



Civil Aviation Department
Environmental Report 2013

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Chapter 1 – Foreword

This Environmental Report covered the environmental performance of the Civil Aviation Department (CAD) in 2013.

In the work of environmental management, the Department strives to minimize the disturbance caused by aircraft operations to the local communities and pursue environmentally friendly operations both in various functional areas and office management. The new CAD Headquarters which commenced operation in December 2012 has been providing one-stop service to the aviation community and the general public.

Our Environmental Goals

CAD is committed to ensuring that all services provided by the Department as well as our operations are conducted in an environmentally responsible manner.

Our Environmental Policy

We support the Hong Kong Special Administrative Region Government's initiatives to improve the environment by:

- committing to a safe, efficient and sustainable air transport system in Hong Kong;
- compliance with relevant environmental protection ordinances;
- striving to minimize the adverse effect that the development of the aviation industry may cause to our quality of life and environment;
- promoting waste reduction, recovery and recycling, and reduction in consumption of resources including material, fuel and energy; and
- providing environmental education and training to staff.

Chapter 2 – Aircraft Noise Management

CAD is conscious of the impact of aircraft noise on the community and has implemented a series of noise mitigating measures, and is closely monitoring their implementation and effectiveness.

Use of Flight Paths during Noise Sensitive Hours

To reduce the noise disturbance that overnight aircraft operations may have on local communities, subject to acceptable wind direction and safety considerations, arriving and departing aircraft are required to avoid flying over populated areas and use the flight paths which are over water for landings at and taking-off from the Hong Kong International Airport (HKIA).

Night Arrivals

Arrival aircraft between midnight and 7:00 am approaching from the southwest over water could reduce the noise disturbance in populated districts such as Shatin, Tsuen Wan, Kwai Chung, Tsing Yi, Sham Tseng and Tsing Lung Tau.



Figure 2-1: Route of arrival aircraft from southwest at night

Night Departures

Subject to weather and safety conditions, aircraft taking off to the northeast between 11:00 pm and 7:00 am are required to fly south to the West Lamma Channel, thereby avoiding flying over populated areas such as Kowloon, North Point, Shau Kei Wan and Chai Wan. Our statistics showed that most aircraft complied with this requirement.



Figure 2-2: Route of departure aircraft to northeast at night

Noise Monitoring

CAD has installed an Aircraft Noise and Flight Track Monitoring system to monitor the compliance with noise mitigation measures by aircraft operators, monitor the noise environment in various districts and help developing noise mitigation measures. The system comprises 16 outdoor noise monitoring terminals located in the vicinity of the flight paths and a computer to process the noise data.



Figure 2-3: Outdoor Noise Monitoring Terminals

Quieter Arrivals: Continuous Descent Approach

When weather and flight conditions do not allow night arrivals to approach from the southwest, arriving aircraft from the northeast direction are encouraged to adopt the Continuous Descent Approach (CDA).

The CDA requires the aircraft to fly higher and adopt a lower power and drag configuration during the commencement of the approach, thereby reducing aircraft noise impacts to areas such as Sai Kung, Tseung Kwan O and Ma On Shan.

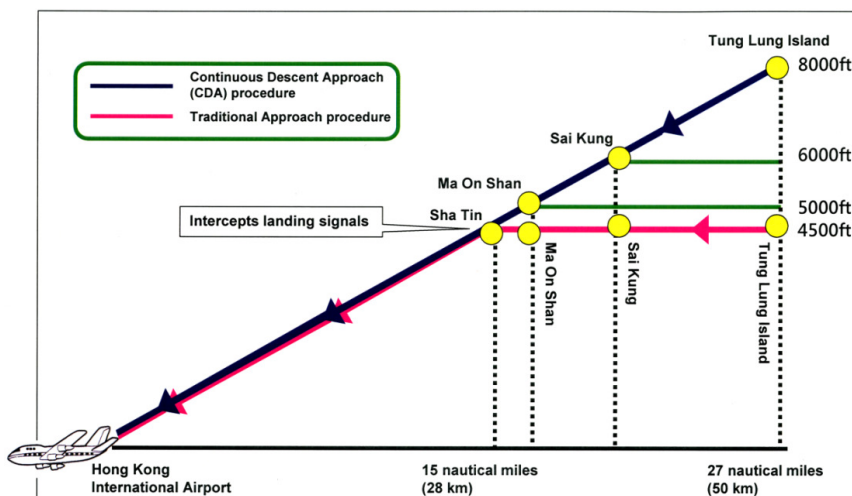


Figure 2-4: Diagram illustrating CDA

Quieter Departures

All aircraft departing to the northeast were required to adopt the Noise Abatement Departure Procedures stipulated by the International Civil Aviation Organization (ICAO) so long as safe flight operations permit.

