

# Green Enterprise

**S**trategy



**Positive Action in Response to Change**

**M**anagement



**Environmental Sustainability Management**



## AWARDS

- Received Excellent Environmental Education Award in private enterprise group from Taipei Government
- Received first place again at information communications for Healthy Brand from Common Health Magazine
- The iEN received quality assurance from the Ministry of Economic Affairs
- Received Excellent Green Procurement and Excellent Green Store Award from Taipei Government

# A ction

**Implementation of  
Power Management  
Carbon Management  
Objective  
Water Resource  
Efficiency Management**



# R esponse

**Impressive Energy  
Conservation Carbon  
Reduction Results**



# T arget

**Creating a Green  
Enterprise  
Safeguard Our  
Beautiful Homeland**





## Positive Action in Response to Change

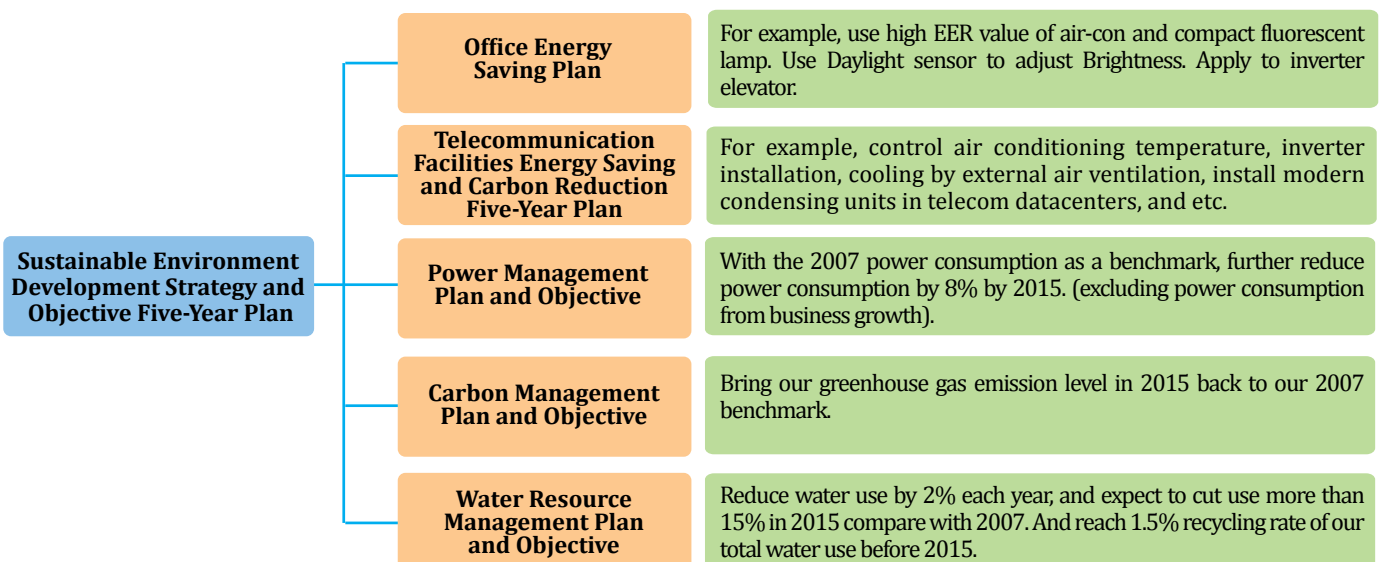
In response to the risk of climate change, we have formulated “Sustainable Environment Development Strategy and Objective”, a five-year plan (2011 - 2015) as prime directive of the development of environmental protection strategy, energy conservation, and carbon reduction. In conjunction with the vigorous implementation of “office and datacenter energy conservation measures,” we have compiled and analyzed all data related to energy usage and paved the way for scientific management.

### The establishment of Environmental and Energy Conservation Policies

Chunghwa Telecom is the most experienced and the largest of the integrated telecommunication operators in Taiwan. Our business covers three major types of communications: fixed networks, mobile, and data networks. As a leader in the Taiwanese market, we pursue growth and sustainable development while offering a more environmentally friendly and energy efficient telecommunications service. To sustainable development issues, we have incorporated environmental protection, energy conservation and carbon reduction, environmental stewardship, and green intelligent building, and formulated specific environmental and energy conservation management plans to improve environmental performance, and to define our direction towards sustainability.

