedures to reduce the risks of violations of regulations and compliance cost, and improve company reputation	Establish a (in-flight) Waste Task Force to monitor management trends and market development of alternatives and engage suppliers for the optimal response solutions; enhance source quality and quantity management and improve terminal processing standards
7. Ground water resources control	The shortage of water resources affects the Company's operations and increases the cost of the purchase of water and alternatives as well as business interruption risks	Properly manage water resources to reduce operational costs and improve the resilience for continuous operation	Improve water resources management mechanisms, continuously optimize equipment and improve operating procedures/production processes, and increase the use of recycled rainwater and sewage and efficiency of water usage
8. Toxic and chemical substance control	Strict regulations increase compliance costs Leakage of toxic and chemical substances will cause harm to operating personnel and the environment	Proper response and management will strengthen corporate resilience and reputation	Establish an operational control mechanism, which should be reported to the Environmental Management Committee quarterly
9. Waste water and sewage control	Strict regulations will increase compliance costs	Proper response and management will strengthen corporate resilience and reputation; zero pollution increases brand trustworthiness	Strengthen operational control and equipment inspection, strengthen the knowledge and ability of dedicated personnel, as well as implement management system risk identification and performance review

CAL Environmental Risk and Opportunity Matrix



The size of the circle represents the adaptation of CAL to the issue (a larger circle means better action and adaptation).

Light circles represent data from the previous year and darker circles represent data from this year.

The arrow indicates the difference in displacement from last year.

Note 1: X-axis represents the possibility of the issue in the global trend of development and control.

Note 2: Y-axis represents the degree of impact and opportunity of the issue on CAL.

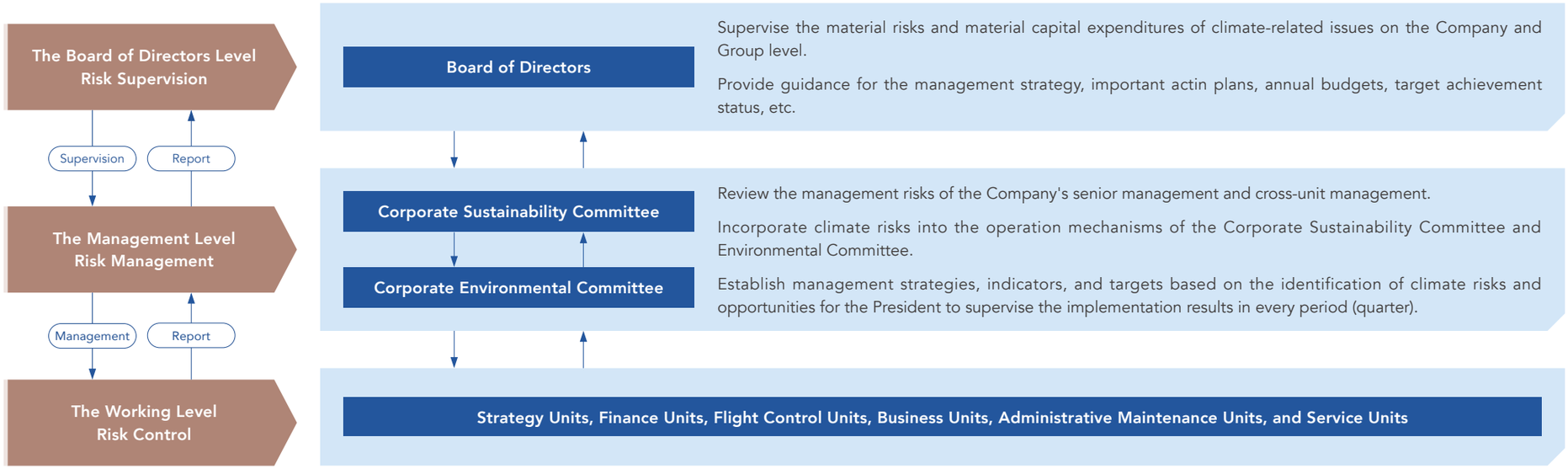
2-4-2 Climate Change Mitigation and Adaptation

Recognizing the direct impact and importance of climate issues on the aviation industry, CAL has actively implemented various climate change mitigation and adaptation measures and has set three phase goals in flight operations and ground operations in response to the voluntary carbon reduction initiatives of the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA), and "the Civil Aeronautics Administration (CAA)"of the Republic of China (Taiwan). We also established a carbon reduction strategy on this basis and adopted appropriate climate adaptation actions to reduce the negative impact of climate change on the Company and grasp derived opportunities. We conducted a comprehensive review of the Company's climate risks and opportunities, and optimized related software and hardware facilities, control and management measures, and response procedures. CAL supported international initiatives and became Taiwan's first airline to publicly sign and adopt the Task Force on Climate-Related Financial Disclosures (TCFD) in 2018. CAL works actively to make TCFD a part of the company's management system. The Company helped complete the translation of TCFD guidelines into traditional Chinese and participated in multiple advocacy campaigns with the industry, government, and academia in 2019. We compiled an independent "Climate-Related Financial Disclosure Report" in 2020 and published it in January 2021 to demonstrate the results of internal management.

Concern for Climate Change

Climate Governance Framework

CAL established a TCFD Task Force composed of multiple units in 2019 and used the Corporate Sustainability Committee and Environmental Committee to monitor climate-related risks and opportunities. We report key results to the Board of Directors each year for supervision and management. CAL's climate governance framework is shown in the figure below.



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Analysis of the Impact of Climate on Company Operations

CAL has referenced the IPCC Fifth Assessment Report (AR5) and analyzed and identified related risks and opportunities that may affect the cost of operations or revenue under 2°C and 4°C scenarios based on global operations and destinations, company assets (including aircrafts, offices, and plants), upstream supply chain, and downstream customers. The analysis results are as follows:

Compilation of Qualitative Evaluation Results

2°C Impact

Governments and ICAO

Low-carbon Transfer Policies, Regulations and Agreements

- Promote sustainable alternative jet fuels: ICAO proposed 2% SAF targets and EU 2019 Green Deal on mandatory use of SAF
- Incorporate carbon tax and carbon offsetting requirements to attain net zero emissions
- Introduction of mandatory renewable energy usage
- Collection of energy expenses and fossil fuel fees

Newcomers in the market

Launch of Low-carbon Travel Flights

Supply Chain (Raw Materials)

Rising Cost of Materials

- Large electricity users use renewable energy for 10% of their consumption
- Extreme weather may cause supply chain interruptions and companies must increase inventory in response

Suppliers (Aircraft Companies)

Increase Fuel Efficiency

- Increase in the demand for next-generation aircrafts with better fuel efficiency
- Development of next-generation aircrafts

CAL

Increased Cost or Reduced Revenue

- Regulatory requirements increase demand for carbon rights / offsetting credits and increase carbon prices
- Increased cost for the development and use of sustainable aviation fuel
- Cost of fleet renewal
- Cost of flood prevention for headquarters and offices
- Disappearance of routes to small islands
- Increased cost for the supply chain

Potential Opportunities

- Improving the Company's operation strategy may create opportunities for increasing revenue by increasing passenger load factor
- Using more fuel-efficient aircrafts effectively reduces operating costs
- Using sustainable aviation fuel to satisfy ICAO's carbon reduction requirements and respond to carbon reduction policies of foreign countries
- Opportunities for investments in renewable energy to produce carbon assets
- Promotion of the ECO Travel Carbon Offsetting Program to cater to customer groups that favor low-carbon consumption
- The customer suggestion system (CSS) helps CAL continue to improve in sustainability, environment, and climate change issues