These procedures require aircraft to reduce power upon reaching an altitude of 800 feet or above, thus can alleviate aircraft noise impact during take-offs on communities in the vicinity of the airport.

Improving Track Adherence

In 2012, we introduced a set of new noise mitigating departure procedures which makes use of satellite-based navigation technology for noise mitigation. Aircraft which are equipped to use the technology, when departing to the northeast of the airport, can make use of navigation capabilities to achieve higher track-keeping accuracy during their turn to the West Lamma Channel. In adhering to the designated flight track, aircraft can keep themselves at a distance from the populated residential areas. In doing so, the aircraft noise footprint can be confined and the overall aircraft noise effect on those residential areas can be reduced.

Restrictions on noisy aircraft

Since 1 July 2002, all noisy aircraft which do not comply with the noise standards stipulated in Chapter 3 of Annex 16, Volume I, Part II to the Convention on International Civil Aviation (Chapter 3 noise standards) are not allowed to operate in Hong Kong.

To further alleviate the aircraft noise impact on local communities, commencing on 30 March 2014, CAD will cease to allow aircraft operators to schedule flights which will be flown by aircraft which have noise levels marginally meet the Chapter 3 noise standards (so-called “Marginally Compliant Chapter 3 aircraft”) to operate in Hong Kong between 11 pm and 7 am.

Chapter 3 – Aircraft Emissions

Most aircraft operating at HKIA should comply with the engine emission standards as stipulated in ICAO Annex 16, Vol II.

With the growing attention to the climate change caused by the greenhouse gas (i.e. carbon dioxide, CO₂), CAD has been closely monitoring the development of guidelines from ICAO on the reduction of CO₂ emission from aircraft operations. These guidelines were conveyed to the industry stakeholders. Airlines have taken measures to retire old aircraft and replace them with new models which are more fuel efficient hence less emissions.

Apart from the modernization of aircraft fleet, airlines also endeavour to reduce emissions through reduction of aircraft weights, better maintenance and improved flight planning and management. The Airport Authority Hong Kong (AAHK) has embarked an initiative to require all saloon cars operating within the airside to be electric vehicles by 2017. For the purpose of reducing aircraft emission, the AAHK will upgrade the fixed ground power and pre-conditioned air system at aircraft stands. By 2014, AAHK will ban the use of Auxiliary Point Units by aircraft and mandate the use of fixed ground power and pre-conditioned air system at aircraft parking stands.

CAD, being the air navigation services provider, also introduced a series of air traffic procedures to reduce emissions. The CDA procedures not only provide the benefits of noise mitigation but also fuel saving. Since late 2005, the transfer level for flights departing from HKIA entering the Mainland Flight Information Region had been lowered during night time. This reduced the track miles required for long-haul departures to climb to the transfer level thus achieved the objective of minimizing flight time in the air. With effect from October 2009, CAD has implemented new air routes which have shorter travelling distances for aircraft arriving from the west and the north of Hong Kong. Each arrival flight from the Mainland, South East Asia and Europe has been able to save up to about 210 kilometres in flight distance or 14 minutes in flight time. During 2013, more than 70,000 flights benefited from these new shortened air routes.



Figure 3-1: New aircraft engine with improved efficiency in emissions and noise reduction

Chapter 4 – Green Initiatives

Airport - Collaboration Decision Making

Airport-Collaboration Decision Making (A-CDM) is a joint government/industry initiative aimed at improving overall efficiency of the HKIA operation through increased exchange of real-time information among aviation community stakeholders. CAD has successfully rolled out the A-CDM platform, available in both desktop computers and mobile devices, via Internet since July 2013 with very encouraging feedback.



Figure 4-1: Screen Capture of the A-CDM platform

With improved operation efficiency, reduction of unnecessary fuel burnt and energy consumption due to reduced holding, taxiing and ground engine running time can be achieved. Hence, reduction of noise and emissions such as carbon dioxide, oxides of nitrogen and suspended particulates are also expected, and actually proven in other A-CDM airports.