We commit ourselves to the following environmental and energy conservation policies to fulfill these commitments:

- Follow environmental regulations and promote self-regulated environmentalism
- Improve energy efficiency to implement energy conservation and carbon reduction
- Use green energy and employ green purchase
- Develop green product and promote green economy
- Enhance ecological environment and green buildings
- Apply recycle and waste reduction to build a sustainable environment





---

### Annually Report to Carbon Disclosure Plan 4.12

Carbon Disclosure Plan (CDP) was raised by international corporation investors, and they started to invite companies to reply CDP questionnaire since 2003, in order to understand how enterprises face and deal with carbon issue.

In response to international investors' concern, that we began to reply CDP questionnaire since 2010 through world café style that held trans-department meeting for discussion. By reporting to the CDP questionnaire that we not only can review our defects but also can set concrete target of carbon deduction, which is the most important function for us.

Reference for Chunghwa Telecom world café: <http://www.youtube.com/watch?v=oFrmtxGqIEg>



---

### Participation in GreenTouch 4.13

The GreenTouch Consortium, formed in January 2010, an organization devoted to the development of an energy conservation technology network at all levels, aim at boosting network energy efficiency by 1000 times. They focus on increasing energy efficiency of ICT equipment, platforms, and networks.

We had attended the autumn general conference, GreenTouch 2010, held in the Netherlands by invitation, and joined a formal membership in January 2011.

In 2012, we continued supporting technology document formulation and case study; besides, to contribute toward ICT field, we continued sharing our energy saving findings in GreenTouch conference, IEEE ICC12 conference, APC 2012 conference, etc.



# Environmental Sustainability Management

We review and amend our different energy conservation programs every year and implement them under a budget ceiling. In addition, we combine energy conservation performance into the “Administrative Performance Assessment” and “Performance Evaluation on Power and Air Conditioning Equipment Maintenance” and include them in regular audits. We applied for two international standard certifications to provide a necessary internal procedural framework and establish guidelines and processes for the compliance of organizations and businesses.

  Saved **NT\$8.85 million** electric overcharges

  Saved **NT\$520 thousand** water overcharges

  Planted **66,468** entries of tree

  Recycled over **5 million** tons of water

  Covered **22** categories recycling

## The EARTH Management System

Our major environmental protection projects in the environmental sustainability system (EARTH) include power and water management, greenhouse gas emission, resource recycling, and tree planting. This shows our emphasis on energy conservation, carbon reduction, and environmental protection. Establishment of the EARTH system began in January 2008, R&D resources were vigorously place to extend the EARTH system, which includes the following functions and effects:

1. Energy conservation innovation: Creative ideas from all units upload results to the EARTH system to share with others, so as to learn together achieve environment protection.
2. Performance evaluation: Performance is evaluated in a systematic and quantified way to encourage all units to maximize contribution.
3. Power management: The system control over 49,273 electricity registrations and 1.36 million entries of electricity charges. Replaced paper bills with electronic files, this not only facilitate process, but also reduced company resource requirements and provided analysis function that shows power usage trends, power factor statistics, and breach of over power usage. With the help of the exception notification function, we saved NT\$8.85million in overcharges by the end of 2012.
4. Water management: By applying electronic billing and collective payment from the water company and collating water usage statistics, our system has controlled over 1,161 water registration numbers and 50,348 entries of water charges. This reduces administrative operation and provides analysis function. With the help of the exception notification function, we saved NT\$520,000 in overcharges by the end of 2012.
5. Carbon inventory: EARTH provides carbon verification forms to help carbon inventory, promote carbon reduction measures, reduce operational risks, and enhance the corporate benchmark. We have saved approximately 300 man-days, amount of traveling expenses, and carbon emissions from travel in all regions.
6. Afforestation: Provided to archive the information about types of trees. Archived logs cover 247 types of trees in the Chunghwa Telecom parks, including 66,468 entries of tree information.
7. Water recycling management: Provided to archive the information about the type, approach, responsible unit, and location of water recycling. Over 5,337,776 tons of wastewater was recycled.
8. Recycling management: Provided to archive the type, amount, and unit for recycling. Logs cover 22 categories and 1,458,024 entries of recycling.