Stakeholders

Issues of Concern to Stakeholders

- Stakeholders increase their environmental awareness and promote replacement of air transportation with land transportation (including rail transportation)
- Increased demand in developing countries
- Population increase and economic growth expand the demand for logistics
- Increased frequency and intensity of extreme weather affect the normal operations of flights (torrential rain, buoyancy, and sea level rise)
- Development of ESG investment
- Consumers pay close attention to the development of low-carbon tourism

Alternatives

Replacement by Land and Sea Transport

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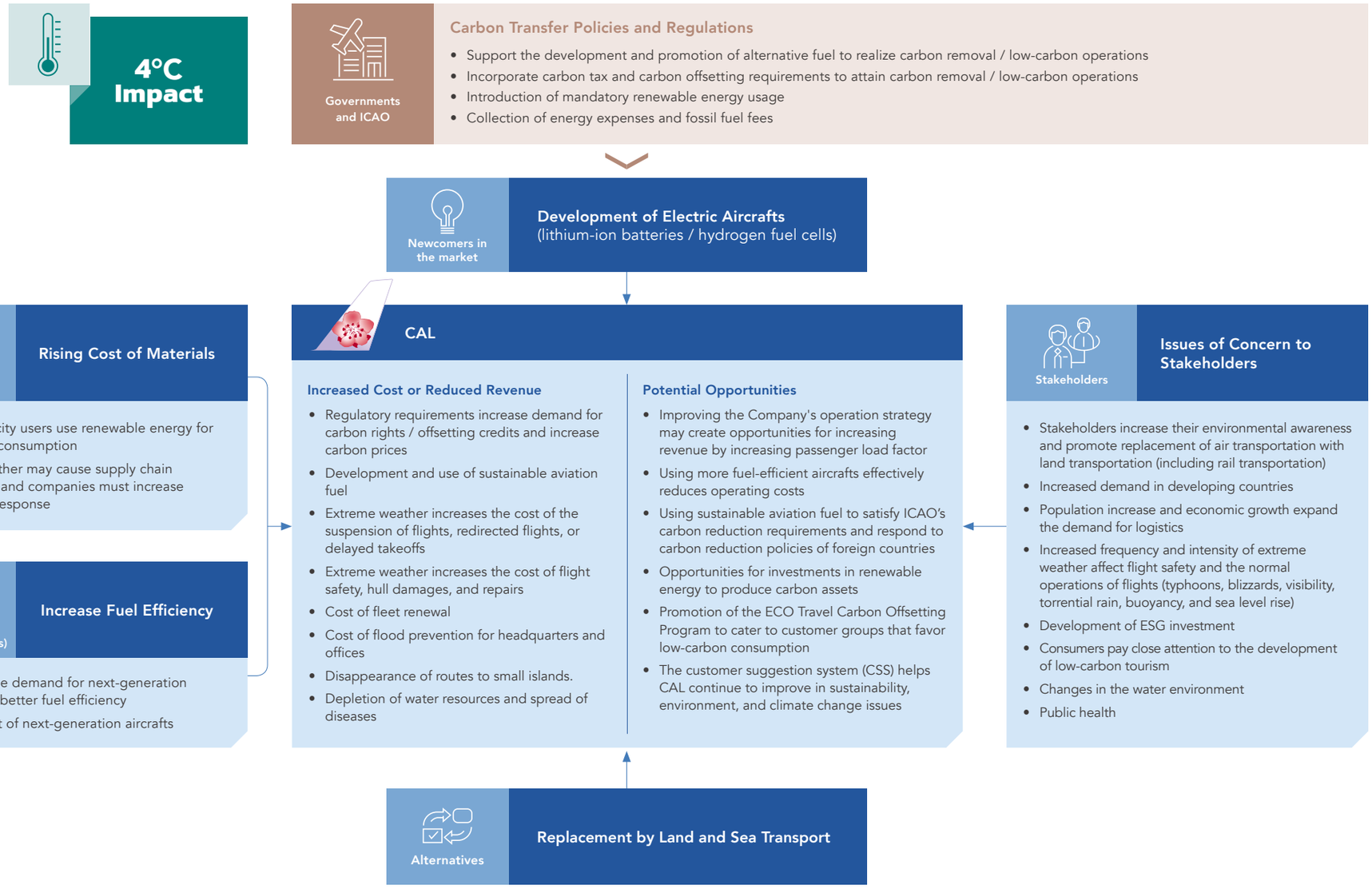

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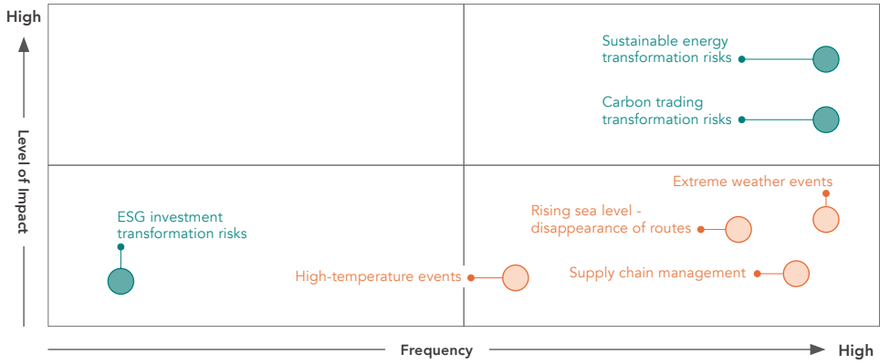
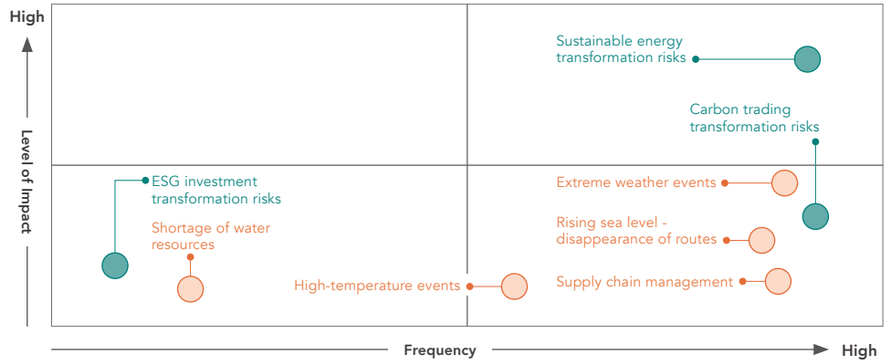
Financial Impact Analysis of Short, Medium, and long-term Climate-related Risks and Opportunities

CAL uses the identification, assessment, response, and review operating procedures in the internal risk management mechanisms for critical climate risk matrix analysis under 2°C and 4°C scenarios in the first phase (as shown in the figure below). The financial impact (as shown in the table below) is measured in the second phase. Please refer to the "China Airlines Climate-Related Financial Disclosure Report".

