07 Measuring our environmental impact

SingTel's environmental footprint reflects the diverse activities of our multimedia and ICT business in Singapore. We are guided by our Environmental Management System (EMS) which supports our commitment to understand and minimise our impact on the environment.

The breadth of our activities in managing our environmental footprint has steadily increased during the last few years. Our aim is to comply with all applicable environmental regulations in Singapore and where possible, introduce and adopt best practices in our operations.

For example, in FY2012 we widened the measurement and monitoring of our carbon footprint by bringing additional elements of Scope 3 emissions into the calculation along with data on Scope 2 emissions from our rented offices, base stations and Main Distribution Frame (MDF) rooms.

Other initiatives include undertaking a series of energy audits at six of our premises in Singapore, the formation of a Power Management Unit, updating our procurement standards and a continued requirement for our contractors and sub-contractors to comply with our EMS when carrying out any on-site activities.

We report our environmental impact under four categories; hazardous and non-hazardous waste management, carbon emissions, energy consumption and water use.

MANAGE WASTES AND HAZARDOUS MATERIALS RESPONSIBLY

Waste management has increasingly become a key issue for Singapore. The lack of physical space for disposal and the environmental impact of waste necessitate the need to be mindful of the amount of waste that we generate. As one of the biggest companies in Singapore, we aim to lead by example and play our part in managing waste responsibly.

SingTel adopts a two-pronged approach to managing waste. We create links between the company and individual employees, providing them with a good awareness of major initiatives. Alongside this, we promote a culture of understanding that small everyday actions can collectively have a big impact. For example, we have invested in a number of digital initiatives to cut down on resource use such as paper, storage, travel and the utilisation of physical space. These include:

- An online WSH portal to provide easy access to all WSH-related information and no printing of hardcopy handbooks;
- SingTel ESPRESSO, an enterprise social networking site which connects people virtually across the SingTel Group;
- The expansion of our secure PeopleConnect intranet site so that all Senior Officers and Directors will be able to access their annual review letters electronically, similar to how our pay slips are viewed;
- Managed printing networks using 'Tap Printing' which greatly reduces unnecessary waste by holding print jobs until users tap their staff access cards on the network printer; and
- Learn-on-the-Go, an E-learning and M-learning platform that promotes and expands the virtual classroom and learning opportunities for our people.

Performance against sustainability goals

Key Areas of Focus	Targets FY2012	Performance against targets
Manage wastes and hazardous materials responsibly	• Feasibility review on provision of recycling facilities for customers to return packaging materials • Study on identifying and monitoring waste streams and their disposal treatment	⬢⬡⬡ • In progress. Our retail bags are now made of recycled paper and biodegradable plastic bags are provided for the trading-in of mobile phones ⬢⬡⬡ • In progress
Manage efficient energy consumption	• 65% of the three year improvement target in electricity savings from energy conservation initiatives implemented since FY2010 to be achieved • Energy audits at six sites to be conducted • Feasibility study for solar panel installation at Seletar Satellite Earth Station to complete • Chiller replacement and overhaul programme to continue	⬢⬢⬢ • 33.8 GWh savings achieved from energy conservation initiatives implemented since FY 2010. We have met and exceeded the five-year target set to save 32.7 GWh by FY2013 ⬢⬢⬢ • Energy audits at six sites completed (telephone exchanges at Ang Mio Kio, Ayer Rajah, Bukit Panjang, Paya Lebar, Tampines and Jurong West) ⬢⬢⬢ • Feasibility completed. Tender has been called to install solar panels mounted on solar trackers on the concrete trellis roof of Seletar Satellite Earth Station. With the innovative feature of single axis solar trackers, the annual production of solar power can be increased by 20% ⬢⬢⬢ • Overhauled 2 chillers and replaced 4 chillers. Replacement of another 6 chillers in progress
Reduce impact on climate change and GHG emissions	• Streamlining of GHG emissions from business air travel for monitoring • Process to track quantities of refrigerants used to be fully developed	⬢⬢⬢ • tCO_2-equivalent emissions from business air travel for SingTel and NCS determined via standardised source ⬢⬡⬡ • In progress
Conserve and manage water usage	• Systematically monitor and promote efficient use of water • NEWater capability to be provided at all new facilities where feasible	⬢⬢⬢ • Daily meter readings taken for early detection of leakage and unusually high consumption ⬢⬢⬢ • Proactively sought info on the development of the NEWater network

