



China Airlines

Corporate Sustainable Environment Report 2012

China Airlines spreads our love towards the earth

Embrace the earth with love, cherish the earth's beauty



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Contents

2012 Environmental Sustainability Report

- 01 From the Management
- 03 The Story of China Airlines
- 07 Environmental Management
- 13 Pollution Prevention and Energy Efficiency
- 29 Design of Eco-Friendly Services
- 37 Eco Communications
- 43 Performance and Outlook

Scope of this Report

This report reviews the environmental performance of all divisions and branches of China Airlines located in Taiwan. The content covers environmental sustainability issues related to China Airlines in recent years (until 2012).

The structure of the Environmental Sustainability Report is based on the G3.1 Guidelines, a widely used sustainability reporting framework issued by the Global Reporting Initiative (GRI). The report contains a table of topics with corresponding GRI G3.1 environmental performance indicators.



From the Management



President

Commitment to Excellence and Reliability

Since its founding in 1959, China Airlines has always followed its corporate vision of "Commitment to Excellence and Reliability" in connecting Taiwan with the rest of the world. After joining SkyTeam and taking the first step to joining the ranks of the world's top airlines in 2011, China Airlines has been actively engaged in the planning and implementing of corporate reforms, improving brand competitiveness and making sustainable development a part of our core business philosophy. Environmental protection is an important component and the starting point for this endeavor. The depletion of energy resources and increasing severity of climate change have made China Airlines keenly aware of how environmental management is not just a moral obligation for enterprises. It is also fundamental to the ability of an enterprise to manage business risks.

To create a framework for corporate environmental management, China Airlines established four principles of corporate environmental management: "complying with environmental regulations, conserving the earth's resources, improving eco-efficiency, and fulfilling social responsibility." Based on these principles, China Airlines established environmental policies and a quality policy called "Eco Plus" while building out its organization to carry out these policies, including the establishment of a dedicated high-level environmental management task force for strategic planning and risk management. In addition to the task force, an Environment Committee at the corporate governance level and a Management Committee responsible for execution jointly enable China Airlines achieve its environmental management goals of accurate planning, effective integration, and thorough implementation. China Airlines has also introduced a corporate environmental management system based on ISO 14001, following the Plan-Do-Check-Act (PDCA) management cycle and setting annual environmental

management performance indicator targets for all maintenance, service, aviation, and administrative operations. Taking 2012 as an example, China Airlines had a total of 64 projects related to energy resources and environmental protection that reduced greenhouse gas (GHG) emissions by 31,917 tons Of CO₂. In external affairs, China Airlines combines public welfare with employee and social education in a range of activities. China Airlines participates in a variety of environmental research projects; encourages employees to take part in public service activities such as beach cleanups, mountain cleanups and tree planting; and supports Earth Day by enlisting consumers in promoting energy conservation.

In conclusion, all internal management initiatives as well as environmental outreach initiatives have one clear goal: To make China Airlines an environmentally-friendly sustainable enterprise. Through organizational and performance management initiatives, China Airlines hopes to infuse environmentalism into the company's DNA and reinforce it as a core value in our operations. With the enthusiastic employee support over the last two years, China Airlines has won national recognition and industry accolades, including the Environmental Protection Administration's "Energy Conservation and Carbon Reduction Action Mark" and Business Next magazine's "Green Brand" and "Super Green" awards. However, China Airlines is not resting on its laurels and will continue to honor the expectations of all stakeholders as well as its own aspirations. China Airlines implements the various environmental and quality policies through structured reviews and with an uncompromising attitude toward excellence. Guided by a corporate culture that embraces "Humanities, Technology, Environment, and Innovation," China Airlines will continue to grow sustainably toward its goal of becoming a first-rate international airline that is in tune with global trends and in harmony with the environment.

The Story of China Airlines

The Beginning

China Airlines was founded on December 16, 1959. For more than 53 years it has grown in tandem with the economy of Taiwan. From day one, China Airlines has been committed to providing the best flight experience for every passenger.



On December 16, 1959, a group of retired Air Force pilots founded "China Airlines," the first locally owned airline in Taiwan, and effectively breaking the foreign monopoly on civil aviation. The emergence of a national airline helped Taiwan develop its civil aviation industry and promote economic development.

In the beginning, China Airlines offered charter flights on demand. At the time, China Airlines had a market capitalization of just NT\$400,000, 26 employees, two PBV propeller-driven flying boats, and very basic maintenance facilities. Business operations included passenger flights, freight, mail, maritime rescue, fish spotting, crop dusting, aerial photography, and group charters. Operations were very difficult as business was irregular and profit margins slim.



After several close calls with bankruptcy, China Airlines was given the opportunity to carry out combat air supply drops in Laos when civil war broke out in 1961. When the political landscape in Vietnam began to change, China Airlines began contracting special freight missions from the Vietnamese government and U.S. forces in Vietnam in 1962. Despite the uncertain times, China Airlines performed the freight missions to the best of its ability and these efforts laid the economic foundation for its future development. Looking back on those early years, every step of progress was forged in blood, sweat, and tears.

Growth



In 1962 China Airlines received approval for its first domestic route: Taipei to Hualien. With scheduled flights and routes, China Airlines launched its first international route from Taipei to Saigon (now Ho Chi Minh City). This marked the official entry of China Airlines to the international aviation market.

In 1967, China Airlines' introduction of the Boeing 727 jet aircraft ushered Taiwan's civil aviation industry into the jet age. Between 1970 and 1974, China Airlines purchased six Boeing 707s to open up the Taiwan-U.S. route. For domestic routes, China Airlines introduced two YS-11s and three SE-210s (Caravelle). China Airline launched intercontinental service in 1975 with the introduction of the Boeing 747 wide-body jumbo jet.

In addition to its domestic routes, by the mid-1980s China Airlines had expanded its international routes to Southeast Asia, Northeast Asia, North America, the Middle East, and Europe. China Airlines operated a fleet of the latest jetliners and represented Taiwan on the world stage.

Transformation



In 1988, the 27 founding shareholders of China Airlines decided to donate all of their shares in order to fulfill the founding mission of the company and ensure its sustainable management. The establishment of the "China Aviation Development Foundation," with government approval and court certification, transferred oversight of China Airlines to the public.

In 1997, China Airlines established its "Mandarin Airlines" subsidiary. In a move toward privatization, China Airlines also applied for public listing in the same year, and current and retired employees were given shares in the company.

On February 26, 1993, China Airlines became the first international airline to be formally listed on the Taiwan Stock Exchange.

Operational
Stability



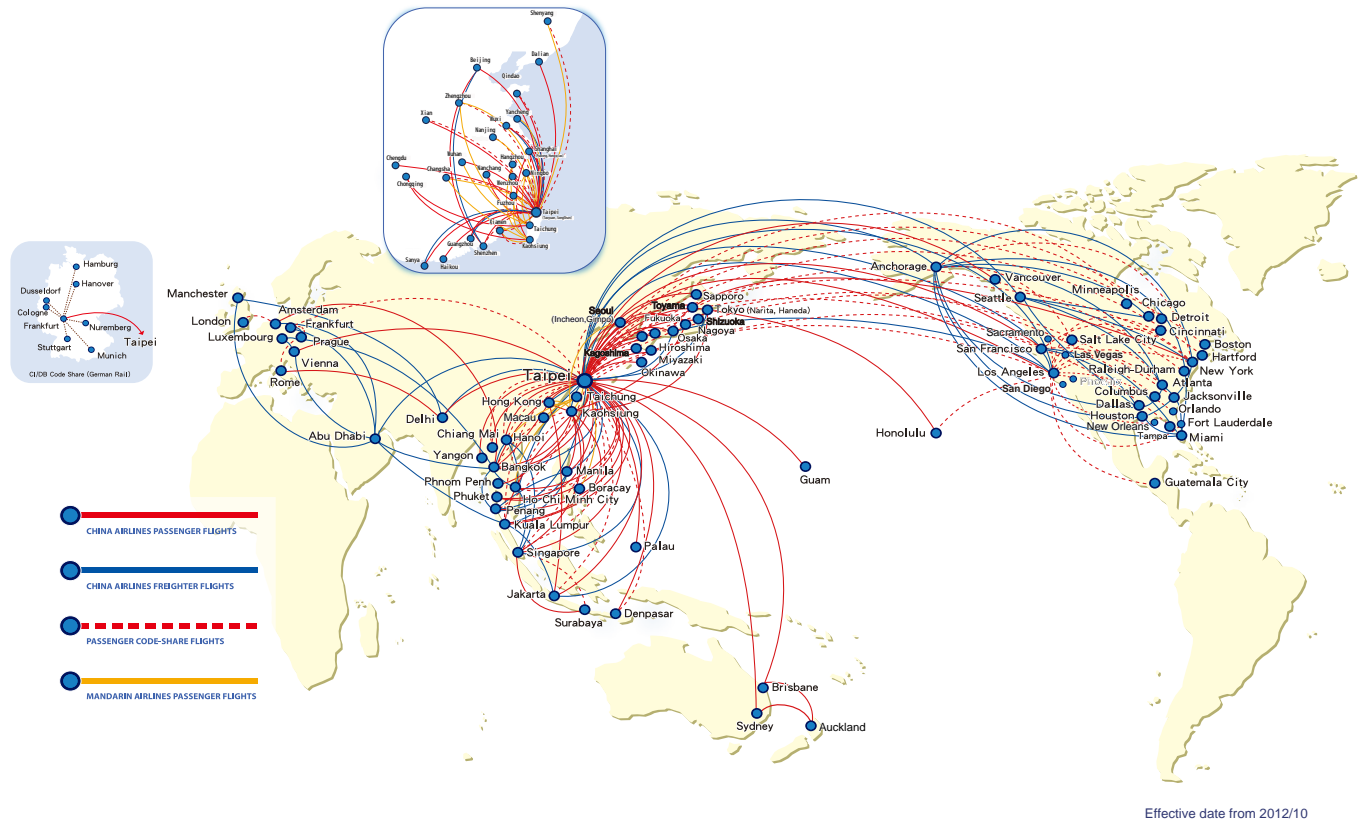
As of December 31, 2012, China Airlines employed 10,866 people including 8,992 employees in Taiwan and 1,874 employees overseas. Its fleet consisted of 72 aircraft – 51 passenger aircraft and 21 freighters – with an average age of 9.6 years. Passenger aircraft included Boeing B747-400s and B737-800s as well as Airbus A330-300s and A340-300s.