Long-term Risks and Risk Distribution under the 2°C Scenario



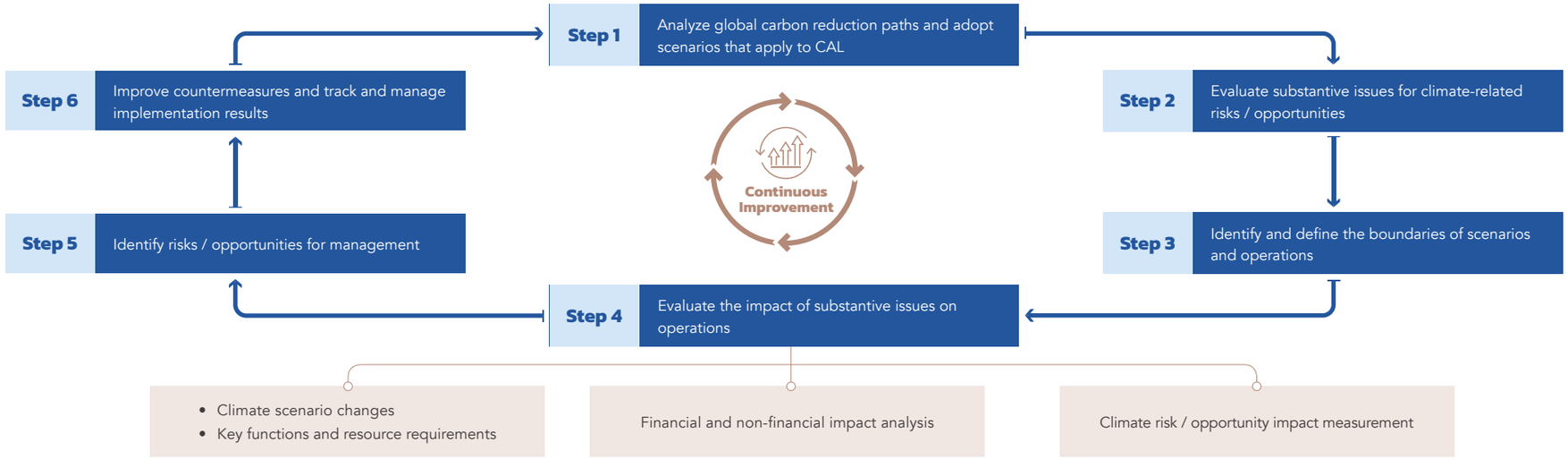
Long-term Risks and Risk Distribution under the 4°C Scenario



Note: Green bubbles correspond to transformational risks; orange bubbles correspond to physical risks.

Climate Risk Management

CAL has incorporated TCFD operating procedures into the Company's management mechanisms and established internal TCFD operating procedures. We also proposed multiple implementation measures for governance, strategy, risk management, and indicators and targets to continuously improve and overall climate-related risk and opportunity management.



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Climate Change Targets and Mitigation and Adaptation Strategy

Response Item		Target and Specific Actions
Governance	Strengthen Climate Governance	Continue to submit climate governance reports to the Board of Directors
	Enhance Management Supervision and Cross Departmental Operations	1. Implement corporate governance and green finance and introduce TCFD and SASB standards and requirements 2. Implement rolling management to improve the short, medium, and long-term ESG performance
Strategy	Enhance TCFD Capabilities	1. Increase the comprehensiveness and depth of quantified financial information 2. Establish a cross-unit operation information platform
	Climate Response Strategies and Management	1. Incorporate climate risks and opportunities into the Company's overall strategies and plans and implement related response actions 2. Incorporate discussions of the impact of climate change in the Company's flight plans, business performance management, and other operations and formulate response strategies and business operation adjustments when necessary
	Participate in Important Engagements	1. Participate in the international and Taiwan's important climate policy engagement platforms, monitor policy development trends, and gain influence 2. Lobby the industry, government, and academia to create a development strategy for sustainable aviation fuel in Taiwan
Risk Management	Strengthen the Risk Management Mechanisms for the Corporate Value Chain	Combine the CAL value chain and the environmental risk management mechanism, continue to implement and expand greenhouse gas inventory and climate and energy risk assessments of key suppliers, strengthen the detection of climate risks and opportunities as well as management, and enhance the capability of continued operations in response to extreme weather
	Strengthen the Existing Enterprise Risk Management Mechanism	Incorporate climate factors into the existing enterprise risk management mechanism to strengthen climate risk / opportunity detection, response, and control capabilities in all units
	Respond to International Carbon Transformation Risks	1. Participate in the carbon offsetting and reduction plans of the international aviation industry 2. Continue to enhance MRV capacity for EU ETS and CORSIA mechanisms 3. Study and perform carbon rights / credit transaction
	Implement Carbon Reduction and Energy Transformation	1. Install dedicated electricity meters on equipment / processes with high energy consumption risks to monitor electricity consumption 2. Continue to perform replacement and renewal of high-energy-consuming facilities 3. Evaluate the installation of renewable energy facilities 4. Enhance energy management systems and improvement of their effectiveness
Indicators and Targets	Continuously Optimize Green-house Gas Inventory	Conduct an inventory of greenhouse gas emissions ISO 14064:2018 categories greenhouse gas emissions inventory every year to grasp the greenhouse gas emissions information
	Implement Carbon Emission Reduction Targets and KPIs	Implement short-, mid-, and long-term carbon reduction targets and establish around 60 KPIs in environmental protection and carbon emission reduction each year; review the performance at the meeting of the Corporate Environmental Committee convened by the President quarterly
	Attain Flight Carbon Reduction Objectives	1. Continue to promote plans for fleet update, aircraft weight reduction, flight optimization, and O&M improvement 2. Implement fleet plans in accordance with medium and long-term business growth and carbon reduction trends 3. Continue to improve aviation fuel efficiency, increase loading rate, and focus on the development of new technologies and new low-carbon aircrafts for purchase at an appropriate time
	Increase Fuel Efficiency	1. Continue to promote aviation fuel-saving operations to increase 1.5% fuel efficiency each year 2. Optimize route planning and develop the most suitable passenger / cargo fleet in response to the epidemic and market development trends

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2-4-3 Achievements in Environmental Sustainability

GRI 301-1, 303-2, 303-3, 303-4, 303-5

CAL continued to focus on the following tasks: improving environmental and energy management, strengthening carbon management, building capacity for supply chain environmental management, and promoting environmental awareness. The Corporate Environmental Committee, its five environmental management committees, and functional task forces convened meetings regularly or from time to time to improve environmental performance and ecological efficiency. For more information on environmental performance, refer to Appendix Environmental Performance.

Task 1 — Optimizing Corporate Environment and Energy Management

In 2017 and 2019, CAL completed the transition to the ISO 14001:2015 standard and ISO 50001:2018, incorporating the "life cycle thinking", "stakeholder engagement," and "risk and opportunity management" into day-to-day operations to continue to enhance environmental and energy performance tracking and management in order to attain the short-term goals for carbon reduction in ground operations and SDGs in 2020. However, the COVID-19 epidemic in 2020 has affected environment and energy performance. We implemented measures to support disease prevention requirements such as adding air-conditioning ventilation, organizing work in separate regions / periods, removing certain water conservation faucets, using disposable utensils, and canceling carpool measures, which exacerbated the burden of the environment in operations.

Nevertheless, CAL remains committed to the spirit of "no resource wasting and precision management" while prioritizing disease prevention. We implemented resource conservation operations across the Company including continuous replacement of lighting equipment, increasing the sources of intermediate water recycling, setting up regional for rotation demands and reduce the burden of the environment. In addition to continuous collection of data on outstation business activities, we also use the opportunity to strengthen resource management and performance evaluation of the system. We implemented measures included the decommissioning of B747-400 passenger aircrafts, installation of electricity meters for major energy usage, installation of water meters at water consumption points, tracking solar energy power generation efficiency, and full inventory and deployment of resource recycling facilities as we prepare for the recovery of demand in the future.

As a benchmark air transportation service provider in Taiwan, CAL is tasked with the critical mission of with supporting border security and strengthening disease prevention tasks for passengers and crew members. CAL complies with related regulations of the Central Epidemic Command Center (CECC) and provides passengers and crew members with suitable protective equipment and takes part in discussions and cooperation on IATA waste operations for disease prevention. We process cabin waste in accordance with high standards in domestic and international regulations. CAL also works with suppliers to actively develop cabin service products that meet disease prevention and environmental protection requirements to protect passengers' health and the environment.