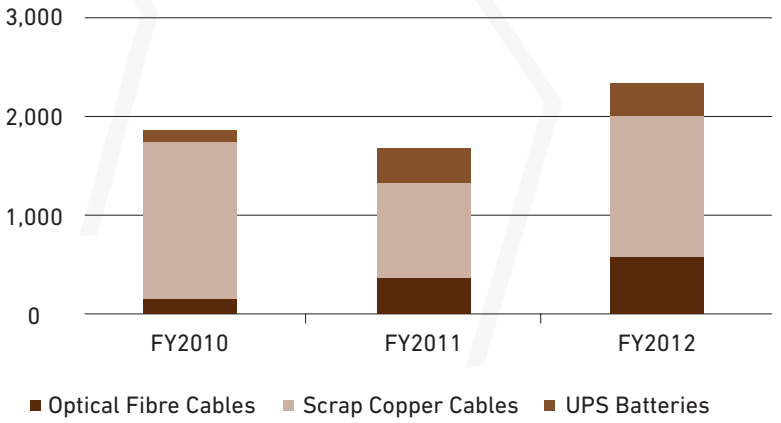
Hazardous and non-hazardous waste

The responsible disposal of waste materials generated within our operations is a key focus of our environmental management programme. We have continued to monitor our major sources of waste and track targets to assess the types and amount of materials we dispose of.

We ensure that all hazardous electrical and electronic components as well as inflammable fuels are handled and disposed of responsibly, by registered and licensed waste management companies.

The disposal of lead acid batteries has fallen by 12.1% this year, from 376 to 324 tonnes. The sharp increase in scrap copper cables to 1,418 tonnes in FY2012 compared to 958 tonnes the previous year was mainly due to the commencement of a replacement initiative to install optical fibres as an alternative to copper cables. There was also an increase in scrap optical fibre cables, up to 602 tonnes compared to 372 tonnes in the previous year.

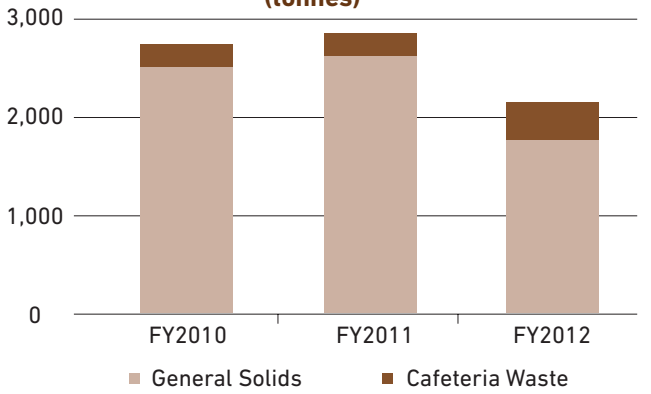
Hazardous Waste (tonnes)



This was mainly due to underground cable re-routing undertaken as part of a major public transport project. All affected fibre cables had to be removed and scrapped, and resulted in our overall hazardous waste generation increasing by 37% in FY2012.

For non-hazardous waste, general solids waste decreased significantly from 2,532 tonnes in FY2011 to 1,711 tonnes in FY2012. Cafeteria waste generated increased to 374 tonnes in FY2012 from 229 tonnes in the previous year.

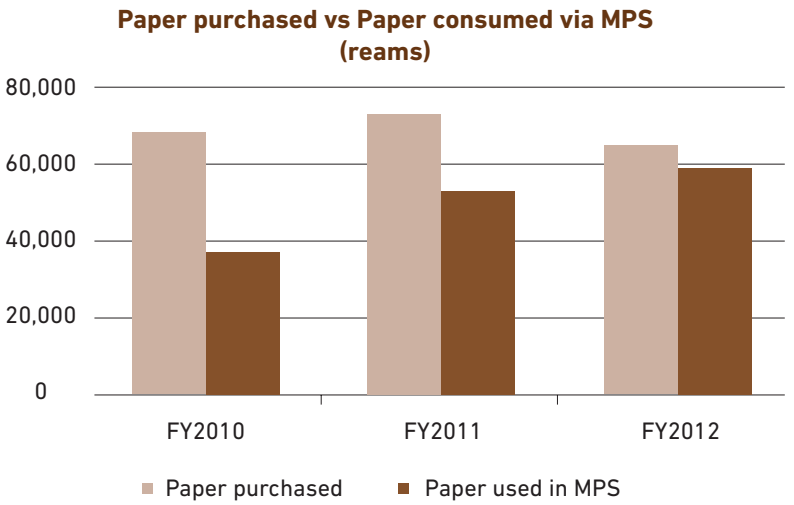
Non-Hazardous Waste (tonnes)



Moving forward we will explore an e-tender initiative which will enable vendors to bid for projects online. This initiative will reduce paper usage and carbon emissions by eliminating the need for physical tenders to be delivered to SingTel's headquarters.

