

# Sustainability of change and reducing ecological impact



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**Manager**  
**Green Energy & Environment Research**  
**Laboratories**

# Introduction to ITRI

- **A non-profit research organization with more than 6,000 researchers generating over 1,000 US patents a year**
- **Global leading organization in developing new businesses and technologies**
- **Won 3 R&D 100 Awards in 2013, (6 in 2012)**
- **Started up more than 200 new companies**
- **Transferring more than 600 technologies to industry annually**
- **New initiative to allocate nearly half of its R&D funding on green energy technologies**



**ITRI GREEN Campus**

# ITRI's Missions and Fields

A NGO founded in 1973 by Ministry of Economic Affairs, ITRI's missions are:

- Research and develop key technologies
- Stimulate and drive industrial development
- Generate economic value
- Elevate social well-being

**Information and  
Communications**

**Electronics and  
Optoelectronics**

**Material, Chemical  
and Nanotechnology**

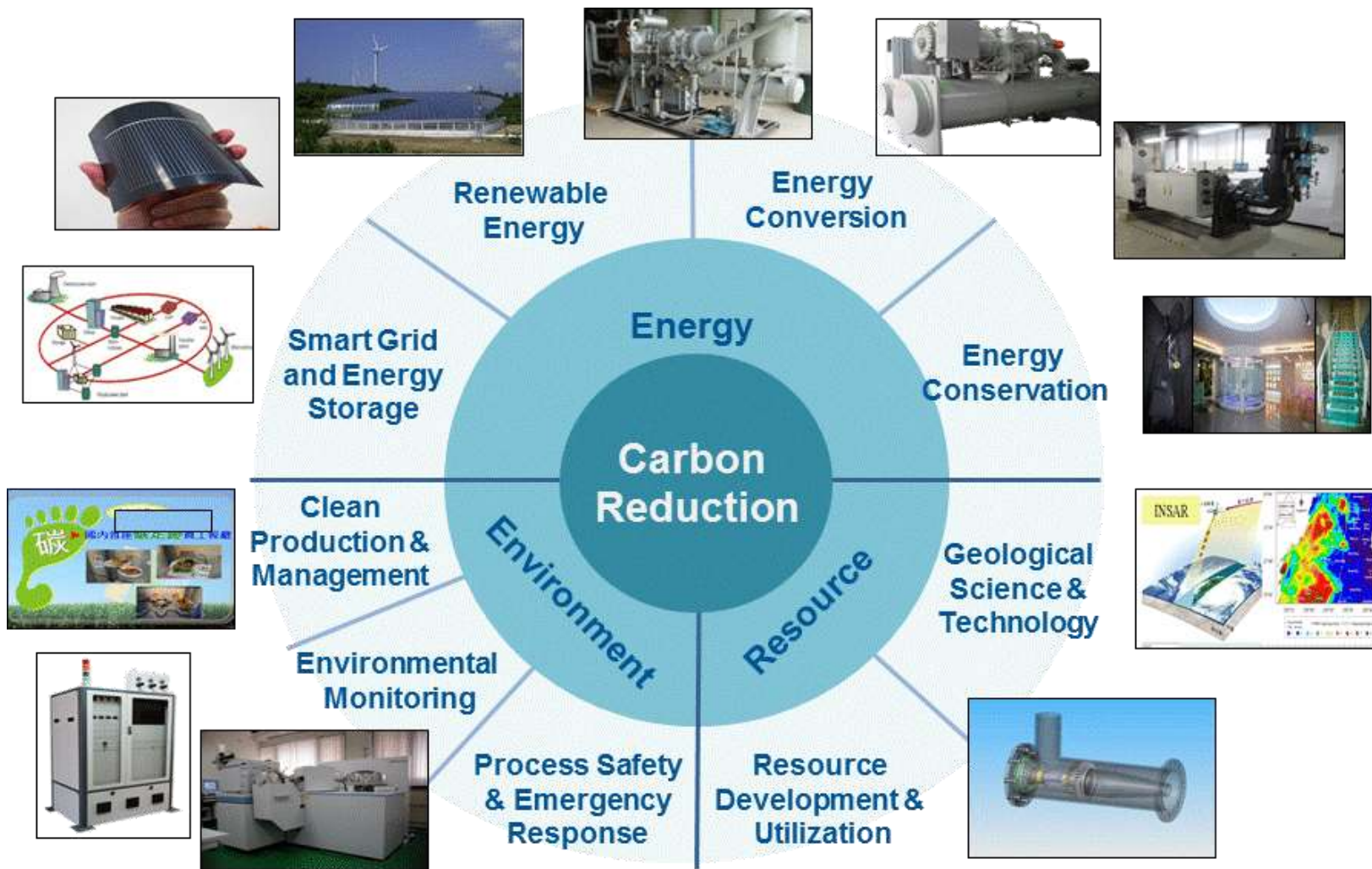
**Medical device and  
biomedical technologies**