Key Achievement

Development of Products for Self Protection by Using Environmental Friendly Materials

Products developed: CAL and BenQ Materials worked together to create the first co-branded "Xpore travel fashion shield hoody" for self protection and eco friendly.

CAL worked with BenQ Materials in launching the"Xpore travel fashion shield hoody" which can be wear for in-cabin protection and make passengers with safety and comfort during their journeys. Alternative waterproof technology without the use of perfluorocarbons (PFCs) is used and an environmental friendly zero-solvent process to ensure that it does not generate hazardous chemical substances that damage the environment and human body. It can keep off the raindrop or hazardous factors in the environment from penetrating, thus, perspiration can easily evaporate through for long lasting waterproof, windproof and dry comfort in wearing.

Resource Management

Use of Energy

CAL carried out 60 environmentally friendly energy conservation measures and the fuel management team implemented 13 fuel-saving programs in 2020. The planed carbon reduction target was 58,057 tons. However, the reduced number of flights due to the epidemic resulted in a lower achievement rate for fuel conservation. The park air-conditioning / lighting equipment replacement project was also postponed. The actual carbon reduction in 2020 was 48,888 tons and the achievement rate was 84%. . CAL consumed 34,523 kWh of electricity in 2020, which was a 1.28% increase from 2019 (34,088 kWh). The main cause is the epidemic. We implemented separate regions or separate periods for certain office areas to reduce clustering. We also increased external air exchange volume for the air-conditioning system to ensure the circulation of air. Therefore, the electricity consumption increased significantly starting from the third quarter. However, CAL continued to replace existing equipment and lighting equipment and enhanced the energy conservation awareness campaigns in the office, maintained the operation efficiency of the electricity recovery system of the elevators, and increased the efficiency of solar renewable energy equipment during the epidemic. We also obtained 117 renewable energy certificates issued by the Ministry of Economic Affairs in 2020 to maintain a certain level of building energy efficiency while satisfying disease prevention requirements.

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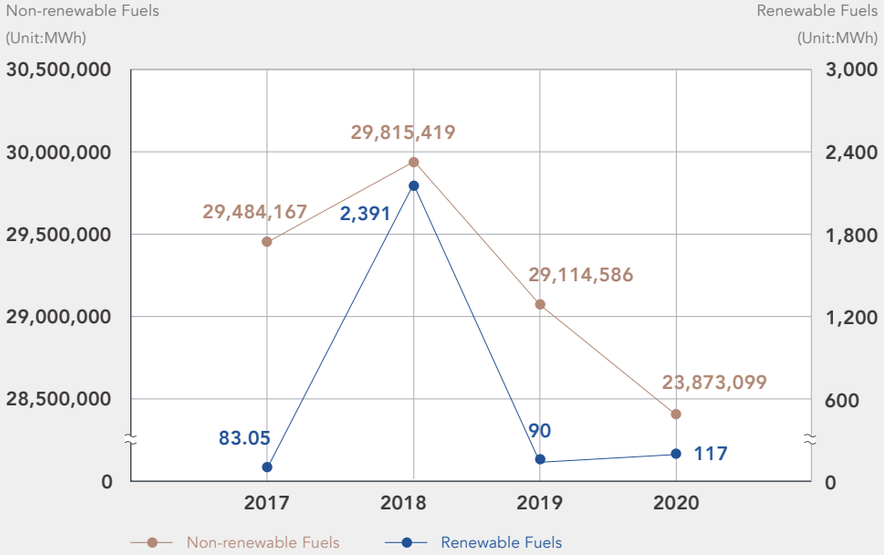
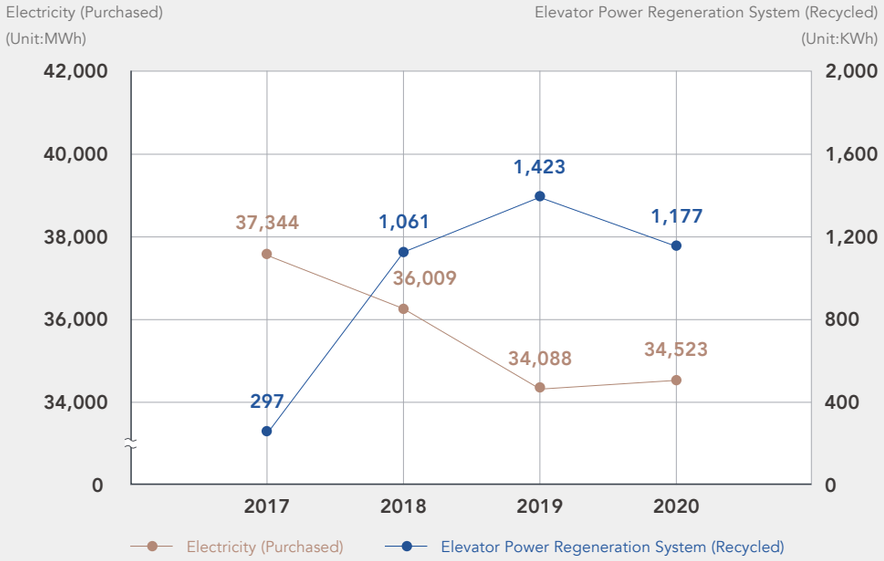
Energy Consumption





Note 1: Non-renewable fuels include gasoline, diesel, liquefied petroleum gas (LPG), liquefied natural gas (LNG), and aviation fuel. All CAL aircraft are counted as part of the calculation of aircraft fuel consumption.

Note 2: Renewable fuels include sustainable aviation fuels and solar photovoltaic.

Note 3: The scope of purchased power covers park areas (China Airlines Park, Taipei Branch Office, Songshan Office), maintenance plants (Hangars 2 and 3, Engine Maintenance Plant), and Kaohsiung Branch Office.

Note 4: Since the fourth quarter of 2017, 2 sets of the elevator power regeneration system have been installed at the Crew Training Building with high utility of elevators. Electricity is recycled and reused through the anti-motoring effect and the internal grid.

Noise Management

CAL takes the following measures to reduce the impact of noise on local communities and front-line employees during takeoff and landing without compromising flight safety:

1. All CAL aircrafts (777-300ER, 747-400, 737-800, A350-900, A330-300) have conformed to international noise standards for low-noise aircraft (noise level for Chapters 3 and 4 of ICAO Annex 16); in particular, noise of A350-900 is 16 dB lower than the current standards and 20% less than that of the same model of competitors.
2. Implement flight operations following the Noise Abatement Procedures posted by each airport.
3. Encourage the flight crew to employ the continuous descent approach (CDA) to lower noise level and reduce fuel consumption.
4. Pay noise charges according to regulations of each country's airports on noise prevention.
5. Collect international information through international exchange platforms, such as IATA to continue to carry out noise reduction.

Use of Water Resources GRI 303-1

CAL's water resources are supplied by Taiwan Water Corporation or Taipei Water Department based on the region. China Airlines Park and Engineering & Maintenance Organization (EMO) Park are located in areas with medium to high water resource risks. We fully incorporated with water conservation label products and rainwater recycling systems into the initial design and construction of China Airlines Park. The system provides water for watering plants and toilet flushing in the Park and we also added multiple intermediary water recycling pipelines after the completion of construction, including condensed water from the air-conditioning system and drainage from training swimming pools as we seek to minimize the consumption of water resources. The water consumption in the in the EMO Park mainly occurs in the maintenance process, wastewater processing, and aircraft cleaning operations. The wastewater includes domestic sewage and industrial wastewater. The former is processed by the Taoyuan Airport Sewage Treatment Plant while the latter is processed by the two wastewater treatment plants in the EMO Park due to the nature of the wastewater. The treatment plants process organic and galvanization wastewater (including heavy metals such as chromium and cadmium). They are also regularly inspected to ensure that the effluent meets related regulations of the Environmental Protection Administration. We recycle and reuse the processed organic wastewater for washing cars and watering garden plants. The remaining effluent is discharged into Nankan River. Songshan Office and Taipei Branch Office are located in areas with low water resource risks.