We have increased the procurement of FSC Certified A4 paper to 8%, despite a 13% cost premium compared to non-FSC paper. Our SingTel-branded 100% recycled paper bags are used at our retail shops as well as the new bio-degradable plastic bags for the trading-in of mobile phones.

In FY2012, we started tracking the amount of paper purchased as well as the consumption of paper via the Managed Printing System (MPS). With more MPS initiatives planned in the year, we expect to further reduce the use of paper.



Waste recycling

In FY2012, we recycled 25.1% of our total waste, up from 19.0% in FY2011. This includes recycling nearly 45% of our hazardous waste, mainly through copper cables. We have extended our recycling efforts to include plastic and metal waste at our exchanges and offices across Singapore and aim to further increase our level of recycling next year.

We have also been encouraging our customers to reduce waste and recycle. In March 2011, we launched a joint mobile phone recycling programme with Nokia, the first telco in Singapore to provide means for our customers to recycle their mobile phones as well as accessories and chargers. Customers who recycle old mobile phones, regardless of brand, will get a tree planted in their name by Nokia. They can drop their phone into the recycling bins at selected SingTel Shops or mail their phones using the prepaid envelopes available at any of our shops. We extended this programme to four of our SingTel Exclusive Retailers from March 2012. Since the programme's launch, we have collected 1,200 mobile phones.

Half-size SIM card body

'Half the size but big on savings' is the message behind SingTel's latest prepaid SIM half-card. Test launched in January 2012, this innovative idea has halved the size of the old credit card style SIM card bodies. This has proven to be highly successful with solid approval ratings of 65% from customers and positive feedback from prepaid retailers in Singapore.

The half-card was a result of an initiative to highlight potential waste and design issues in SingTel products. Using Lean Six Sigma concepts, the team identified that the removal of waste can help to increase productivity, reduce costs, gain intangible benefits such as stronger branding, and play our part for the environment. The half-card is expected to help the company save at least S$150,000 in the next financial year.

Following the success of the half-card concept, the design will soon be extended to our prepaid Top-up, Broadband on Mobile (BOM) and calling cards.

MANAGE EFFICIENT ENERGY CONSUMPTION

Energy efficiency is a strategic priority for SingTel and is an important part of building sustainable operations. Energy is also a national focus for regulators in Singapore with the Energy Conservation Act being passed in early 2012. The Act is expected to ensure that companies with heavy energy usage will measure, and eventually fully report their energy usage and efficiency programmes.

At SingTel, we have already started the process of improving our energy management and have implemented recognised standards and reliable, cost effective sources of renewable energy. For example, our data centre in Singapore, Kim Chuan Telecommunications Complex 2 (KCTC-2), achieved the Building and Construction Authority's Green Mark Gold Award, a rating system that evaluates buildings based on criteria such as energy and water efficiency, as well as environmental innovation.

KCTC-2 also achieved the SS564 certification, a new standard that provides the framework and methodology to measure the energy efficiency of data centres, and is built to Tier-4 specifications which is the industry's most stringent data centre standards for reliability and service availability. The Power Management Unit was also set up during the year to coordinate our strategies and optimise our usage of power systems and electricity.

Energy conservation

SingTel pledged to save 32.7 GWh of electricity from energy conservation initiatives implemented since FY2010 by FY2013.

To achieve this target, we have implemented various energy management measures, including a programme of energy audits, replacement and overhaul of chillers and lighting systems and awareness campaigns aimed at increasing staff understanding of issues. The Project LESS (Little Eco StepS) environmental campaign highlighted the importance of energy conservation to all our people with the 'Think before you flick' initiative.