**ISO14001 Certification Sequence for Chunghwa Telecom Units**

Year	Execution Unit
2008	Southern Taiwan Business Group
2009	Mobile Business Group
2010	Northern Taiwan Business Group, Data Communications Business Group
2011	International Business Group, Telecom Laboratories
2012	International Business Group
2013	Telecom Laboratories

**ISO15001 Certification Sequence for Chunghwa Telecom Units**

Year	Execution Unit
2011	Data Communications Business Group
2012	Telecom Laboratories
2013	International Business Group, Mobile Business Group
2014	Northern Taiwan Business Group, Southern Taiwan Business Group
2015	Telecom Training Institute, Enterprise Business Group

**Organization of Sustainable Environment Management**

To execute the promise of environmental protection, we set a sustainable development group under CSR committee, to be responsible for putting environmental protection, Energy Conservation and Carbon Reduction into operating plan, and decide yearly objectives.

Otherwise, we also enhance communication between internal employees, upstream and downstream companies, work together to implement related measures to create a low carbon network.

**ISO14001 Environmental Management Certification**

Certification under the ISO14001 environmental management system clearly demonstrates our commitment to environmental sustainability. It also offers many benefits, such as proof of environmental performance, more management confidence, reduced environmental management risk, better market competitiveness, regulatory and other compliance, continual improvement, and lower costs.

**ISO50001 Energy Management Certification**

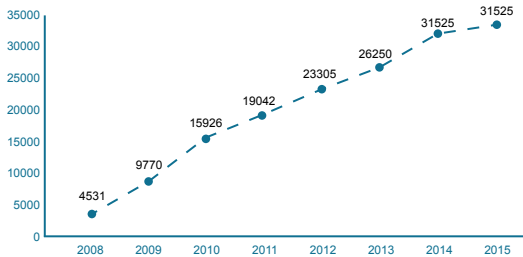
The ISO50001 energy system management standard primarily aims at providing a necessary procedural framework for organizations and businesses by establishing certain guidelines and processes for compliance. This should allow them to maximize energy efficiency in a way that leaves their existing operation unaffected and closely aligned with their business operation strategy and objectives. When supplemented by the PDCA (Plan-Do-Check-Action) mechanism, not only can energy use in an organization be continuously improved, but the objectives of sustainability and environmental friendliness can be met by reducing energy cost and greenhouse gas emission. Our Laboratories acquired ISO50001 energy system management certification in 2012 and we plan to get certification of the International Business Group and Data Communication Business Group for 2013.



# Implementation of Power Management

As a large enterprise, we use a lot power therefore we encourage energy conservation. We have taken an inside-out approach, starting with the energy conservation monitoring network in the largest building in Taiwan, and then gradually improving the energy management and efficiency of the others. We hope that by the end of 2015 we can save 297 million kWh of energy, which accounts for 22% of all conserved electricity.

**Cumulative Power Consumption Target**  
(Unit: kWh)



Note: Years 2013~2015 show target values.

## Power Management Plan and Objective

Our power management objective is to “implement energy conservation and carbon reduction plans to reduce power use in telecommunication datacenters and office buildings by 12% in 2012 as compared to that of 2007.” With proper control, this objective had already been met in 2011, when our corporate power consumption had decreased by 220 kWh.

During 2012, we have worked with Intel to develop Green Cloud Data Center to use Virtuoso and Intel’s Node Manager and Data Center Manager. In accordance with server’s power consumption and management measurement, we can decrease the cloud server power consumption by 5-15%, and prolong operating time by 25% when there is black out. While energy is being conserved the center rack’s density is also increasing.

We will continue to follow the government energy conservation and carbon reduction policies. With the 2007 power consumption as a benchmark, we plan to further reduce our total power consumption by 8% by 2015. It is estimated that our power consumption will decrease 29,750 kWh by 2015 (excluding power consumption from business growth) in contrast to that of 2007, accounting for 22% of total conserved electricity.

## Chunghwa Telecom Power Management Plan

Year	Cumulated office building energy saving (kWh) (A)	Cumulated power consumption from business growth (kWh) (B)	Power consumption growth vs. 2007 (kWh) (C)	Power saving vs. previous year (kWh) (D)	Net power saving ratio (%) (E)	Cumulated power saving (kWh) (F)	Cumulated power saving ratio (%) (G)
2008	200	8530	4199	4531	3.37%	4531	3.37%
2009	1050	13167	4447	5239	3.89%	9770	7.26%
2010	1900	17832	3806	6156	4.57%	15926	11.83%
2011	2580	21435	4973	3116	2.32%	19042	14.15%
2012	2938	26070	5703	4263	3.17%	23305	17.32%
2013	3258	29553	6561	2945	2.19%	26250	19.51%
2014	3558	35477	7510	5275	3.92%	31525	23.43%
2015	3808	38209	8914	1578	1.17%	33103	24.60%