**Mechanical and  
Systems Technologies**

**Green Energy and  
Environment Technologies**



# Green Energy & Environment Research Laboratories (GEL)





Power Saving : 30% (2010 level)  
Carbon Mitigation : 40% (2010 level)  
Green Cover Rate > 125%





Our world is dynamic and changing



# Taiwan & Climate Change

## Geographic Setting

### Population



23,373,517

### Area



36,193 km<sup>2</sup>



Taiwan is facing serious challenges of climate change.

1 of 35  
Biodiversity  
Hotspots

## High Tech Industry

Top

Semiconductor foundries

Top  
LED

Total value of  
production

Top



Total value of  
production

2<sup>nd</sup>

Solar Battery

Total value of  
production

## Economy

14<sup>th</sup>

World Competitiveness  
Scoreboard  
(IMD, 2014)

6<sup>th</sup>

World's Foreign exchange  
reserves (2014)

21<sup>st</sup>

World Largest Economy  
(IMF, 2014)

8<sup>th</sup>

Global Entrepreneurship and  
Development Index (2014)

## Life Style

#1

10 Best Health Care  
Systems in the World

Popular  
destinations  
for  
companies.

HSBC Expat Explorer Report  
2014

Night  
Markets

#1

Free WiFi  
Coverage

# Taiwan

# 2014

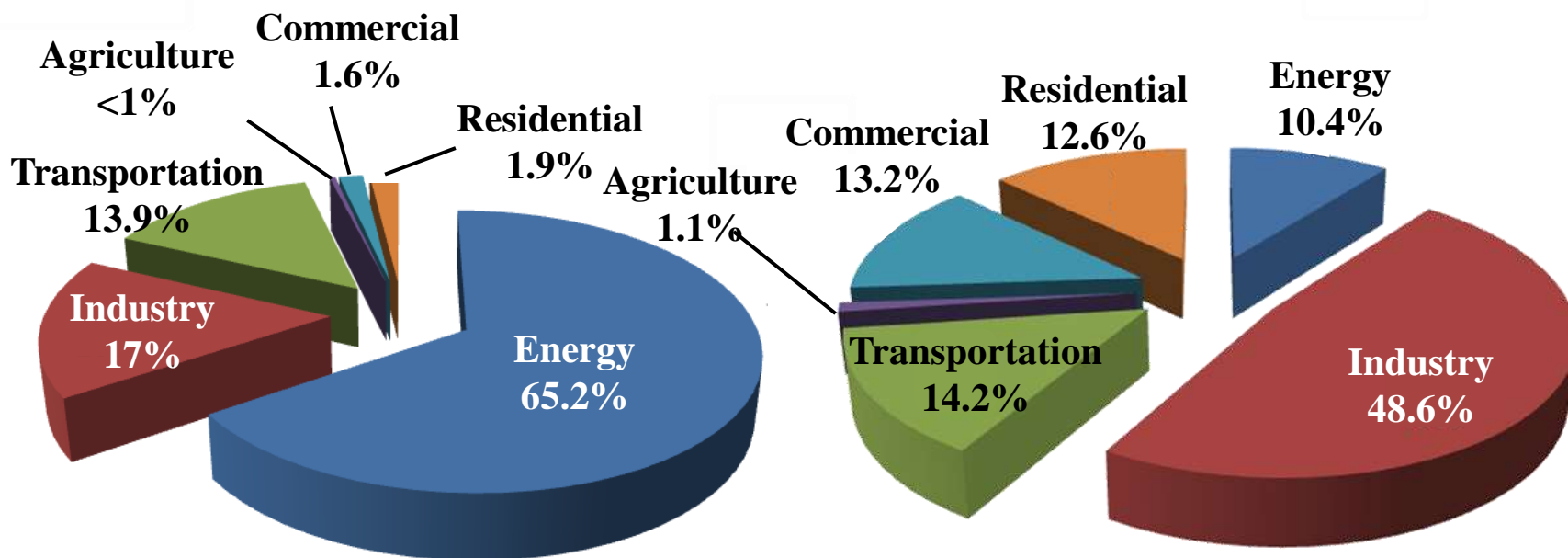
# PROFILE



# Introduction: CO<sub>2</sub> Emissions Profile

## Taiwan's CO<sub>2</sub> Emissions by Sector

- In 2012, CO<sub>2</sub> emission from fuel combustion was about 248.7 million tons of CO<sub>2</sub>e.
- Main emitters are energy and industrial sectors, which are the primary regulated targets for emissions reduction



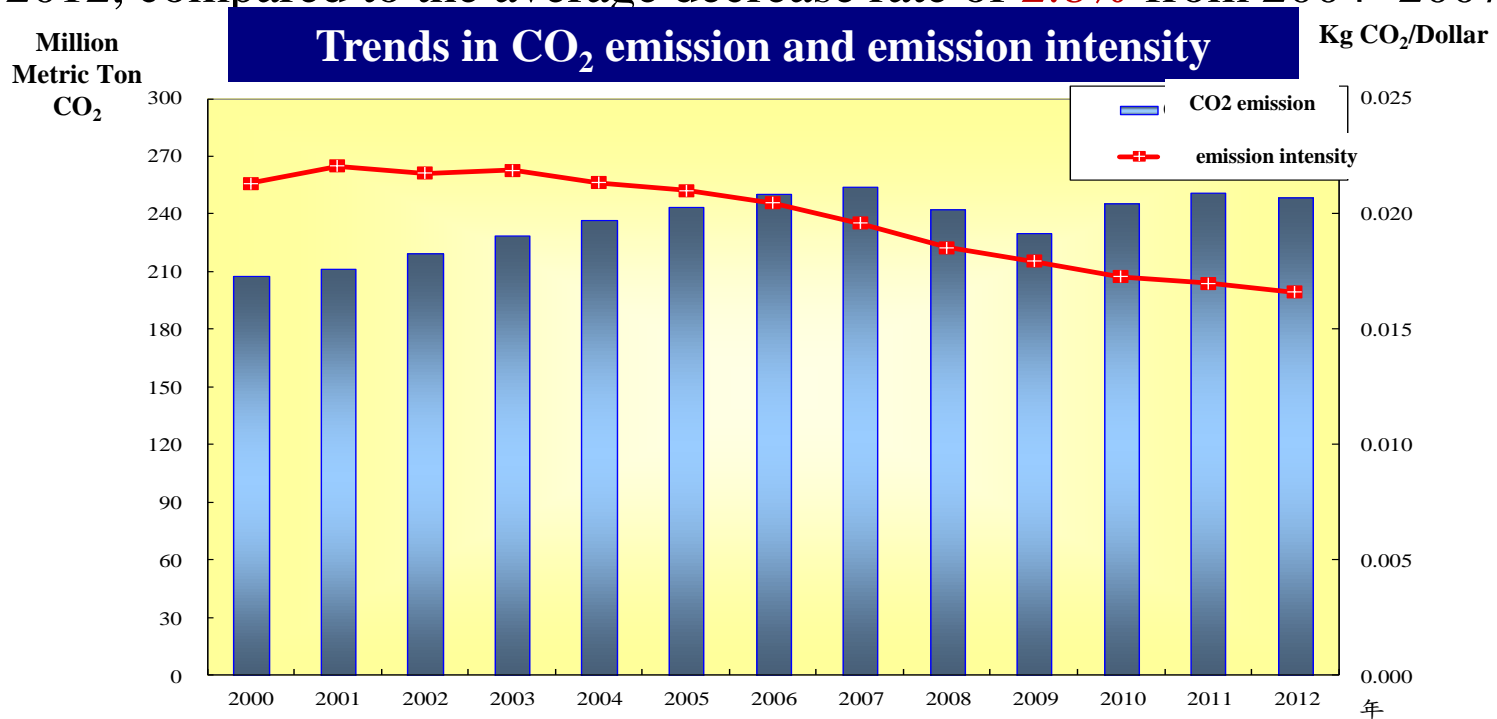
Emissions by Sectors  
(excluding electricity consumption)