As of result of our actions, we achieved cumulative electricity savings of 33.8 GWh since FY2010. This equates to nearly 10% of our total energy consumption in FY2012 and translates into a reduction of our carbon footprint by 17,402 tCO_2e emissions.

There were six energy audits conducted at exchanges in Singapore during FY2012. The results gave us a good understanding of these operations and will provide a basis for planning improvements in the future. We intend to conduct eight more audits in the next 12 months and this will complete the energy audit programme at all SingTel exchanges.

SingTel's Power Management Unit

The Power Management Unit (PMU) was formed in January 2012 under the SingTel's property group. PMU's mandate is to undertake the planning, implementation and operations of the DC (Direct Current) and UPS (Uninterruptible Power Supply). The key objectives of PMU are to:

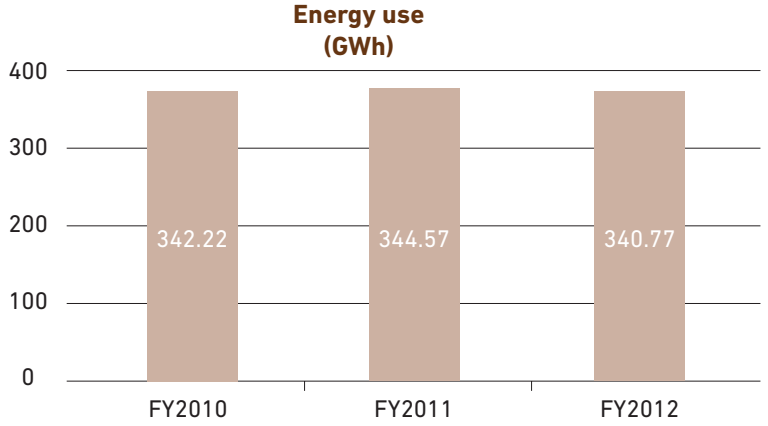
- Consolidate and optimise power systems in our network by deploying and optimising larger capacity power systems to replace the numerous smaller power systems;
- Reduce electricity wastage by implementing systems to improve energy conversion efficiency by replacing end-of-life power systems with newer efficient systems; and
- Replace lead acid battery plants with maintenance-free battery plants to reduce emissions of hydrogen and recharging requirements while actively exploring the feasibility of alternative battery technologies and alternative energy sources.

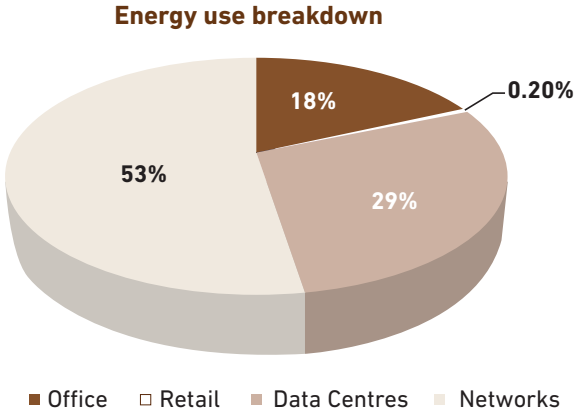
PMU will also produce best practice guidance on the proper operations and utilisation of power systems to minimise system outage due to interrupted power supply.

Indirect energy use

Our electricity usage has been recalculated to include our rented offices, base stations and the MDF rooms. This has been retrospectively applied to cover the period FY2010 to FY2012 to ensure comparisons are made on a consistent basis throughout this report.

Overall, SingTel consumed 340.8 GWh in FY2012 compared to 344.6 GWh in the previous year, representing a marginal decrease of 1.1%. We have also provided information on energy usage by operation for the first time. The majority of our usage comes from networks[3], with 53% of total energy use.





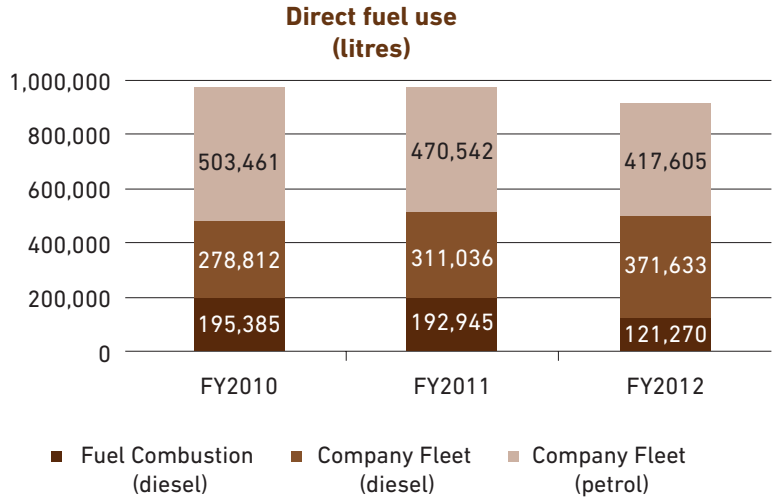
[3] *Networks include our exchanges, mobile base stations and MDF rooms*

