



*Environment Friendly Hospital Workshop
(Northern Area)*

Green Hospital Experiences Sharing

Taipei Medical University Hospital
(TMUH)



Preface

- To Protect the Earth
- Sustainable Operation
- Corporate Social Responsibility(CSR)
- To Control Cost



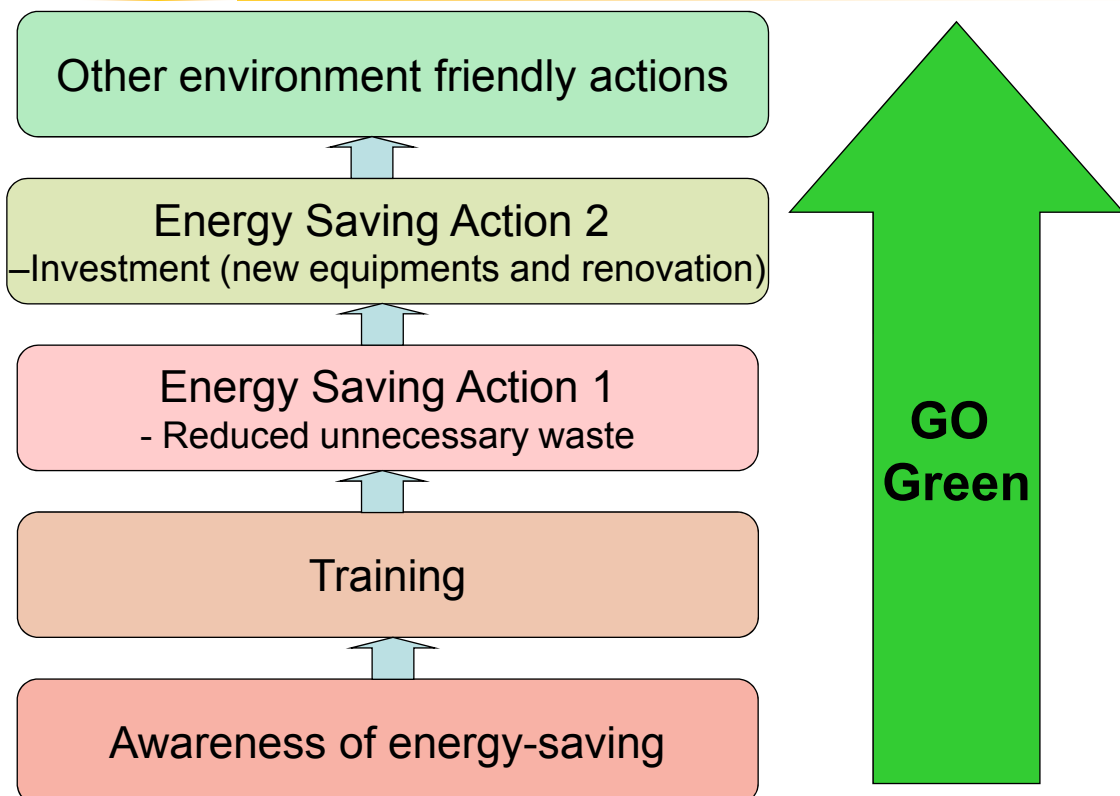


Commencement

- Quick growth of energy cost in 2007
 - Building #3 new opening
- Energy Bureau, the Ministry of Economic Affairs held a 3-year 「Energy saving」 campaign in 2007.
 - Target groups: Hospitals, Hotels and Department stores.
 - Objectives: 5% reduction of energy consumption based on 2007 data.



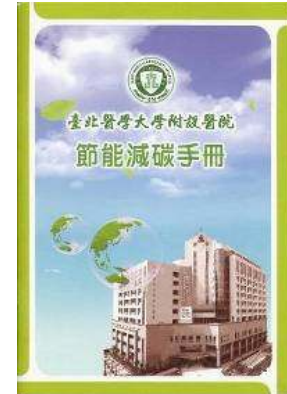
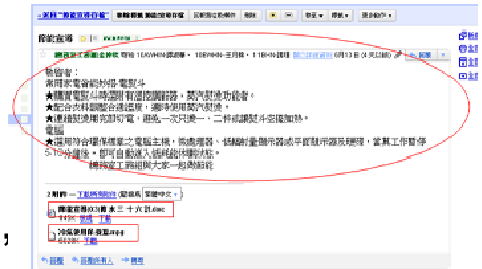
Strategies and Steps