Water Usage Area	Water Shortage Level 1	Water Supply Unit	Wastewater Processing Unit (Level)	Effluent Site	Effluent Standard
CAL Park	Located in Taoyuan City with high water resource risks	Taiwan Water Corporation	Domestic sewage: Taoyuan Airport Sewage Treatment Plant (secondary treatment)	Nankan River (River with Category C terrestrial surface water)	pH: 6 ~ 9 COD: < 100 mg / L BOD: < 30 mg / L SS: < 30 mg / L
EMO Park			Domestic sewage: Taoyuan Airport Sewage Treatment Plant (secondary treatment) Industrial wastewater: CAL's first and second wastewater treatment plants (tertiary treatment)		pH: 6 ~ 9 COD: < 100 mg / L SS: < 30 mg / L Cadmium: < 0.03 mg / L Total chromium: < 2 mg / L
Taipei Branch	Located in Taipei City with low water resource risks	Taipei Water Department	Dihua Sewage Treatment Plant (secondary treatment)	Tamshui River (River with Category D terrestrial surface water)	pH: 6 ~ 9 COD: < 100 mg / L SS: < 30 mg / L NH3: < 10 mg / L
Songshan Office					

Note 1: Source: A study on the adaptation indicators for the high water resource risk area in Taiwan, Water Resources Agency, Ministry of Economic Affairs, 2016.

Note 2: There were no violations of regulations regarding wastewater or sewage in 2021.

With regard to water resources, the Company's water withdrawal volume in 2020 was 126,774 tons which was a 13.46% reduction from 2019. In response to disease prevention requirements in 2020, we removed water conservation measures for faucets in certain areas to ensure cleaning effectiveness. However, the Company still actively installs internal water meters and intermediary water recycling pipelines and promotes conservation of water used for watering plant. We implement the ECO-SHINE environmentally friendly aircraft cleaning technology that saves water and other measures. We sought to minimize the consumption of water resources in the system while ensuring disease prevention.

(Unit: thousand tons)

Water Usage Area	Water Withdrawal 1				Water Consumption	Water Discharge	Water Recycling	Recycling Ratio
	2017	2018	2019	2020	2020	2020	2020	2020
CAL Park	54.95	54.47	57.49	49.10	21.56	27.55	6.32	12.8%
EMO Park	69.22	75.88	70.25	59.78	30.12	Domestic: 10.32	NA	-
						Industrial: 19.343	Industrial: 2.32	3.89%
Taipei Branch	6.50	5.80	5.83	5.41	2.37	3.03	NA	-
Songshan Office	10.59	12.07	12.93	12.48	5.48	7.00	NA	-
Total	141.26	148.22	146.50	126.77	59.53	67.24	8.64	-

Note 1: Scope covered by water meters: CAL Park, maintenance plants, Songshan Office, and Taipei Branch.

Note 2: The water consumption volume is calculated based on the actual water consumption ratio in the air-conditioning system.

Note 3: Only 19.34 thousand tons of industrial wastewater from the Engineering & Maintenance Organization is discharged into the terrestrial surface water in accordance with regulations. The remaining 47.9 thousand tons of wastewater is discharged into urban sewage treatment plants in accordance with regulations.

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Pollution Prevention

Air Pollution GRI 305-7

Among the gases emitted by aircraft engines, nitrogen oxides (NOx) and sulfur oxides (SOx) have a significant impact on the local air quality. Despite the impact of the epidemic in 2020 on the Company's operations and emissions performance, CAL continues to reduce the impact on ground air quality during aircraft takeoff / landing mainly through introducing low-pollution new aircraft, encouraging the shutdown of one to two auxiliary power units (APUs) during taxiing, and improving the efficiency of ground power units. CAL's 14 A350-900 aircrafts have been delivered and have replaced the A340-300 and 747-400 aircrafts in flights. We plan to purchase six 777F cargo aircrafts from 2020 to 2023 and two aircrafts have been delivered as of the end of 2020. CAL provides passenger and cargo transportation services with a brand-new fleet of aircrafts. Mandarin Airlines has fully updated its fleet and has purchased nine ATR72-600 aircrafts from 2017 to the end of 2020. Tigerair Taiwan already has eleven A320neo aircrafts and will lease-purchase fifteen additional A320neo aircrafts which are expected to commence operations in 2021. By introducing these next-generation new fleets, CAL continuously improves fuel efficiency and reduces NOx emissions at takeoff and landings.

SOx and NOx Emissions of CAL Group

Item			Unit	CAL			
				2017	2018	2019	2020
Passenger Aircraft	SOx	Emissions	Ton	57.67	58.28	58.95	30.41
		Emission Efficiency	g / RTK	0.0125	0.0122	0.0122	0.0133
	NOx	Emissions	Ton	601.20	607.47	614.49	317.03
		Emission Efficiency	g / RPK	0.0152	0.0150	0.0149	0.0400
Cargo Aircraft	SOx	Emissions	Ton	13.23	13.72	13.09	14.58
		Emission Efficiency	g / RTK	0.0028	0.0029	0.0031	0.0030
	NOx	Emissions	Ton	137.88	143.02	136.48	152.04
		Emission Efficiency	g / RTK	0.0294	0.0301	0.0321	0.0317

Item			Unit	Mandarin Airlines			Tigerair Taiwan		
				2018	2019	2020	2018	2019	2020
Passenger Aircraft	SOx	Emissions	Ton	27.27	31.23	25.24	15.52	16.19	2.89
		Emission Efficiency	g / RTK	0.1875	0.2107	0.5066	0.0416	0.0399	0.0486
	NOx	Emissions	Ton	284.30	325.53	263.10	161.77	168.72	30.09
		Emission Efficiency	g / RPK	0.1901	0.2129	0.5128	0.0384	0.0368	0.0454

Note 1: SOx: SOx is calculated based on the methodology of the American Environmental Protection Agency: Total annual emissions = Number of flights x 0.000891, where 0.000891 is the emission factor (Tons / LTO).

Note 2: NOx: NOx is calculated based on the methodology of the American Environmental Protection Agency: Total annual emissions = Number of flights x 0.009288, where 0.009288 is the emission factor (Tons / LTO).

Note 3: LTO: LTO refers to the number of landing and take-off.

Note 4: Mandarin Airlines and TigerAir Taiwan have no cargo aircrafts.

Note 5: Mandarin Airlines revised the 2018-2019 emission data in accordance with the adjustment of flight information system and adoption of RPK to calculate NOx efficiency.

Note 6: Tigerair Taiwan revised the 2018-2019 emission data in accordance with the adoption of RPK to calculate NOx efficiency.

Waste Management GRI 306-2

Despite the challenge of the global pandemic in 2020, international attention and control on issues of single-use plastic (SUP) products and leftover food reduction are still ongoing. CAL implements waste management based on the characteristics and output of the waste produced in the operation process, including general domestic waste from office operations, hazardous / general industrial waste in maintenance operations, and recyclable resources and kitchen waste from transportation services, in accordance with five major principles: refuse, reduce, reuse, recycle, and repair. CAL's objective is to recycle 100% of waste, reduce waste volume, and increase the waste recycling rate year after year.