Direct energy use

SingTel's direct energy use, or our use of primary fuels, consists of petrol and diesel for our commercial vehicle fleet and diesel for our back-up power supply generator sets in Singapore. Our total fuel use in FY2012 was 910,507 litres (diesel: 492,903 litres, petrol: 417,605 litres), a decrease of 6.6% from the previous year.

For SingTel-owned vehicles, we have a programme to replace existing vans with Euro IV compliant models at the end of their normal lifecycle. No vehicles were due for replacement in FY2012. To date, we have 138 Euro IV compliant vehicles, representing 28% of our fleet.

All diesel vans leased from an external fleet company by our subsidiary NCS are non-Euro IV compliant. Over the year, we have been in discussions with our vendor and are currently reviewing their conditions to lease Euro IV compliant vehicles.



Renewable energy initiatives

The Bukit Timah Hill Radio Station's alternative energy project came into operation in April 2011. It harnesses energy from the sun to supplement energy from the national power grid. The system comprises 100 pieces of solar panels with a total capacity of 24 kW that generated 23,420 kWh during the year.

The Grid-Tied Solar Photovoltaic System at our Pasir Ris Telephone Exchange yielded 46,026 kWh in FY2012 and between the two projects, we realised carbon emission reductions of 36 tCO_2e.

SingTel and GSMA collaboration on mobile energy efficiency benchmarking

In November 2011, the SingTel Group and our associated companies announced that we would jointly participate in the GSMA's Mobile Energy Efficiency (MEE) Benchmarking initiative. GSMA is a global organisation that represents mobile telecommunications operators.

Through this exercise, a benchmark will be developed as a tool to drive energy reductions, cost savings and reduce greenhouse gas emissions in network operations. Results will be compared against industry peers using standard indicators. To deliver long-term improvements, the exercise will be conducted annually and outcomes tracked against the benchmarks. The results should help to identify areas to improve power consumption efficiency.

Since the introduction of the MEE Benchmarking service in 2010, 34 operators covering more than 200 networks have signed up to work with GSMA.

Green networks

SingTel is currently upgrading to the latest generation of 'green' base stations (Ericsson 6000 series) which not only consumes up to 50% less energy from previous models, but can also support higher traffic capacity and/or multiple technologies, 2G and 3G as well as LTE (Long Term Evolution) within one base station depending on the configuration.

Our assessment is that although the 6000 series is considerably more power efficient, this can be offset by the substantial increase in data traffic across our network, which has doubled over the past one year. Therefore the absolute energy use for SingTel is likely to be the same due to the rapid high growth in data traffic.

GSMA's MEE Benchmarking result recently graded SingTel as one of the most optimum operators in terms of energy utilisation when looking at base station power versus network traffic performance.

REDUCE IMPACT ON CLIMATE CHANGE AND GHG EMISSIONS

Although emissions reduction in Singapore is voluntary, we undertook a more comprehensive carbon footprinting exercise in FY2012 which increased the scope of our greenhouse gas (GHG) emissions calculations[4]. Our GHG emissions now include the fleet of contractor vehicles and wider property coverage to provide a more accurate picture of SingTel's emissions. We intend to continue the development of a more robust strategy in the next financial year.

The emissions factors for purchased electricity in Singapore between 2009 and 2011 were updated in April 2012 by the National Environment Agency. These updated factors have been used in this report. For consistency, we have restated the figures over the period FY2010 to FY2012 to ensure comparisons are more meaningful taking into account these methodological changes.

The full extent of aspects included in emissions calculation is shown in the table below.