Emissions by Sectors  
(including electricity consumption)

Source: CO<sub>2</sub> emission from fuel combustion of 2011 estimation by Bureau of Energy

# Overall CO<sub>2</sub> Emissions Reduction Results

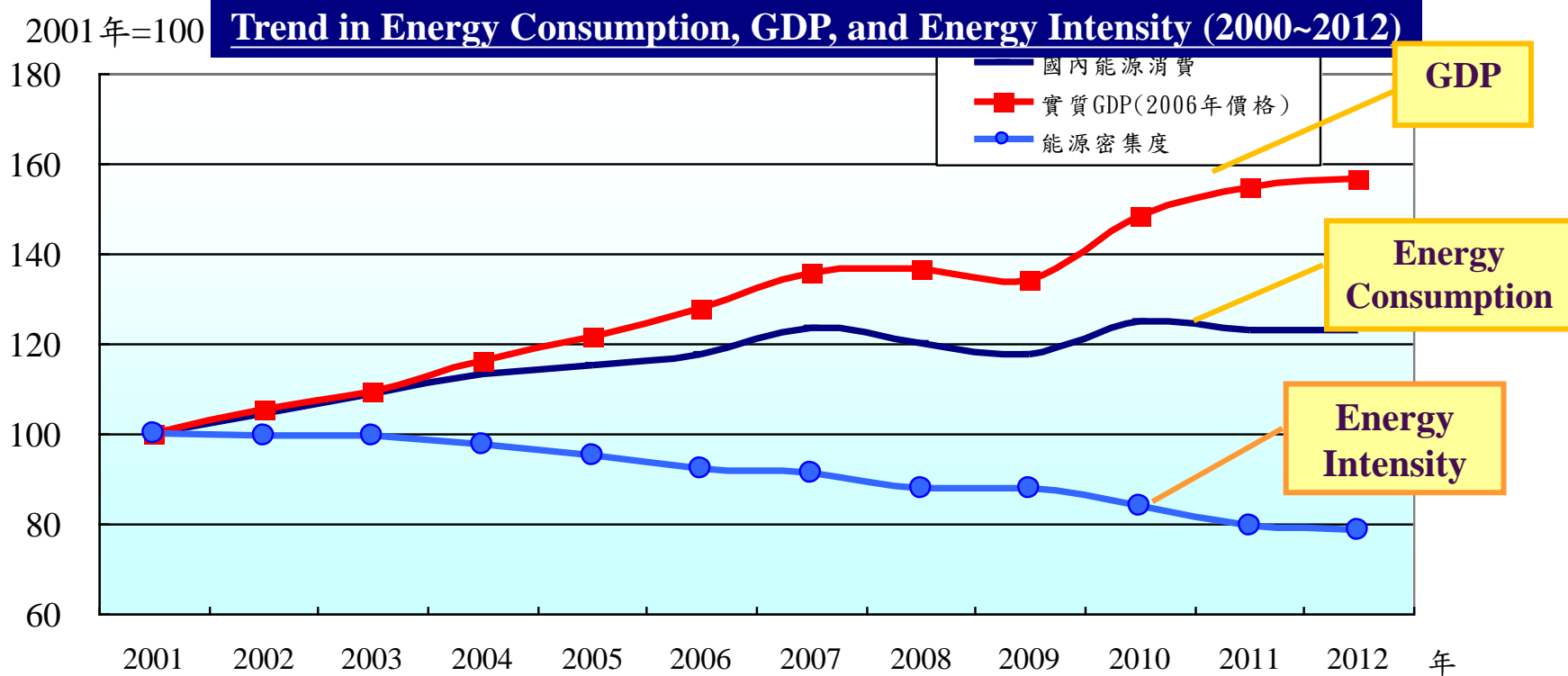
- CO<sub>2</sub> emissions trend has improved: negative growth consecutively in 2008 and 2009.
- During the 2010~2011 economic recovery period CO<sub>2</sub> emissions rebounded
- Overall emissions trend has improved: 2008~2012 there was an average annual decrease of 0.6% compared to an average annual growth of 2.7% from 2004~2007
- CO<sub>2</sub> emission intensity continued to decrease: average decrease of 3.4% from 2008~2012, compared to the average decrease rate of 2.8% from 2004~2007.



