

# Mitigating Climate Change

What Taiwan Is Doing



## Message from Dr. Stephen Shu-hung Shen Minister of Environmental Protection Administration, Executive Yuan, R.O.C. (TAIWAN)



Global warming and climate change have become a two-pronged challenge as we march into the 21st century. Like many other island nations, Taiwan will be adversely affected by the results of climate change. Thus, we hope to work with the international community to reduce emissions of greenhouse gases as well as to adapt to the effects of climate change. Taiwan can create real examples of green lifestyles and a green industry to lead international trends and transform the crises of greenhouse gas emissions and environmental degradation. This will raise Taiwan's international competitiveness and image, and create a healthy and sustainable new Taiwan.

Environmental protection and sustainable development are a measure of the welfare of a nation's people; sustainability should therefore be given prime consideration in the formulation of national policy. Our future administrative focus will be "institutional sustainability, energy conservation and carbon reduction, resource recycling, industrial sustainability, and grassroots

education." This will provide each government agency with a foundation for environmental sustainability as it participates in the process of national development.

For the sake of national security and adapting to climate change, the EPA is pushing for a timely establishment of the Greenhouse Gas Reduction Act. This act will provide the legal basis for implementing plans to achieve reduction measures in step with the global trend. The vision—extending to 2050—was described in President Ma Ying-jeou's 2008 election campaign. To keep up with the actions of the international community, Taiwan will follow common but differentiate responsibility as we fulfill our responsibility as a member of the global village. To achieve these objectives, the EPA is planning and promulgating energy conservation and carbon reduction policies and regulations. We also encourage the participation of all citizens to join a national campaign and work towards a real low-carbon society.

I strongly believe that the earth we are living on now should not so much be regarded as the heritage from our ancestors, but rather as something we are borrowing from our children and grandchildren. When we return it to them, we have the responsibility to make them aware that they should esteem this planet and re-create a more pristine environment for the generations to come.

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Minister



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## 1. Preface

The Intergovernmental Panel on Climate Change (IPCC) concluded that the warming of the climate system is unequivocal, and most of the observed increase in global average temperatures is very likely due to the unprecedented increases in atmospheric concentrations of global greenhouse gases (GHG) caused by human activities. Particularly in Asia, the current global economic development mover and manufacturing hub, the potential impact from climate change could cause potential turmoil in the global economy. The rise in the sea level would threaten the security of coastal cities in Asia, and the frequent occurrence of extreme climate conditions and the melting of alpine ice fields would also potentially impact Asia, which contains one third of the world's population.

Subsequent to the Bali Conference at the end of 2007, several meetings of relevance to climate change negotiations were held before mid-2008, including the climate change talks in Bangkok in April, and the G8 Hokkaido meeting in July. Through these negotiations, we can anticipate more viewpoints and efforts expressed by Asian countries for the post-2012 climate

framework. In Taiwan, the newly-elected President Ma Ying-jeou has laid out an ambitious plan to cut greenhouse gas emissions, and established targets to keep carbon dioxide emissions to the 2008 level by 2020, reducing to the 2000 level by 2025, and then to half the 2000 level by 2050. Furthermore, Taiwan is aggressively responding to the outcome of the Bali Action Plan with respect to mitigation through implementing measurable, reportable and verifiable (MRV) actions. As this vision will be jointly promoted by the government and the private sector, this booklet aims to share the experiences on the MRV aspect of emissions reduction efforts in Taiwan.

In coping with the development of UNFCCC, Taiwan has published the First National Communication in 2002 with climate change response policy and measures, which are currently under implementation. The Second National Communication will be published in 2010, detailing the achievements from the implemented policy and measures that respond to global climate change. In this booklet, we wish to address Taiwan's actions in response to climate change and how we wish to work with the international community to address one of the most pressing environmental problems in the 21st century.





## 2. Taiwan at a Glance

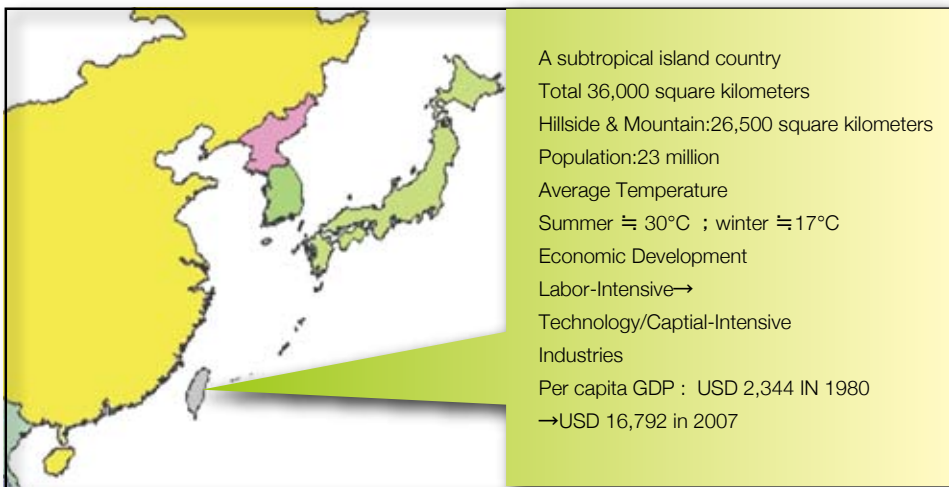
### Natural Environment

Taiwan, situated off the southeast coast of China and separated from the mainland by the Taiwan Strait, is located in the Western Pacific between Japan and the Philippines. With a total area of about 36,188 square kilometers, the main island is 394 kilometers long and 144 kilometers across at its widest point. Taiwan's territory also includes Penghu (the Pescadores), Kinmen (Quemoy), Matsu, and numerous smaller islands.

Taiwan's most prominent geographic feature is its 270-kilometer central mountain range, which has more than 200 peaks that are over 3,000 meters high. Foothills from the central mountain range lead to flatlands and coastal plains in the west and south. The eastern shoreline is relatively steep, and volcanic mountains over 1,000 meters high dominate the northern part of the island. Over 60 percent of the island is classified as mountainous.

Taiwan's local climate is greatly influenced by the East Asian monsoon. Rainfall is mostly from thunderstorms and tropical cyclones in the summer

and from shallow fronts or mountain slope lifting effects in the winter. In the northeastern part, the season with the most intense rainfall is usually in the autumn. Tropical cyclones (typhoons) are significant not only because they cause disasters, but they are also beneficial carriers of water resources. More than half of the total annual rainfall, particularly in southern Taiwan, comes from typhoons. The temperature variations in Taiwan are mild, with the average temperature around 17-20°C in the winter and 30°C during the summer. The warming trend over the entire island in the past 100 years is about 1.0-1.4°C, higher than the global average. Due to its subtropical climate, Taiwan supports a diverse flora of over 4,000 vascular plants and six forest types. This range of flora in turn supports a rich fauna. Sixty-one species of mammals, more than 400 species of birds (about 40% indigenous), 92 species of reptiles, 30 species of amphibians, 140 species of freshwater fish, and an estimated 50,000 insect species, including more than 400 species of butterfly, are known to exist here.



Taiwan at a Glance

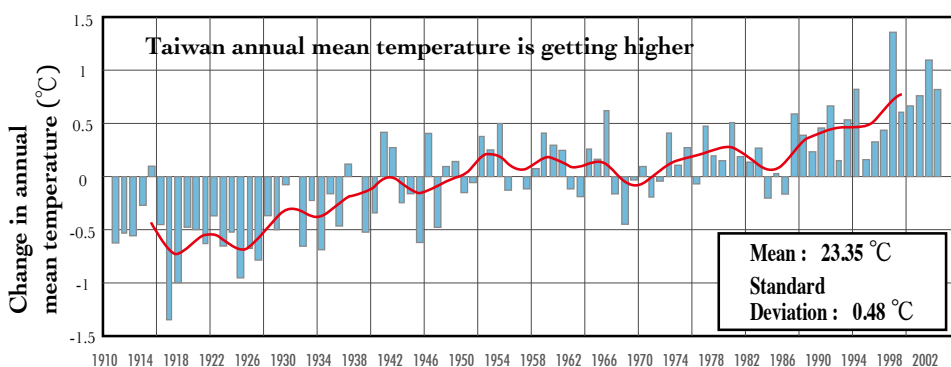
## Economic Development

From the early 1960s to 1980s, Taiwan gradually changed from an agriculture-based economy to an industry-based economy. During the past twenty years, Taiwan's economic transition from labor-intensive to technology and capital-intensive industries has created further changes in production ratios for our economic sectors.

The current production structure of Taiwan is very similar to those of many industrialized countries. Over the past 20 years, Taiwan has become one the world's top manufacturers and exporter of high-tech products, such as computers and other IC products. As a result, Taiwan ranks as the world's sixteenth largest trading nation, with a foreign exchange reserve of US\$262.9 billion, the third highest in the world.

## Adverse Impacts from Climate change

Having the natural environment of a subtropical island, Taiwan is very vulnerable to the impacts of climate change. Rate of temperature rise in Taiwan reached as high as 1.43°C (1998) in the last century, almost twice the global average (about 0.6°C) as Figure 1 shows. Efforts are now underway to comprehensively assess the potential effects of climate change on Taiwan. In particular, the impacts could include a rise in the sea level and a shortage of water resources, as well as adverse effects on primary industries, public health, and ecosystems. A rise in the sea level would result in flooding of coastal lands, coastal erosion, and retreat of coastal front. If the sea level rises one meter, an area of about 272 km<sup>2</sup> would be flooded in Taiwan, and some coastal communities would face problems of relocation and subsequent social adaptation.

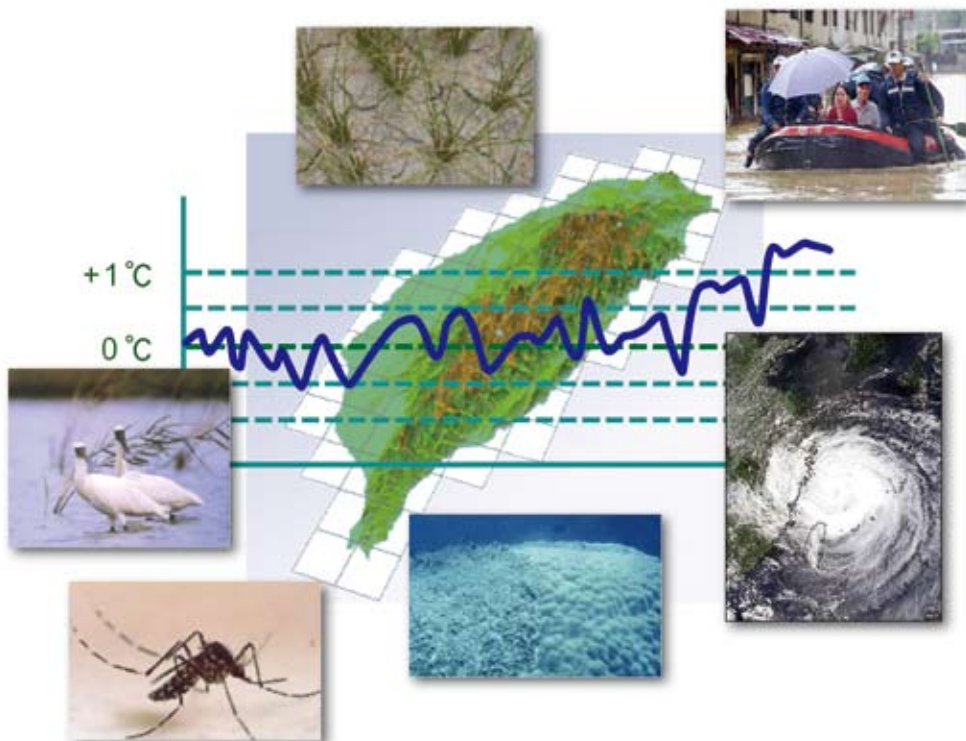


Global Warming is intensifying



The impacts on water resources could include an increase in the frequency and extent of droughts, shortage of water resources as well as various impacts on the livelihood of people and on industrial development. A decrease in rainfall could also affect agricultural production and distribution of plant species. In addition, the rise in temperature could also decrease livestock production as well as fish and shellfish populations. Furthermore, climate change would also promote the growth of pests and the propagation of vector-borne diseases such as dengue fever, causing significant impact on public health.