Raising Awareness and Training

1. Information collection: from website, brochures.
2. Employees education: E-mail, Hospital Intranet- Portal system.
3. Clients education: published TMUH Energy saving handbook.
4. Seed teacher training and employee education classes



Energy Saving Actions 1

1. Central monitor system set up, time control:

- 1) Lighting system
- 2) Air conditioning system

2. Light bulbs reduction





Light Bulbs Reduction

Light Fluorescent	1108 Reduced
Electricity	540,088 KWH/ y
Money (\$1,000 NTD)	114
TonCO2e	356



7



Energy Saving Actions 2

A. Changed Fluorescent Lights

- **Fluorescent lamp(T8) → Fluorescent lamp (T5)**
- **Fluorescent lamp (T8) → LED**
- **Halogen light bulbs →LED**



8



Energy Saving Actions 2

■ Lighting: Change to High Efficient LED light blubs

Year	Methods	TonCO2e	Money (\$1,000 NTD)
2008	<ul style="list-style-type: none"> ■ Changed parking lots fluorescent lamps (T8) to (T5). ■ Change Halogen light bulbs to LED. ■ Changed clinic lighting to fluorescent lamps (T5) ■ Building#3 elevator waiting area lights reduction. 	503.69	1,539
2009	<ul style="list-style-type: none"> ■ Change fluorescent lamps (T8) to (T5). ■ Departments Refurbished: all used fluorescent lamps(T5). 	235.08	861
2010	<ul style="list-style-type: none"> ■ Change fluorescent lights (T8) to LED. ■ Art Exhibition: changed Halogen light bulbs to LED. 	1,161.1	4,272

9



Energy Saving Actions 2

B. Air conditioning system improvement

- Merge chilled water systems
- High EER air condition
- High Efficient Refrigerant (Hydrocarbon)
- Installed inverters
- Water Condenser pipes cleaned





Energy Saving Actions 2

■ Air-conditioning:

Year	Methods	TonCO2e	Money (\$1,000 NTD))
2008	<ul style="list-style-type: none"> ■ Used Hydrocarbon Refrigerant ■ Purchased high EER air condition ■ Tightened control temperature 	273.03	877
2009	<ul style="list-style-type: none"> ■ Time control of zone pump in operation rooms ■ Merge chilled water systems (Building#1 and Building#2) ■ Added inverter to chilled water pump (Building#1) 	188.61	691
2010	<ul style="list-style-type: none"> ■ Condenser pipes cleaned ■ Cooling water tower (Building #3) added inverter ■ zone pump added inverter (Building #2) ■ Cooling water tower added inverter (Building #2) 	252.21	958

11



Energy Saving Actions 2

C. Diesel:

- Heat pump
- Water pre-heat system
- High pressure steam tank



12



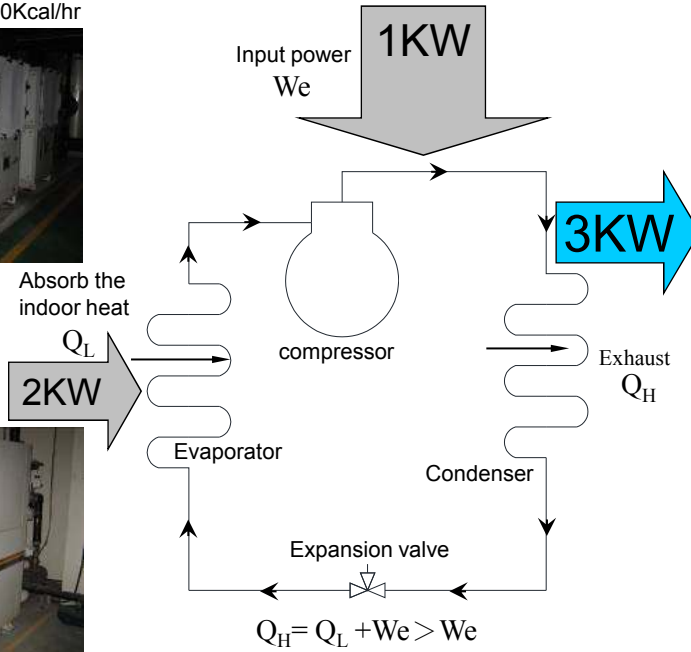
High efficiency heat pump hot water system

air-to-water *7 SETS
 Heating capacity 25300Kcal/hr
 Cooling capacity 18000Kcal/hr



water-to-water *2 SETS
 Heating capacity 25300Kcal/hr
 Cooling capacity 18000Kcal/hr