China Airlines' flight network covered 112 destinations in 28 countries. After becoming the 15th member of SkyTeam on September 28, 2011, China Airlines' network expanded to 926 cities in 173 countries, providing passengers with even greater convenience.

Total fleet: 72 aircraft, including 51 passenger jets and 21 freighters from Boeing and Airbus.
(as of December 31, 2012)

Aircraft	Number
B747-400	13
A340-300	6
A330-300	22
B737-800	10
B747-400F	21
Average age: 9.6 years	

China Airlines global network



Destinations: 112 destinations in 28 countries and regions, as of December 31, 2012:

Europe	Amsterdam, Frankfurt, Rome, London@, Luxembourg*, Manchester@, Belgrade*@, Vienna, Hamburg@, Hannover@, Stuttgart@, Dusseldorf@, Cologne@, Nuremberg@, Munich@
Asia	Tokyo Narita, Tokyo Haneda, Fukuoka, Nagoya, Hiroshima, Ryuku, Miyazaki, Hong Kong, Macao★, Bangkok, Phuket, Jakarta, Bali, Surabaya, Hanoi, Ho Chi Minh City, Kuala Lumpur, Penang, Singapore, Phnom Penh, Abu Dhabi*, Delhi, Manila, Boracay★, Yangon, Seoul Incheon, Seoul Kimpo, Chiang Mai, Osaka, Sapporo, Beijing, Shanghai Pudong, Shanghai Hongqiao, Guangzhou, Nanjing★, Hangzhou★, Shenzhen, Chengdu, Xi'an, Chengzhou★, Xiamen★, Ningpo★, Shenyang★, Changsha★, Fuzhou★, Qingdao, Wuhan, Wuxi@, Sanya, Yancheng, Haikou, Chongqing, Nanchang, Dalian, Wenzhou★, Kagoshima, Shizuoka, Toyama
Americas	Anchorage*, Honolulu, Los Angeles, New York, San Francisco, Chicago*, Dallas*, Miami*, Vancouver, Seattle*, Houston*@, Atlanta*, Boston@, Cincinnati@, Salt Lake City@, Orlando@, Fort Lauderdale@, Tampa@, Hartford@, Columbus@, Raleigh-Durham@, Jacksonville@, Guatemala@, Minneapolis@, Detroit@, Las Vegas@, San Diego@, Phoenix@, Sacramento@, New Orleans@
Oceania	Sydney, Brisbane, Auckland, Guam, Palau
Taiwan	Taipei Songshan, Taipei Taoyuan, Taichung★, Kaohsiung

Remark: * Cargo Services Waypoints; @ Joint Waypoints; ★ Mandarin Airlines Flights

Environmental Management

China Airlines Environmental Policy

China Airlines recognizes the increasing severity of global warming and climate change. As a member of the global community, China Airlines became the first airline in Taiwan to make "Environmental Management" a key component of its business operations in May 2007. China Airlines established four principles of environmental management to promote energy conservation and carbon reduction, protect the ecological environment, and ensure sustainable development.

Complying with Environmental Regulations

Countries are increasingly tightening their greenhouse gas reduction standards in response to environmental degradation. As the largest airline in Taiwan with services to over 20 countries across four continents, China Airlines strives to ensure that all of its flights and ground operations comply with the relevant environmental legislation of these countries.

Conserving the Earth's Resources

With safety as a prerequisite, China Airlines promotes the "3R" policy of "Reduce," "Reuse," and "Recycle" through conservation of aviation fuel to reduce carbon dioxide emissions; conservation of surface water and electricity consumption; and promotion of the paperless office.

Improving Eco-Efficiency

"Eco-efficiency" is a management philosophy proposed by the World Business Council for Sustainable Development (WBCSD) in 1992, and it encourages companies to use green innovation to increase the competitiveness of their products or services while protecting ecological resources and the environment. China Airlines continues to raise its overall eco-efficiency by improving operating procedures.

Fulfilling Social Responsibility

"Corporate Social Responsibility" (CSR) is where a business contributes to the protection or improvement of the environment in which it resides. Environmental protection is one of the key pillars of CSR and a responsibility China Airlines takes seriously. With a systematic approach to environmental protection, China Airlines has integrated environmental management into its operations and will continue to embrace our "Commitment to Reliability and Excellence."

Statement of China Airlines' Environmental Policy

To fulfill its corporate philosophy of environmental management and sustainable development, China Airlines has made the following commitments:

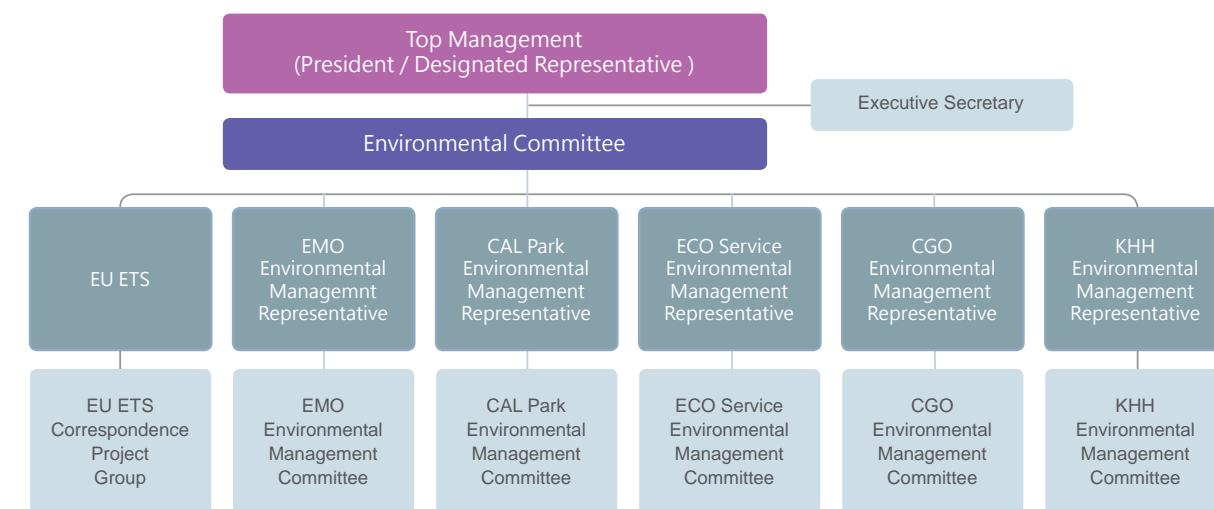
1. Comply with regulations and fulfill the company's environmental responsibility.
2. Establish an environmental management system and devise management performance indicators.
3. Provide environmental education and foster employee environmental awareness.
4. Promote eco-friendly aviation and implement green supply chain management.
5. Create a low-carbon operating environment and improve overall eco-efficiency.
6. Support green research and events and promote sustainable development.



Environmental Management



Environmental Management Organization



China Airlines' internal environmental policy and initiatives originated in 2007 when a cross-unit environmental management task force was formed. The Environmental Department was subsequently established in August 2011, making China Airlines the first airline in Taiwan to set up a dedicated environmental strategy unit and high-level internal liaison and governance platform.

In 2012, China Airlines set up the Environmental Committee, which is made up of five working groups and the European Union Emissions Trading Scheme (EU ETS) response team. The Environmental Committee is headed by the President, and responsibility for daily operations is delegated to each department, including services, training, carbon credits, maintenance, and office operations.

Each working group is headed by the vice president of the core business unit, who serves as the convener and holds regular meetings with relevant divisions and offices. The convener is also responsible for reviewing the business unit's operating procedures and environment, evaluating opportunities for improvement, establishing key performance indicators (KPIs), and delivering proposals for improvement. Each working group's KPIs are monitored by project specialists within the convening unit and reported to upper management each quarter.

China Airlines will gradually expand environmental governance from headquarters to its subsidiaries and affiliated companies in the enterprise group. Environmental sustainability has already become an important operational philosophy of the China Airlines Group.

Responsibility and Controls for Environmental Impact of Corporate Activities

According to United Nations, carbon dioxide emissions from the aviation industry account for approximately 2% of all man-made greenhouse gases, and the figure is expected to increase to 3% by 2050. As such, the International Air Transportation Association (IATA) in June 2009 set three sequential targets and a four-pillar strategy for the global aviation industry around energy conservation and carbon reduction. Based on this principle, China Airlines is committed to doing its part for the planet.

China Airlines has made significant investments in energy conservation and carbon reduction in recent years to realize the IATA targets and strategies. Apart from being the first in the industry to voluntarily introduce the ISO 14064 Greenhouse Gas Management System for monitoring greenhouse gas emissions, China Airlines has also set up an inventory management scheme for aviation fuel and greenhouse gas emissions in response to EU ETS requirements. Both have been certified by an independent international body. In other environmental issues, China Airlines is committed to reducing the environmental impact of its operations and has made the improvement of eco-efficiency one of the company's key objectives.

To implement sustainable management and create an eco-friendly business model, China Airlines has launched a corporate environmental management project and was the first transportation company in Taiwan to introduce the ISO 14001 Environmental Management System (EMS). The EMS is an environmental risk identification, monitoring, management, auditing and improvement mechanism that conforms to international standards and is in line with the PDCA cycle. Through continuous improvements to its business operations, China Airlines will enhance its competitiveness, achieve sustainable development, and enter a new era of environmental protection and sustainability.

As Halon 1301 and Halon 1211 fire extinguishers are essential to the airworthiness of all carriers in the global aviation industry, China Airlines has installed Halon fire extinguishers or their substitutes on its planes in accordance with International Civil Aviation Organization (ICAO) and Taiwan Civil Aviation Administration regulations. The import, export, and reporting of Halon fire extinguishers are handled in accordance with the Taiwan Environmental Protection Administration's "Air Pollution Prevention Act" and the "Montreal Protocol on Substances that Deplete the Ozone Layer" to minimize their environmental impact.

