

# Energy Governance in Taiwan: policy transition and challenge

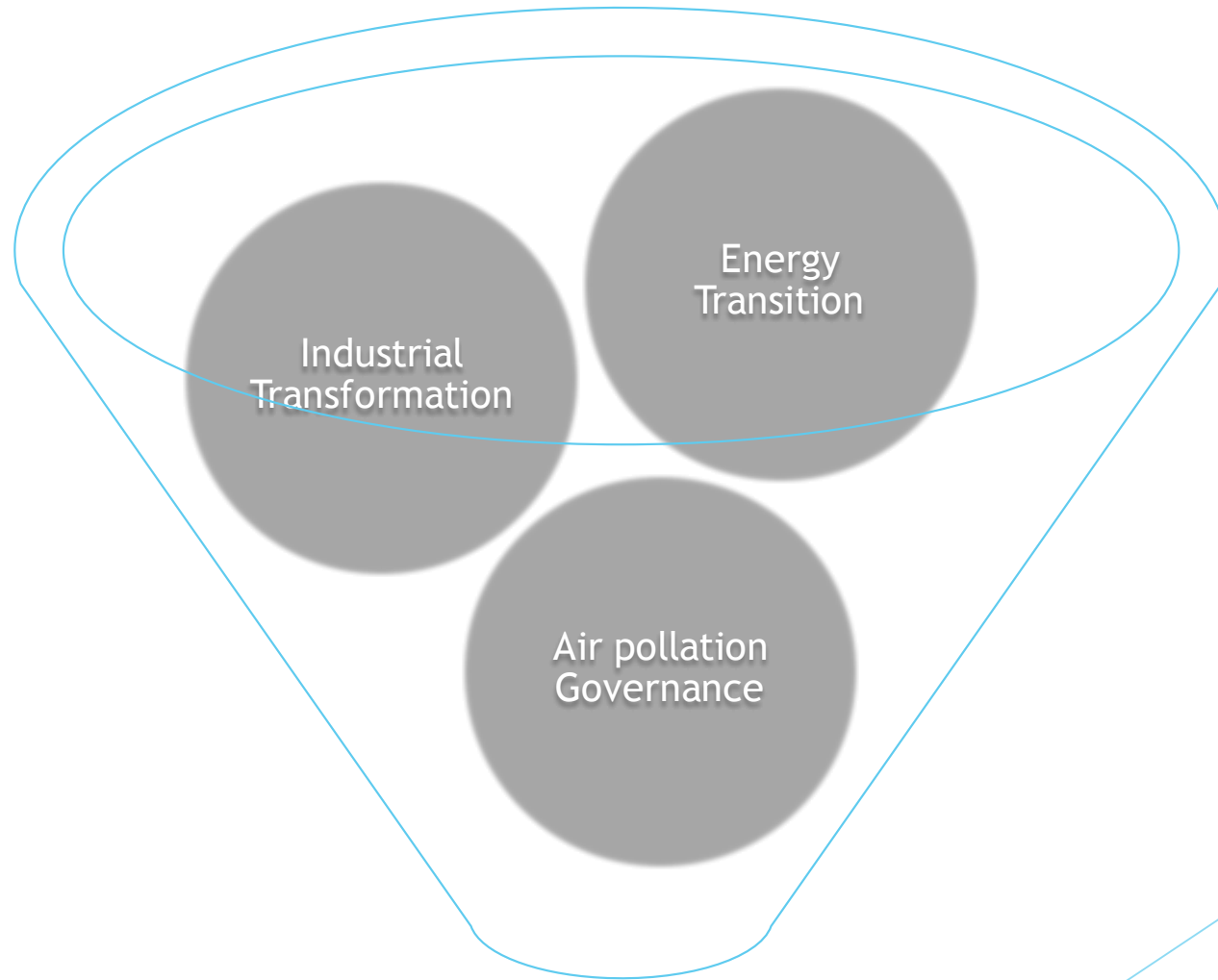
Liling Huang