Standardized Forms

Exchange of correspondence and submission of documents in relation to various tariff and flight applications to the Air Services Office involve considerable consumption of paper and processing time. By constantly reviewing the application procedures and formats, we aim to improve our work efficiency and at the same time minimize paper consumption.

By the use of standardized forms for application of passenger and cargo fuel surcharge, the required information and details can be provided in pre-set formats. This avoids excessive emails and letter exchanges by providing a one-stop platform in respect of provision of guidance to and collection of essential information from applicants, as well as approval of the application by CAD with the use of the same application form.

Similarly, with the streamlined procedures to submit documents for flight applications using standardized forms, paper consumption can be reduced.

Figure 4-2: Standard Form for Application for Passenger Fuel Surcharge

Figure 4-3: Safety Assessment Form

Electronic Flight Strip System

For a long time, paper flight progress strips had been used to facilitate air traffic control operations in the control tower at the HKIA. As a step to enhance operation efficiency and environmental friendliness, the paper strips have been replaced since December 2012 by the Electronic Flight Strip System (EFSS), which displays flight data on a screen and allows data management by electronic means. EFSS helps reducing paper usage. It is estimated that during 2013, more than 930,000 paper strips (equivalent to more than 77,500 sheets of A4 size paper) have been saved.



Figure 4-4: Traditional paper flight progress strips

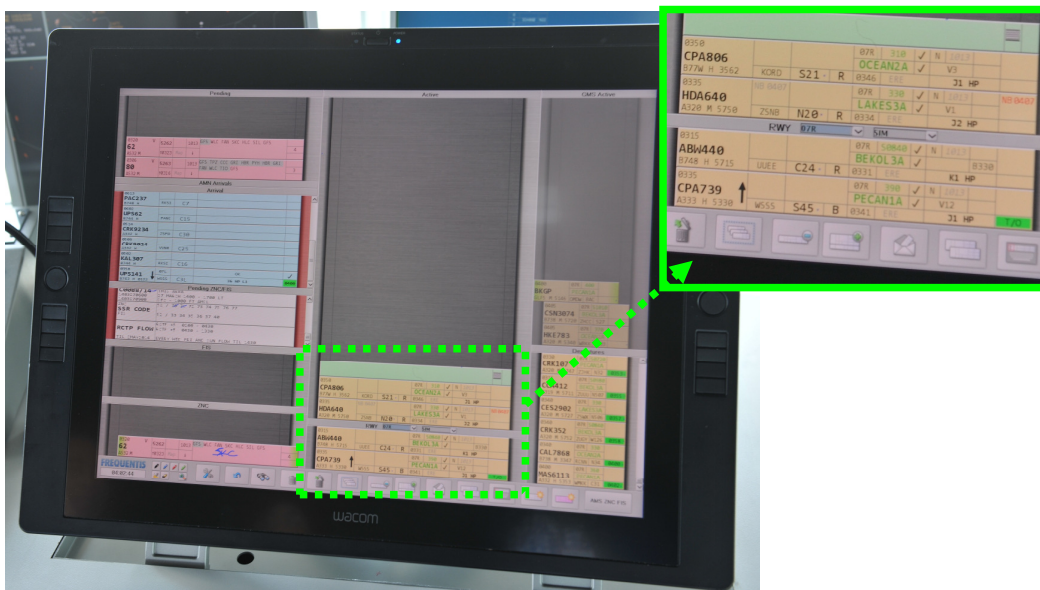


Figure 4-5: EFSS display

Electronic Submission/Approval

Starting from end 2013, upon the fulfillment of safety related requirements, most document records, manuals and licenses that were used to be carried on board aircraft or submitted to CAD in paper form, can be provided through electronic means.

This practice greatly reduces and replaces paper-based reference found in the carry-on flight bag in the past, including various operating manuals, maps and navigational charts.

With the use of electronic flight bags which bring the technological advances of computer information delivery to the airplanes, flight crews can perform different management tasks more efficiently with less paper.

The Air Services Office receives a number of flight applications on a daily basis, including scheduled flights, charter flights, private non-revenue flights, schedule changes, extra section flights, leased aircraft, etc. from scheduled airlines, non-scheduled air operators and agents for operations to or from Hong Kong. For the purpose of improving efficiency and paper saving, applications and related documents can be submitted to CAD by electronic means via the E-filing System of the Air Traffic Statistics System.