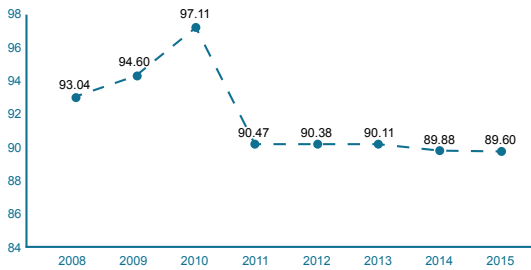
Note: 1. T=134,572 kWh (the baseline of 2007). E=D/T, F=A+B-C, G=F/T  
2. 2013~2015 show the target value.



## Carbon Management Objective

Chunghwa Telecom are ahead of the industry to conduct GHG examination by SGS since 2008. By using the tool based on GHG Protocol, we compile the data and make up emission inventory for the sake of further carbon management plan.

**Total Carbon Emission (Unit: CO<sub>2</sub> 10,000 tons)**



Note: Years 2013~2015 show target values.

### Carbon Management Plan and Objective

Our carbon management objective is to “bring our greenhouse gas emission level in 2012 back to our 2007 benchmark.” Therefore, we continue reducing usage of electric power and fossil fuel, which bring us a lower operating cost and carbon emission.

Our greenhouse gas inventory for 2012 showed that our total emission for the year counted for 808,961.27 t-Co<sub>2</sub> e, and that by using the proper control we can meet our reduction objective (903,800 t-Co<sub>2</sub> e) by a significant amount.

In the future, we will maintain this control so that our greenhouse gas emission can remain unchanged in 2015 even as business grows. Meanwhile, we will take GRI 4.0 indicators as reference, gradually induce and complete the calculation of carbon emission for Scope 3.

### Chunghwa Telecom Carbon Management Plan

Unit: CO<sub>2</sub> 10,000tons

Year	Carbon emission from power consumption	Increased carbon emission vs. 2007	Carbon emission from fossil fuel	Other carbon emission	Total carbon emissions	Carbon emission from business growth	Cumulated carbon saving	Cumulated carbon saving ratio(%)
2008	85.98	2.67	1.74	4.21	94.60	5.43	2.76	2.97%
2009	88.58	2.72	1.61	4.20	97.11	8.20	5.49	5.90%
2010	82.50	2.33	1.49	4.19	90.51	10.91	8.74	9.39%
2011	81.80	3.04	1.45	4.18	91.09	13.12	10.23	11.00%
2012	81.20	3.63	1.38	4.17	90.38	15.24	11.77	12.65%
2013	80.50	4.08	1.37	4.16	90.11	17.26	13.34	14.34%
2014	79.80	4.59	1.35	4.14	89.88	19.04	14.60	15.69%
2015	79.00	5.11	1.34	4.15	89.60	20.81	15.85	17.04%

Note: Years 2013~2015 show target values.

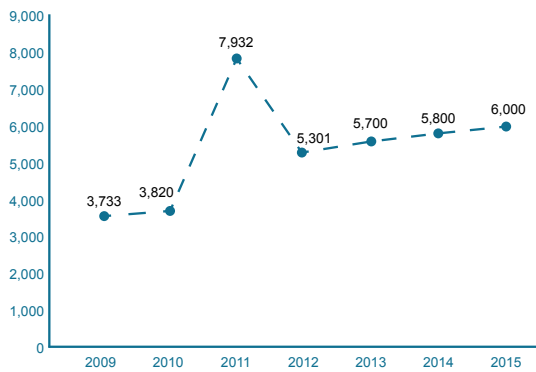




# Water Resource Efficiency Management

Eco-efficiency has been proposed by WBCSD, and is aimed at improving effective resource utilization and lowering pollution. We have introduced energy conserving mobile products / services and programs designed to assist residential and commercial departments, for example, our water resource recycling management has been incorporated into the EARTH system since 2008.

## Chunghwa Telecom Water Resource Recycling Plan and Objective



Note: Years 2013~2015 show target values.

## Water Resource Management Plan and Objective

Our water usage primary includes facilities such as restrooms and air-conditioning. As business expands there will be less room for reduction. Therefore, we turn to rainwater and cooling water recycling as well as water resource management plans to meet the effective use of water.