IATA's Three Sequential Targets and Four-Pillar Strategy



Technology

Reduce the weight of airframes; use light and composite materials; update engines and retrofit airframes; renew fleet; develop next-generation aircraft and engines; adopt alternative or renewable energy

Operations

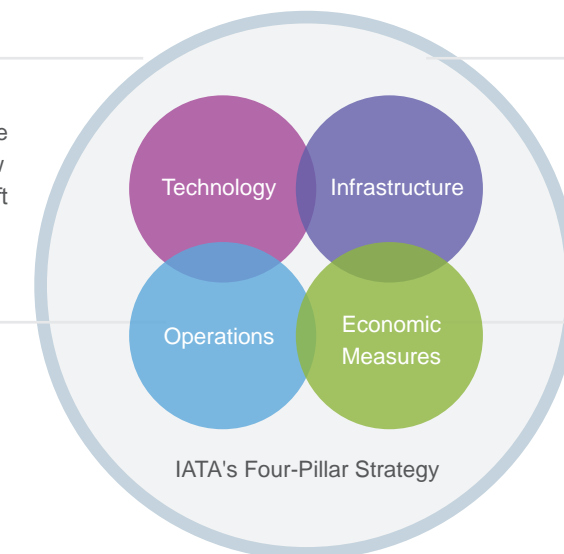
Improve flight operating procedures; refine and optimize fuel management; optimize flight path planning and management.

Infrastructure

Improve air traffic management efficiency; improve airspace structure and management performance; improve airport infrastructure.

Economic Measures

Promote a sectoral approach based on cost-effectiveness including carbon offsets and credits.



IATA's Four-Pillar Strategy

Environmental Management

Education, Training, and Personal Development

China Airlines realizes that education is fundamental to consensus building and communications. As such, it identified employee education as the first step in promoting environmental management, with a three-stage strategy to educate all employees. Between September and October 2011, China Airlines led the industry in rolling out a lively environment-themed education campaign targeted at mid- and high-level executives as well as the general employee population. In 2012, China Airlines set minimum learning hours for employees in the spirit of the Environmental Education Act. To pave the way for self-management at the division level, China Airlines encouraged employees to enroll in general and specialist environmental training.



2011 All-Employee Environmental Protection Campaign

Between September and October 2011, China Airlines rolled out the "All-Employee Environmental Protection" campaign to enhance employee awareness and understanding of environmental protection while also giving them the tools to put concepts to practice. The campaign consisted of activities under three main categories:

1. Knowledge Education

Upon start-up, employees' computers showed a new promotional video a day to build up their knowledge of environmental protection; All-Employee Environmental Protection e-learning took an in-depth look at important environmental issues; China Airlines provided a series of presentations and seminars aimed at different levels of employees.

2. All-Employee Activities

China Airlines organized a wide range of activities, including movie screenings, environmental education exhibitions, tours of recycling depots, tree planting, and health events.

3. Incentive Activities

China Airlines offered incentive activities to encourage employees to learn about environmental protection and fill out online questionnaires. China Airlines also organized an eco-friendly painting event for families to boost employee participation.

Environmental Events and Audits

Environmental protection is of the utmost importance to China Airlines. As such, China Airlines promotes environmental management practices, complies with environmental requirements and standards, and cooperates with the environmental audits of the Taoyuan County Environmental Protection Bureau.

Audit Year	Audit Quarter	Auditor	Audit Type	Audit Result	Compliance
2010	1st Quarter	Environmental Protection Bureau, Taoyuan County Government	Toxic chemical substances	Sampling inspection of submitted data and storage site to ensure compliance	Yes
2011	4th Quarter	Environmental Protection Bureau, Taoyuan County Government	Toxic chemical substances	Sampling inspection of submitted data and storage site to ensure compliance	Yes
2012	2nd Quarter	Environmental Protection Bureau, Taoyuan County Government	Toxic chemical substances	Sampling inspection of submitted data and storage site to ensure compliance	Yes
2012	4th Quarter	Environmental Protection Bureau, Taoyuan County Government	Wastewater	Sampling inspection of wastewater discharge to ensure compliance	Yes

Investment of environmental utilities and equipment

Audit Year	Depreciation of Pollution Prevention Utilities	Operation & Maintenance of Pollution Prevention Utilities	Environmental Protection Hardware (pollution prevention) Investment	Environment Monitoring	Other
2010	5,177.0	14,288.0	1,327.0	47.0	144,438.0
2011	4,389.0	13,296.0	350.0	41.0	144,848.5
2012	8,786.0	13,380.0	1,184.0	56.6	146,247.2
Total	18,352.0	40,964.0	2,861.0	145.0	435,533.7

Unit: Thousand NTD

Green procurement

Audit Year	Category I	Category II	Category III
2010	61.0	53.6	0
2011	4,409.0	72.0	86.0
2012	9,422.6	0	0
Total	13,892.6	125.6	86.0

Unit: Thousand NTD

Category I: Environmental Preferable products obtained permission of use as an Eco-label from the Environmental Protection Administration of Executive Yuen (EPA) and obtained permission to use as an Eco-label from a foreign country that has mutual recognition agreement with the Taiwan government.

Category II: Not the Environmental preferable products that obtain permission of use as Eco-label by the Taiwan EPA. However had been recognized by the Taiwan EPA that a product or its raw material to be manufactured, used, and disposed of in such condition that conforms to recycled material, returnable product, low pollution, or energy-saving requirement referred to the Article 96 of the Government Procurement Act, 2011.

Category III: Products which increase social benefit or reduce social cost referred to Article 96 of the Government Procurement Act, 2011 means products that have been approved by the competent entity responsible for such products as satisfying the condition and been issued with a certificate.

Pollution Prevention and Energy Efficiency

- Energy and resource usage
- Environmental emissions data



- Aviation fuel efficiency and maintenance
- Aviation fuel efficiency and reduction in carbon emissions
- Pollution prevention and treatment



- CAL Park Green Building
- Green Office initiative

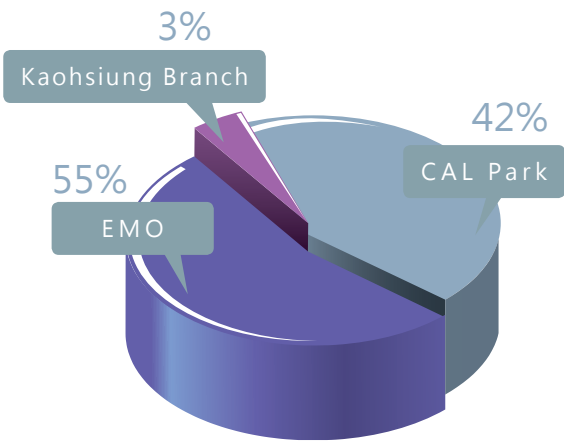
Pollution Prevention and Energy Efficiency



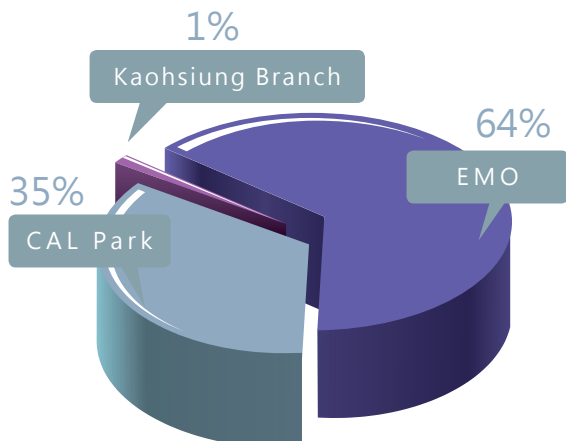
Energy and Resource Usage

Energy and Resource Usage of China Airlines, 2012

		Item	Unit	2012 Consumption/ Production
Water Re-source	Water	Tap water	m³	110,156
		Recovered Rainwater	m³	28,259
		Total Water Usage	m³	138,415
Energy	Electricity	Electricity Usage	kWh	39,886,538
	Fuel	Aviation Fuel	10 KL	246,656
		Gasoline	KL	347
		Diesel	KL	919
	Gas	Natural gas	m³	25,383



Tap Water Usage by China Airlines



Electricity Usage by China Airlines

Environmental Emissions Data

Table of China Airlines Environmental Emissions, 2012

Item		Unit	2012 Consumption/ Production
Wastewater Discharge			
Wastewater	Domestic Sewage	m³	48,948
	Industrial Wastewater	m³	25,145
	Total Wastewater	m³	74,093
Discharge Quality	Water Temperature	°C	21.6 / 20.6
	pH	-	7.7 / 7.3
	Cyanide	mg/L	ND / ND
	Arsenic	mg/L	ND / ND
	Mercury	mg/L	0.0002 / ND
	Copper	mg/L	ND / ND
	Cadmium	mg/L	ND / ND
	Lead	mg/L	ND / ND
	Chromium	mg/L	ND / ND
	Hexavalent Chromium	mg/L	ND / ND
Waste Disposal			
Outsourced Waste Disposal	Domestic Waste	Tonne	442.31
	Hazardous Waste	Tonne	Including cadmium batteries 1.581
			Electroplating sludge 20
	Recyclable Waste	Tonne	Scrapped lighting 1.36
			Waste lubricant 44.5
			Kitchen residuals 10
			Scrap iron and aluminum 165
			Scrap timber 160
	Waste Sludge	Tonne	24

Pollution Prevention and Energy Efficiency

Greenhouse Gases & EU ETS

In 2009 China Airlines established a greenhouse gases (GHG) inventory and management team to gain an accurate picture of the company's GHG emissions and to help slow global warming through GHG reduction. Each year, China Airlines conducts a GHG inventory of its aircraft flight operations and Taipei headquarters, Songshan training facility, Taoyuan maintenance facility, Kaohsiung branch office, and other sites in accordance with ISO/CNS 14064-1 and Greenhouse Gas Protocol requirements. Understanding the sources and volume of GHG emissions from China Airlines' business operations provides a baseline for carbon reduction.

In 2011, China Airlines' GHG emissions (CO₂) totaled 6,628,363 tCO₂e. Scope 1 (direct GHG emissions from company operations) CO₂ emissions totaled 6,603,107 tCO₂e, with aviation fuel accounting for 99.52% of total Scope 1 emissions. Scope 2 (indirect GHG emissions from electricity usage) CO₂ emissions totaled 25,256 tCO₂e. China Airlines' reported results have consistently received "Reasonable Assurance" rating, showing the company has disclosed GHG data and information in a fair and accurate manner.

The European Union has included the aviation industry in the EU Emission Trading Scheme (EU ETS) in order to realize the international GHG caps and emission trading provisions of the Kyoto Protocol.

China Airlines has conducted a GHG inventory and validation of its European routes based on the EU ETS Directive, and the results have been recognized by the EU. China Airlines has also set up a carbon credits management scheme in addition to its existing in-flight fuel-saving measures. These measures are a first for the aviation industry in Taiwan.