Climate change could also increase the frequency and intensity of typhoons and floods. Taiwan's insurance losses due to typhoons and floods have accumulated 1,324 million NTD (New Taiwan Dollars), about 41.3 million USD from 2003 to 2006.



Adverse Impacts on Taiwan

### 3. Energy Supply, Demand, and Consumption

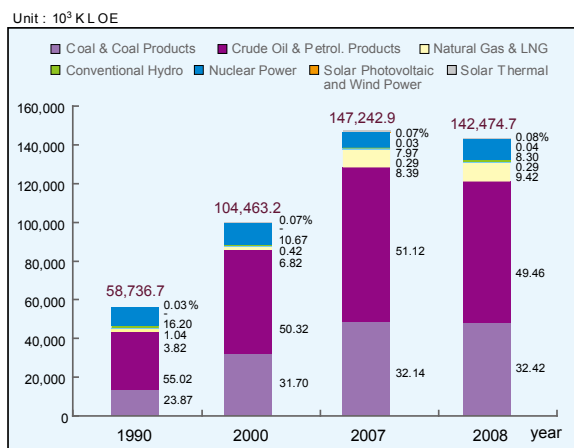
#### The Energy Supply Situation in Taiwan

In 2008, ROC's dependence on imported energy was 99.23%; the value of energy imports was US\$56.2 billion, which was 44.69% more than the previous year; the per capita energy imports cost burden in 2008 was NT\$85,057, which was an increase of 36.08% compared with NT\$62,504 in 2007.

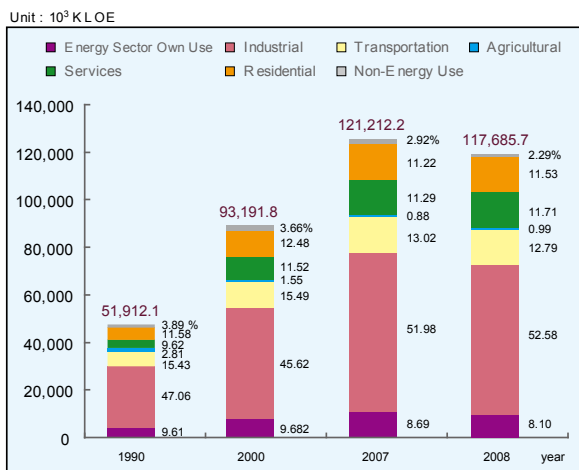
The ROC went from a supply of 51.64 million kiloliters of oil equivalent in 1988 to 142.47 million kiloliters in 2008, an average annual growth of 5.21%. Of this total in 2008, indigenous energy contributed 0.66%, and imported energy occupied 99.34%. Classified by energy form, coal contributed 32.42% in 2008, oil constituted 49.46%, natural gas shared 9.42%, hydro power provided 0.29%, nuclear power provided 8.30%, geothermal, solar and wind power provided 0.04%, and solar thermal 0.08%.

#### The Energy Demand Situation in Taiwan

The ROC's total energy consumption has grown greatly over the past two decades, going from 46.42 million kiloliters of oil equivalent in 1988 to 117.69 million kiloliters in 2008, which is an average annual growth of 4.76%. Of that in 2008, 97.71% was for energy use, and non-energy uses consumed 2.29%. When classified by consumer, the consumption of energy for each sector in 2008 was as follows: energy and industrial sectors consumed 60.68%; transportation sector, 12.79%; agriculture, forestry and fishery sectors, 0.99%; residential sector, 11.53%; services sector, 11.71%. Classified by form of energy, coal and coal products contributed 7.69% of consumption in 2008; petroleum products provided 38.68%; natural gas shared 2.36%; electricity constituted 51.03%; solar thermal 0.09% and heat 0.14%.



Energy Supply (by Energy Form)



Total Domestic Consumption (by Sector)





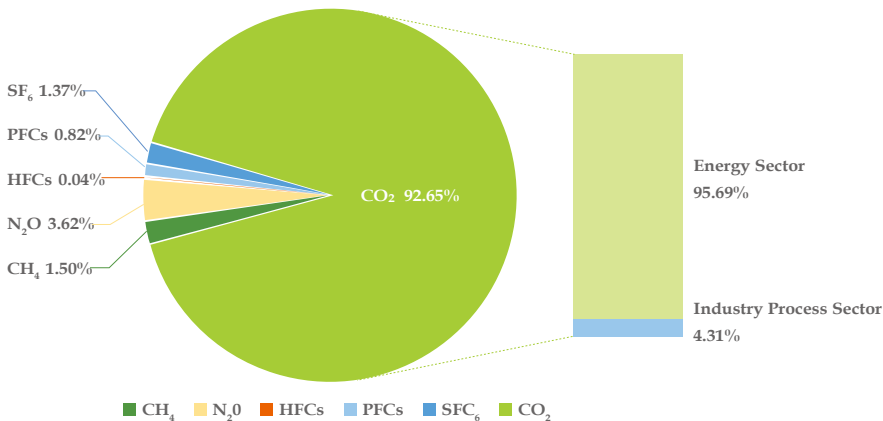
## 4. Taiwan's GHG Emissions

### GHG Inventories

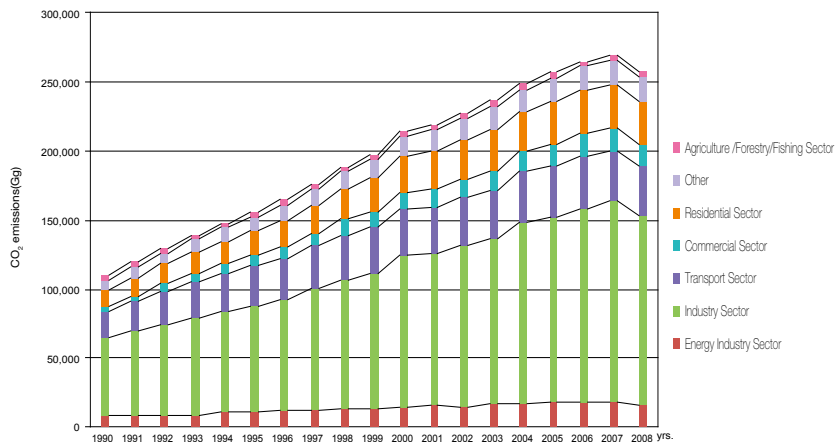
The Taiwan Environmental Protection Administration (TEPA) has completed the most recent update of Taiwan's GHG emissions inventories, which include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and hexafluoride sulfur (SF<sub>6</sub>). GHG emissions in 2008 was 294.6 MTCO<sub>2</sub> eq (LUCF absorption

excluded), CO<sub>2</sub> emissions increased by 120% from 1990 to 2008, and 91.2% was from energy related CO<sub>2</sub> emissions. Taiwan's Greenhouse Gas Emissions Structure in 2008 is as follows:

If total CO<sub>2</sub> emissions from fossil fuels combustion are allocated to the economic sector, then the energy industry sector would account for only 6.3% of total CO<sub>2</sub> emissions, the industrial sector



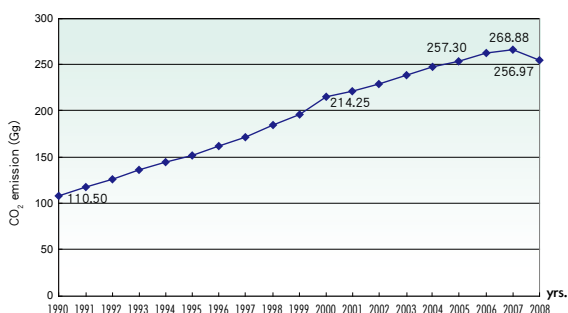
Taiwan's GHG emissions inventories



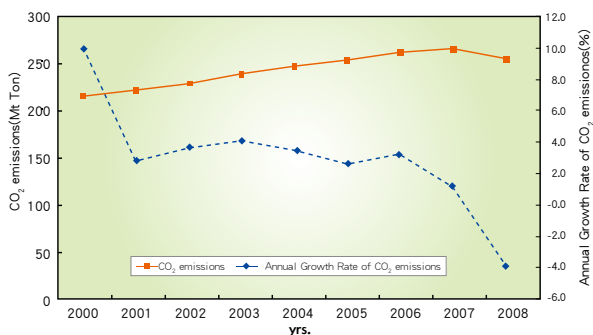
CO<sub>2</sub> emissions from fossil fuels combustion in Taiwan Emissions from generation of electricity are allocated to economic sectors

53.5%, the transportation sector 13.7%, and the commercial/residential sector 18.4% in 2008. The 1990-2008 period shows higher growth in commerce and residential sectors, followed by industry, energy conversion and transportation sectors. The growth of emissions in transportation and commercial/residential sectors is similar to that of more developed and industrialized economies.

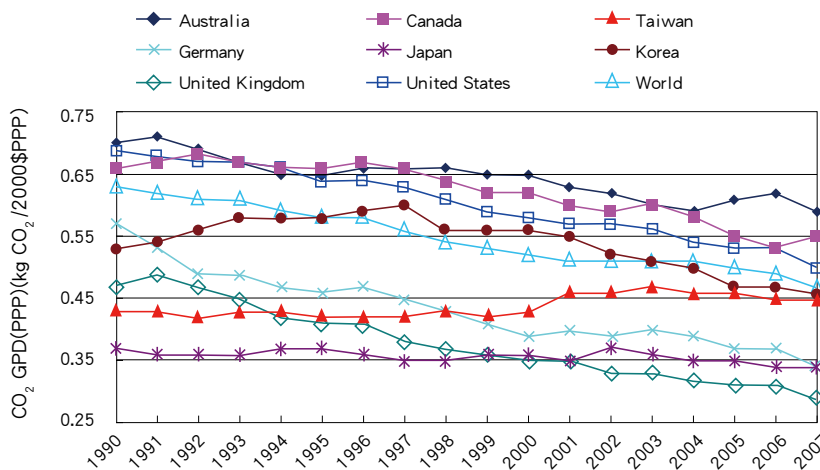
The CO<sub>2</sub> emissions from fossil fuels combustion in 2008 show a decrease by 4.4% first time. Three main reasons contribute to a negative growth between 2007 and 2008. The first may be the economic recession caused by the global financial crisis. Next is that energy consumption went down after the prices of oil and electricity were rationalized. The third is that the government is vigorously conducting the relative policies and measures on energy saving and carbon reduction.