Graduate Institute of Building and Planning

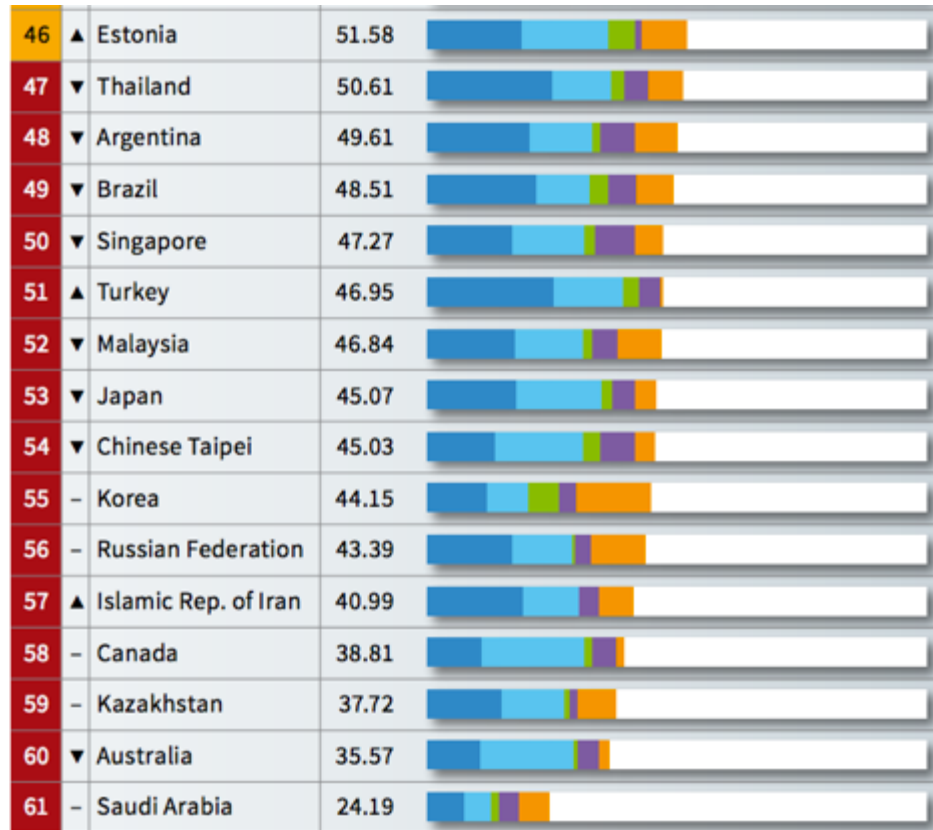
National Taiwan University

[liling@ntu.edu.tw](mailto:liling@ntu.edu.tw)