Source : Bureau of Energy, Ministry of Economic Affairs, Energy Statistics (2013)

# Overall Energy Saving Results

- ✦ **Growth in energy consumption slowed**: Over the past 5 years (2008~2012) average energy growth rate was -0.1%, compared to the average growth rate of 3.3% (2004~2007).
- ✦ **Gradual improvements in energy efficiency**: Over the past 5 years (2008~2012) energy intensity has decreased by 3.0% on average, in contrast with the average decrease of 2.2% from 2004~2007, improvements in energy efficiency have seen more prominent improvements.



Source : Bureau of Energy, Ministry of Economic Affairs, Energy Statistics (2013). Year 2000 as base year.

# Climate issues and impacts in Taiwan

## NATURAL

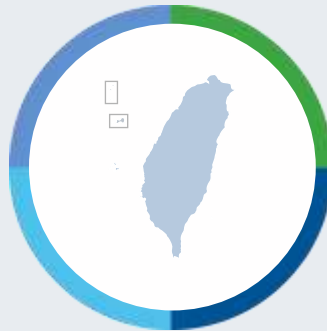


Ref: Digital-typhoon.org, 2009

## RISK EXPOSURE



Ref: hltt88.com.tw, 2014



## VULNERABLE



Ref: THB.gov.tw, 2009