CO<sub>2</sub> emissions from fossil fuels combustion in Taiwan.



Since 2000, total CO<sub>2</sub> emissions increase from fossil fuels combustion turned slowdown and the annual growth rate was going down.



Energy-related CO<sub>2</sub> emission intensity



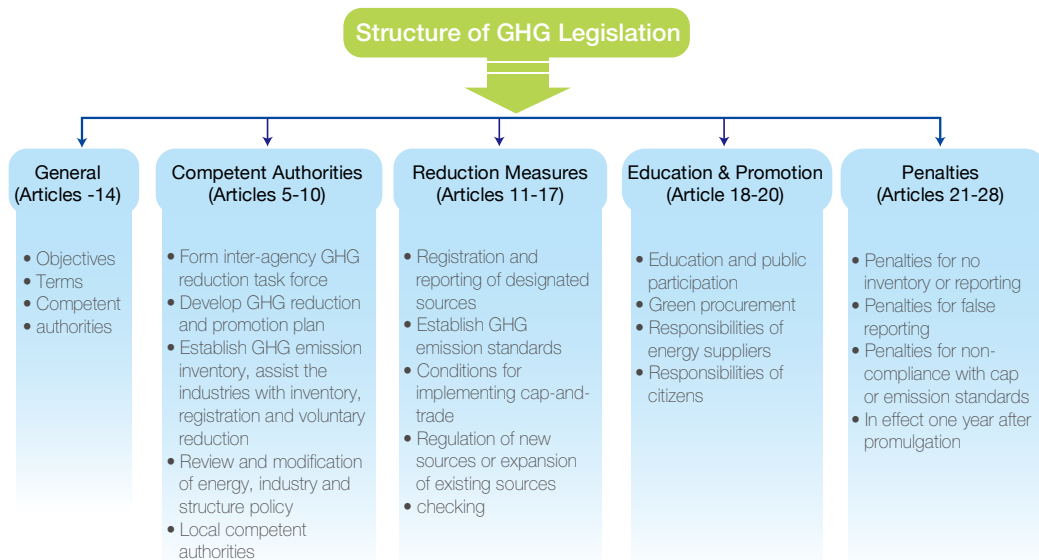
## 5. Actions to Reduce GHG Emissions

Actions to reduce greenhouse gas emissions are significantly less costly than the potentially catastrophic consequences of inaction. Furthermore, the transition to a low-carbon economy will provide enormous opportunities for technological innovation, economic growth, and job creation, while improving energy security. In order to promote sustainable development and to maintain abundant natural ecosystems in Taiwan, the government has already started to address climate change and to fulfill its duty as a member of the global village. The following policies and measures have been implemented to reduce GHG emissions:

### Taiwan's GHG Reduction Act

On 4 February 2008, the Executive Yuan (the executive branch of the ROC Government) passed

the draft GHG Reduction Act ("Bill"), which was then submitted to the Legislative Yuan for deliberation. Jointly developed by the government and the private sector, the Bill establishes a framework to regulate GHG emissions based on emission efficiencies and new-source emissions, as well as penalties for non-compliance. In addition to serving as the legal basis for developing and implementing domestic GHG emission reduction measures, the Bill is also expected to demonstrate to the international community Taiwan's willingness to participate in global actions to reduce GHG emissions and to fulfill its responsibilities as a member of the international community. If the legislative process proceeds on schedule, Taiwan will likely become the first country with GHG reduction legislation among developing countries. The key elements of the Bill (6 chapters with 28 articles) are outlined below:



Framework of The GHG Reduction Act

Before the Bill takes effect, voluntary agreements with industries and incentives for early action are being promoted. When the Bill becomes effective, emission permit system, inventory

verification and reporting, as well as emission performance standards would be enforced. Finally, when the national emissions target is established, a cap-and-trade scheme would be enforced.

### GHG Emission Permits:

Designated emission sources must conduct annual emission inventory and verification, then register on the EPA platform.

Existing, new or modified emission sources above certain level must apply for an emission permit from the EPA, and operate, monitor, record and report emissions in accordance with the permit conditions.

Related management regulations will be set by the EPA.

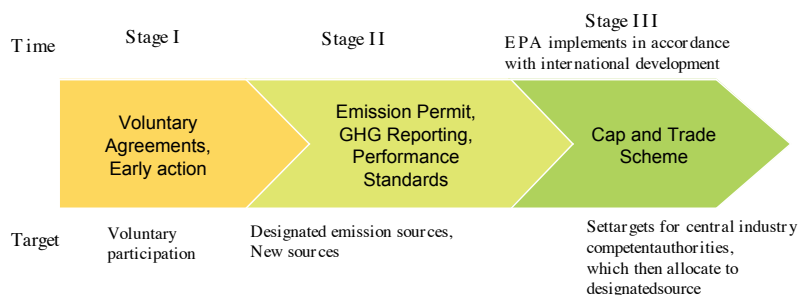
### GHG emission performance standards:

Designated emission sources to comply with GHG emission standards (Benchmark, e.g. GHG emission per ton of steel production) based on established emission intensity for new/existing emission sources, installation under various sectors, products, etc.

The standards would be set by the EPA in consultation with the central industry competent authorities, such as the Bureau of Energy and the Industrial Development Bureau.

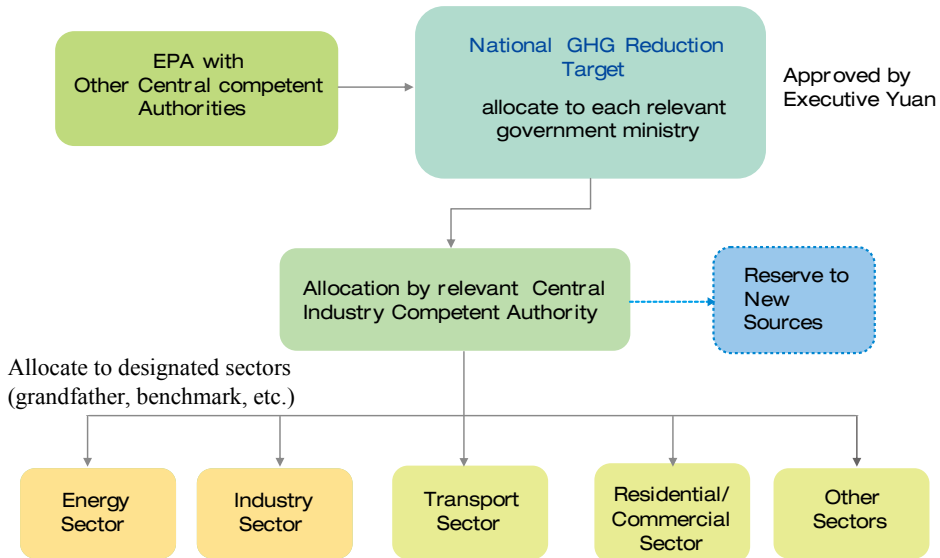
### Cap and Trade scheme:

In the final stage of the GHG management, Taiwan will set a national emissions target and implement a domestic cap-and-trade system, as a part of our economic and financial policy instruments to reduce GHG emissions. The timing and stringency of our target setting would depend on the progress of international climate negotiations, as stipulated in the Bill.



Step-Wise Reduction Strategy





Cap and Trade Scheme



## Taiwan's Sustainable Energy Policy

The Ministry of Economic Affairs (MOEA) develops the Sustainable Energy Policy which targets energy, the economy and the environment, leading to 3 wins, together with 2 highs (high efficiency and high added value), and 2 lows (low emission and low dependency) on clean energy sources and energy saving.

### Policy Objective: A Three-win Solution for Energy, Environment and Economy

Taiwan is lacking in natural resources and constrained by limited environment-carrying capacity. In order to create a three-win solution in energy, environment, and economy, sustainable energy policies should support the efficient use of limited energy resources, the development of clean energy, and the security of energy supply. Our targets are:

(1). Improving energy efficiency

The goal is to improve energy efficiency by more than 2% per annum, so that when compared with the level in 2005, energy intensity will decrease 20% by 2015. Supplemented by further technological breakthroughs and proper administrative measures, energy intensity will decrease 50% by 2025.

(2). Developing clean energy:

Increase the share of low carbon energy in electricity generation systems from the current 40% to 55% in 2025.

(3). Securing stable energy supply:

Build a stable energy supply system to meet economic development goals, such as 6% annual economic growth rate from 2008 to 2012, and US\$30,000 per capita income by 2015.

### Policy Principles

The basic principles of a sustainable energy policy is to establish a high efficiency, high value-added, low emission, and low dependency energy consumption and supply system.

(1). High efficiency: improve energy consumption and transformation efficiency.

(2). High added value: increase the added value of energy consumption.

(3). Low emission: adopt energy supply methods and consumption practices that ensure low carbon emission and low pollution.

(4). Low dependence: decrease the dependence on fossil fuels and imported energy.

### Provide a comprehensive regulatory framework

(1). Facilitate the legislation of the "Greenhouse Gas Emissions Reduction Act" to substantially build emission reduction capacity and enforce reduction measures.

(2). Facilitate the legislation of the "Renewable Energy Development Act" to develop clean energy.

(3). Draft and legislate the "Regulations on Energy Tax" to reflect the external cost of energy consumption.

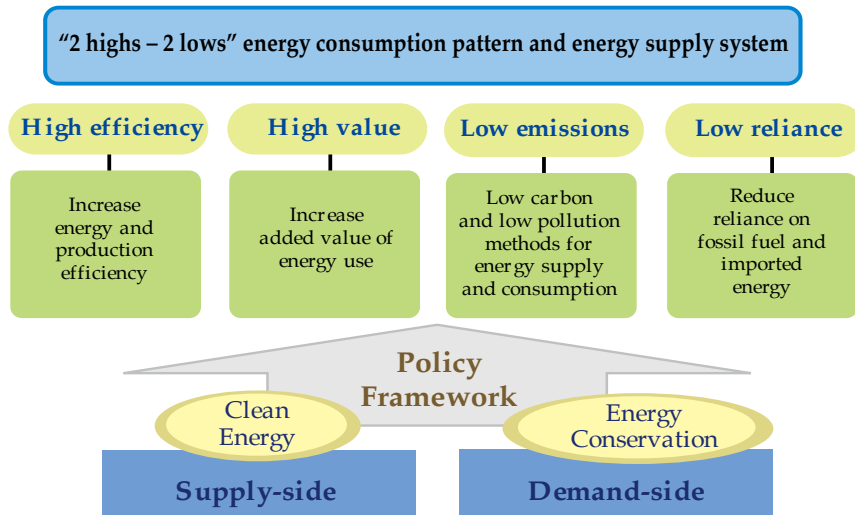
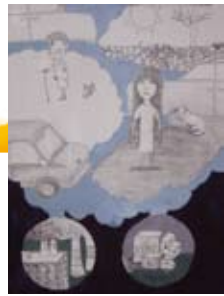
(4). Amend the "Energy Management Act" to effectively promote energy saving measures.