## Water conservation measures

Since 2007, we have been promoting water conservation measures, such as spray taps for washbasins, restrooms with two-stage flushing devices, office boiled water supply only in office hour, minimum water usage, rainwater is recycled to water plants, repair water supply equipment immediately after damaged and reclaimed new water installations and process used water to the required standard water quality.

## Water use reduction objective

In 2012, we used 2,515,000 tons of water, the number is little higher than before, because our EARTH system includes more water use data and thus the number is more accurate. In the long run, we will continue on water reduction plans to reduce water use by 2% each year, and expect to cut use more than 15% in 2015 compare with 2007, which used 2,431,000 tons.

## Resource recycling 5-year plan

The statistics show a slight growth on recycled water from 3,733 metric tons in 2009 to 5,301 metric tons in 2012. To further enhance the effectiveness, we planned for new rainwater recycling systems to collect clean rainwater from the datacenter roof and ground. New condensed cooling water recycling systems will also be installed in the air-conditioning systems in office buildings to recycle water. We expect to reach 1.5% recycling rate of our total water use before 2015.



## Impressive Energy Conservation Carbon Reduction Results

Energy conservation and carbon reduction is one of the current government priorities. As a responsible member of the global village, government will present a succession of relevant action plans, and policy objectives will also be amended accordingly to bring them into line with international trends. We will also amend and update our policies every year with the firm vision of sustainability through high efficiency, high value, low emission, and low consumption.



### Introducing Renewable Energy

By taking the measures described above, power consumption was reduced by 6.20 million degrees in 2012 against 2011; and 25.20 million degrees against 2007 the baseline year. Compared to 2007, power consumption in 2012 was reduced by 12.6% and carbon by 3,850 tons. The 5-year plan for energy saving and carbon reduction in telecomm datacenters will continue and are expect to reach the goal of a 2% power saving each year.

To lower the impact of the business operation on the environment, a score of aircon (air conditioning) related energy saving measures have been adopted for the telecomm datacenters including inverters, high heat sensibility, and the use of supplementary cooling by external air. At the end of 2012, total installation of energy saving related capacity was: inverter modules 224 HP, aircon equipment with sensible loads 4,390 RT, high efficiency air-con equipment 1,465 sets (of capacity 2~3 kW respectively), wholly external-air based aircon equipment 708 RT and natural-air-based-and-aircon-supplemented equipment 23 sets. A total capacity of 26.6 kW wind and 154.88kWp solar power generation equipment has been installed.

### Waste disposal from the Telecomm datacenters

The scrapped lead-acid battery is a recyclable industrial waste regulated by the EPA as. To reduce pollution the recycling and disposal operations are outsourced by joint contract based public auction. The contractor must be a qualified service provider listed on the website of the Recycling Fund Management Board of the EPA to ensure legitimate management and disposal.

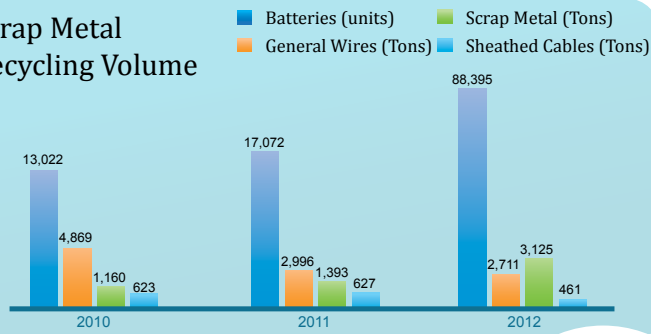
All the lead-acid batteries scrapped by each business unit are auctioned on site and proper documents for their disposal are filed for audit tracking. There were 41,718 scrapped lead-acid batteries, with a total weight of 1,976,552 kg disposed in 2012.