Figure 4-6: Portal of the Air Traffic Statistics System

Chapter 5 – Green Housekeeping

CAD has implemented a number of green housekeeping measures in daily office operations to encourage energy conservation, paper conservation, waste collection and recycling, proper disposal of environmentally hazardous waste, green procurement and environmental awareness among all staff.

Energy Conservation

Environmentally Friendly Design of the CAD Headquarters

The CAD Headquarters comprising the Air Traffic Control Centre (ATCC) Building, Office Building, Facilities Building and Antenna Farm, was constructed with three main design themes, namely “Sustainability”, “Environmental Friendliness” and “Education”. The large area of lawn and plants at the Antenna Farm, the lush vegetation on the ground and around levels one to three of the Facilities Building and provision of planted area on the roof has provided a total of over 30% landscaped area. Various environmentally friendly and energy-saving facilities such as photovoltaic panels (PV system), light pipes, solar light collectors with fiber optics, solar powered pole lighting and rainwater recycling systems, etc. are installed. All these features make the CAD Headquarters a green building.

- Light Pipes
 - ✓ 4 nos. of 300mm diameter and 5 nos. of 450mm diameter light pipes are installed at the roof of the ATCC Building
 - ✓ 5 nos. of 300mm diameter light pipes are installed at the roof of the Office Building



Figure 5-1: Light pipes at the roof of ATC Building (viewing from underneath)

- Solar Light Collectors with Fiber Optics
 - ✓ 6 nos. of 12-mirror type solar collectors available at the roof garden of the ATCC Building
 - ✓ 5 nos. of 300mm diameter collectors available at the roof of the Office Building



Figure 5-2: Solar Light Collectors with Fiber Optics (tracking feature installed)

Our Achievements in 2013

In 2013, electricity generated by PV system was 20,716 KWh, while the estimated energy saving for light pipes and solar light collectors was 840KWh in 2013.

- PV System
 - ✓ 19kW on-grid system is installed at roof top of the Facilities Building



Figure 5-3: Approximate 130 m² of Photovoltaic Panels

- Green Roofs and Landscaped Terrace
 - ✓ Over 400 trees and more than 17,000 shrub/groundcovers/climbers
 - ✓ Provide a total of over 30% site landscaped area



Figure 5-4: Green roof of CAD Headquarters

- Daylight Sensors and Occupancy Sensors
 - ✓ To dim the lighting to take into account the natural light
 - ✓ To switch the lights on or off by sensing occupancy automatically



Figure 5-5 : (Left) Daylight Sensor and (Right) Occupancy Sensor

- Air Conditioning
 - ✓ Under-floor air conditioning for specific areas (e.g. equipment rooms, ATCC, Watch Keeping Control Centre)
 - ✓ Separate cooling provision for equipment and occupant in ATCC



Figure 5-6: Separation of air-conditioning for equipment and occupant

- Electrical and Lighting
 - ✓ Maximum $15\text{W}/\text{m}^2$ power density for office lighting
 - ✓ High efficacy light source such as T5 fluorescent lamp, compact fluorescent lamp, etc.
 - ✓ Solar-powered street lamp installed at Antenna Farm



Figure 5-7: Solar-powered street lamp at Antenna Farm

- Lift and Escalator
 - ✓ Automatic shutdown of passenger lift ventilation and lighting in a pre-set time after normal office hour
 - ✓ Escalators with built-in “services-on-demand” sensor

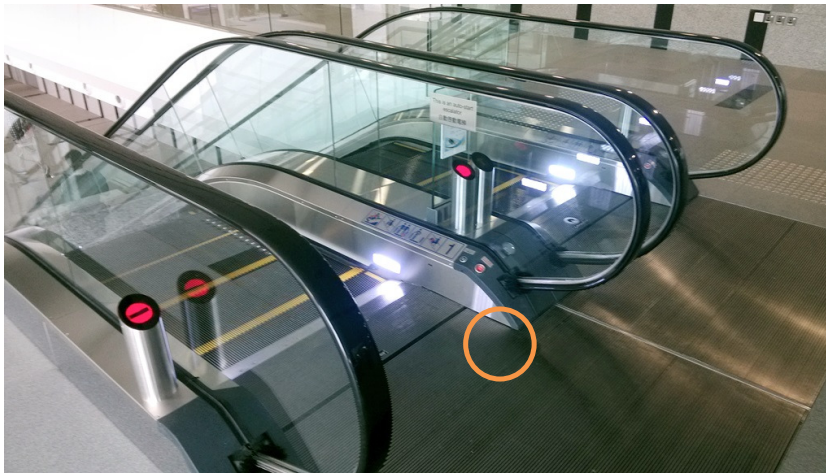


Figure 5-9: Escalator with services-on-demand sensor

Daily Energy Saving Measures in Housekeeping

CAD adopts the following measures in order to minimize the consumption of energy in our daily office operations –