### Action Plans

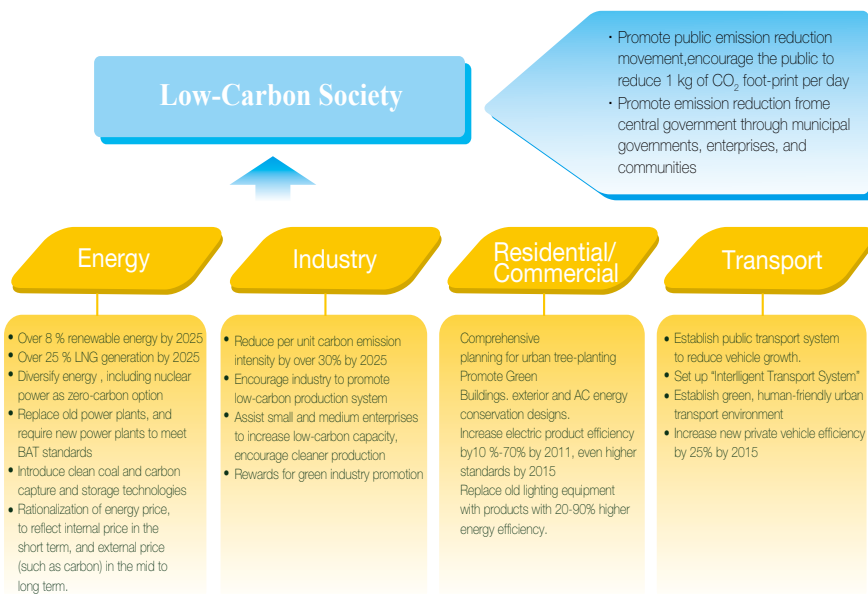
The strategy framework of sustainable energy policy is divided into two parts: cleaner energy supply and rationalized energy demand.

(1). Cleaner Energy Supply: restructure energy mix and improve energy efficiency.

(2). Rationalized Energy Demand: promote energy conservation schemes in various sectors.



Framework of Taiwan's Sustainable Energy Policy



Energy Conservation /Carbon Reduction Action Plans

## The Renewable Energy Act

- The bill passed legislation in the Legislation Yuan on June 12, 2009, laying Taiwan's foundation for long-term renewable energy development. To the energy sources, it will enhance self-sufficiency as well as diversification. And, to the environmental issues, it will certainly have effect on greenhouse gas emission reduction, and also contribute to the emerging renewable energy industry.
- Main prescription includes: Scheming the increase capacity of 6.5 million kW renewable energy up to 10 million kW in total within the the next 20 years upscaling the usage with large volume; Through the renewable energy purchase mechanism, the incentives on demonstration programs and deregulation to enhance encouragement for the settings of renewable energy facility by the public; furthermore, the promotion goal of the thermal applications will be setting to upscale the proportion of Taiwan's self-produced energy to make full application on the potential of renewable energy in Taiwan.
- For the purchase mechanism of renewable energy electricity, provide incentive on reasonable profit to the renewable energy facility power providers together with the parallet connection from the electrical power grid service providers and the wholesale purchase of electricity to the renewable facilities. The price of the wholesale purchase is determined according to the rates and formula approved and announced by the committee of relevant ministries, scholars,

experts and organizations organized by the Ministry of Economic Affairs that will be revised yearly. Public hearings will be called if necessary. It is an open and transparent process.

- For the incentives on demonstration programs, in additional to the above purchase mechanism, incentive will be provided to those renewable energy power generation facilities with potentials on development and technologies at the initial stage, within a certain period. For those of thermal applications, in additional to the incentive and subsidy from the Petroleum Fund, the agricultural sector will provide incentive, through the Fund for Agricultural. Development, to the producers of biofuels on applying fallow lands in planting energy crops.

## Partial Amendment in Energy Management Act

- The amendment of several articles passed the legislature on June 9, 2009
- Explicit regulations on the facilities of lighting, electricity consumption, air conditioning and refrigeration of department stores, office buildings and other public places. For example, a maximum fine of NT\$100,000, with double fine on subsequent violation, will be issued on overcooling or cool leakages in violation of the energy conservation article and if no improvement is made after warning.
- Regulate the energy consumption standards for vehicles and performance standards for electrical appliances, equipment industry, to achieve the purpose of energy conservation and carbon reduction.





- Government agencies should formulate the “Framework for Energy Development” as the overall fundamental for the development of energy policy.

### Sustainable Green Energy Industry Proposal

- The cabinet approved the program developed by the Ministry of Economic Affairs on April 23, 2009 selecting solar photovoltaic, LED lighting, wind power, biofuels, hydrogen energy and fuel cells, Energy Information and Communication, and electric vehicles as focus industry. The government will invest NT\$25.0 billion to implement renewable energy and energy conservation as facility and subsidy, and NT\$20 billion on research and development in the next five years. It is expected to stimulate NT\$200 billion private investments based on the estimation on the scale of production. Through the growth of demands on Global Green Energy, the selected industries, and supporting with the industry characteristics and technology potential, it is expected to further promote the intense development of related domestic industries.
- The Premier also instructed that the “National Energy Science and Technology Initiative” of the National Science Council be carried out in step with the implementation of MOEA’s Green Energy Industry Developing on key technology researches and developments and the nurture of the manpower as the foundation of strengthening the green energy industry development; the Ministry of Economic Affairs should establish the green industry services team, in situ realize the actual needs of the industry and assist the industry to solve difficulties on technology breakthrough, investments and operations, so that industries can be profoundly affected by the attentiveness of the

government; a certain proportion, as of 10%, of the 4-year NT\$500 billion “The Recovery Initiative to Expand Public Construction Investment” will be invested in green energy or green engineering; and requests all ministries to realize the concept of green energy, energy conservation and carbon reduction during the project implementation, which shows the emphasis and the determination on the implementation with environmentally friendly renewable energy from the government.

### "The measure of tariff discount incentive on energy conservation"

- To promote energy conservation and carbon reduction policy, the Ministry of Economic Affairs and the Taiwan Power Company have been carrying out the "tariff discount incentive measure on energy conservation" since July 1, 2008. The applied targets are residential customers, elementary schools and junior high schools. Those whose average daily consumption falls below the same period of the previous year are entitled to tariff discounts. The discount incentives adopt a three-level system; consumption lower than 5%, consumption lower than 5% to 10%, and above 10% comparing to the same period of the previous year will be awarded tariff discount of 5%, 10% and 20% respectively.
- Six months after the implementation of the "tariff discount incentive measure on energy conservation," 40% of the total targets are eligible for the incentives and the saving accumulated to 2.59 billion kWh, with discount amount NT\$3.84 billion. Upon implementation on energy conservation and carbon reduction through the

users of residential sector and elementary and junior high schools in person shows significant achievement. Adopting CO<sub>2</sub> emissions of 0.637 kilograms per kwh of electricity, the total electricity saving is counted as 1.65 million tonnes of CO<sub>2</sub> emissions reduction during the six-month period, which is equivalent to 1,722 Da-an Forest Park's volume in absorbing CO<sub>2</sub> annually, based on 958 tonnes of CO<sub>2</sub> is absorbed per Da-an Forest Park, the major Taipei City Forest Park, per year.

### "Extensive Lighting Revolution,"

■ The Energy Bureau indicated that the consumption of electricity from lighting was around 26 billion kWh in Taiwan, accounting for 11.3% of the total 2,298 billion kWh of electricity consumption. To promote energy conservation in lighting, the Energy Bureau has initiated Taiwan's "lighting revolution" with preludes of "promoting 585 incandescent replacement program", "the retirement of high power-consuming incandescent lights from government agencies, schools, residences, markets, hotels, department stores and others", "demonstration program on promoting energy-efficient new technology LED lightings such as full traffic LED lights, LED street lighting etc." , "promoting and demonstration in phases to

high-efficiency lighting and high-quality design" and "the concept of energy conservation monitoring and control" since 2008 with good achievements over the past year.

■ With active public participation, the sales volume of the energy-saving light bulbs has surpassed the incandescent bulbs for the first time in 2008, according to the latest market survey. It shows that the incandescent replacement project has created tangible results. According to the incandescent light bulbs use survey in 2008 by ITRI, the domestic market size in 2007 was approximate 22.18 million which had dropped to 18.97 million in 2008, with a rate of 14.5% drop. The overall benefit of saving about 116 million kWh in electricity, reducing nearly 74,000 tonnes of carbon dioxide emissions. Observing the market size of energy-saving light bulbs in Taiwan from 2006 to 2008, the number of energy-saving light bulbs in 2006 was about 15.00 million units, and increase to 21.13 million units in 2008, with a growth of 40.9%. The fact that the number of the energy-saving light bulbs in the market has exceeded incandescent bulbs for the first time in 2008 indicates the "585 incandescent replacement program" has achieved initial success, and indirectly brought up the annual production of domestic energy-saving light bulbs together with industrial benefits.



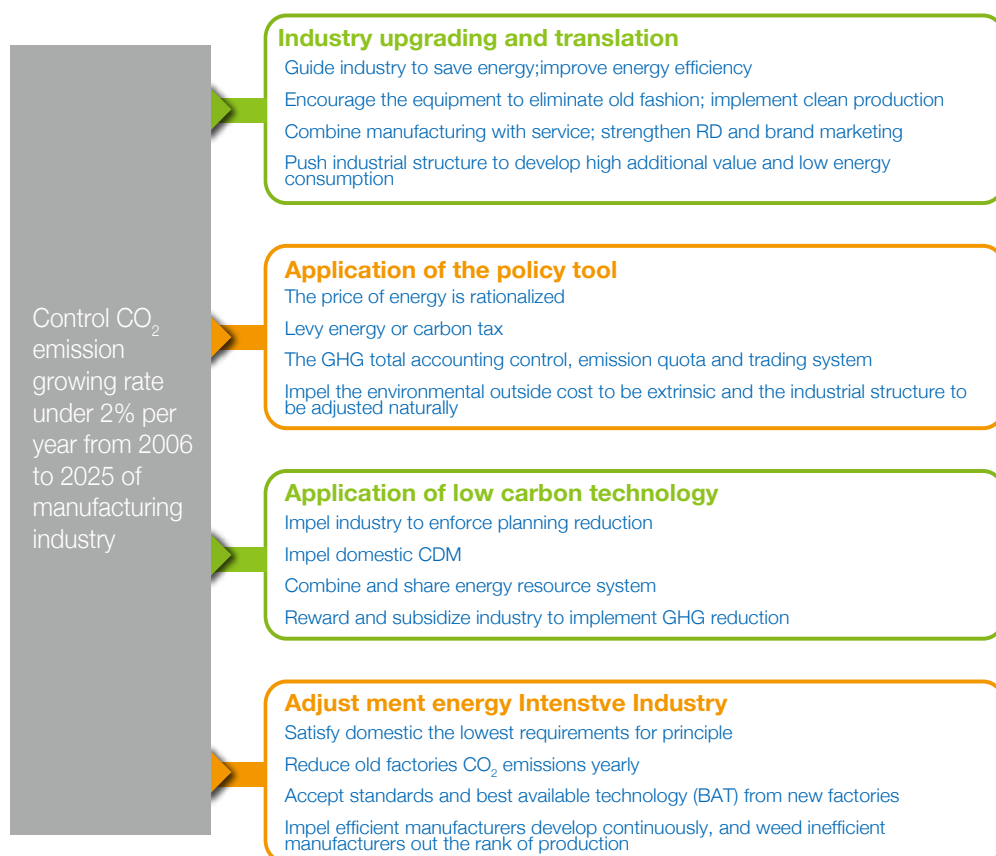
Replace the bulbs , the world will be more wonderful.