### Waste Recycling

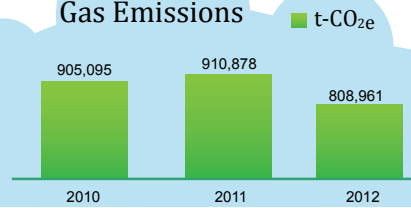
Recycling can reduce waste and raw material consumption. In 2012, the recycling amounts are as follows:

- Computers: 1,993 units
- Cell phones: 8,707 units; Communication accessories: 34,224 units.
- Batteries: 295,489 Kg
- Paper: 403,305 Kg
- Plastics: 8,453 Kg

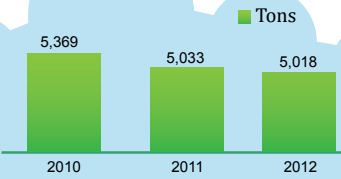
### Scrap Metal Recycling Volume



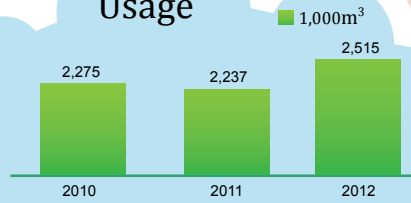
### Greenhouse Gas Emissions

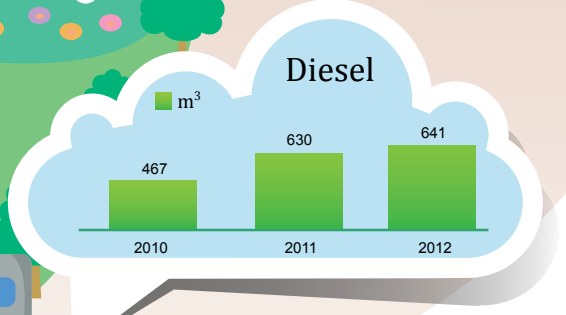
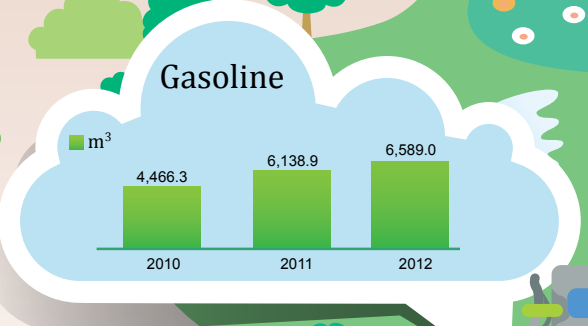
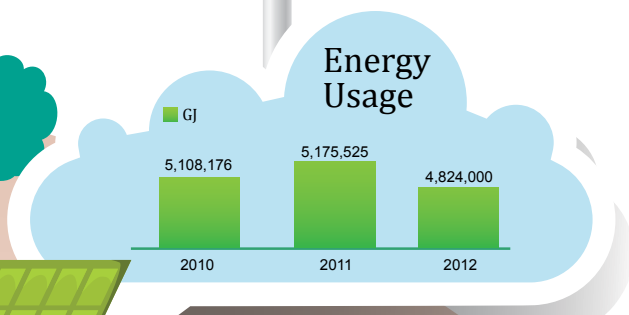
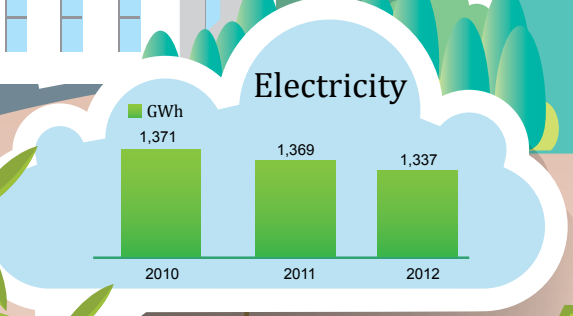
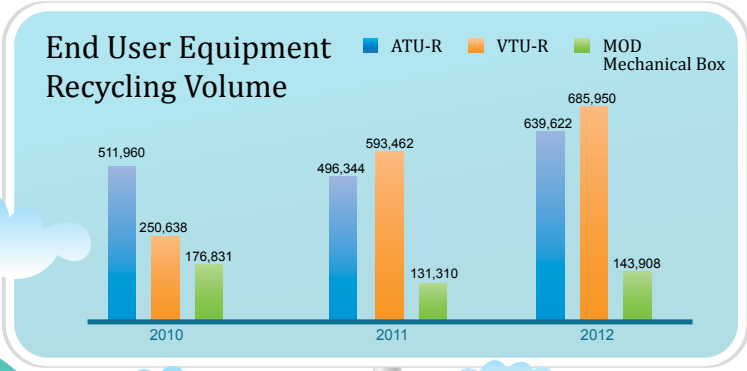