The ICAO and many countries believe that EU ETS has a serious impact on the development of the aviation industry. According to the spirit of the United Nations Framework Convention on Climate Change (UNFCCC), the aviation industry should not have been unilaterally included in the ETS, which imposes financial punishments on airlines. The international community can achieve better and more effective results if it concentrates on restricting aircraft models and age to improve fuel efficiency. Nevertheless, China Airlines continues to push for carbon emissions reduction in its flight operations and has completed the GHG emissions reporting process in accordance with EU ETS regulations.

China Airlines' Greenhouse Gas Emissions (2008 - 2011)

	2008	2009	2010	2011
GHG Emissions (tCO ₂ e/year)	6,620,959.43	6,220,469.59	7,038,483.58	6,628,362.78
Change relative to 2008 (%)	-	-6.05%	+6.31%	+0.17%



Aviation Fuel Saving and Maintenance

Recognizing the importance of energy conservation and carbon reduction in protecting the environment, China Airlines introduced Aviation Fuel Saving measures in 2007. After an extensive review of operational planning, aviation operations, aircraft maintenance, and process controls, China Airlines developed 31 initiatives in four categories: Operation, Maintenance, Aircraft Weight, and Fuel on Board.

Continuous implementation since 2007 has led to significant gains in fuel efficiency and reduced CO₂ emissions. Using the Airbus A330-300 passenger aircraft as an example, the above eco-friendly initiatives on average reduced the weight of each flight by 126.3 kg while reducing carbon emissions by 60 kg.

Operation

Optimize flight operations throughout the flight from taxi, take-off, climb, cruise, descent, and landing; encourage the use of ground power units instead of the auxiliary power units (APU); turn off one or two engines after safe landing.

Maintenance

Inspect engine performance on a regular basis to ensure tiptop condition; inspect the cleanliness of flight control surfaces and the aircraft to reduce drag and fuel consumption.

Aircraft Weight

Upgrade to newer and lighter food carts and unit load devices; adjust the amount of water on board based on flight distance and number of passengers; minimize the use of paper; adjust the aircraft's center of gravity.

Fuel on Board

In observance of safety guidelines, review the amount of fuel required for each stage of a flight to avoid carrying extra weight and consuming more fuel than necessary.

Carbon Reductions from Reduced-Weight China Airlines Aircraft

Aircraft Type	Average Reduction per Flight		Average Carbon Reduction per Flight	Carbon Reduction Benefits in Terms of Trees **
Boeing 747-400	Food Cart -276 kg	Paper* -8 kg	262.5 kg	23.9 trees
Airbus 340-300	Food Cart -180 kg	Paper -5.6 kg	147.3 kg	13.4 trees
Airbus 330-300	Food Cart -138 kg	Paper -6.3kg	60 kg	5.5 trees
Boeing 737-800	Food Cart -42 kg	Paper -3.2 kg	15 kg	1.4 trees

* Paper refers to China Airlines in-flight magazines and duty-free catalogs.

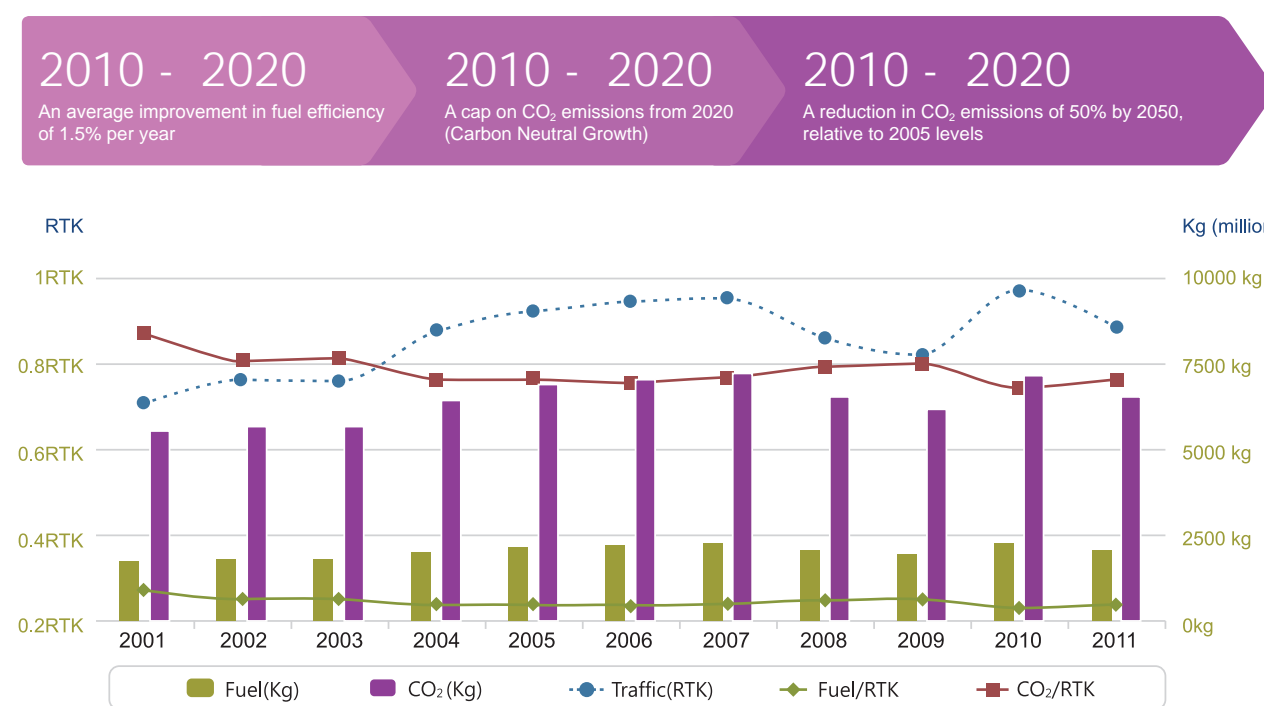
** Local research shows a 20-year old tree on average absorbs 11-18 kg of carbon dioxide per year. (Chun-Cheng Lin et al., 2002)

Pollution Prevention and Energy Efficiency

Aviation Fuel Efficiency and Carbon Reduction Benefits



IATA's Three Sequential Targets and Four-Pillar Strategy



China Airlines introduced fuel-saving and carbon reduction initiatives in 2001, and in 2007, upgraded these initiatives to project status. The 28 projects carried out in 2012 saved 9,535,850 kg of aviation fuel and reduced CO₂ equivalent emissions by 30,037,927.5 kg compared to 2011.

Fuel efficiency in 2012 was 0.2535 K Fuel/RTK, representing an 8.12% improvement in fuel efficiency compared to 0.2759 K Fuel/RTK in 2001. China Airlines will continue to carry out fuel-saving and carbon reduction activities in 2013 with the goal of reducing fuel consumption by 9,544,536 kg.

Green Aviation

- Provide flight crew with fuel-saving procedures based on IATA fuel-saving checklist and China Airlines' flight policy.
- In addition to following flight plans and standard operating procedures, flight crew are encouraged to seek air traffic control's permission to fly at optimal altitudes to maximize aircraft performance.
- Regularly review flight routes and select the optimal flight path for improved flight efficiency.
- Evaluate the latest information from airports near the destination when appropriate. If suitable facilities and auxiliary equipment are available at the airport and weather conditions permit, select a closer backup airport to reduce fuel on board and carbon emissions. Review implementation results on a regular basis.

Enhanced Ground Control

- Before making the flight plan, ask business units to provide precise passenger numbers and cargo weight to accurately calculate the fuel load.
- Plan the optimum center of gravity position to improve aircraft loading balance and fuel efficiency.
- Use the aircraft's APU as little as possible. When the aircraft is parked on the apron, reduce GHG emissions by connecting to the airport's ground-based power supply and air-conditioning system whenever possible.

Regular Maintenance

In addition to continuous monitoring of aircraft performance, wash the engines and aircraft on a regular basis. The engine is like the heart of the aircraft and requires regular cleaning to maintain its performance. At China Airlines, engines are washed with water every six months based on IATA's recommended best practice, and this practice reduces fuel consumption and carbon emissions by 0.5%.

During regular maintenance, make additional inspections for dust or grease on the fuselage acquired during flight or any gaps developed in the control surface seals. These increase drag and fuel consumption during flight.

Aircraft Weight Reduction

A. Service Cart Weight Reduction

In June 2006, China Airlines began replacing its food carts with newer and lighter models. Apart from providing passengers with better cabin service, the lighter carts help to reduce carbon emissions.

B. Paper Weight Reduction

To reduce aircraft weight and the amount of tree logging, China Airlines switched to a light-weight paper for all in-flight magazines and duty-free catalogs in January 2009.

C. Other Weight Reductions

New types of unit load device (ULD) constructed from lighter materials were adopted to reduce aircraft weight. Water carried aboard the aircraft was also adjusted based on the nature of the route and passenger numbers.

Pollution Prevention and Energy Efficiency

Pollution Prevention and Treatment

Apart from in-flight energy-saving practices and regular aircraft maintenance, China Airlines has also installed emissions and wastewater treatment facilities that limit the environmental impact of its flight operations to a minimum. The facilities not only reduce environmental pollution in the operations facility, but also minimize health hazards for operators.