Source: Energy Bureau, MOEA

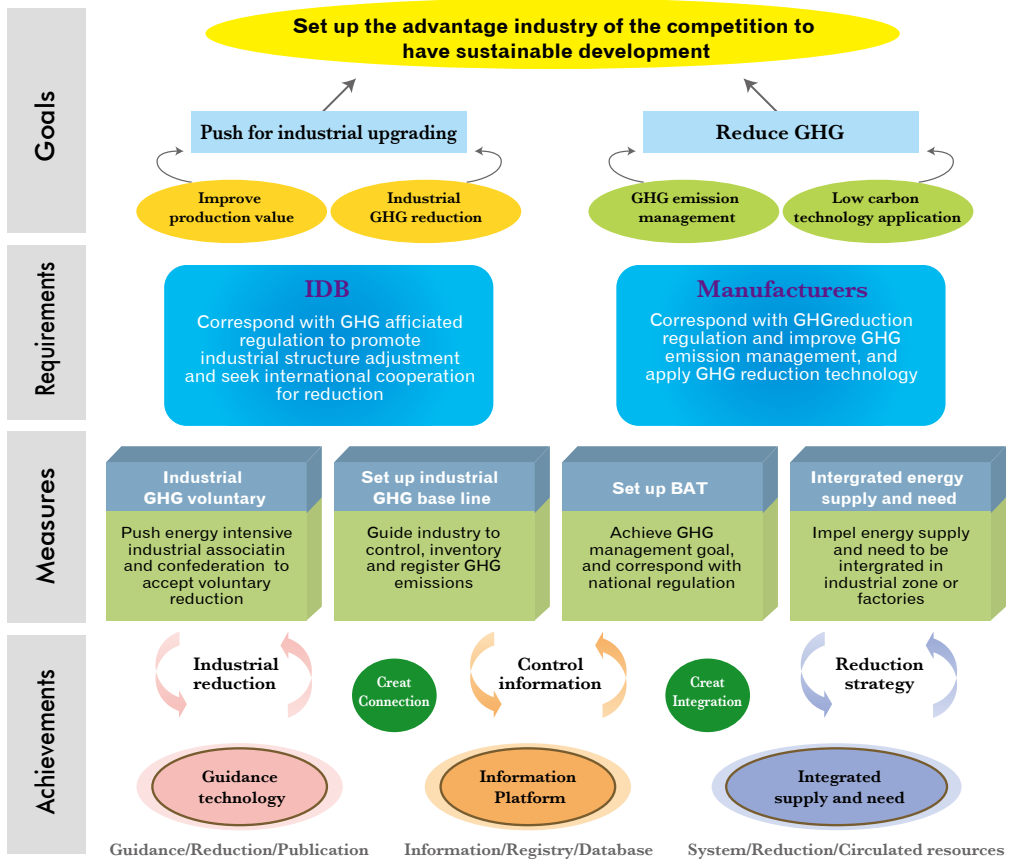


## Sector Reduction Actions: Industry

After the adoption and entry into force of the Kyoto Protocol, Taiwan convened two National Energy Conferences in 1998 and 2005 to draft voluntary reduction targets and improvement standards, and provide industries with energy conservation information, services and reduction technology assistance, proactively promoting domestic GHG reduction.



### Basic Strategy of Industrial Voluntary Reduction Actions



Blueprint of GHG Plan of MOEA IDB





## Industrial Voluntary Agreements

For many years, Taiwan's actions have fully adhered to regulations in the Montreal Protocol. Taiwan is keeping in step with developed countries in controlling and sharply reducing the production and consumption of ozone depleting substances (ODS).



In August 2004, Taiwan's TFT-LCD Association (TTLA) signed a cooperation memorandum on PFC reduction with the EPA. According to the memorandum, TTLA members will reduce PFCs emissions below the 2002 level by 2010.



In July 2005, the EPA and the Taiwan Semiconductor Industrial Association (TSIA) signed a memorandum of understanding to reduce PFC emissions. EPA Minister Chang Kow-lung and TSIA President Frank Huang represented the two sides in signing the "Perfluorocarbon Emissions Reduction Cooperation Memorandum." The objective is to reduce PFC emissions to 1997 and 1999 levels (the average for the two years of 0.73 million tonnes carbon equivalent) by 2010.

## Top 6 industries of GHG voluntary reduction chart

Industrial unions	Number of participants	Base year	Goal year	Reduction target	
				Reduction volume (10 million oil tons)	Equal reduction CO <sub>2</sub> emission (10 thousand tons)
Steel	11	2004	2008	17.3	48
Petrochemistry	58	2004	2008	83	240
Cement	13	1997	2008	32	89
Papermaking	16	2004	2008	3.96	11.23
Man-made fiber	21	2004	2008	2	10.4
Cotton-dyeing	6	2004	2008	0.75	3.44
Amount	125	—	—	139	402



In March 2007, TSIA and TTLA signed voluntary reduction agreement with MOEA in 2007 to promise total accumulation of 24 million tons of CO<sub>2</sub> reduction from 2006 to 2010.

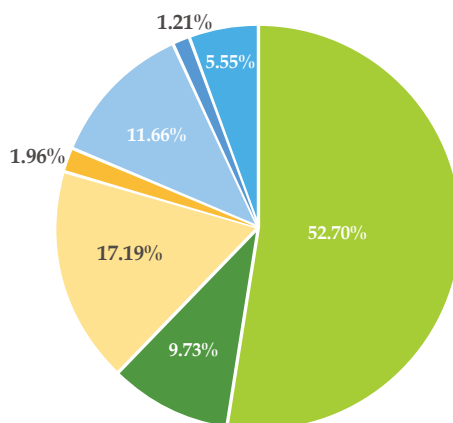


In December 2005, representatives of domestic industrial fields convened to face GHG reduction trend. The top 6 energy intensive industries (steel, petrochemistry, cement, papermaking, man-made fiber and cotton-dyeing) under Ministry of Economic Affairs (MOEA) called for voluntary reduction assignments, which expected to accumulate 4.02 million tons of CO<sub>2</sub> reduction from 2004 (base year) to 2008.

### Greenhouse Gas Registration

The EPA has established the "National GHG Registry Platform" (<http://www.GHGregistry.tw/>) to integrate the industries' emissions, manage Taiwan's greenhouse gas emissions, and allow industries to report emission inventories. So far 117 enterprises have voluntarily reported their

inventories, and a total of 300 is expected to report within 3 years, accounting for over 80% of CO<sub>2</sub> emissions in the energy and industrial sectors. In the future, industries can use this platform to understand the status of Taiwan's greenhouse gas emissions as well as reduction results.



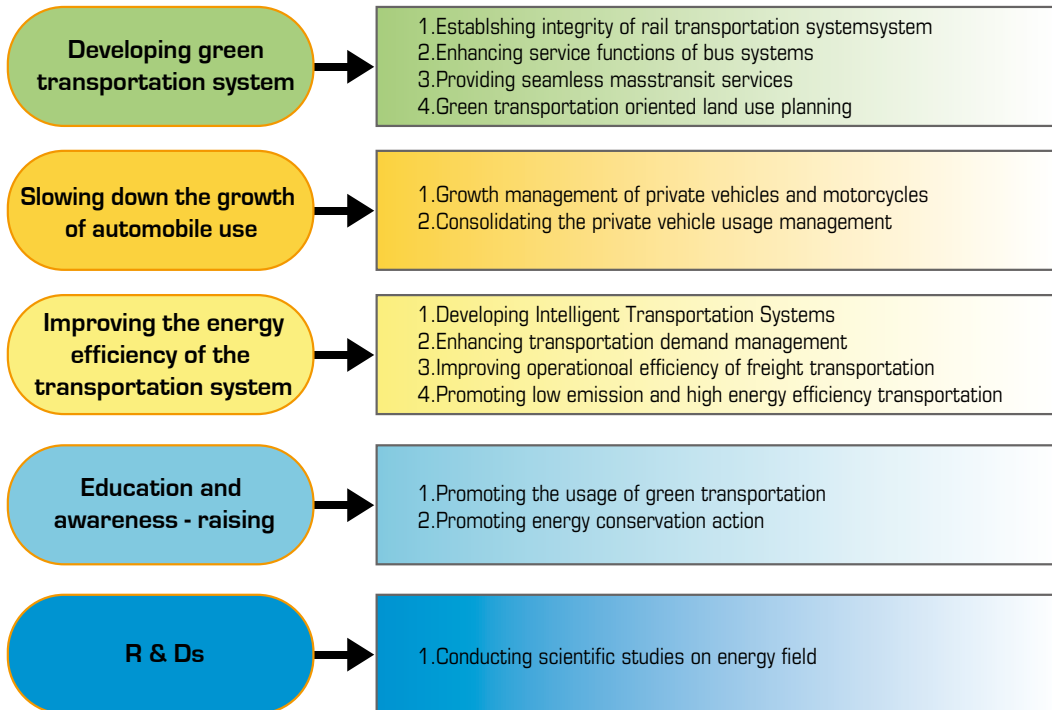
Electricity ● Petrochem ● Iron/steel ● Paper ● Cement ● Electronic ● Other

Promoting the Greenhouse Gas Registry



## Sector Reduction Actions: Transportation

### Key Ongoing Action Plan



The newly built Taiwan High-Speed Rail (THR) has shortened travel time between major cities in Taiwan down to less than 100 minutes. It changes domestic lifestyle and also reduces energy consumption in the transport sector.