Waste Management Principle	Strategic Objective	Action
Refuse	Reducing the use of resources and disposing off waste through green design and procurement	Work with suppliers to develop and purchase non-disposable plastic products (e.g. wooden stirrers); increase green purchases
Reduce		Plan business and service supplies precisely to reduce consumption; improved maintenance processes to reduce end-of-life waste, and implemented electronic teaching materials and operations to save paper consumption for training and communication
Reuse	Increasing the reuse of waste and reducing it through workflow improvement	Increase the reuse of usable industrial waste (e.g. waste plastic buckets)
Recycle		Support the Environmental Protection Administration's plastic wrap recycling platform to enhance the reuse of plastic wraps
Repair		Repaire passenger / freight transport equipment (e.g. containers, pallet nets etc.) for reuse

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Our business revenue was affected by the epidemic in 2020 and the overall waste output decreased significantly by 62% compared to 2019. The services in employee cafeterias and inflight services were adjusted to meet disease prevention requirements, such as Inflight catering services: We provide single-use packaging materials for inflight catering to prevent contamination of crew members and also provide them with suitable protective equipment such as masks and protective suits. These measures have increased the waste volume of single-use items and reduced the recycling ratio from 30.27% in 2019 to 29.37%. Nevertheless, the Company still strengthened the collection of related data, compliance audits, and supply chain management during the epidemic to ensure adequate waste disposal. We also developed strategies to reduce plastic and surplus food through the (in-flight) Waste Task Force established in 2019 and prepare for the future recovery of the aviation industry.

Waste Information

(Unit: kg)

Item	Service Segment			
	Waste Produced			Disposal Method 2
	2018	2019	2020	
General Domestic Waste	134,594	120,771	113,196	Incineration (power generation)
	64,672	260,855	219,381	Incineration (without power generation)
Recycling	817,180	779,467	189,060	Recycling
Kitchen Waste / Waste Materials	526,125	658,270	282,627	Compost / Hog Raising
	2,674,334	3,052,460	943,952	Incineration (power generation) requested by quarantine regulation
Hazardous Industrial Waste	16,434	18,814.5	12,657	Curing Burial / Chemical Treatment
Non-hazardous Industrial Waste	108,867	113,308	99,650	Recycling and Reuse
	142,450	119,710	84,770	Recycling
Total	4,684,656	5,123,655	1,945,293	-

Note 1: All methods of disposal consist of appointing a qualified third-party company to remove the waste for offsite disposal.

Note 2: Scope of statistics from service segments: EMO, CAL Park, Kaohsiung Branch, VIP lounges of four stations (Taoyuan, Songshan, Kaohsiung and Tainan), and Taoyuan Airport inflight services.

Key Achievement

Waste Task Force Operations and Performance

CAL has formed a Waste Task Force in the third quarter in 2019, inviting services, supplies, planning, and quality assurance units, as well as supplier partners in catering and cabin cleaning, to establish a regular communication platform. We adopted green design, waste reduction, and passenger communication as our three main operation guidelines and actively reduces the external environmental cost from inflight services and medium to long-term compliance risks.

To gain a more comprehensive understanding of the composition and volume of inflight waste, CAL invited suppliers to collect information and inventory the waste production on certain short and long-haul flights in December 2019. We also established a baseline for waste production based on the number of passengers and number of meals provided as the basis for improving onboard waste management. According to statistics, the average waste produced per person on flights that provide 1, 2, and 2.5 meals was approximately 0.43kg, 0.74kg, and 0.86 kg, which was lower than the international average of 0.52kg for short flights and 0.63 - 1.81kg for medium to long-haul flights. (Note) In addition, we also actively promote the reduction of plastics used in inflight services through the Waste Task Force operation platform while meeting food safety, convenience, comfort, and cost requirements. We use products that can be repeatedly used, seek alternatives or products/materials that passed environmental protection certification, establish appropriate recycling mechanisms, and strengthen passengers' environmental protection awareness to respond to international initiatives and management trends.

Note: References: IATA, wrap (2017) IATA Zero cabin waste handbook.

Implementation Strategy and Results

Waste Management Principles	Major Aspects of Promotion	Promotional Measures	Operation Achievements
Refuse	Green Design	1. Promote weighing of actual waste on return flights to Taiwan 2. Set per-capita waste generation targets for VIP lounge waste	1. We completed the first weighing operations and we plan to implement the operation twice in 2021 2. We have set the average kitchen waste reduction target for Taoyuan Airport VIP lounge (< 0.13 kg / person)
Reduce	Waste Reduction	1. Increase the proportion of green / environment-friendly products 2. Work with suppliers to reduce plastic packaging and use of single-use plastic (SUP)	1. Use of pillow case and headrest covers made from recycle PET yarn and café yarn polyester 2. Full replacement of plastic stirring sticks with birch sticks 3. Replace ice cream in plastic containers with ice pops (wooden sticks)
Reuse	Communication with Passengers	1. Reuse inflight products under high safety and food safety standards 2. Share environmental information on-board (magazines and videos)	1. We developed the Foldable Platinum Silicone Cups with Zen Zhou 2. We published 8 environmental protection articles and 14 environmental protection videos via push notifications in 2020.

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Follow-up Operation Plans

The Waste Task Force shall continue to promote onsite waste quantity and composition inventory. It shall also use products that can be repeatedly used, seek alternatives or products / materials that passed environmental protection certification, establish appropriate recycling mechanisms, and strengthen passengers' environmental protection awareness while meeting food safety, convenience, comfort, and cost requirements.

Environmental Expenditure

CAL actively implements green procurement, invests resources every year, purchases environment-friendly equipment, promotes green maintenance and operation projects, and pays for waste cleaning and noise prevention expenses. The epidemic reduced revenue in 2020 and we purchased 44 environment-friendly products in Category 1, 2, and 3 with a decrease of TWD 9,059,000 in this regard compared to 2019.

CAL Investment in Green Facilities and Green Procurement

(Unit: TWD thousand)

Item	2017	2018	2019	2020
Environmental Protection Equipment and Maintenance Projects (Note 1)	22,769	23,106	22,805	21,774
Green procurements (Note 2)	11,730	15,760	19,258	10,199
Waste Disposal	3,315	4,536	4,062	3,854
Noise Prevention	188,485	190,357	189,351	136,812
Air Pollution Control	1,587,723	1,007,276	752,948	818,968
Total Investment Amount	1,814,022	1,241,035	988,423	991,607

Note 1: Green facilities include the depreciation of pollution prevention equipment, operational maintenance, hardware investments, environmental testing, and related projects.

Note 2: Green procurement includes Category 1, Category 2 and Category 3 eco-products specified in the "Regulations for Priority Procurement of Eco-Products (January 15, 2001)."

Task 2 — Consolidating Climate Risk Management and Carbon Reduction

GRI 302-1, 302-2, 302-4, 302-5, 305-1, 305-2, 305-3, 305-5

CAL has introduced a complete ISO 14064-1 greenhouse gas management mechanism, and established a Carbon Management Task Force under the framework of the Environmental Committee to comprehensively manage the carbon risk issues of corporate operations and manage compliance with international carbon control schemes based on the structure of carbon rights management.

In order to achieve the carbon reduction target in the first phase in the aviation industry — improving fuel efficiency by 1.5% per year by 2020 — CAL has continued to strengthen its fuel efficiency measures and formulated four major fuel-saving strategies, namely, "promoting green-energy flights," "improving ground service control," "enhancing regular repair and maintenance," and "strengthening weight reduction of fuselages," and other specific implementation measures. However, due to the severe impact of the epidemic on flight plans and dispatches in 2020, although total aviation fuel consumption decreased by 2.4% from 2019, the total number of flights was reduced by 38% in 2020 and the performance of revenue ton kilometer (RTK) decreased by 22%. The overall fuel efficiency was 0.2586 tons / 1,000 RTK, which failed to meet the 2020 target (0.2349 tons / 1,000 RTK). However, CAL has achieved the carbon reduction target for ground operations in 2020 by 38% compared to the 2009 baseline.