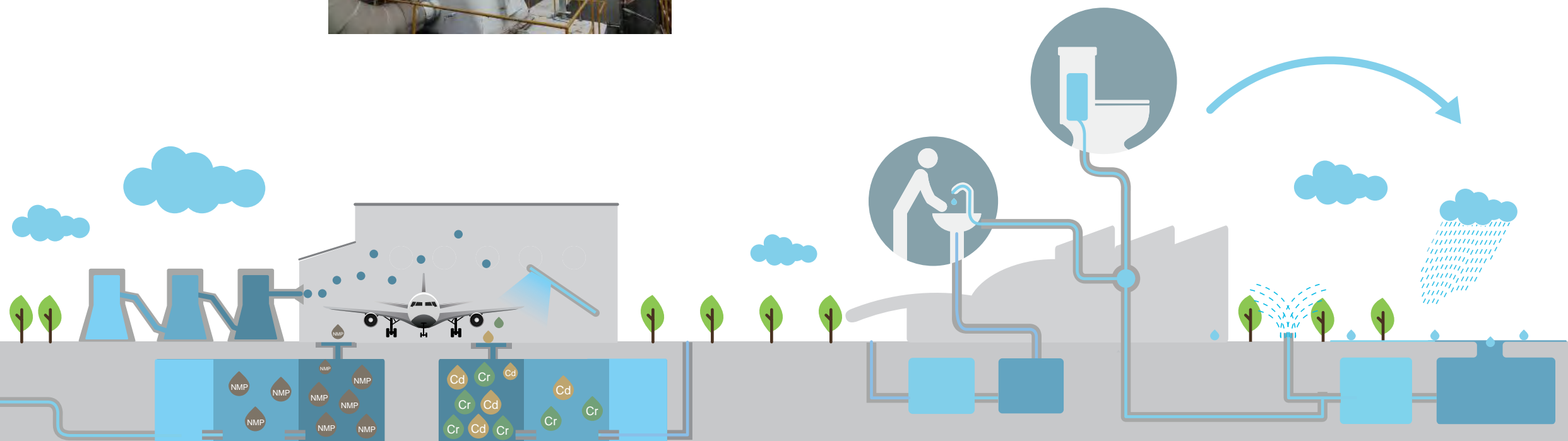
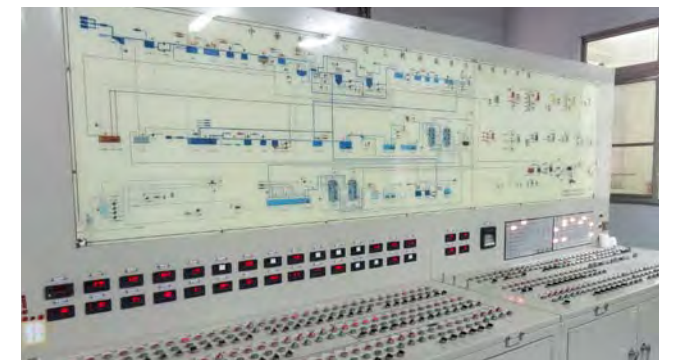
VOC Pollution Prevention Equipment

Emissions from aircraft maintenance, painting, and paint stripping are collected and filtered. This reduces CO₂ emissions by approximately 86.68 tonnes a year, the equivalent of planting 7,370 trees. More environmentally-friendly high-solid reactive paint is also used instead of conventional organic solvents to reduce pollution and health hazards.



Wastewater Treatment Facility

The maintenance facility is equipped with two wastewater treatment plants for dealing with the heavy metals (e.g., chromium and cadmium) from electroplating and organic wastewater produced during aircraft maintenance and cleaning. The wastewater treatment plants can process 162 tonnes of electroplating wastewater and 144 tonnes of organic wastewater each day. The treatment plants are equipped with a water quality lab to regularly monitor the water quality and ensure compliance with the Environmental Protection Administration's discharge standards.



Pollution Prevention and Energy Efficiency

CAL Park Green Building

Global warming and corporate social responsibility were taken into account during the planning of the CAL Park. China Airlines followed green building principles and adopted green design features such as water conservation, energy-efficient air conditioning, energy-efficient lighting, site optimization, low emissivity (Low-E) glass, and sun shades. In 2010 the CAL Park was certified as a green building candidate.



A. Flight Training Center

The server rooms and flight simulators were placed along the central axis of the "T-shaped" simulator building because they need less natural lighting. The office spaces require more natural lighting so they were placed to either side.



B. Crew Center

The "H-shaped" training and dispatch building consists of high-ceiling training facilities on either side. The skylights and glass curtain walls admit natural lighting, ensuring that the large interior space remains well lit.



C. Headquarters Building

The "I-shaped" headquarters building has a rectangular layout and consists of standard offices. The building enjoys plenty of natural lighting due to the glass curtain walls on both sides.



D. Energy-Saving Facade

Low-E glass and sun shades were used for the external facade to block solar heat and reduce cooling loads. In cooler weather, natural ventilation and rooftop insulation help to reduce energy consumed by air conditioning. Good natural lighting also helps to reduce lighting loads.



E. Recycled Building Materials

Based on the concepts of environmental sustainability and low-carbon green buildings, the main structural materials were made out of recyclable building materials. These include structural steel, metal panels used for the rooftop and walls, the glass curtain wall, and natural stone. Construction waste from the demolition of the original buildings was also reused. Concrete blocks were pulverized on site and used as roadbed aggregates to reduce the amount of construction waste.



F. Site Water Retention and Greening

Site water retention is a part of the ecological water cycle. The master plan of the CAL Park increased the amount of green space and made use of water-permeable paving such as grass blocks to improve the site's water permeability and retention.

Out of a total area of 4.7 ha, green areas make up 1.3 ha or 27% of the CAL Park. Vegetation includes trees, bushes, ground cover, and aquatic plants. A multi-tiered approach to greening (trees, bushes, and ground cover planted in overlapping layers) was chosen as it increases CO₂ absorption by 9,000 tonnes compared to conventional landscaping.

Pollution Prevention and Energy Efficiency

Water Resource Design

Water-Saving Fittings

Products with the water-saving mark, and water-saving equipment including taps, toilets, showers, automatic flush sensors, and automatic sprinkler systems for the lawn and gardens, were used throughout the CAL Park. These use 15-20% less water than standard equipment.

Rainwater Recovery System

Rainwater is collected for flushing toilets and urinals as well as watering the gardens in the CAL Park. The tanks, with a total capacity of 1,050 tonnes, are located in the CAL Park's outdoor areas as well as the basements of the three buildings and the hotel.

Environmental Quality Design

Drinking Water Quality

Centralized water dispensers are used (no RO filtering equipment was installed). The water dispensers provide chilled, warm, and hot drinking water that has been boiled, filtered, and sterilized.

Air Quality

The air conditioning and controls in the three buildings are tailored to their particular spaces. The central air conditioning system includes a fresh air intake system to provide good air quality indoors.

Use of Green Building Materials

The offices, training classrooms, and conference rooms all use green building materials with eco-friendly acrylic paint and light-weight partitions. The building materials are low in VOC emissions, pollution, and ozone, minimizing health hazards for employees.

Energy-Saving Design

Architectural Windows

The windows are not all sealed and low-E glass was used to reduce radiant heat. In cooler weather, natural ventilation and rooftop insulation help to reduce energy consumed by air conditioning. Good natural lighting also helps to reduce lighting loads.

Energy-Saving Air Conditioning

Energy-saving equipment such as automated chiller control and variable frequency system were used. The number of chillers active can be reduced in winter or at night when the load is low. Selective activation of the chillers as well as variable frequency operation reduces power consumption by 20% compared to conventional non-variable frequency units.

Power Purchase Agreement Adjustment

Based on CAL Park's power consumption, China Airlines revised the terms of its power purchase agreement from 6,000 KW to 4,000 KW. The change proved effective, and contracted capacity was reduced again from 4,000 KW to 3,600 KW, which reduced the electricity bill by approximately NT\$500,000 a year.

Energy-Saving Lighting

The buildings featured plenty of windows for natural lighting. High-efficiency lighting and electronic ballast were also used in the lighting system to improve energy efficiency. The 18,000 conventional T8 lamps in the CAL Park were replaced by T5 lamps. By replacing existing T8 lamps and metal mercury vapor lamps with energy-saving LED and T5 lamps, China Airlines is expected to reduce power consumption by 830,000 kWh a year.

Floor Renovations

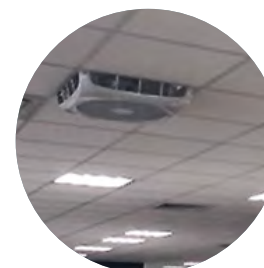
The floors of the maintenance facility were in darker tones. However, darker flooring tends to absorb the light in the work area, requiring additional lights to be installed to meet lighting requirements and thus consuming more power.

After assessing the situation, China Airlines used white epoxy resin for the flooring. The increased reflection from the ground made lighting more effective and helped to reduce carbon emissions.

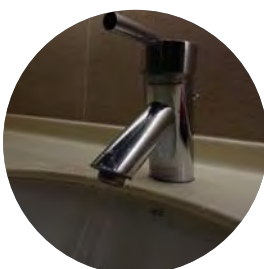
Nighttime lighting was originally turned on between 5 p.m. and 12 a.m. This has now been changed to 7 p.m. – 10 p.m. from April to October and 6 p.m. – 10 p.m. from November to March. Only logo lighting, street lights, and safety lights are now turned on, while the use of decorative lighting has also been reduced.



Office areas upgraded with T5 lamps



LED lighting at 2nd Maintenance Hangar

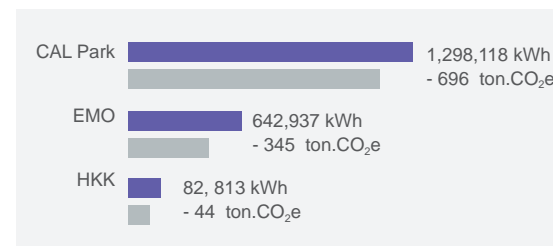


Pollution Prevention and Energy Efficiency

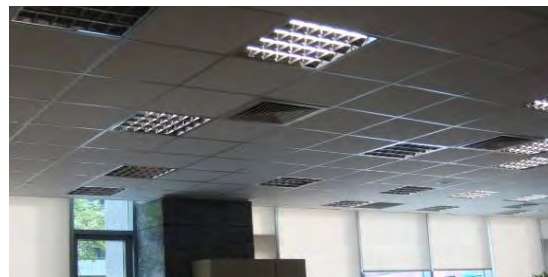
Green Office Initiative

-1,085 ton.CO₂e

Power consumption reduced by 2,023,868 kWh and carbon emissions reduced by 1,085 tonnes in 2012

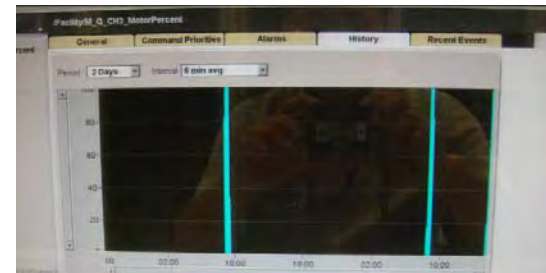


Reduction in Office Lighting



- The position and number of lighting fixtures at all CAL Park offices were adjusted or reduced based on the principle of four T5 14W light bulbs per person. A total of 370 light bulbs have been removed so far.
- Taoyuan Airport T1/T2 VIP lounges:** 50W and 20W halogen light bulbs replaced with 4W LED light bulbs.
- Maintenance Facility Bonded Warehouse:** T8 light bulbs replaced with T5.
- Songshan Campus Minquan Building Car Park:** 493 T8 light bulbs replaced with T5.
- CAL Park Crew Center First Floor Lobby:** Upgraded to energy-saving LED lighting.
- No.2 Maintenance Hangar:** One hundred thirty-seven (137) 1,000W light bulbs replaced with 320W LED light bulbs. Eighteen (18) AS/AR light bulbs replaced with 320W LED light bulbs.
- No.2 Training Division:** Eighty-two (82) T8-40W light bulbs replaced with T5-14W bulbs.