## Progress of Action Plan

- a. Establishing Integrity of rail transportation and Transit systems
  - National Scale: Taiwan High Speed Rail is on service (started in Mar. 2007)
  - Local Area: Kaohsiung MRT started partially service (Feb.2008). Taoyuan International Airport MRT is under construction.
- b. E-Bus & IC Card integration
  - Subsidies to Kaohsiung county, Taichung county, Hsinchu county, etc. are completed.
- c. Slowing down the usage and growth number of vehicles
  - Vehicle inspection and maintenance (I/M): The target for raising inspect rate is 70%.
  - Parking fee management in Taipei metropolis.
- d. Enhancing transportation system efficiency to increase speed and reduce congestion.
  - Complete ETC system for highway and raising its usage rate gradually.
  - Establishing highway integration traffic management and control system.
  - Completing an intelligent traffic control system of local cities and counties.
- e. Improving operation efficiency of freight transportation
  - Establishing Harbor automatic access control system to reduce energy consumption from congestion
- f. Improving energy efficiency of fossil fuel vehicles
  - For new vehicles: Gradually tightening the standard of fuel efficiency.
  - For used vehicles: Encouraging installing tool kit on trucks (e.g., baffle).
- g. Promoting of LPG cars
 

Working to promote the LPG Dual Fuel Car Promotion Plan, the EPA has established a cross-ministerial joint service group to divide work according to areas of authority and set up liaison windows to answer inquiries. The group will also provide guidance and assistance to counties and cities without LPG filling stations. The roadmap for Promoting of LPG cars is as following:

  - Subsidies to reduce selling price of LPG (Dec. 2005)
  - Promoting to refit LPG cars. The subsidy is 25,000NTD for each vehicle.
  - Target of promotion: 150 gas station and 150,000 LPG cars (2012)
- h. Promotion of Biofuel: Base on abolished farmland (subsidies for production and fuel purchase)
  - Biodiesel
    - B2 Green Bus Demonstration in Kaohsiung City (Jan. 2007)
    - B1 Green County Demonstration in Taoyuan and Chiayi county (Jul. 2007)
    - Fully supply B1 fuel for cars (Jul. 2008)
    - Target of consumption: 100,000 KL/year of B2 (2010)
  - Bioethanol
    - E3 Green official fleet Demonstration in Taipei city (Sep. 2007)
    - E3 Supply in Taipei & Kaohsiung metropolis (2009)
    - Target of consumption: 100,000 KL/year of E3 (2011)

“LPG Dual Fuel Vehicle Promotion Plan” Joint Service Group

Area of authority	Organization
Establishment of LPG filling stations	Bureau of Energy, Ministry of Economic Affairs
	LPG Filling Station Association
Retrofit regulations and testing of alterations to car models	Ministry of Transportation and Communications
	Automotive Research & Testing Center
Retrofit personnel training and conducting exams for retrofits	Directorate General of Highways, MOTC
Subsidies for new vehicles or retrofits	EPA
The roadmap for Promoting of LPG cars is as following: (a) Subsidies to reduce selling price of LPG (Dec. 2005) (b) Promoting to refit LPG cars. The subsidy is 25,000NTD for each vehicle. (c) Target of promotion: 150 gas station and 150,000 LPG cars (2012)	



**i. Establishing GHG Inventory Reporting Scheme in transport sector**

●Short-term actions:

- Establishment of GHG inventory process and contents (2007)
- Designing user manual and tool for GHG accounting for on-road freight and passenger transport industry.
- Promoting GHG Inventory reporting Demonstration.

●Mid & Long-term actions:

- Establishing GHG accounting system (e.g., Inventory reporting Registration, Voluntary reduction & Emissions trading, etc.).

**b. Promoting eco-mobility (e.g., walking, ride a bicycle, taking public transportation), and gradually reducing the usage of private vehicles with low fuel efficiency.**

- Encouraging the usage of bicycles for commuting in metropolitan areas.
- Improving pedestrian space in certain places such as stations of public transport, business areas, schools, etc.

**c. Promoting usage of mobile LPG and LNG by subsidies for constructing gas stations and refitting LPG cars as well as reducing tax rate of hybrid electricity cars.**

**d. Enhancing R&Ds in hybrid electricity vehicles, hydrogen fuels, aerodynamic kits for vehicles, fuel efficiency improvement, etc.**

**e. Developing public transportation and human-oriented transportation to change people's transportation behavior.**  
- Promoting eco-driving including anti-idling. Setting up Voluntary Reduction for private-drivers and fleets.

**Intensified reduction strategies:**

**a. Constructing Green Transport for the public such as rapid transit systems, bus lanes, bicycle lanes, etc.**

- Executing integrated approaches and increasing the incentive for public transportation.



The newly built Kaohsiung Metropolitan Rapid Transit System (MRT) has expedited the development of Kaohsiung City. The architecture surrounding the MRT, designed by Richard Rogers, a Pritzker Architecture Prize winner, has become one of the city landmarks.



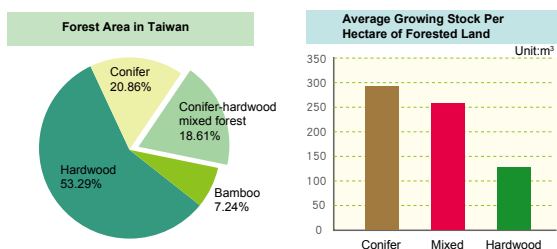
For the past 10 years, the Mass Rapid Transit System (MRT) in Taipei city has been serving as a daily lifeline for residents. The development of the MRT upgraded Taipei to a world-class modern city and at the same time solved severe traffic deadlock problem, not to mention the reduction of carbon emissions.



## Sector Reduction Actions: Forestry

### Forest Resources

According to the results from the 1995 Third Survey of Forest Resources and Land Use in Taiwan, forestland occupies 2,102,400 ha (58.53%) of the total island area (3,591,500 ha). Among the forestland, 76.7% (1,642,900 ha) belongs to national forest. The main forest types are hardwood forest (1,120,400 ha), coniferous forest (438,500 ha), mixed coniferous and hardwood forest (391,200 ha), and bamboo (152,300 ha). The total forest volume of the island is approximately 358 million m<sup>3</sup>. On average, forest volume per hectare is 287 m<sup>3</sup> for conifer, 119 m<sup>3</sup> for hardwood, and 254 m<sup>3</sup> for the mixed forest.



### Afforestation/Reforestation Objective

Although forest covers 58.53% of the island, the geographical distribution is unbalanced. Forest covers 93% of the mountain ranges in central Taiwan, while only 31% of slope land and flat area is forested. Meanwhile, after joining the WTO in 2002, Taiwan inevitably faces great competition and challenge in agriculture sector; many crop fields have been abandoned. In consequence, the Forestry Bureau promotes afforestation of abandoned lands. It provides economical incentives for the farmers, creates recreational agro-forest environment, increases

forest cover in flat area, as well as responding to the need for curbing global warming by increasing carbon sink from the planted trees.

### Carbon Stock of Forest Resource in Taiwan

Although Taiwan is a small island, estimate of Taiwan's forest carbon storage is about 591.6 million tons in total, with absorption from the atmosphere around 19.1 million tons per year. The annual absorption rate compensates 10.2~21.1% of the emission from local petrochemical industry.

### Forest Carbon Management Strategies

To cope with global greenhouse gas emission reduction strategy, the Council of Agriculture has, under the "Greenhouse Gas Reduction Act", formulated "Healthy Forest Carbon Management" as a comprehensive target. The policy entails implementation of three management strategies: carbon sequestration, carbon conservation, and carbon substitution. Active ways towards "Healthy Forest Carbon Management" are good forest management and expansion of reforestation. It is our consensus that forest resources will reduce carbon dioxide, slow down global warming, increase the economic value and use-efficiency of forestry products, as well as provide biodiversity, groundwater restoration and many other values.

Although reforestation is a long term commitment, accumulation of organic carbon can be relatively quickly restored. Since highland forest usage has reached the saturation point, choosing suitable trees and expanding reforestation area to increase carbon absorption would be an active and effective way to achieve carbon dioxide emission reduction under the principle of "the right tree for the right place". With thorough considerations of both economical incentive and sustainable ecosystem, hardwoods such as *Zelkova formosana*, *Cinnamomum*



camphora, *Acacia confuse*, *Swietenia* spp. are chosen as major planting species. From 1990 to 2007, total reforestation area with hardwoods has reached 84,237 ha.

Planting trees on barren land, farm land, or damaged forest land and greening of city/community will effectively expand the forested area and increase absorption of carbon dioxide. Thus the Forestry Bureau has been actively promoting reforestation at the ground level in the period of 2002 to 2008. In 2007, the total increase of afforestation/reforestation area is 86 ha. It was the balance of 1,135 hectares of afforestation/reforestation minus 1,049 ha forest loss due to forest fire etc. The main afforestation area includes 602 ha under "Afforestation in the Flat Area" project and 511 ha of national forest. The main reason of forest land loss was due to the collapse of forest lands, mainly landslides.. It counts 956 ha (91%) of forest loss. From 2000 to 2008, there was around 1,100 ha of collapsed forest land turned into barren land per year (which equals to 81% of total forest losses). This is the main cause of forest area decrease in Taiwan.

The government has actively encouraged "Afforestation in the Flat Area" project that targets abandoned farm land. Between 2002 and 2007, 7,813 hectares of abandoned land has been planted and has created good landscape. In the mean time, the government initiates "Green Afforestation"

project in 2008 and targets to reforest 60,000 ha of land in the following 8 years. Through a large-scale afforestation effort of this sort, it will effectively increase forest cover, improve landscape quality in the low-land, and enhance timber's carbon sequestration effect.



### In the Future

Global warming has impacted the climate and agricultural economies to a degree that can no longer be ignored, and forests are extremely important as future resources and protectors of nature. Therefore the most cost-effective way to protect our natural resources and ensure sustainable development of the earth is through considerate protection, management, and afforestation/reforestation which shall minimize the production of greenhouse gases.



## Sector Reduction Actions: Waste

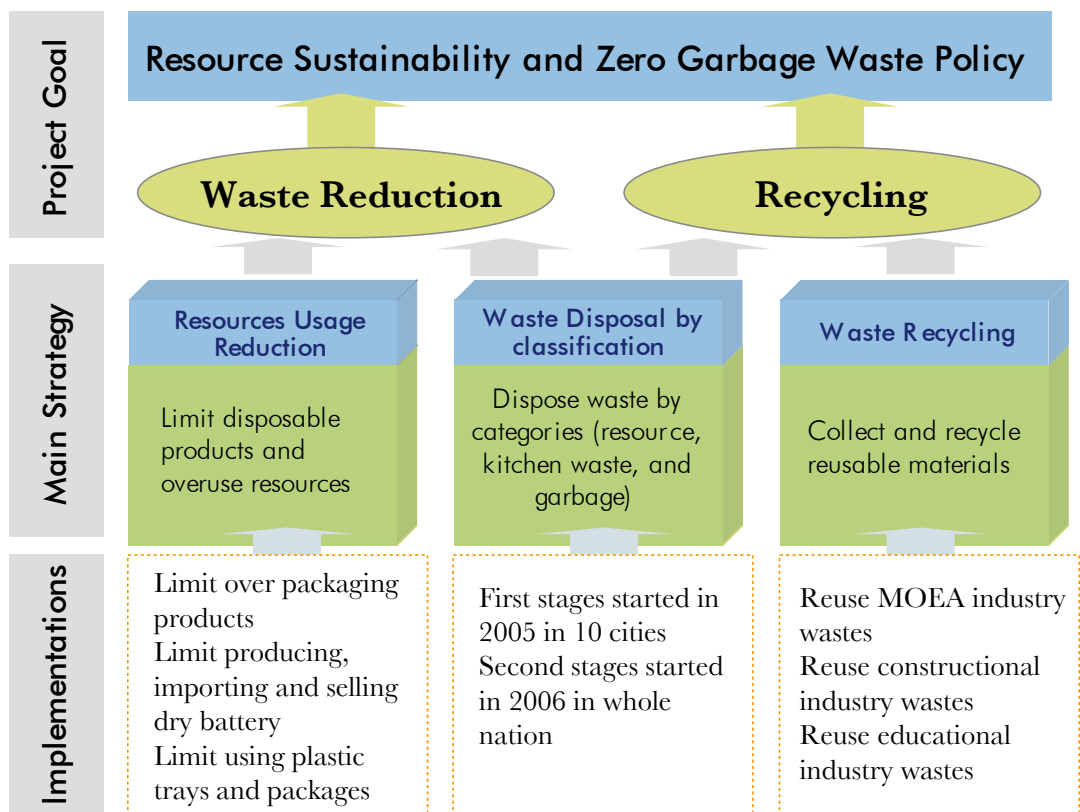
### Basic Strategy

For the purpose of pursuing a sustainable society, the EPA establishes the "Zero Garbage Waste Policy." The main strategy is as follows :

- (1). resource usage reduction.
- (2). waste disposal classification.
- (3). waste recycling.