- Follow the Government recommended summer air condition setting of 25.5 degree Celsius and use electric fans to improve air circulation and provide better staff comfort if necessary

- Switch off any air conditioning, interior lights, exterior lights, elevators, escalators, digital signage system, video wall, etc. when not in use
- Fine-tune the external lighting on-off hours periodically to optimise against seasonal changes in light/dark hours
- Lifts, escalators, air conditioning and lighting at Office Building operate from 7:30 a.m. to 6:30 p.m. during working days. Only one lift in each lobby remains in service after normal office hour
- Staff are encouraged to use staircases instead of lifts
- Energy-saving timer devices are installed in most share-used printers and photocopiers to prevent the consumption of electricity in standby mode during non-office hours
- During security patrol outside office hours, lights are checked to ensure that they are switched off if not in use
- Notices are displayed in all meeting rooms to remind users to switch off all electrical appliances before leaving
- Solar films are installed in strategic locations to reduce sunlight and heat



Figure 5-10: (Left) Energy-saving timer devices connected to the photocopiers and (Right) an the energy-saving timer device

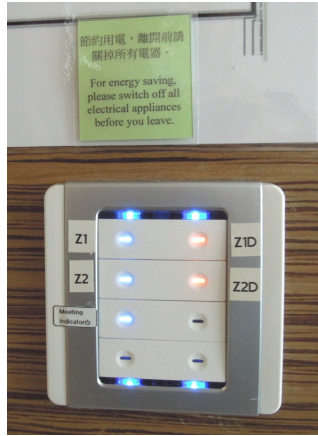


Figure 5-11: A notice reminding staff to turn off the electrical appliances before leaving



Figure 5-12: Solar films are installed in strategic locations to reduce sunlight and heat

Paper Conservation

The paper consumption in 2013 is 8,026 reams, representing an increase of about 39.6% as against 2012. The surge was mainly due to the increase in paper consumption during the launch of two major recruitment exercises for Assistant Operations Officers and Student Air Traffic Control Officers during which over 12,000 applications were processed. We will continue to make every effort with a view to reducing paper consumption.

Daily Paper Saving Measures in Housekeeping

We promote the “4-R principle” in paper conservation:

Reduce

- Minimize paper usage by encouraging staff to use both sides of paper for printing and photocopying, as well as to circulate one copy of document to relevant staff rather than to make a separate copy for each staff
- Minimize paper usage by making use of the electronic means (e.g. communicating by E-mails, circulating notices/circulars through CAD electronic bulletin board, conducting online e-application for flights schedule coordination, etc)

Reuse

- Reuse envelopes and loose minutes jackets
- Use blank side of used paper for photocopying, printing and drafting

Replace

- Use recycled paper instead of plain paper

Recycle

- Waste paper is collected for recycling

Waste Collection and Recycling

Recycling Bins

We collect waste paper, used plastic bottles and aluminium cans for recycling. Recycling bins are placed in common areas to facilitate disposal by staff or visitors. The materials collected are delivered on a regular basis to designated operators for recycling. The table below showed the amount of recyclables collected in 2013.

<u>Recyclables</u>	<u>Amount Collected (kg)</u>
Waste Paper	3,087
Plastic	12
Metal	12



Figure 5-13: Recycling bins in CAD Headquarters

Recycling Printer Cartridges

We also collect used printer cartridges, which would be delivered to the Government Logistics Department for recycling. In 2013, we collected about 600 used printer cartridges for recycling.

Food Waste Decomposition System

Food waste is one of the major solid waste in Hong Kong. Reduction of food waste is therefore crucial for minimizing the load of landfills. To work towards this goal, a food waste decomposition system was installed and operated in CAD Headquarters. During the decomposition process, the food waste is converted by enzyme into liquid, which is discharged as an effluent. In 2013, we collected about 3.2 tonnes of food waste, mainly from our Staff Canteen.



Figure 5-14: The food waste decomposition system in CAD Headquarters

Water Recycling for Irrigation

Rain water and air-conditioning condensate water is recycled for the irrigation system.