Equivalent CO_2 Emissions	tCO_2e		
	FY2012	FY2011	FY2010
Scope 1 (direct)			
Fuel combustion (diesel generator)	324	516	529
Refrigerant gases	4,354	4,364	1,501
Company-owned commercial fleet (diesel)	993	831	755
Company-owned commercial fleet (petrol)	970	1,093	1,314
TOTAL SCOPE 1 EMISSIONS	**6,641**	**6,803**	**4,099**
Scope 2 (indirect)			
Purchased electricity	175,360	177,593	172,547
LESS: Renewable energy generation	(36)	(23)	(25)
TOTAL NET SCOPE 2 EMISSIONS	**175,324**	**177,570**	**172,522**
Scope 3 (other indirect)			
Contractor fleet (diesel)	669	711	705
Contractor fleet (petrol)	132	134	115
Air travel	3,064	2,628	3,021
TOTAL SCOPE 3 EMISSIONS	**3,864**	**3,473**	**3,841**
TOTAL NET EQUIVALENT CO_2 EMISSIONS	**185,829**	**187,846**	**180,462**

[4] The equivalent CO_2 emission for electricity use are calculated based on the updated 2009, 2010 and 2011 operating margin grid emission factors from the National Environment Agency in Singapore. Direct emissions are calculated using the 2010 Guidelines to DEFRA / DECC's GHG conversion factors for company reporting (Annex 1). Other indirect emissions are calculated using the 2010 Guidelines to DEFRA / DECC's GHG conversion factors for company reporting (Annex 7)

Our main source of greenhouse gas (GHG) emissions is Scope 2 electricity purchased directly from the national power grid and is the main focus for the reduction of our carbon footprint. Our net overall carbon equivalent emissions from this indirect energy are 175,324 tCO_2e. The energy conservation programmes undertaken in FY2012 have contributed to a decrease of 2,245 tCO_2e from the previous year.

Our Scope 1 GHG emissions, contributed mainly by refrigerant use, are 6,641 tCO_2e in FY2012. This represents a slight decrease of 162 tCO_2e from the previous year. As part of our commitment to phase out ozone depleting refrigerants and those that have high global warming potentials (GWPs) and reduce the carbon intensity associated with air-conditioning and chiller systems, we awarded a contract to a vendor who uses R134a refrigerant gas as the cooling medium instead of the ozone depleting R123 coolant.

The Scope 3 GHG emissions were dominated by air travel at 3,064 tCO_2e, representing 79% of our disclosed Scope 3 emissions. We continue to encourage the use of video and telephone conferencing to reduce the overall need for business air travel. Scope 3 emissions also include the use of contractor vehicles for the first time.

CONSERVE AND MANAGE WATER USAGE

Water scarcity is a key global issue as cities and populations grow. A resource-scarce island-nation Singapore feels this more than many others. SingTel recognises our role in conserving and protecting this essential resource for the nation.

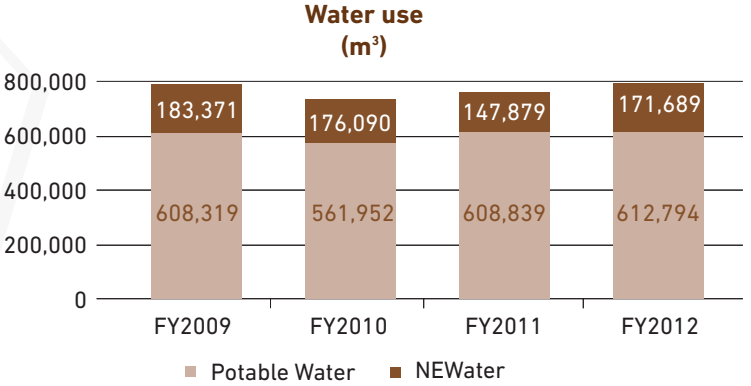
We use potable water, drinking quality water, and NEWater, a high-grade reclaimed water used more for operational activities such as cooling. Both are supplied by Singapore's Public Utilities Board (PUB) and where possible we seek to replace our use of potable water with recycled water.

Between 2009 and 2011, all our premises were certified under PUB's Water Efficient Building (WEB) programme. For this certification, we put in place a process to take daily water meter readings for early detection of water leakage.

For this report, our water usage data has been expanded and recalculated to include our rented offices. This has been backdated to cover the period FY2010 to FY2012 to ensure comparisons are made on a consistent basis.