### Waste Management Actions

This "Zero Garbage Waste Policy" is a modification of the original solid waste management system, which was dominated by landfill disposal and waste combustion. The new system's focus is on waste reduction and recycling.



## (1). General Waste Management

The new policy has reduced the average daily waste generated per capita from 0.1335 Kg (1998) to 0.583 Kg (2007).

Sie Pei-Ying  
age 9



Average Daily Waste Generated per Capita between 1997 and 2007

Year	Average daily waste generated per capita (kg)
1997	1.143
1998	1.135
1999	1.082
2000	0.982
2001	0.898
2002	0.829
2003	0.752
2004	0.708
2005	0.667
2006	0.605
2007	0.583

building incinerators since the 80s and widely adopting incineration technology to replace the traditional landfill method of burying garbage in the ground.

## (2). Industrial Waste Management

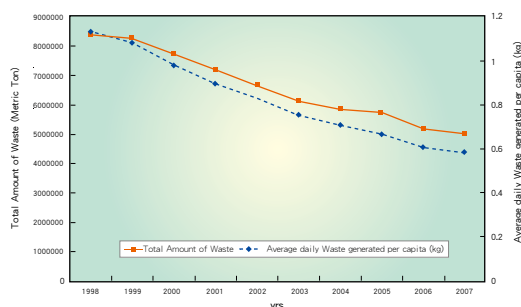
In 2000, the EPA formulated the "National Industrial Waste Disposal and Management Program" and established the "Industrial Waste Control Center" as well as a reporting system that controls the complete life cycle of industrial wastes from production to disposal. With source management, registrations and inspections, the EPA inspects unidentified industrial waste dump sites and has established a complete database. The administration also manages government waste disposal departments and cooperates with private waste disposal companies to solve the problem of insufficient capacity of waste disposal facilities.

The CH<sub>4</sub> generated from the anoxxygenic reactions of organics in wastes are released to the air due to burying the wastes. However, the greenhouse effect caused by one unit of CH<sub>4</sub> is 23 times the greenhouse effect made by CO<sub>2</sub> (IPCC 2001 third report). Due to advancement of incineration technology, the government had been continuously

Amount of waste disposed and burned between 1998 and 2007

Unit:Metric Ton

Year	Total Amount of Waste Treatment	Amount of Waste Burned	Amount of Waste Buried in Sanitary Landfill	Amount of Waste Buried
1998	8,428,009	1,741,095	5,597,980	1,088,934
1999	8,244,837	2,020,634	5,366,936	857,267
2000	7,748,923	3,229,749	3,822,124	697,050
2001	7,167,026	3,736,891	2,996,805	433,330
2002	6,656,901	4,316,049	2,116,375	224,477
2003	6,118,126	4,304,573	1,700,438	113,115
2004	5,845,550	4,307,737	1,474,166	63,647
2005	5,726,194	4,444,613	1,246,364	35,217
2006	5,192,247	4,290,839	888,069	13,339
2007	4,991,280	4,461,842	504,944	24,494

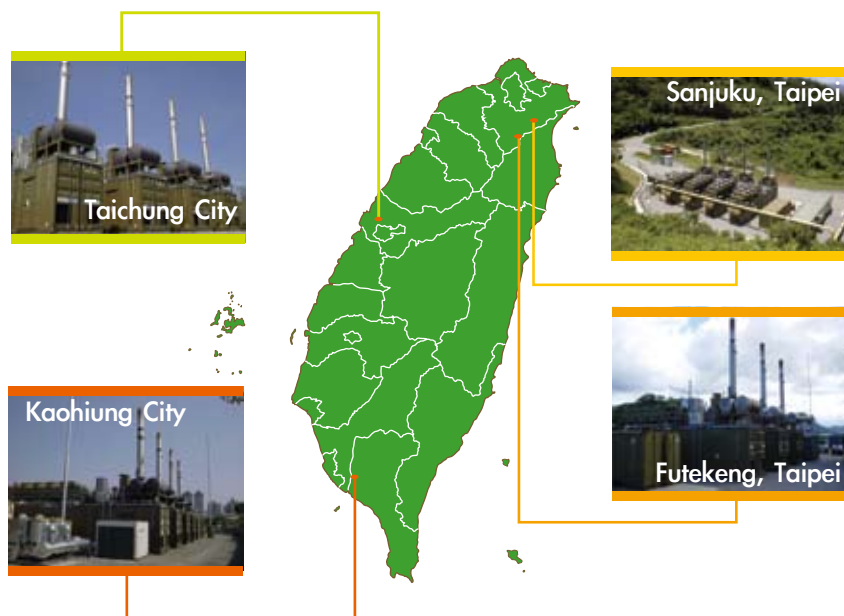


Since 1998, both total amount of waste and average daily waste per capita have been decreasing.

### (3). Efforts on Reducing Bio-Gas Emissions

In response to global climate change and to improve domestic air quality, the EPA has long been in support of developing low discharge technologies as the major policy to reduce methane, a greenhouse gas, and encourage waste recycling.

Major bio-gases in Taiwan come from animal husbandry, municipal sewage, industry wastewater and urban landfill sites. Among these, only large-scale landfills, with filling capacity more than 1 million tons, can develop commercial power generation connecting to main grid economically, while others are mainly for self usage as boiler fuel or small scale power generations.



In January 2003, the EPA released an ordinance "Rules to Encourage the Use of Landfill Methane Gas for Electricity Generation" as the stipulated practice which offers NT\$0.5 per kWh, or US\$0.016, incentive to landfill gas power suppliers on selling electricity to the main grid. Currently, there are four municipal landfill sites installed with power generating facilities. The total capacity was 22 MW which equals 5 million kWh monthly for output originally. Yet, due to decrease of the methane gas output, the installed capacity has now dwindled to 11 MW.

Year	Electricity Supply (kWh)	Reduction Landfill gas Emission (cubic meters)	Reduction CH <sub>4</sub> Emission(ton)	Reduction CO <sub>2</sub> Emission (ton)
1999	13,322,666	8,764,912	3,127	82,320
2000	23,359,752	15,368,258	5,483	144,339
2001	85,998,606	56,578,030	20,187	531,381
2002	103,168,749	67,874,177	24,218	637,474
2003	89,728,800	59,032,105	21,063	554,430
2004	65,921,600	43,369,474	15,474	407,326
2005	57,033,168	37,521,821	13,388	352,405
2006	49,072,191	32,284,336	11,519	303,214
2007	43,244,000	28,450,000	10,151	267,202
Total	530,849,532	349,243,113	124,610	3,280,091

By December 1996, the EPA has verified and dispensed NT\$ 248 million, or US\$ 7.76 million, as an incentive to the suppliers. And the total electricity supplies have to date been accumulated to 530 million kWh, which is equivalent to reducing landfill gas emission by 349 million cubic meters, or methane emission by 124,000 tons, or 3.28 million tons CO<sub>2</sub>-e.





## Annual Achievements of Energy Conservation and Carbon Reduce in 2008

### Actively promoting renewable energies, increase the percentage of self-sufficient energy

#### Wind power generation

- Currently the total installed volume capacity of wind power is 376.6 thousand kW, 198 units in total. The annual electricity generating volume is about 1.017 billion kWhs, which would be sufficient for the need of 254,000 households. The energy contribution is calculated for 250,000 kiloliters of oil equivalent, which can effectively reduce 603.9 thousand metric tons of CO<sub>2</sub>.



Taichung County Oingshui Township



Taichung County Oingshui Township

#### Photovoltaic

- Currently the domestic system installation, including the solar roofs, solar campus and emergency disaster sets in remote Islands, totals 408 with total volume capacity 4,291 kW, annual electricity generation volume 5.15 million kWhs, which is equivalent to 3,280 tons of CO<sub>2</sub> emissions reduction.
- The Government will initiate the "100,000 roofs Sunshine Program," which is expected to reach 20,000 installations by 2012 with the volume capacity 60MW in producing 72 million kWhs in electricity from solar power annually, equivalent to 46,000 tons of CO<sub>2</sub> emissions reduction. A NT\$9 billion in subsidy is projected to be provided, while it will lead to 18 billion output value from related industries.



Taipower South Visitors Center

### Biomass fuel

- Since July 15, 2008, the sales of vehicle using diesel with 1% biodiesel added can reduce 38.50 million liters of fossil diesel fuel usage, which is equivalent to 100 million barrels of imported oil and reduce 12.6 tons of CO<sub>2</sub> emissions annually.
- The "Green Official Vehicle Pioneer Project" has led to the supply of E3 ethanol gasoline at eight gas stations in Taipei City. Official vehicles within Taipei City take the lead to apply the E3 ethanol added gasoline. Meanwhile E3 opens to the customers for voluntary adoption with incentive of 1 NT/liter price reduction. To date, the accumulated volume of E3 ethanol gasoline usage totaled 3,373 kiloliters, about 212 tons of CO<sub>2</sub> emissions reduction.



Taipei Fu-An Memorial Building



Ching Yun University



Taiwan Hakka Cultural Center

### Actively promote energy conservation, reduce energy demand

#### Enhance overall energy efficiency

- The energy intensity in Taiwan has decreased to 9.11 liters of oil equivalent/ thousand NT in 2008 from 9.65 in 2005, 9.42 in 2006, and 9.36 in 2007 with an average of 1.9% decrease per year, close to the original target of 2%. The overall performance of the increase in energy efficiency and the promotion of energy conservation has gradually emerged

#### Promoting voluntary energy conservation (chain stores, wholesale, group enterprise)

- Implement the endorsements of voluntary energy conservation agreement with the five major chain convenience stores (7-eleven, FamilyMart, etc.) and set 5 to 10% as the energy conservation target which will save 85 million kWhs of electricity, 21000 kiloliters oil equivalent, within the following three years.
- Implement the endorsements of voluntary energy conservation agreement with the seven hypermarket chains (Carrefour, RT-Mart, B&Q, TK3C, etc.) set 2 to 6% as the energy conservation target which will save 60 million kWhs electricity, 15000 kiloliters oil equivalent, within the following three years.
- Implement the endorsements of voluntary energy conservation agreement with the 19 hospital groups, 21 hotel groups, and 13 department store groups, totaled 53 groups with 166 operating sites. These groups will save 5% electricity usage as the target within three years, projected 130 million kWhs in saving within three years.



### Extend the energy conservation services

- Since the establishment of the full deployment of energy conservation service system in October, 2008, as the start of the "Comprehensive Energy Conservation Service Center", it is projected that it will provide consultation on energy conservation to 4,712 households and lead to an energy saving of 525,000 kiloliters of oil equivalent in industry, which equals a saving of NT\$10.7 billion in energy costs.