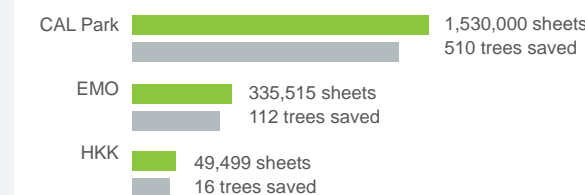
Air-Conditioning Energy Savings



- Building thermostat set to 26 °C . Air conditioners shut down during cold fronts in the winter to save power.
- Office air-conditioning (Air Handler Unit, AHU) balancing: for example, adjust airflow and the position of the air filter facing the sun.
- Raise the indoor temperature, while also increasing the chiller's output temperature and loading temperature. By limiting chiller operations to one unit or only running the second unit for short periods, China Airlines expect to cut chiller running time by three hours per day in the summer.
- Regular maintenance and chemical washing of the chiller's condenser help to reduce power consumption.
- Suspend the operation of infrequently used elevators. In early July, three elevators on the outskirts of the CAL Park Crew Center were switched off to save approximately 215 kWh per month. Employees were also encouraged to take the stairs to reach nearby floors.

-638 tree

A4 paper usage reduced by 1,915,000 sheets in 2012
Paper consumption reduced by 5%, saving 638 trees

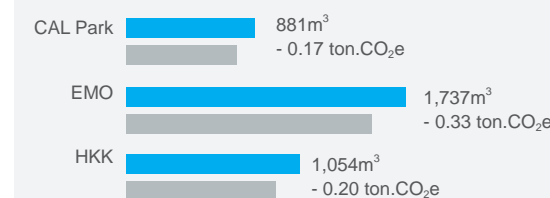


Paperless Operations and Recycling

- China Airlines encourages paperless meetings and the use of projection equipment and mobile devices to reduce the amount of printed paper.
- Consolidation of multiple printers and fax machines into one piece of equipment and reduction in printing.
- Employees are encouraged to use less paper and to choose double-sided printing. Requisitions are reduced by 5% at time of purchase.
- Produced internal educational videos on paperless meetings, which are shown when employees power up their computers every morning.
- Paper cup requisitions reduced by 50% across all units, and paper cups will not be replenished in the future.

-0.71 ton.CO₂e

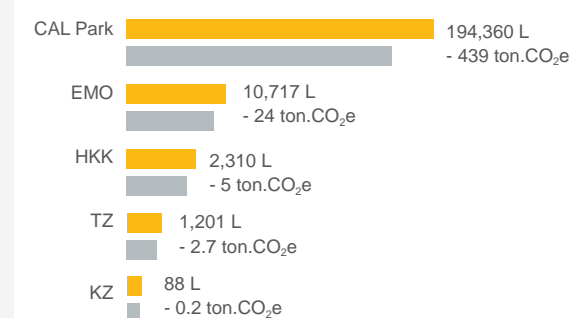
Water consumption reduced by 3,672 m³ and carbon emissions reduced by 0.71 tonnes in 2012



- Water conservation awareness: If everyone uses 2.6 L less water a day, then 1,200 people in the CAL Park will save 768 tonnes (m³) of water over 252 working days in one year.
- 115 water-saving taps installed, reducing water consumption by 20%.
- Rainwater recovery system: Rainwater is collected for use in toilets and the plant watering system.
- Regularly inspect water coolers, the building's water pipelines, and air-conditioning pumps to prevent any leakages.

-471 ton.CO₂e

208,200 L of fuel saved in 2012, carbon emissions reduced by 471 tonnes.



Reducing Ground Vehicle Fuel Consumption

- Combustion engine vehicles at the Maintenance Facility were replaced with five electric vehicles, reducing fuel consumption by 1%.
- The Kaohsiung Branch Office reduced 5% of its fuel consumption by using cars with smaller engines for apron operations and by carpool arrangement between departments to reduce the number of dispatched vehicles
- Ground Services Division reduced its vehicle fuel consumption by 1,201 L.
- In-Flight Supplies Division reduced its vehicle fuel consumption by 88 L.

Design of Eco-Friendly Services

Eco-Friendly Design and Services

China Airlines continues to promote mobile and electronic services for passenger convenience. Paperless services improve check-in efficiency at airports, shorten queues, and help protect the environment. China Airlines is working with customers to do its part for the planet.

Apart from eco-friendly services on the ground, China Airlines is also working with cross-industry partners to replace onboard consumables with green products such as headrest covers and pillow slips made from coffee grounds. These in combination with China Airlines' existing environmental policies will demonstrate its commitment to environmental protection from ticket purchase to boarding and disembarkation.

- Pre-Check-In
- Boarding by Mobile Phone
- VIP Lounge – Local Ingredients
- Recycling



- Green Cloth
- Green Culture & Creativity Amenity Pack
- Green Menu
- Menus Showing Carbon Footprint
- LOHAS Meals
- Lightweight Bottled Water
- Lightweight Food Carts
- Lightweight China Airlines Magazine



- Encourage Reuse of Cutlery
- Reuse of Shopping Bags
- Recycling
- Window Shade Service



- Green Calendars
- Green China Airlines Magazine Printing
- Green Icon and Awareness
- Public Welfare Events
- Environmental Friendliness Documentary

Design of Eco-Friendly Services

On the Ground - Eco Services

Paperless

China Airlines has made paperless services its top priority for reducing paper consumption and tree logging. Eco-friendly paperless services include the "CI Mobile" app and the China Airlines website for online booking, ticketing, check-in and even the use of electronic boarding pass. In the future, passengers will be able to book tickets, check-in, and board their flight without using a single piece of paper. All customs and clearance for freight services will become paperless, which is better for the environment and also more convenient for customers. In November 2009, IATA announced that China Airlines will become the 22nd "e-Freight" airline.

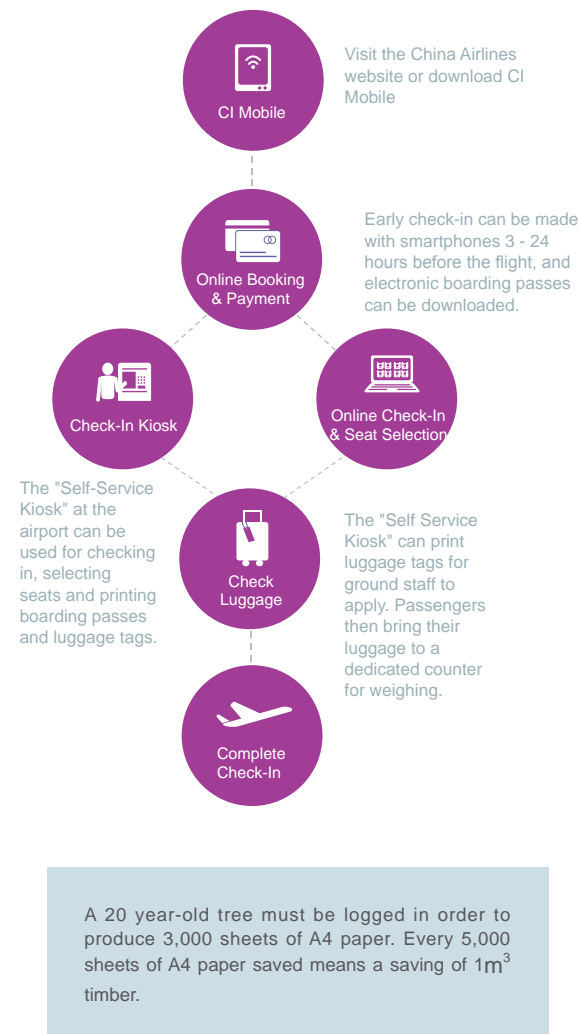
Eco benefits:

- **Reduced paper consumption:**
Computerized 38 types of freight industry documentation to reduce paper consumption.
- **Reduced weight:**
Reduced weight of documentation carried on flight to save energy and reduce carbon emissions.
- **Reduced costs:**
Employed electronic messaging instead of manual entry, fax, telephone, and vehicle delivery.

China Airlines has assisted ten freight forwarding agents with the implementation of paperless freight services. The goal is to transition to totally paperless operations.

China Airlines 2012 Paperless Office Results and Method

Results	Method
17,000 e-Freight entries	1. Continue to promote e-freight services to customers
Recovered 13,485 binding strips and 4,126 wooden sleepers	1. Personnel assigned to recover and inspect reusable binding strips and wooden sleepers
Reduced number of cargo labels by 29%	1. Encourage customers to print their own labels 2. Strict control on numbers for printed labels



Online Booking and Payment

Customers can purchase up to four tickets on the same flight and cabin class in a single transaction. To complete a purchase, customers need to enter ticketing information including departure city, arrival city, number of passengers, choice of roundtrip or one-way journey, date of travel, cabin class, flight number, choice of fare class, passenger information, and payment information.

Online Check-In and Seat Selection

Early check-in can be made with smartphones 3 - 24 hours before the flight. Electronic boarding passes can be downloaded and used directly at the following airports: Taoyuan, Kaohsiung, Hong Kong, Tokyo (Narita and Haneda), Osaka, Nagoya, Kuala Lumpur, Vancouver, Frankfurt, Vienna and Rome. Passengers can also download the QR code and print their boarding pass directly from the self-service kiosk at the airport.

Mobile phone boarding passes were introduced at twelve airports in 2012 between March 26 and the end of December. The service has now been used 33,587 times.

Check-In Kiosk

Four "Check-In Kiosks" have been installed in front of the China Airlines check-in counter in the international terminal of Songshan Airport. The machines can be used for one-stop check-in, seat selection, and the printing of boarding passes and luggage tags.

Printing of Luggage Tags at Self-Service Kiosks

Passengers can print luggage tags and have them applied by the ground staff. The check-in process is complete once a passenger hands his/her check-in luggage over at the dedicated counter for weighing.

China Airlines currently offers the following e-services: e-Check In, self-service boarding pass printing, and airport check-in kiosks. Apart from providing passengers with a comprehensive suite of services of the highest quality, these e-services also demonstrate China Airlines' commitment to excellence and efficiency.