The building #3



The building #2

Hot water storage tank
 1400GAL*4 2000GAL*1 1000GAL*1
 total:8600GAL



Hot water storage tank
 2000GAL*1 1000GAL*1
 total:3000GAL



Energy Saving Actions 2

■ Diesel:

Year	Methods	TonCO2e	Money (\$1,000 NTD)
2008	■ Heat pump installation	620.66	5,777
2009	■ Installed hot water pre-heating system to water tank	79.84	608

14

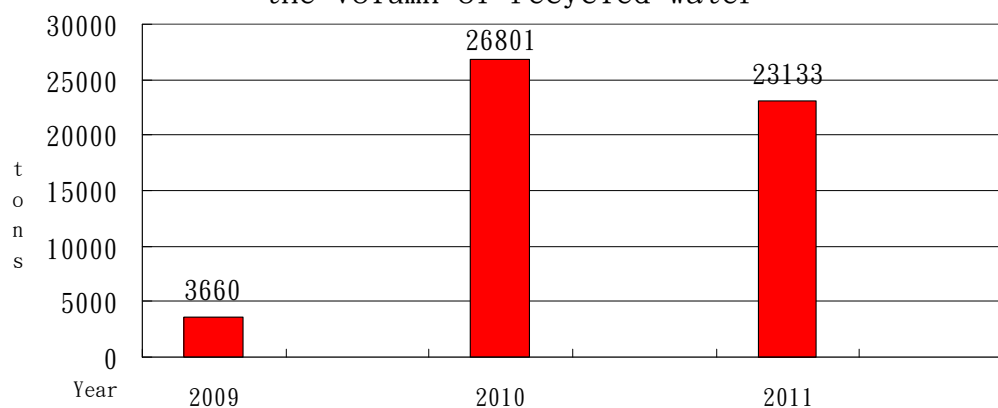


Energy Saving Actions 2

D. Water Recycling

- Rain water
- RO Processed water (clean waste water)

2009~2011 Building no. 3
the volumn of recycled water



15



Energy Saving Actions 2

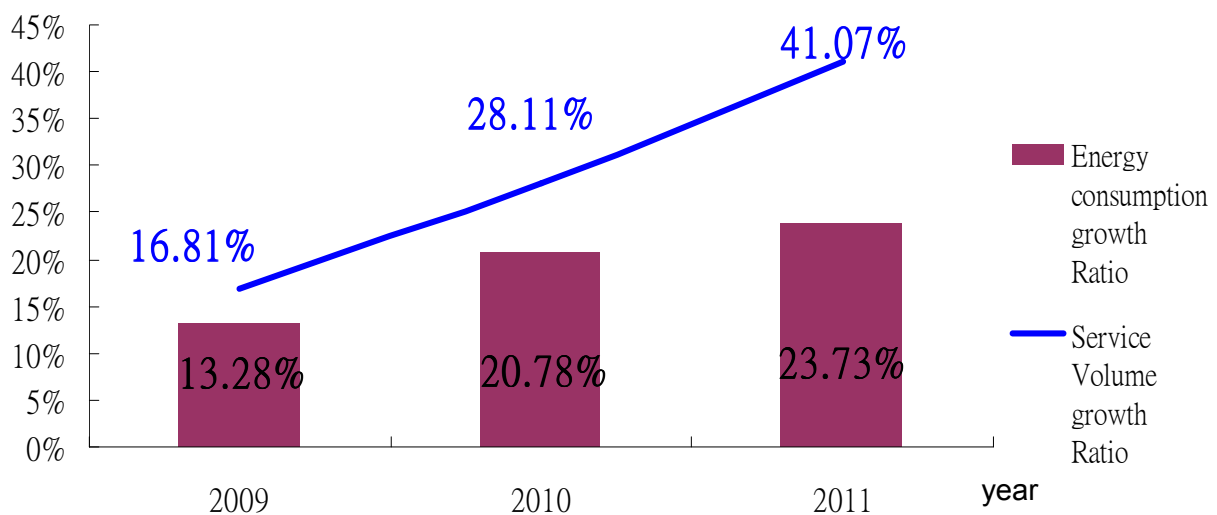
■ Water:

Year	Methods	TonCO2e	Money (\$1,000 NTD)
2009	Recycle the Rainwater and RO Processed water from Dialysis units, ICU and Boiler	0.37	39
2010		2.69	276
2011		2.32	238

16



Effects/ Outcome (compare with 2007)



17



Other Environment Friendly Actions

- Central linen and garbage delivery pipe system
- Free shuttle service
- Green Procurement
- Green Food
- Green Office



18



Free Shuttle Service

- Provide shuttle service for patients, stops include [MRT City Hall](#), [MRT Liuchangli](#), [Songshan Train Station](#),
 - Service volume: 5,000 people per month.
- Taking public transportation (MRT) thus achieving the purpose of energy saving and carbon reduction.



19



Green Procurement

Year	Total purchase amount (1,000 NTD)
2009	7,978
2010	9,702
2011	20,680





Green Food

Encouragement- Reducing Waste



NTD 5 Discount if staff brings their own tableware

21



Green Food - Meatless Day



All you can eat for NTD 55

- Healthy
- Low Carbon

Once or twice a month meatless day to attract people who love to eat vegetables



22



Green Office – Hospital wise IT system

Equals to 1.5 Da-An Forest Park

- Saved **0.4** million papers per year
- Simplified procedures, increased efficiency

Top 1 Green Brand in HealthCare Industry

Electronic Official Documents system



Maintenance Application System

Knowledge Management System



Conference Room Reservation System

IT Application System



TMS Education System

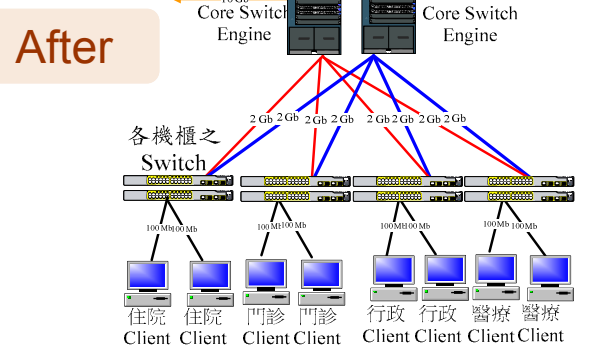
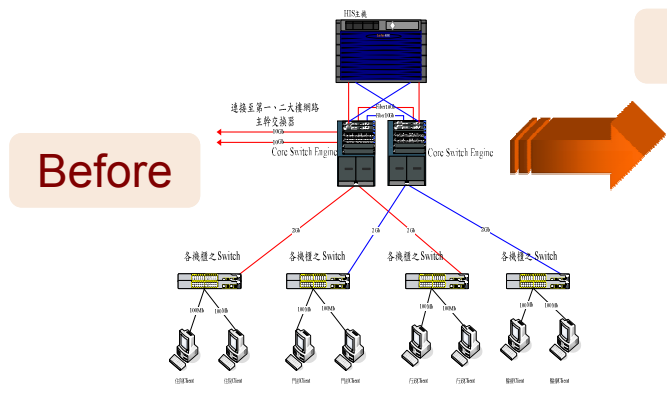
類別	冠軍企業	類別	冠軍企業
資訊/通訊設備及其周邊	SONY 索尼(SONY)	日常生活用品	BURT'S BEES 小蜜蜂爺爺(BURT'S BEES)
家電	Panasonic 台灣松下(Panasonic)	零售通路	7-ELEVEN
交通運輸	豐田 TOYOTA (TOYOTA)	觀光休閒	TEMPIUS 永豐棧酒店
食品飲料	可口可樂 (Coca-Cola)	醫療服務	台北醫學大學附設醫院
餐飲服務	星巴克 (STARBUCKS)	金融服務	匯豐銀行



Green Office - Cloud Technology

- Virtualized platform and Automatic data center
- Improved efficiency and hardware utilization.

- Saved up to 50-70% IT cost
- Electricity saved up to 30%
- Hardware cost ↓ 50%





Awards

- Awarded 「Green Organization」 in August, 2011.
- **Totally saved 21% energy, achieved the desired goal in July, 2011.**
- Awarded 「Green Procurement Hospital」 in 2010~2011.



Green Organization Award



Green Procurement Hospital

25



Conclusion

- Environmental friendly for sustainable operation
- Future Strategies:
 - Green building concept
 - Use clean energy
 - Recycling reinforcement
- Leadership support

26