	Facilities Building	Office Building	ATCC Building
Annual Irrigation Consumption (L)	6,205,000	1,679,000	4,380,000

Annual Recycled Water Collection Catered for Irrigation (L)	1,621,519	1,178,014	3,024,225
Percentage of Saving	26%	70%	69%

Proper Disposal of Waste – Sea Water Effluent

Both Air Traffic Control Complex/Tower (ATCX/TWR) and Backup Air Traffic Control Complex/Tower (BATCX) use sea water for their cooling systems. In 2013, the average daily flow rate and temperature of the sea water effluent discharged from ATCX and BATCX remained well below the prescribed limits. Monthly figures of 2013 are presented in Figures 5-15 to 5-18.

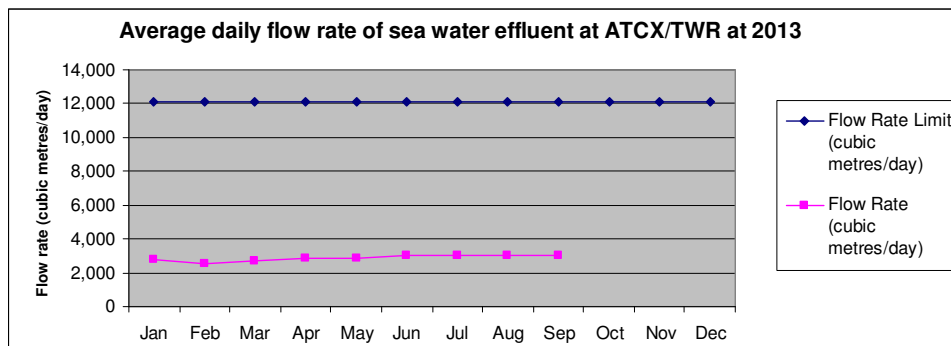


Figure 5-15 : Average daily flow rate of sea water effluent at ATCX/TWR in 2013

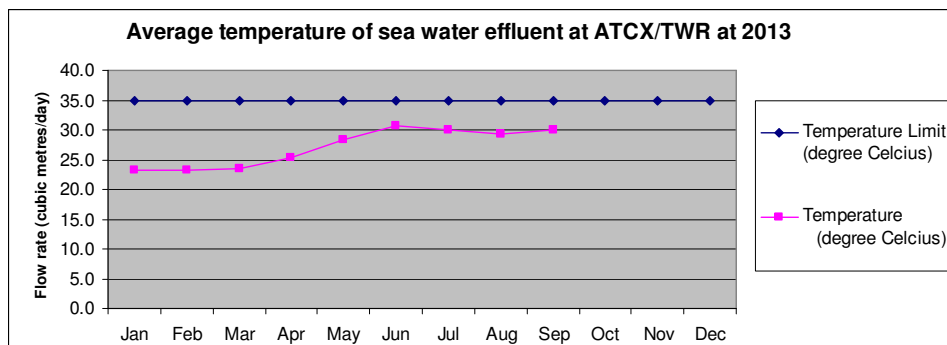


Figure 5-16 : Average temperature of sea water effluent at ATCX/TWR in 2013

Remark: The sea water cooling system of ATCX/TWR was not in use from October to December 2013.