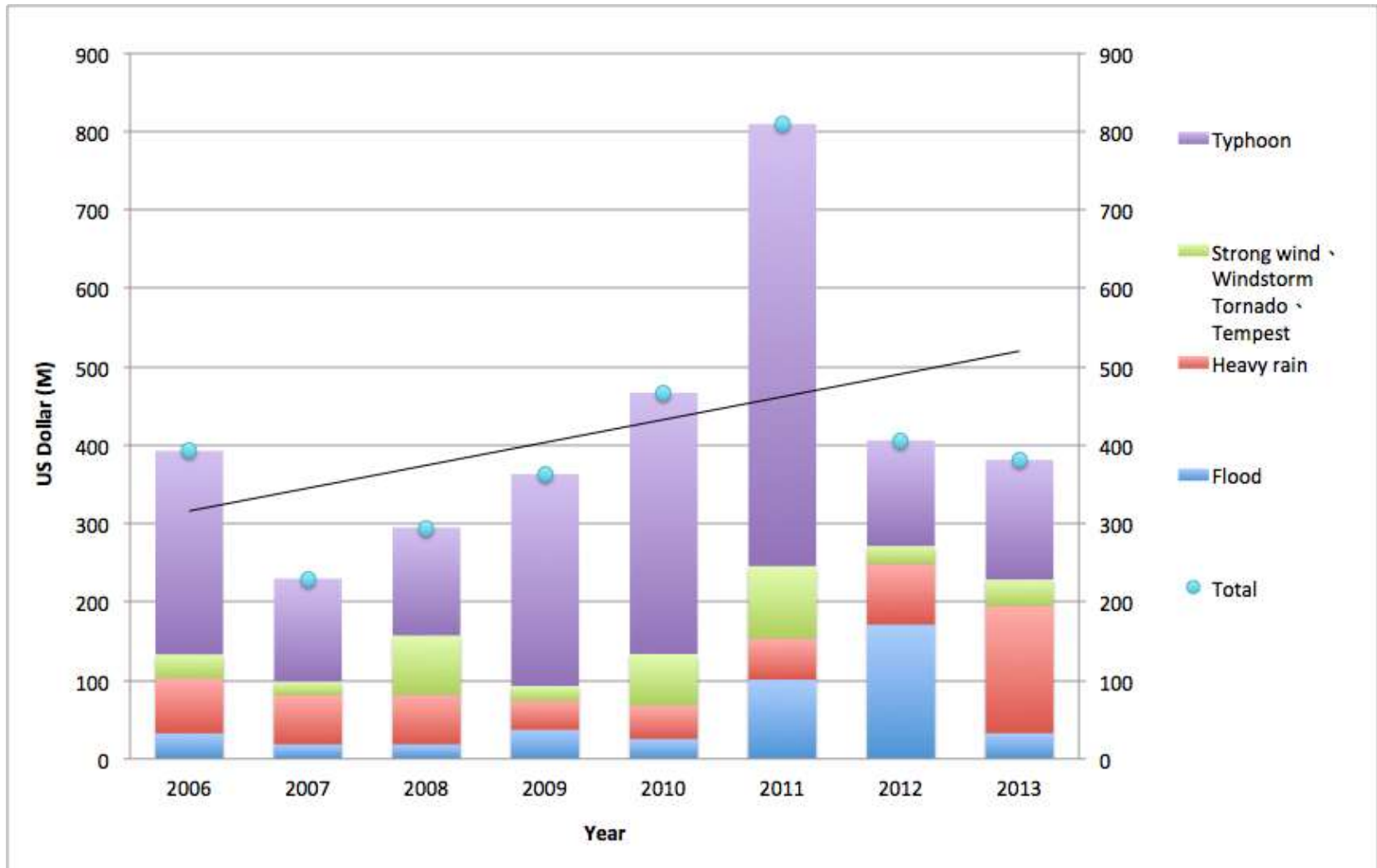
## IMPACT



Ref: WCDR, 2014

# Loss events Taiwan in 2006 – 2013

## Increasing trend of insured losses



Source: Annual statistics for liability and other property insurance (2006-2013), Taiwan Insurance Institute

# Our threats, needs, and vision

## Threats

The nature of vulnerability: extreme precipitation events, seasonal high precipitation variation, and fragile geological settings

The effect of social economical development: flooding and post-hazard issue and water resource shortage

The impact by global climate: sea level rising affect zone, water and energy resource equity



## Needs

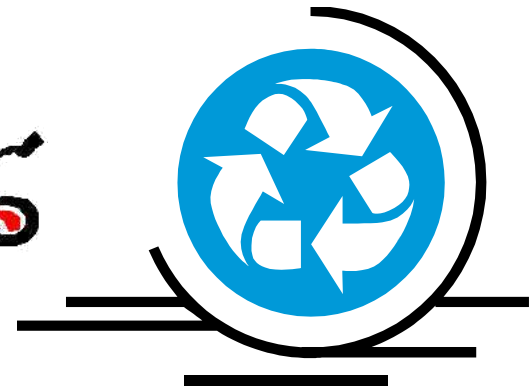
Adaptation strategy  
Mitigation technology  
Climate finance  
Comprehensive legislative framework  
Development of the climate resilience path and the capacity