### Waste



### Water Usage



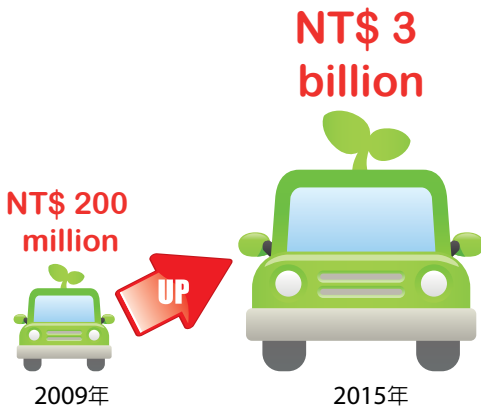




## Creating a Green Business

During our 15th anniversary publication, we announced: “To Build a Beautiful Sustainable Vision 2020,” we have set an objective for comprehensive (exclusive) green purchasing by 2015, and for active participation in international energy conservation research, as well the exploration of energy conservation and carbon reduction issues and implements corporate social responsibility.

### Green Procurement Plan



### Promote Comprehensive Green Purchasing

By 2015, we will exclusively purchase “low-pollution, recyclable, and resource-saving” green products and provide related services and activities. The definition of comprehensive or exclusive green purchasing is products that are compliant with government and other countries’ green marks and provision of self-proclaimed environmentally friendly products, services, and related activities. This includes the purchase of green products, the implementation of green purchasing by combining corporation and supply chains, the development of green products, and the provision of relevant services and activities. As we are vigorously promoting green purchasing, we have established the following annual green purchasing plans and objectives:

### The First Green Accommodation in Taiwan

We have renovated some properties into accommodations around Taiwan, as a service for publics and welfare of employees. And since 2012, in order to spread the low carbon traveling concept, we have followed the Hotel Carbon Measurement Initiative 1.0 made by World Travel & Tourism Council (WTTC) and International Tourism Partnership (ITP), to arrange a project that discloses carbon footprint of accommodations, and advocate of bringing self toiletries. We plan to launch the project “Carbon Footprint for Room” in late 2013, and hope to lower the impact of tour done by our staffs.



### A Green Building Label

A Green building is academically part of the earth sustainable development policy. The “Green Building Promotion Program” promulgated by Executive Yuan defines seven environmental assessment indexes regarding buildings, which includes greenness, water conservation, energy saving, the reduction of CO2 emission, the reduction of waste disposal, indoor environment, water resources, and improvement of sewage and garbage disposal. Therefore, with a fifty million construction budget, we will apply for environmentally-friendly and energy-saving green building labels for new buildings and datacenters. Our north branch has applied for diamond-rating green building label candidate certification.





### Education and Business Activities

Article 19 of the “Environmental Education Act” :“Government agencies, state-run enterprises and institutions... all employees... shall participate in more than four hours of environmental education,” which appropriately echoes Article 15 of “Corporate Social Responsibility Best Practice Principles for TWSE / GTSM Listed Companies”: “Listed Companies should establish a dedicated unit or assign dedicated personnel to environmental management to maintain the system and should hold environment education courses for their managerial officers and other employees on a regular basis.” To comply with these obligations in the future, we will begin implementing the following:

1. Four hour environmental classes for all employees every year.
2. Fusion between environmental education classes and major corporate activities. 34 environmental courses were held in 2012 and 2,736 persons enrolled.

### Corporate Volunteer Exchange

Our “CSR Committee” includes an “Environmental Sustainability Group” and “Corporate Volunteerism Group,” enabling our colleagues from business locations across Taiwan to engage in environmental education and considerable experience has already been accumulated.

The Chunghwa Telecom corporate volunteers also participated in the Taiwan Energy Conservation Patrol initiated by Epson Technology and other corporations. This focuses on increasing energy efficiency within corporate operations and production processes to achieve the objectives of carbon reduction and to mitigate global warming. It is hoped that on-site inspections and the provision of energy conservation advice, given to the units inspected, will help us achieve maximum benefit for both environmental protection and corporate profit.

### Adopt Electric Vehicle

On October of 2012, we signed a 2-year lease for 20 business use Luxgen Electric Vehicles. For every kilowatt-hour the electric vehicle can travel 6 kilometers and releases 0.536 kg of CO<sub>2</sub>e; therefore, 0.089 kg of CO<sub>2</sub>e per kilowatt-hour is released every kilometer. Compared to similar vehicles, the average gasoline use is 8 km per liter and releases 2.361 kg of CO<sub>2</sub>e per liter; therefore, 0.295 kg of CO<sub>2</sub>e per kilowatt-hour is released every kilometer.