Despite the implementation of water conservation initiatives, such as installing thimbles in taps to regulate water flow, our total potable water consumption increased by a marginal 0.7% in FY2012 compared to the previous year. However, NEWater usage increased by 16.1% (this is equivalent to 22.5% of total water usage) due to the completion of the chiller replacement programme in Telepark and the restart of six cooling towers.

In FY2012, the total water (potable and NEWater) use was 784,483 m^3, an increase of 3.7% compared to FY2011.



Other environmental issues

Radiation emissions from base stations

The transmission of radio frequency (RF) waves makes mobile communication possible. RF waves are electromagnetic fields (EMF), and their possible impact on health is a frequently discussed issue in the mobile telecommunications sector. Radiation is produced by mobile devices and base stations and there has been a great deal of research undertaken since the early 1990s related to EMF. SingTel frequently monitors the latest developments and publications.

The World Health Organisation (WHO) has been very active in promoting research and awareness of possible EMF health impact and states that a large number of scientific studies have been performed over the last two decades to assess potential health risks. They currently conclude that no adverse health effects have been established as being caused by EMF in everyday mobile phone use[5].

In Singapore, the Centre for Radiation Protection (CRPNS), an office of the National Environment Agency, is responsible for all matters relating to EMF exposure. The permitted levels of radiation from mobile phones and base stations in Singapore is based on the WHO recommended guidelines and International Commission on Non-Ionising Radiation Protection (ICNIRP) standards. CRPNS current advice is that levels of public exposure to EMF from base stations and mobile phones in Singapore is normally well below international guidelines, and much lower than levels where health risks are likely to be present[6].

The radiation levels from SingTel's mobile base stations are within the ICNIRP acceptable limits and mobile phone handsets sold at our stores must comply with regulatory guidelines set out by CRPNS and IDA.

[5] *http://www.who.int/mediacentre/factsheets/fs193/en/index.html, Electromagnetic fields and public health: mobile phones, Factsheet No 193, June 2011*
[6] *http://app2.nea.gov.sg/about_crpns.aspx#7, CRPNS FAQ's, Potential health effects and risks associated with the use of mobile phones, National Environment Agency*

Biodiversity

Two of SingTel's operational activities have a potential impact on biodiversity, specifically cable laying and base station placement. The loss of biodiversity is a global concern and one which SingTel acknowledges as an important matter.

When laying cables and choosing base station sites, we will first assess any potential environmental issues, including biodiversity. Should our cable laying routes or base stations affect any natural areas, we will consult the National Parks Board (NParks), and with their advice make a judgement on how best to proceed and minimise or eliminate any adverse impact. With undersea cable installations, minor localised seabed disturbance is unavoidable although we do take into account, where possible, any adverse environmental impact to water quality and the natural environment.

During the reporting period, we have not encountered any significant biodiversity issue.

Improvement targets

Key Areas of Focus	What We Will Do	
	Five-Year Plan (FY2011-FY2015)	FY2013
Manage wastes and hazardous materials responsibly	• Implement processes for reducing, recycling and re-using product packaging, either by encouraging our customers to return packaging materials and/or by using bio-degradable or recyclable materials	• Feasibility review on provision of recycling facilities for customers to return packaging materials
	• Develop a waste management system to track wastes from generation to disposal/recycling	• Implement a manual tracking system for the disposal of general solids and cafeteria waste
Manage efficient energy consumption	• Target to save 32.7 GWh of electricity from energy conservation initiatives implemented in FY2010 over the period FY2011 to FY2013	• Target to save 49.6 GWh of electricity from energy conservation initiatives implemented in FY2010 over the period FY2011 to FY2013
	• Conduct energy audits for selected exchanges to analyse electricity consumption patterns so that power efficiency improvement programmes can be undertaken	• Energy audits at another eight sites to be conducted
	• Improve our chiller replacement and overhaul programme to further enhance cooling system efficiency	• Chiller replacement and overhaul programme to continue
Reduce impact on climate change and GHG emissions	• Develop monitoring processes for benchmarking GHG emissions from business air travel	
	• Set goals for replacement of new chillers which is compliant with the Montreal Protocol	• Review chiller replacement opportunities under the Carbon Footprint exercise
Conserve and manage water usage	• Continue to systematically monitor and promote efficient use of water	• Systematically monitor and promote efficient use of water
	• Provide for NEWater capability at new facilities	• NEWater capability to be provided at all new facilities where feasible