**Moving toward  
a sustainable society**



**It is the time to decide our future!**

# Environment Benefits and Co-benefits from the Efforts of Health Sector





# Health Care Consumes Resources and Generates CO<sub>2</sub> Emissions



**Energy**



**Waste**



**Water**



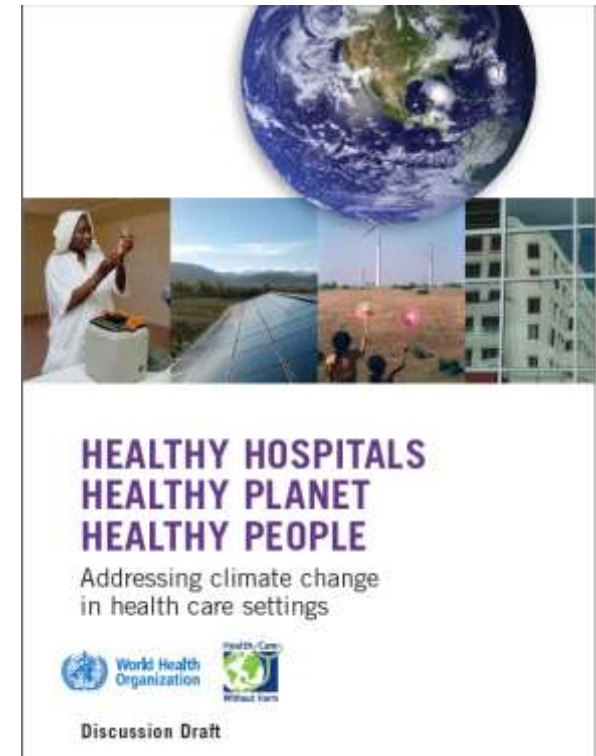
**Transportation**

# Health sector and climate change

1. Identify and manage health impact of climate change
2. Take the leadership for community actions against climate crisis by
  - Raising the **public awareness** of climate crisis;
  - **Leading by example**: reduce health sector's CO<sub>2</sub> emissions by green design and green practices (**environment benefit**);
  - **Promoting healthy living** (healthy eating, green transportation, breastfeeding) and producing **environment co-benefit** at the same time;
  - **Reducing healthcare utilization** by health promotion and disease prevention, and hence reducing CO<sub>2</sub> emissions (**indirect environment co-benefit** )

# WHO and Health Care Without Harm

- Published “Healthy Hospitals, Healthy Planet, Healthy People” in 2008, addressing healthcare facilities’ impact on climate changes and their opportunity to help lead the fight against it.
- 7 elements of a Climate-friendly hospital:
  - Energy efficiency
  - Alternative energy generation
  - Green building design
  - Water
  - Waste
  - Transportation
  - Food




# Global Green and Healthy Hospitals Agenda


## THE TEN GOALS

- 1 **LEADERSHIP**  
Prioritize Environmental Health
- 2 **CHEMICALS**  
Substitute Harmful Chemicals with Safer Alternatives
- 3 **WASTE**  
Reduce, Treat and Safely Dispose of Healthcare Waste
- 4 **ENERGY**  
Implement Energy Efficiency and Clean, Renewable Energy Generation
- 5 **WATER**  
Reduce Hospital Water Consumption and Supply Potable Water
- 6 **TRANSPORTATION**  
Improve Transportation Strategies for Patients and Staff
- 7 **FOOD**  
Purchase and Serve Sustainably Grown, Healthy Food
- 8 **PHARMACEUTICALS**  
Safely Manage and Dispose of Pharmaceuticals
- 9 **BUILDINGS**  
Support Green and Healthy Hospital Design and Construction
- 10 **PURCHASING**  
Buy Safer and More Sustainable Products and Materials


## HCWH, 2011



GLOBAL  
GREEN and  
HEALTHY  
HOSPITALS



A Comprehensive Environmental Health  
Agenda for Hospitals and Health  
Systems Around the World



HealthCare  
Without Harm

[www.noharm.org](http://www.noharm.org)  
[www.greenhospitals.net](http://www.greenhospitals.net)



# ENERGY



# Energy

## Replace

### 1. Heat pump equipment

- 1) Conventional boilers need to diesel to combust , in addition to potential explosion hazards, there are also issues of carbon dioxide emission and heat consumption.
- 2) Heat pump can absorbs ambient heat to generate hot water, carbon dioxide emission is also reduced, nearly a quarter of the energy can be saved.