After switching over to electric vehicles, we are saving 0.206 kg of CO<sub>2</sub>e per kilometer. Estimating that we travel 2,000 km per month, every vehicle is reducing CO<sub>2</sub>e emissions by 4,944 kg and a total of 98,880 kg less CO<sub>2</sub>e emissions for 20 vehicles.

It’s a small step but a big change to the earth if every company adopts electric vehicles. Therefore, in order to take responsibility for our earth we plan to increase the use of electric vehicles in our company



## Safeguard our Beautiful Homeland EN26

The Global climate has changed considerably in recent years. The number of storms is increasing, the power of typhoons has intensified, and even the summer temperature keeps hitting record highs. To relieve the pressure on the gradually depleted natural resources, countries all over the world are committed to energy conservation and carbon reduction activities, we need to do whatever we can to contribute to the safeguard of our beautiful homeland.

### Environmental Information Disclosure

- Implement annual greenhouse gas inventory. Obtain ISO14064 verification and certification.
- Respond to the annual Carbon Disclosure Project (CDP) questionnaire.
- Respond to environmentally related issues in the annual Dow Jones Sustainability Indexes (DJSI) and other environmental related questionnaire.
- Publish the CSR report.

### Improve Energy Use Efficiency

- Integrate datacenters: Merge and exploit datacenter space.
- Incorporate Intelligent Energy Saving System into new datacenter.
- Save cooling energy: Use high-efficient and air- conditioners, and cold/hot channel air-conditioning systems in the datacenters.
- Use green materials for newly constructed datacenters or buildings.
- Install solar water heaters in Telecommunications clubs.
- Recycling: Set up rainwater, underground, and condensed cooling water recycling systems.
- Environmentally-friendly LED bulbs: Internal office building trial plan.

### Autonomous Environmental Protection

- Green purchasing: Import green purchasing data into EPIS, also been imported for the sustainable development system.
- Replace old vehicles with environmentally friendly, electric vehicles for trial.
- Clean homes, energy saving office, health management system, car-free days, and paperless ODAS.
- Energy conservation team: Provide helps to SMB or disadvantaged.
- Industrial waste recycling: Set recycling goals.
- Environmental award summary

### Green Energy

- Photovoltaic system: 34.1kWp capacity System constructed in 2012.
- Wind power: 26.6kWp capacity built in 2012.
- Fuel cell: Pilot program with the Industrial Technology Research Institute, 15kWp capacity system built in 2012.





### Intelligent Energy Network (iEN)

iEN can integrate monitoring of power consumption for each equipment. Using cloud platform to provide customers with performance computing, operating condition and instant notification to complete predict and prevent mechanism. In addition, iEN can provide energy saving diagnoses and integrate solution by its sensors, remote controller and detailed record data.

With iEN, we saved nearly 12% of electric power consumption (168 million kWh), which equaled to NT\$ 500 million, and reduced about 110 thousand ton CO2 emission in 2012, therefore, we received the “2012 Company with Excellent Energy Technology Award” from Ministry of Economic Affairs.

We also provide iEN rental service, help company to reduce expense in energy saving, which already widely used by hospitals, schools, governments, etc., and got many awards.

### EARTH Management System

EARTH management system let company do overall resources management, save operating cost and then to raise company's goodwill, by providing complete information, analysis, and expert diagnoses:

- Power management: provide power consumption analysis, energy efficiency analysis, unusual power consumption notification, etc.
- Water management: Provide electronic billing and collective payment from the water company and collating usage statistics service, etc.
- Fuel management: Provide vehicle data management, gather fuel statistics and analysis.
- Paper management: Provide usage data comparison and analysis.
- Afforestation: Archive the information about types of trees.
- Recycling management: Archive the type, amount, and unit.
- Green Procurement: Except procurement amount, date and category, also archive procurement item with green mark, energy saving mark and water saving mark, etc.
- Carbon inventory: Provide carbon verification forms to help carbon inventory, promote carbon reduction measures, reduce operational risks, and enhance the corporate benchmark.
- Performance evaluation: Performance is evaluated in a systematic and quantified way to encourage all units to maximize contribution.



### Value-added Products and Services

- Electronic billing: Features environmental protection, promote with marketing section.
- iEN and promote eight energy-saving categories.
- Mobile device recycling: Recycle bins are available at service centers in line with the promotion of waste recycling.
- Assist suppliers to apply for product eco-labels.