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GHG Emissions of CAL, Mandarin Airlines, and Tigerair Taiwan

(Unit: Tons CO_2e)

Company	GHG Scope	Item	2017	2018	2019	2020
	Category 1	Flight Operations	7,149,309	7,229,903	7,059,083	5,787,751
		Ground Operations in Taiwan	5,004	3,511	4,981	3,051
		Ground Operations in Outstations (Note)	-	1,379	1,395	1,012.21
	Category 2	Ground Operations	20,677	19,949	18,169	17,572
	Categories 3-6 (Note)	Ground Operations	1,627,649	1,644,656	1,607,690	3,109,822
	Category 1	Flight Operations	259,695	255,241	237,699	107,505
	Category 1	Flight Operations	284,791	336,684	362,794	53,514

Note 1: The statistics contain 100% of the aviation fuels used by China Airlines, Mandarin Airlines, and Tigerair Taiwan.

Note 2: GHG emissions assessment agencies: BSI (2011-2013, 2015- 2016) and DNV GL (2014, 2017-2019).

Note 3: CAL calculated the emissions from the products purchased, capital goods, fuel- and energy-related activities not included in Scope 1 or 2, upstream and downstream transportation and distribution, waste treatment, employee commuting, upstream and downstream leased assets, and investments based on 15 classification requirements of the GHG Protocol Scope 3 Guidance; The emissions totaled 3,109,822 tons of CO_2e was base on ISO 14064-1:2018 in 2020. CAL's emissions data has passed the 3rd-party verification. (Exceptd the emission of ground operations in outstations)

Aviation Fuel Efficiency

GRI 302-3, 305-4

Item															
	2009	2017	2018	2019	2020	2020 vs. 2019	2020 vs. 2009	2017	2018	2019	2020	2017	2018	2019	2020
Fuel Consumption (Ton / GJ)	1,927,803 / 830.17	2,259,923 / 973.19	2,284,957 / 983.97	2,230,971 / 960.72	1,829,328 / 787.76	-401,643 / -172.96	-98,475 / -42.41	82,075 / 35.34	80,667 / 34.74	98,910 / 42.59	35,395 / 15.24	90,006 / 38.76	106,406 / 45.82	114,658 / 49.37	21,178 / 9.12
CO_2 Emissions (Ton CO_2e)	6,099,820	7,150,674	7,229,839	7,059,083	5,787,751	-1,271,332	-312,069	259,694	255,241	237,699	111,849	284,790	336,700	289,227	53,422
Transport Volume (Thousand RTK)	7,721,089	9,289,789	9,544,260	9,072,762	7,075,331	-1,997,430	1,351,672	152,281	145,251	147,209	46,177	319,554	373,185	405,262	59,347
Fuel Efficiency (Fuel / Thousand RTK)	0.2497	0.2433	0.2394	0.2459	0.2586	0.0126	0.0089	0.5390	0.5554	0.6719	0.7665	0.2817	0.2851	0.2829	0.3569
Carbon Emission Intensity (Ton CO_2e / Thousand RTK)	0.7900	0.7697	0.7575	0.7781	0.8180	0.0399	0.0280	1.7054	1.7572	1.6147	2.4222	0.8912	0.9022	0.7137	0.9002

Note 1: The lower the fuel efficiency and the carbon emission intensity, the better is the performance.

Note 2: Carbon emission intensity (ton CO_2e / 1,000 RTK) = GHG emissions / Total RTK.

Note 3: No alternative fuel or sustainable aviation fuel were used in 2020.

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Task 3 — Building Capacity for Value Chain Environmental Management

In addition to strengthening its sustainable environmental management momentum, CAL has actively enhanced the sustainable value of the overall industrial value chain. CAL launched environmental management of the value chain in 2018, inviting the Group's partners to initiate the Eco Seed Development Plan, and using environmental / energy / carbon management workshops and environmental risk surveys to promote an understanding of the concepts and benefits that will accrue from environmental / energy / carbon management. In 2020, CAL has asked value chain partners to formulate appropriate environmental and energy policies and to implement management measures and supervise the measurement operations for key environmental impacts. Operational information (such as power / oil consumption) of surveyed and interviewed organizations will be added to support the core values of the revision of ISO 14064:2018 and to strengthen the investigation and understanding of indirect emissions from the value chain. In addition, points of contact from the value chain partners and their first-level supervisors were invited to participate in the "Environmental Risk Analysis and Results Presentation Meeting," at which the results of risk survey and analysis were summarized and industry's excellent case studies were also shared.

Key Achievement

Leading Partners in the Value Chain to Continue to Improve Environmental and Energy Management Performance

- **Object:** 11 key value chain companies
- **Operation Highlights:** Questionnaire survey
  1. Identify value chain partners and complete the implementation status of phase 1 environment and energy management progress
  2. Focus on key environmental impact compliance status
  3. Conduct communication meetings to consolidate the awareness of energy conservation and environmental protection in the value chain
- **Six Major Question Categories in the 2020 Questionnaire:**
  Category 1: Environment and energy resource management implementation status
  Category 2-4: Key environmental impact compliance status
  Category 5: Survey of energy laws and regulations
  Category 6: Environmental protection requirements or partnership initiatives of stakeholders
- **Implementation Results:**
  All the value chain companies have used employee email, intranet, and bulletin boards to increase employees' awareness of the "Environment and Energy Policy". Certain partners have also used meetings with contractors, suppliers, and third-party service providers to communicate the "Environment and Energy Policy" or set up environmental sustainability webpages to publish the policy on external networks. Most partners have established action plans for the annual energy resource management targets. They also proposed improvement measures if they failed to meet their target. They considered environmental protection and energy conservation for new investment or equipment procurement. They assigned dedicated units to take charge of evaluating compliance obligations for the key environmental issues with direct impact on the company. There were no violations of environmental regulations in 2020.The total GHG direct and energy indirect emissions from 11 companies were 208,914 ton CO_2e in 2020.
- **Follow-ups:**
  We shall continue to expand CAL's environment and energy management experience and formulate and promote environment and energy management mechanisms that meet requirements for the Group's operation resources and sustainability targets while ensuring cost-effectiveness. We shall also strengthen environment and energy information disclosures.

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Task 4 — Strengthening Awareness and Brand Image of Corporate Environmental Protection

CAL organizes the environmental training campaign every year to develop employees' awareness of environmental protection. Training programs are organized online or offline in Taiwan to cultivate the attitude and actions of protecting the planet. To implement external communication, CAL communicates the corporate concept and performance of environmental protection with stakeholders through social media and inflight magazines in hopes of creating and spreading the awareness of green consumption. CAL created the "CAL ECO Path" for corporate headquarters environmental actions map with a virtual environmental education site for special environmental protection measures implemented in the headquarters park in 2020. We provided five environmental protection education videos for internal and external visits to help the visitors understand and support the Company's environmental friendly operations, and increase the environmental protection awareness of internal and external stakeholders.

Environmental Protection Videos

Air-Fuel Efficiency

LOHAS Park

ECO Footprint

Renewable Energy

Green building

Item		Operation Description	2020 Achievements
Shape a Culture of Environmental Protection	Environmental Training for All Employees	Improve employees' identification and awareness of environmental sustainability and help develop good conduct and business habits.	• **Environmental education** CAL communicated with new employees regarding the corporate policies and approaches to environmental protection and energy conservation in the course "CAL and I". The achievement rate reached 100%. • **Knowledge-based education** 1. Environmental knowledge: CAL published 24 articles and reports on environmental sustainability through internal communication platforms, such as employees' email, China Airlines newsletter, and the startup screen, in 2020. 2. Environmental protection contests and environmental protection satisfaction survey for all employees:The "Employee Environmental Protection Knowledge Challenge" quiz and annual satisfaction surveys were attended by 2,250 employees and the overall satisfaction rate was 97.6%. They provided 291 environmental protection recommendations which were all included in the design of 2021 operation plans. 3. Environmental protection lecture: two environmental lectures were held, focusing on environmental issues related to climate change and ecological conservation, to raise the employees' awareness of environmental protection; 207 participants attended.