CI Mobile

The "CI Mobile" app is available on iOS, Android, and Windows Phone platforms, providing passengers with all the information they need, including "Flight Schedule," "Flight Status," "Trip Management," "Member Services," "Special Offers," and "Travel Channel." China Airlines offers passengers the most comprehensive suite of mobile and electronic services, reducing their wait times at the airport while also providing them with an eco-friendly paperless experience.

As Taiwan's leading brand for eco-friendly services, China Airlines has pioneered mobile and electronic service offerings for Taiwan's airline industry. The China Airlines website attracts nearly 10 million views a month. The website features more than 20 frequently used services. In Taiwan (Taoyuan, Songshan, and Kaohsiung airports), up to 50% of China Airlines passengers use pre check-in service online and self-service kiosks at airports, exceeding that of any other airline in Taiwan. In addition to new mobile commerce functions on the "CI Mobile" app, China Airlines also uses technology to engage customers on social media. The "China Airlines Travel Channel" on Facebook complements China Airlines' electronic and mobile service offerings, underscoring China Airlines' commitment to satisfying customer needs as they evolve.

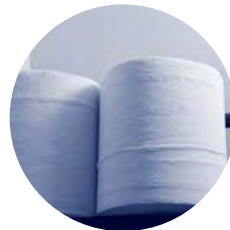
Design of Eco-Friendly Services



In the Air - Eco Services

China Airlines passenger services include the use of local ingredients in in-flight meals where possible to reduce the need for transportation, while most in-flight supplies are made from recycled materials. China Airlines encourages Business and First Class passengers to take their slippers home with them, and the "Chopsticks for Home" campaign also encouraged passengers to take home the chopsticks they used onboard. All of these initiatives have been very popular with passengers. In the future, China Airlines hopes to engage passengers even more in eco-friendly activities.

Eco-services will be implemented on all flights including eco-friendly hand wipes, encouraging passengers to reuse onboard consumables (eco-friendly chopsticks and slippers) and encouraging flight attendants to bring their own eco cups.



Eco hand wipes have been supplied on all flights since July 2011. The hand wipes are made from 100% recycled paper and have eco-friendly certification to help conserve forest resources.



Passengers are encouraged to protect the environment as well. The chopstick sleeves in First and Business classes feature the label "To conserve the Earth's resources, please take your chopsticks home for reuse."



Control of Excess Meals to Reduce Waste



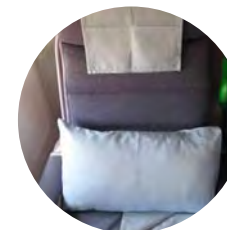
Lightweight utensils were introduced in August 2012. The new utensils are around 69g lighter (17%) than the previous version. On intercontinental flights with two meals served, the new utensils represent a reduction of 33kg per flight.



Eco service task force was formed to inspect all service processes as well as develop and promote eco-friendly services.



The introduction of ultra-light food carts in 2012.



The First and Business Class cabins on some routes are now provided with headrest covers and pillow slips made from recycled coffee yarn (35%) and PET bottles (65%). These have received eco-friendly certification.



Since the fourth quarter of 2012, all China Airlines flights from Taipei to Frankfurt have been serving in-flight meals labeled with their carbon footprint and calorie content. The new initiative will help boost environmental awareness of passengers by providing information on the environmental and health effects of in-flight meals. CAL is the first airline in the world to label both carbon footprint and calorie content of its in-flight meals.



In-flight meals will use local ingredients as much as possible to reduce carbon emissions from transportation. New vegetarian meals are also beneficial to the environment and passengers' health.



Electronic menus are now used in Economy Class on the Taipei-Frankfurt route. Business Class menus are printed with eco-friendly soy-based ink on 100% recyclable paper.

Design of Eco-Friendly Services



Recycling Initiatives

Aviation maintenance is very complex and requires the use of precision equipment and tools for routine maintenance. Nevertheless, when old and worn equipment need replacing, some parts remain serviceable. All scrapped equipment is therefore inspected by China Airlines, and working parts are recovered for reuse to conserve resources and reduce waste.

Recycling of Wastes

China Airlines' maintenance facility has a dedicated indoor waste storage area where all waste is sorted and stored. The large volumes of waste fluorescent light bulbs generated in the maintenance facility are disposed of by EPA-licensed contractors. Large volumes of potentially reusable waste are also produced during aircraft maintenance, including metal scraps, solvents, instrumentation, wiring, and cables. All of these are sorted then sold to licensed companies for recycling, increasing China Airlines' profit margins and reducing environmental impact.

During aircraft maintenance work, any remaining aviation fuel in the fuel tanks is pumped out. As the fuel is of good quality, CPC is contracted to recover the fuel for reuse.

Nighttime Lighting Cart Modification

In a demonstration of professional design and creativity, scrapped crane arms and chassis were used to build a nighttime lighting cart to support maintenance work at night.



Surplus crane towers



Surplus crane towers

Electric Supply Cart Modification

Electric supply carts were built by the maintenance facility to replace conventional combustion engine carts. The five carts modified in 2012 save 10,630 L of fuel and reduce carbon emissions by 24 tonnes.



Surplus crane towers



Surplus crane towers



Warehouse Resources

The maintenance facility produces large volumes of wooden crates, cartons, pallets, fillers, padding, foams, and papers when stock is received or picked up. All of these are collected and reused for other warehouse operations. All vendor paper and forms are collected and reused if their reverse side is blank. The above management measures have been effective in reducing the amount of waste generated by the maintenance facility.



Reuse of aviation fuel



Storage of waste fluorescent light bulbs



Carton reuse



Pallet reuse



Clean and orderly waste storage facility



Waste storage areas are clearly labeled and sorted



Filler reuse



Foam reuse

Waste Recycling by China Airlines in 2012

	Aluminum and Steel Cans	Plastics	Paper
CAL Park	537.6 kg	971 kg	21,820 kg
Maintenance Facility	1,983 kg	1,618 kg	43,382 kg
Kaohsiung Branch Office	50.2 kg	93.4 kg	17,098 kg

Communication for Eco

• Internal Communication



• External Communication



• Performance
• Outlook

Communication for Eco



Internal Communication

Weekly Letter

At least one article on carbon reduction has been emailed to all employees every month since mid-April 2012. Additionally, an internal information platform, CAL Newsletter, is also used to promote environmental concepts, educate employees about annual conservation targets, and encouraging everyone to get involved.

CAL Newsletter

The column "Let's ECO Together" is used to motivate employee learning. The Weekly Letter is published in this column and a large-scale contest was held in July 2012. Over 500 employees enthusiastically took part and those that sent in a correct answer had the chance to win tickets to popular exhibitions over the summer break.



Eco Suggestions/Proposals

In mid-July 2012, the Public Relations Office launched the "Invite Passengers to get Eco Together" initiative, and employees were asked to submit their proposals based on the theme. The proposals were judged by the PR Office on their creativity, feasibility, and effectiveness. Winning proposals were not only shared with other employees through the CAL Newsletter but also considered for the company's environmental initiatives.

For example, the "Electronic Aircraft Maintenance Manual" proposal suggested that China Airlines make the electronic maintenance and training manuals for current aircraft and new personnel available for viewing online to reduce paper consumption. The proposal delivered savings of around \$1 million.

Year	Eco Proposal	Savings
2010	5 proposals	NT\$927,100
2011	8 proposals	NT\$1,271,500
2012	6 proposals	NT\$2,139,200
Total	19 proposals	NT\$4,337,800

Over the last three years, 19 eco-related proposals helped save China Airlines approximately \$4.33 million.



External Communication

Dynasty Magazine

One environmental article is published in the Dynasty in-flight magazine each quarter. Examples include the "General Manager Launches Eco Year Zero" in March, the "Green Brand Awards Report" in May, and the "PGGM Report" in July.



10,000 People Planting Trees at Fudekeng

April 23, 2011

China Airlines has adopted 0.25 ha of land each at the Fudekeng and the Sea View Park for tree planting. Around 500 rehabilitated species have been planted at each site including trees, bushes, coastal plants, plants that attract birds and butterflies, and fragrant plants. China Airlines has taken an active role in the rehabilitation and conservation of Taiwan's ecological environment in order to build a new and healthy eco island.



"Green Forestation" Program

November 10, 2011

China Airlines supported the government's "Green Forestation" program by participating in the "One Tree per Person, Yes, I Can Do" event organized by the Business Council for Sustainable Development at Park No. 4 of the Taiwan High Speed Rail Special Zone in Dayuan Township, Taoyuan County. China Airlines' participation communicated our commitment to promoting CSR, protection of the ecology and environment, and eco-friendly practices. Together, we will build a healthy and low-carbon society.

Communication for Eco

External Communication

CAL Volunteers for Beach Cleanup

September 17, 2011



To support the 2011 "September 17 International Beach Cleanup Day", China Airlines organized the 2011 beach cleanup at Zhuwei Fishing Harbor in Dayuan Township, Taoyuan County. General Manager Hung-Hsiang Sun led nearly 100 China Airlines volunteers to the beach at Zhuwei Fishing Harbor to collect scattered trash. The initiative helped clean up Zhuwei Fishing Harbor and reach out to the international community.

The beach cleanup raises environmental awareness among employees and the general public. By not littering and polluting the oceans, we can help keep the Earth clean and ensure that our future generations can continue to enjoy the beauty of nature.



Carbon Disclosure Project

The Carbon Disclosure Project (CDP) was launched in 2000 and is an independent non-profit organization headquartered in London. In 2012, it represented 655 institutional investors managing assets worth US\$78 trillion. CDP investors ask companies to disclose their carbon emissions as well as measures for alleviating and adapting to climate change. The information is used for evaluating investment risk.

China Airlines was invited to participate in CDP in 2012. We became the first airline in Taiwan to submit our environmental management mechanisms and operations, climate change risk management, and greenhouse gas inventory and verification data to the CDP.

China Airlines Turns Off the Lights for Earth Hour

March 30, 2012



China Airlines began supporting the annual "Earth Hour" promoted by the Society of Wilderness in 2008. All unnecessary lights and appliances are switched off for one hour between 8:30 p.m. and 9:30 p.m. The event is aimed at promoting power management as well as reducing energy consumption and the burden on planet Earth. By taking action to support the planet, China Airlines hopes to raise national awareness on the importance of greenhouse gases and climate change.



Participation in International Environmental Initiatives

As a member of the global village, China Airlines actively participates in environmental initiatives of environmental organizations such as IATA and AAPA (Association of Asia Pacific Airlines). China Airlines is actively promoting the "3R" policy of "Reduce," "Reuse," and "Recycle" where it does not compromise safety. The emphasis is on the use of innovative green practices to deliver more competitive products or services as well as protecting the environment and ecology to enhance overall eco-efficiency. Local environmental protection or rehabilitation is also practiced to protect the planet and realize sustainable development.