### Promote energy technical services

- Assist offices and schools to implement the demonstration projects in assuring the energy conservation achievement. It is projected the saving rate will be 29 ~ 58% for each implementation. According to the statistics of cases in 2008, the overall energy conservation benefit could reach 1,907 kiloliters of oil equivalent that save 27.21 million NT annually.

### Promote energy conservation in government agencies and schools

- The Executive Yuan approved the "comprehensive measures energy conservation and carbon reduction among government agencies and schools" on August 6, 2008, which regulates negative growth on the usage of electricity and oil of the government offices and the schools yearly. The target is 7% energy saving by 2015. By the end of 2007, the statistics revealed the usage of electricity of the offices and the schools have achieved yearly target, a negative growth of -1.73% in electricity usage.

### Popularize of high-efficiency electric appliances

- Publish the minimum allowable energy efficiency standard for electric appliances.
- The amendments on energy efficiency certification stand of 11 Energy Saving Label Products.
- Establish internet Mall of Energy Saving Label products.

### Promote Energy Saving Label products

- Integrate with hypermarkets, newspapers, radio and television media in promoting the Energy Saving Label products. To date, 27 products, 184 brands, and 2,959 models have been certified, and the use of Energy Saving Label piece number has accumulated to 61.2 million, an estimated annual energy savings of 80000 kiloliters of oil equivalent.

### Subsidize the public in purchasing Energy Saving Label products

- The Ministry of Economic Affairs has subsidized the public in purchasing the three domestic products as air-conditioners, refrigerators and washing machines with Energy Saving Labels, NT\$2000 for each unit. It is projected the sale of the products will grow to 265 thousand units, from 122 thousand units. The total sale will reach NT\$9 billion. The total unit number has accumulated to 230 thousand since the implementation of this measure.

### Attaining the result of energy-saving through floating oil price mechanism

Attain the floating oil price mechanism. The consumption of vehicle gasoline and diesel were 9.445 million kiloliters and 4.318 million kiloliters respectively in 2008. In comparing with those in 2007, they were decrease by 512,000 kiloliters and 12000 kiloliters respectively with growth rates of -5.14% and +0.28%, respectively.

The Fuel Saving in 2008

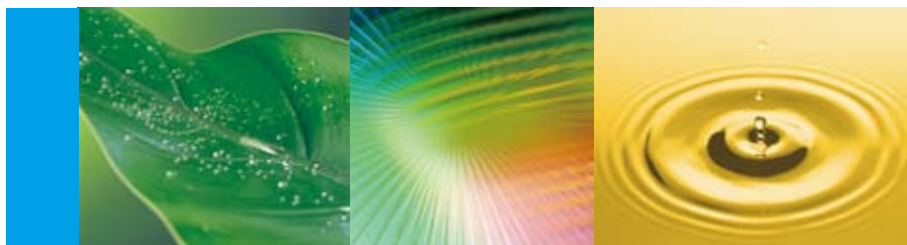
ITEMS	2008
Vehicle Gasoline Growth Rate(%)	-5.14
Vehicle Diesel Growth Rate(%)	+0.28
Fuel Growth rate(%)	-13.65
Total(%)	-7.75

### Attaining the result of energy-saving measures through discount measure of electricity tariff discounts

The electricity consumption increased by 330 million kWhs (+1.29%) during January and June, 2008 in comparison with the same period of the previous year. While, in effect of the implementation of tariff discounts, the accumulated electricity consumption was 89.43 billion kWhs during July to December, decreasing by 2.59 billion kWhs comparing to the same period in the previous year, of which the lighting electricity consumption decreased 890 million kWhs comparing with that of the previous year.

The Electricity Saving in 2008

ITEMS	2008
Peak electricity consumption growth rate (%) (Peak load)	-4.49 (31,320 thousand kW)
Electricity consumption growth rate (%)	-1.60





## 6. Enhancing Public Awareness

### President Signs Declaration on Energy Conservation and Carbon Reduction

On World Environment Day on June 5, President Ma Ying-jeou signed the Ten-Step Presidential Declaration on Energy Conservation and Carbon Reduction. Example actions include encouraging employees to wear simple, lightweight work attire, turning off lights and unplugging appliances. It is hoped that citizens can put these actions into practice in their everyday lives.

For this year's World Environment Day, President Ma put forward an energy conservation and carbon reduction declaration for all of his colleagues at the Office of the President to sign. President Ma and Vice President Vincent Siew attended the ceremony. The Ten-Step Presidential Declaration on Energy Conservation and Carbon Reduction entails actions such as wearing simple lightweight attire, opening windows to cool off, turning off lights, unplugging appliances, driving less, walking more, buying local products, eating only as much as you can finish, refusing to buy overpackaged products, recycling, reusing, and carrying one's own cup, bowl, chopsticks, handkerchief, and shopping bag.

President Ma said that by strongly promoting energy saving and carbon-reduction practices at the Office of the President, these habits are more likely to spread to the people. While it is not easy for everyone to adopt energy-saving practices, taking it one step at a time will improve the environment. The Office of the President launched the 123 Energy Conservation and Carbon Reduction Plan with targets to save 10% of electricity, 20% of water and 30% of paper. In the future, employees of the Office of the President have agreed to turn off all the lights during breaks or after work, set the air conditioner at 26 degrees Celsius, and not wear suits to informal meetings. The Office of the President has also set up a rainwater harvesting system and a water recycling and purification system.



President Ma signs the Declaration on Energy Conservation and Carbon Reduction



## Sector Carbon Reductions

The EPA announced the guidelines for a low-carbon lifestyle on August 22, 2008, in order to achieve the objective of creating a low-carbon society and sustainable homeland. The guidelines contain four main themes: energy conservation and carbon reduction for a cool earth, resource recycling and zero waste, pollution reduction and environmental conservation for sound ecology, and clean homeland with lifestyles of health and sustainability (LOHAS). To be in line with these themes, the EPA has also taken the following actions:

### (1) Nationwide carbon reduction campaign:

The EPA initiated in June 2008, the Citizens' No Regret Carbon Reduction Action Plan and encouraged government agencies to lead the private sector in fulfilling the Ten Carbon Reduction Declarations, including reduce usage of air conditioners, purchase energy and water-saving labeled products, and reduce car use through biking and walking, etc.

### (2) Carbon reduction information sharing through Internet:

The EPA has established an energy conservation and carbon reduction action website, and invited the private sector and citizens to sign on to the Ten Carbon Reduction Declarations. Participants of the carbon reduction activities may calculate their carbon reduction performance on the web-based calculation tool to track the progress, as well as sharing the most effective implementation experiences on the blogs associated with the website.

### (3) Environmental education for the children:

Nationwide poster contests were held to encourage elementary school students to express their concerns for the environment and the Earth through their creative drawings.

### (4) Creative thinking in carbon reduction actions:

Carbon reduction promotion design contest was held to increase the citizens' awareness of carbon reduction. Winners of the contest have agreed to adopt the Creative Commons copyright licensing process with author acknowledgement for non-commercial purpose. The winning designs will be used on the EasyCard for transit services to spread the carbon reduction message further.

### (5) Tips for carbon reduction through daily lives:

The EPA has published the booklet "Citizens' Carbon Reduction: Tips for Daily Lives," which provides energy saving tips for families and individuals all done in easy-to-understand comics style. The booklets are provided to EPA offices and local environmental protection bureaus for distribution to civil organizations, and over 60,000 copies of the booklets have already been distributed.

#### The top ten ways to reduce carbon consumption are:

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• Wearing simple lightweight attire</li><li>• Opening windows to cool off</li><li>• Turning off lights</li><li>• Unplugging appliances</li><li>• Driving less, walking more</li></ul> | <ul style="list-style-type: none"><li>• Buying local products</li><li>• Eating as much as you take</li><li>• Refusing to buy overpackaged products</li><li>• Recycling and reusing</li><li>• Bringing your own cup, bowl, chopsticks, handkerchief, and shopping bags.</li></ul> |
|---|--|

Top ten ways to reduce carbon consumption





Lin Shin-Syu  
age 10



#### (6) Carbon reduction on college campuses:

Through cooperation with the National Central University, the EPA conducted a cost and benefit evaluation of college campus buildings' energy saving and greenhouse gas emission reduction potentials. The results have been incorporated into a campus building carbon reduction case study report which is then used as benchmark for inventory and improvement of college energy consumption.

#### (7) Campus environmental education:

In 2007, the EPA acquired the rights for public showing of the movie "An Inconvenient Truth" presented by former US President Al Gore. It was exhibited in selected schools and communities during March to October, 2007. The EPA also purchased 209 Collector's Edition sets of the movie and donated them to junior high schools in remote areas for use in their environmental awareness courses.

#### (8) Low-carbon families:

The EPA has sponsored the Low-carbon Family Summer Camps for third to sixth graders, in order to teach elementary school students how to reduce carbon emissions through daily actions. After the summer camps, carbon reduction family contests were held to let camp participants practice and compete in energy saving tips learned.

#### (9) World Environment Day activities:

On June 5, 2007, the EPA joined the National Geographic magazine in providing free booklets with 24 tips on carbon reduction through magazine distribution of the June 2007 Issue. On June 5, 2008, the EPA sponsored outdoor showing of the movie Arctic Tale at Taipei's Da-an Forest Park, which also accompanied exhibition of information and tips on energy savings.

#### (10) Carbon Reduction Information Pavilion:

The EPA has cooperated with the Taipei Computer Association for five consecutive years in setting up carbon reduction information pavilion during the annual Information Technology Month exhibitions. The Pavilion integrated the promotional efforts of several eco-labeling programs, including Energy Star, Green Mark, Energy Label and Water-Saving Label, in providing information on energy and resource conservation efforts, and teaching citizens how to reduce carbon emissions through lifestyle changes.



## 7. Looking Ahead

In response to climate change, Taiwan has re-evaluated its energy and industrial policies and promoted various "no-regret" measures to reduce GHG emissions. Much of Taiwan's economic progress, either in labor-intensive manufacturing in the past or high-tech production today, has been made to satisfy the needs of the industrialized world. Therefore, it is only fair to ask us to share "common but differentiated" responsibility in meeting the global challenge of climate change.

Based on long-term strategic concept to improve energy efficiency, develop renewable energy, change industrial structure with high dependence on energy, and Reduce reliance on fossil fuel energy and manage high risks of energy uncertainty is the key to ensure Taiwan's sustainable development and national security. Taiwan should strengthen capacity building for UNFCCC, promote GHG emission reduction activities, increase relevant technology development, and build up citizens' awareness of GHG reduction and resource conservation.

Like many other island countries, Taiwan will be adversely affected by the results of climate change. Thus, we hope to work with the international community to reduce emissions of greenhouse gases as well as to adapt the effects of climate change. As a non-Party, we wish to gain recognition from others for voluntarily taking local action for the global benefit. By sharing our common responsibility, we can together protect the earth's environment and achieve sustainable development for our future generations.





Yeliou Queen's Head

Shei-Pa National Park

Cingshui Cliff

Yangmingshan  
National Park

National Palace  
Museum





Environmental Protection Administration  
Executive Yuan, R.O.C. (TAIWAN)  
<http://www.epa.gov.tw>