TCFD advanced lectures: Chairman Dr. Eugene Chien of the Taiwan Institute for Sustainable Energy gave a speech on "Sustainable Development of Industries under Climate Change"

Employee environmental protection lecture: The researcher Hui-Shan Lin of the Institute of Wildlife Conservation, National Pingtung University of Science and Technology gave a lecture on "Environmental Protection - From Eagle Red Bean and Black-shouldered Kite Rice to Guantian Pheasant-tailed Jacana Water Chestnuts"

Item		Operation Description	2020 Achievements
			4. Cross-industry exchange and engagement: The Company organized 2 cross-industry exchange programs in 2020 to collect implementation experience of other corporates and promote CAL ECO ideals.  Cross-industry exchange with Delta  Visiting benchmark company First Bank's "Green Finance Education Hall"
	Professional Environmental Training	• Organize training on environmental and energy management for the related personnel of the Company and affiliates • Appoint trainees to participate in external training and seminars as needed	• Organized three enterprise training sessions on "environmental energy management systems" • Organized one enterprise training session on "greenhouse gases" • Organized four enterprise training sessions on "TCFD Training" • Organized one session on "Value Chain Environment Management Communication Meeting" in the Group
Build an Image of Environmental Protection	Promote Awareness of Green Aviation	• Promote environmentally friendly awareness and consumer behavior	• Worked with Zen Zhou company to develop "CAL Foldable Platinum Silicone Cups", which was awarded the "Environmental Sustainability Category - Special Prize" in the Buying Power Awards by the MOEA, creating value for environmental protection and sustainable development of the natural environment • Continued the practice of closing windows during summer to lower the temperature of the cabin and thus reduce the cost of APU, and airport energy use • Selected 14 environment and ecology-themed videos to play during flights • Published 3 environmental protection articles and reports via social media • Printed menus with recycled paper and soy ink and added an environmental protection slogan on the last page of the menu • Added the warning of an embargo on transport of endangered species on the Company website • Published CAL's environmental practices and electronic and mobile approaches to carbon reduction in inflight magazines • Marked the Taipei-Kinmen carbon label on the website of Mandarin Airlines, supplies, check-in counter, boarding pass, inflight magazines
		• Promote green consumption	• Added environmentalism products in the catalogue of home-delivery duty-free goods, and include China Airlines' sustainability logo. • Updated and shared the carbon footprint of routes • Enhanced the promotion of the ECO Travel Carbon Offsetting Program • Mandarin Airlines set up the Environmental Sustainability Section on the official website to publish the "Environment and Energy Policy Statement" and the results of "Carbon Labeling", and "Carbon Reduction Labeling"
		• Optimized service processes and reduce waste and waste processing costs	• Use 100% FSC paper for printing boarding passes • Adopted local ingredients for in-flight meals and Group catering and put a ban on food ingredients from endangered species • Implemented waste management • Incorporated the concept of environmental protection into design of in-flight meals and supplies • Promoted and implemented electronic and information service • Pursued the reduction of the weight of in-flight magazines and inflight service supplies and enhanced weight-reducing and fuel-saving benefits

Key Achievement

Promotion of Green Consumption — Mandarin Airlines was the first airline awarded "Carbon Footprint Reduction Label."

CAL Group fulfills corporate social responsibility and cherishes the Earth's limited resources to create sustainable value. In 2020, we helped the subsidiary company Mandarin Airlines reorganize the "Songshan-Kinmen" route carbon footprint inventory and calculated the carbon footprint of Mandarin Airlines' Songshan-Kinmen passenger transportation service route in accordance with the "Product and Service Carbon Footprint Calculation Guidelines" of the EPA and "the Aviation Passenger Transportation Services: Carbon Footprint Product Category Rule (PCR) 2.0" Based on SGS certification, the carbon footprint label was reduced from 280g CO_2e / per person-kilometer to 200g CO_2e / per person-kilometer. In addition to the updated Carbon Label certificate, the EPA also awarded Mandarin Airlines with the "Carbon Footprint Reduction Label Certificate" for reducing its carbon footprint by 30%, which far exceeded the target of 3%. Mandarin Airlines thus became the first airline company in the world to receive the carbon emissions reduction label. Detailed on the environmental protection page of Mandarin Airlines' official website.

Key Achievement

Invited Airline Companies of the Group to Take Part in the ECO Travel Carbon Offsetting Program

Since 2019, CAL has integrated the official website, the ticketing system, travel reminders, and a diversified electronic-friendly service platform to strongly encourage passengers to participate in the voluntary ECO Travel carbon offsetting program. In 2019, CAL added carbon offsetting links to the employee preferential ticket system and the business trip dispatching system to invite employees to jointly support carbon-offsetting actions. As of the end of December 2020, the amount of offset reached 293.93 metric tons, the best in the industry in Taiwan.

To continue to help domestic consumers Learn about low-carbon travel and take action, CAL invited Mandarin Airlines and Tigerair Taiwan to join the "ECO Travel Carbon Offsetting Program". We included the carbon emissions of domestic destinations into the platform database and provided domestic consumers with links for participation and the opportunity to participate in supporting international sustainable development initiatives and contribute to sustainability of the Earth's environment.

Future Plans

Operational Focus	Future Development Plan
1. Advance operational effectiveness of management systems	1. Advance the operation of ISO 14001 and ISO 50001 management systems 2. Enhance the transition of ISO 14064-1: 2018 3. Promote informatization of management systems 4. Participate in discussion on environmental management system planning in the industry
2. Expand the scope of environmental, energy and greenhouse gas management	1. Gradually expand the environmental management level to the value and supply chains 2. Implement environmental risk assessment of outstations and suppliers 3. Assist the Group's enterprises to improve their momentum in carbon management

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Operational Focus	Future Development Plan
3. Comply with the Carbon Offset and Reduction Scheme for International Aviation (CORSIA)	1. Continue to participate in the IATA and Taiwanese government's engagement for strategic planning of CORSIA operations 2. Follow CORSIA monitoring plan, manage emissions inventory, data verification and report to competent authorities 3. Optimize carbon emission management and conduct carbon offset management in accordance with ICAO regulations
4. Consolidating the financial quantification mechanism for corporate climate and environmental risks	1. Continue to strengthen capabilities of the management, such as the Board of Directors, in climate and environmental governance 2. Build the momentum of financial disclosures relating to climate and environmental risks 3. Enhance the implementation knowledge of all units on climate issue management
5. Continue to refine carbon reduction targets	1. Continue to manage and improve air and ground carbon reduction targets 2. Strengthen energy-saving and carbon reduction measures, continue to reduce the carbon footprint of operations, and improve ecological benefits 3. Assess the introduction of SBT aviation sector methodologies in the international aviation industry and participate in the negotiation and cooperation industry
6. Continue to improve the utilization efficiency of environmental resources	1. Improve water resources and waste management operations 2. Implement environmental protection and energy-saving measures and increase resource uti-lization efficiency
7. Investigate sustainable aviation fuel (SAF) application strategy	1. Continue to keep abreast of developing trends in sustainable fuels 2. Push the industry and the government to develop Taiwan SAF strategies
8. Create an environmental protection culture inside and outside the company	1. Continue to support environmental sustainability initiatives at home and abroad 2. Create diversified promotion channels and inspire innovative momentum of cooperation inside and outside the Company