### 2. Lighting

- 1) Street lighting: change control device from light sensitive to time controlled, to be adjusted according the seasons.
- 2) Frosted light bulbs: replace original 220V with 240V bulbs, to increase bulb service life.
- 3) Toilet light bulbs: switch to infrared sensor switches that automatically switch the lights off when there is nobody.
- 4) Replacing old-style lamps on its own with T5, LED and other energy-saving lamps.

### 3. Other

- 1) Change the air-conditioning of operating rooms from air-cooled to water-cooled.
- 2) Install thermal insulation in order to avoid direct sunlight exposure and achieve thermal insulation effects.
- 3) select inverter-type elevator that are in line with energy efficiency criteria



# Energy

## Reduce

1. Increase ventilation and reduce the use of air-conditioning.
2. Adjust illuminance in accordance with prescribed illumination standards according to the different intended use of each site, replace traditional lighting with more luminously efficient T5 lighting, and adjust lighting numbers in order to meet the requirements.
3. Switch the lights off in turn for different sections and install photoelectric automatic switches for lighting to reduce unnecessary lighting losses.
4. Temperatures are set between 26-28°C.





# Energy

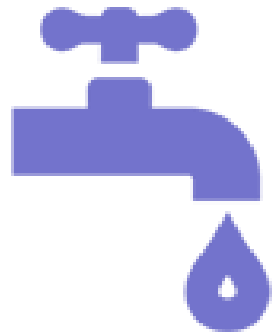
## Other energy saving strategies

### 1. Solar power generation equipment

Set outdoors in the open-air solar power equipment; the solar power systems operate in parallel with Taipower to provide clean energy and to inhibit the peak hours' energy demand.

### 2. Control floor stops and operation time.





# **WATER**



# Water

## Reuse

- Reuse recyclable wastewater for toilet flushing
- Collected the rainwater was to used to irrigate gardens

## Replace

- Replace with water-control equipment and water-saving devices in public toilets and bathrooms in wards

## Recycle

- Recycling water from waste water treatment plant
- Recycling of discarded water from RO water preparation



Low-flow sensor faucets



Pressure reducing valve

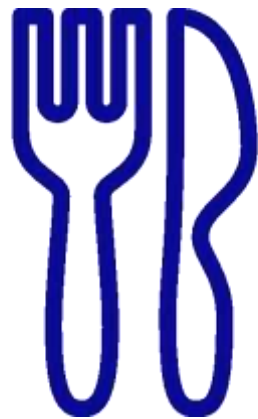


Water-saving toilet



Dual flush toilets





**FOOD**

# Food

- Adopted reusable tableware for patient meals
- Adopted reusable tableware for dining area
- Provide only reusable green cups at meeting rooms without paper cups
- Use only environmental-friendly chopsticks in cafeteria, no longer supply disposable chopsticks
- Avoid using plastic bag for lunch transportation by use of large environmental-friendly food cart





**WASTE**

# Waste

- Refrain from using disposable items such as paper/ plastic plates, cups, bowls & chopsticks
- Mandate the use of reusable items whenever feasible.
- Color-based classification of waste products
- Digital imaging to replace traditional radiographs
- Audit of compliance with waste classification for all units
- Each unit responsible for its cost of waste management to achieve self-surveillance
- Install “Unused drug recycle bin” next to the hospital’s drug information desk







# TRANSPORTATION

# Transportation

- Provide shuttle buses to decrease the chance to drive by individuals
- Promote biking and stair climbing for carbon reduction





***Thank You for Your  
Attention***

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