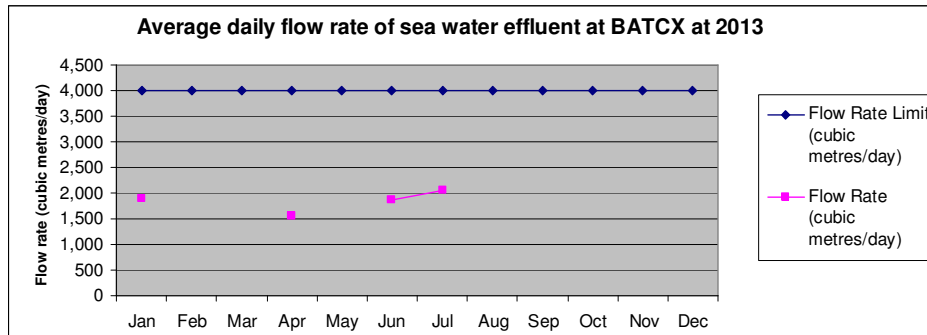


Figure 5-17 : Average daily flow rate of sea water effluent at BATCX in 2013

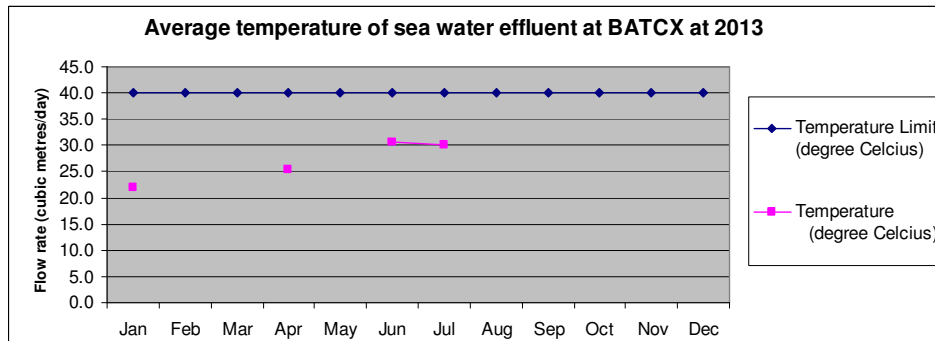


Figure 5-18 : Average temperature of sea water effluent at BATCX in 2013

Remark: The sea water cooling system of BATCX was not in use in February, March, May and August to December 2013.

Green Procurement

CAD follows the guidelines as set out in the Government's green procurement policy and avoids procuring single-use disposable items. We purchase items that are durable, energy-efficient and recyclable. Below are some examples of green procurement measures implemented in our department:

- Procure equipment such as air traffic control equipment, fluorescent tubes, photocopiers and printers that have obtained an energy label
- Choose green products such as refillable ball pens, mechanical pencils and recyclable laser printer cartridges
- Review the operational need against monthly supply items regularly, particularly for those items with expiry dates
- Avoid using items that are environmentally unfriendly, for example, correction fluid and batteries containing mercury



Figure 5-19: Example of equipment that has obtained an energy label

During procurement of goods, we recommend the following environmentally friendly measures to the suppliers in the preparation of quotation documents relating to invitation to quotation and the future performance of the contract:

- All documents are recommended to be printed on both sides and on recycled paper. Paper that exceeds 80 gsm should be avoided
- Use of plastic laminates, glossy covers or double covers should be avoided as far as possible
- Single line spacing is recommended and excessive space in the margins and in between paragraphs should be avoided
- The use of packaging material should be minimised
- If the goods are to be packed in a carton box, the carton box packaging made from 100% recovered fibre is preferred and must be strong enough for storage, stacking and transit

Electric Vehicles

Air pollution causes various health problems and is a matter of grave concern in Hong Kong. To help improve roadside air quality and lessen greenhouse gas emissions, electric vehicle (EV) is becoming a better alternative of transport. We are replacing our petroleum saloon vehicles with EVs by phases to help foster a greener environment. Currently, two saloon-type EVs are in operation and it is expected that another two EVs will render service by 2015.



Figure 5-20: An EV under electricity charging

Training and Communication

An Environmental Management Committee, chaired by the Departmental Green Manager, was established to recommend environmental goals, policy objectives and targets to promote environmentally responsible management within the department. The Committee, comprising members from all divisions of the department, would meet regularly to consider green initiatives, promote staff awareness, monitor and report on the implementation of green measures.

A Green Corner has been made available in the CAD electronic bulletin board, where staff members can easily gain access to relevant guidelines and green tips such as circulars and pamphlets on energy saving measures and waste avoidance practices in office. The related information will be recirculated to staff regularly. A green manager was nominated from each division to coordinate and oversee green management issues of the respective division.

Indoor Air Quality

We support the commitments under the Clean Air Charter. As mentioned in the previous chapters, we have been implementing measures to reduce emissions from our daily operation.

The Indoor Air Quality (IAQ) of CAD premises is assessed annually to monitor the situation. In 2013, the CAD Headquarters obtained the “Excellent Class” of the IAQ Certificate, while ATCX/TWR and BATCX were awarded the “Good Class” IAQ Certificate.



Figure 5-21: (Left and Middle) The ATCX/TWR and BATCX were awarded the “Good Class” IAQ Certificate in 2013; (Right) The CAD Headquarters obtained the “Excellent Class” IAQ Certificate in 2013

Views and Suggestions

CAD Environmental Report in the previous years can be found in the CAD website (http://www.cad.gov.hk/english/er_report.html). We welcome comments and feedback from readers so that we could identify ways for improvements. You can provide your views and suggestions to us by the following means:

General Enquiry

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