China Airlines also takes part in the biennial Environmental Working Group (EWG) of the AAPA and other related IATA symposiums to network with international aviation organizations and airlines as well as promote energy-saving, carbon reduction, and environmental initiatives.

Pacific Greenhouse Gases Measurement Project

China Airlines has partnered with the Environmental Protection Administration (EPA), National Science Council, and National Central University on the "Pacific Greenhouse Gases Measurement Project" by installing the IAGOS (In-service Aircraft for a Global Observing System) instrument in the flight electronics bay of an

IAGOS is installed in the flight electronics bay underneath the cockpit. A sampling port extending from the fuselage collects data on atmospheric gases, water vapor, ozone, carbon monoxide, and nitrogen oxide during each flight. The collected data is automatically transmitted by GSM (Global System for Mobile Communications) to the CNRS (Le Centre National de la Recherche Scientifique) in France for analysis then made available to scientific research communities worldwide. The EPA and the National Central University will also combine the data collected by China Airlines with observations from FORMOSAT-3 satellite, ground weather stations, and sea observations to analyze the sources and vectors of air pollution. The information can be used as a reference when formulating air pollution control policy.

"PGGM-Pacific Greenhouse Gases Measurement" is painted on the nose of the aircraft while both sides of the fuselage display "The Official Airline for Climate Monitoring." The aircraft livery itself features the earth cradled by a flight attendant to call upon everyone to protect the environment.

Performance and Outlook

Performance

Energy Conservation and Carbon Reduction Action Mark

In 2011, China Airlines became the first airline in Taiwan to be presented with the award of excellence for the "Energy Conservation and Carbon Reduction Action Mark" by the EPA.

China Airlines also became the only Taiwanese airline to receive the distinction award in 2012 as well. China Airlines has developed a series of environmental management measures such as the launch of an environmental management system, promotion of employee environmental education, and establishment of environmental management KPIs. In 2012 carbon emissions were reduced by 31,719 tonnes compared to 2011, the equivalent of carbon absorbed by 86 Da-an Forest Parks. These represent recognition of China Airlines' results from continued commitment to energy conservation and carbon reduction.



Green Brand Awards

March 29, 2012

China Airlines won the "Super Green" Grand Jury Award as well as top honors in the transportation category of the third "2012 Green Brand Survey" conducted by Business Next magazine.

China Airlines President Huang-Hsiang Sun received the awards on behalf of the airline. The exceptional performance of China Airlines in its first submission saw it awarded the top Super Green award by the professional judging panel from a field of 162 applicants across ten industries. China Airlines also beat out other firms in the freight and transportation category to win the first prize as a Green Brand. These honors reflect the fact that both the judges and consumers recognized the efforts of China Airlines in environmental protection, energy conservation, and carbon reduction.

During the third Green Brand Survey event, Business Next magazine surveyed the "green products/services" of ten industries based on their "green products/services," "green policy and execution," and "green reputation". Judging involved a professional judging panel and also consumers that were invited to take part via an online poll. The goal was to identify the most eco-friendly and popular green brands on the market. The top six brands in each industry by score were presented with a first-place prize, distinction (two places) and merit prizes (three places), respectively. For the Super Green Grand Jury Award, seven experts conducted an interdisciplinary comparative analysis to choose between the top three scoring green enterprises as voted by consumers.

Outlook

China Airlines has embraced a vision of Commitment to Excellence and Reliability since its founding. China Airlines strives to provide the best service for every passenger. During the pursuit of corporate growth, China Airlines has come to appreciate just how rare and unique environmental resources are. China Airlines also realize that it is the duty and responsibility of enterprises to protect natural resources and the environment. Sustainability has therefore been the theme of its recent corporate environmental and sustainability roadmap. China Airlines has set up various environmental management mechanisms, introduced advanced management tools, and combined them with the implementation of its internal environmental policy and "Eco Must" quality policy. China Airlines' corporate environmental management is now beginning to show results and has won external recognition.

Nevertheless, China Airlines reached the following conclusion during this process: environmental protection can't depend only on top-down performance management. It must become a part of the core corporate culture and be voluntarily embraced by employees in order to complement the spirit of sustainability. In the future, China Airlines will not only continue to implement the environmental management system, refine its management initiatives and enforce performance indicators, but also inject the DNA of sustainable development into employee education and training. The priorities of management will be gradually expanded from maintenance and administration to other services, and the scope will be expanded from China Airlines to all CAL Group subsidiaries and the supply chain. By taking things one step at a time, the seed of environmental sustainability will take root in the aviation service industry, and China Airlines will fulfill its vision to grow in harmony with the planet.



Table of Comparison for Global Reporting Initiative (GRI) G3.1 Environmental Performance Indicators

GRI Indicator		Report Chapter	Page
Code	Content		
EN1	Materials used by weight or volume	Energy and Resource Usage	15
EN2	Percentage of materials used that are recycled input materials	Eco Design and Services	29
EN3	Direct energy consumption by primary energy source	Energy and Resource Usage	15
EN4	Indirect energy consumption by primary source	Energy and Resource Usage	15
EN5	Energy saved due to conservation and efficiency improvements	CAL Park Green Building	23
EN6	Initiatives to provide energy-efficient or renewable-energy-based products and services, and reductions in energy requirements as a result of these initiatives	Aviation Fuel Savings and Maintenance	18
		Green Office Initiative	27
EN7	Initiatives to reduce indirect energy consumption and reductions achieved	Green Office Initiative	27
EN8	Total water withdrawal by source	Energy and Resource Usage	15
EN9	Water sources significantly affected by withdrawal of water	CAL did not significantly affect any water sources by the withdrawal of water.	-
EN10	Percentage and total volume of water recycled and reused	Energy and Resource Usage	15
EN11	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	CAL Park Green Building	23
EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity outside protected areas	CAL Park Green Building	23
EN13	Habitats protected or restored	CAL Park Green Building	23
EN14	Strategies, current actions, and future plans for managing impacts on biodiversity	CAL Park Green Building	23
EN15	Number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk	No IUCN Red List species and national conservation list species habitats were affected by CAL corporate operations	-
EN16	Total direct and indirect greenhouse gas emissions by weight	Environmental Emissions Data	16
EN17	Other relevant indirect greenhouse gas emissions by weight	Eco Design and Services	29
EN18	Initiatives to reduce greenhouse gas emissions and reductions achieved	Aviation Fuel Savings and Maintenance	18
		Green Office Initiative	27
EN19	Emissions of ozone-depleting substances by weight	Corporate Responsibility and Controls for Environmental Impact	10
EN20	NO, SO, and other significant air emissions by type and weight	Environmental Emissions Data	16
EN21	Total water discharge by quality and destination	Environmental Emissions Data	16

GRI Indicator		Report Chapter	
Code	Content		
EN22	Total weight of waste by type and disposal method.	Environmental Emissions Data	16
EN23	Total number and volume of significant spills	There were no significant spills at CAL.	-
EN24	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III and, VIII, and percentage of transported waste shipped internationally	CAL did not transport, import, export or treat any hazardous waste.	-
EN25	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organization's discharges of water and runoff	All effluents and waste discharged by CAL conform to regulatory requirements and had no significant impact on biodiversity.	-
EN26	Initiatives to mitigate environmental impacts of products and services, and extend of impact mitigation	Corporate Responsibility and Controls for Environmental Impact	10
EN27	Percentage of products sold and their packaging materials that are reclaimed by category	Recycling Initiatives	35
EN28	Monetary value of significant fines and total number of non-monetary sanctions for noncompliance with environmental laws and regulations	Environmental Events and Audits	12
EN29	Significant environmental impacts of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce	Aviation Fuel Savings and Maintenance	18
EN30	Total environmental protection expenditures and investments by type	Environmental Cost Control and Management	12

List of English Acronyms

Acronyms	English	Chinese
APU	Auxiliary Power Unit	輔助動力系統
CDP	Carbon Disclosure Project	碳揭露組織
EMO	Engineering & Maintenance Organization	修護廠區
EMS	Environmental Management System	環境管理系統
EU ETS	EU Emission Trading Scheme	歐盟排放交易制度
ISO 14001	International Organization for Standardization 14001	環境管理系統
ISO14064	International Organization for Standardization 14064	溫室氣體管理系統
KPI	Key Performance Indicator	關鍵績效指標
RTK	Revenue Tonne-Kilometer	載運噸公里
VOC	Volatile Organic Compound	揮發性有機化合物

Reader Response

Thank you for taking the time to read through the 2012 edition of China Airlines' Environmental Sustainability Report. China Airlines has always taken our environmental protection obligations seriously and will continue to fulfill our corporate social responsibility. Your suggestions, support, and encouragement are therefore welcome. Please fill out this questionnaire and send it by fax or post to the Corporate Safety Office/ Environmental Department of China Airlines (No.1 Nanzhang Rd. Dayuan Township, Taoyuan County).

Fax: (03) 399-3210

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E-mail: Environment@china-airlines.com

01

How do you rate this report?

- ☐ 1. Very good ☐ 2. Good ☐ 3. Average ☐ 4. Poor ☐ 5. Very poor

02

Which part of this report did you find to be most memorable?

Multiple answers accepted and your opinion is welcome.

- ☐ 1. Brief Introduction ☐ 5. Communications
☐ 2. Environmental Management ☐ 6. Energy and Resource Usage, and Pollution Emissions
☐ 3. Industrial Pollution and Pollution Prevention ☐ 7. Performance and Outlook
☐ 4. Environmental Protection and Recycling

03

Which chapter needed the most improvement? Multiple answers accepted and your opinion is welcome.

- ☐ 1. Brief Introduction ☐ 5. Communications
☐ 2. Environmental Management ☐ 6. Energy and Resource Usage, and Pollution Emissions
☐ 3. Industrial Pollution and Pollution Prevention ☐ 7. Performance and Outlook
☐ 4. Environmental Protection and Recycling

04

Your recommendation on China Airlines' future environmental initiatives and activities:

05

Please provide any other opinions on this report that China Airlines can use as a reference for next year's

06

Would you like to receive the next edition of China Airlines Environmental Sustainability Report?

Thank you for filling out this questionnaire and please provide your details. Your comments are very important to China Airlines!

Name		Gender	
Address		E-mail	
Telephone		Fax	
Profession		Title	