# Energy Governance and Low Carbon Society



# Climate Change Performance Index 2015



▲ comparison with previous year

© Germanwatch 2014

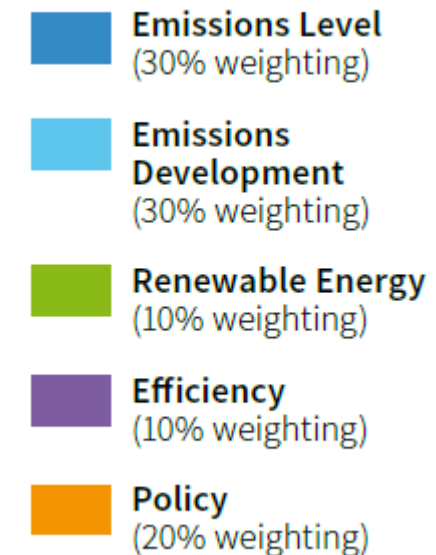
## Rating



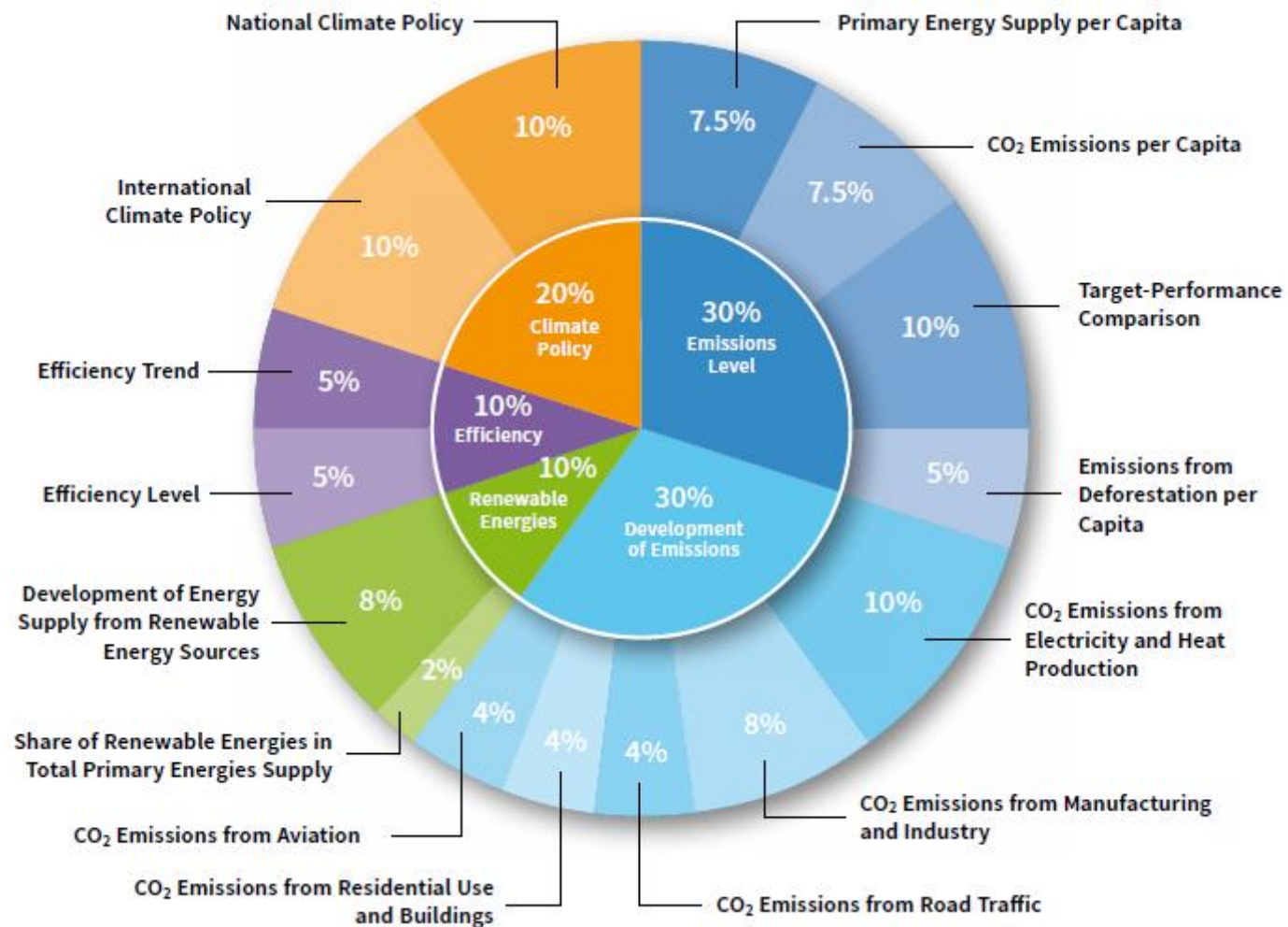
\* None of the countries achieved positions one to three. No country is doing enough to prevent dangerous climate change.

\*\* rounded

## Index Categories



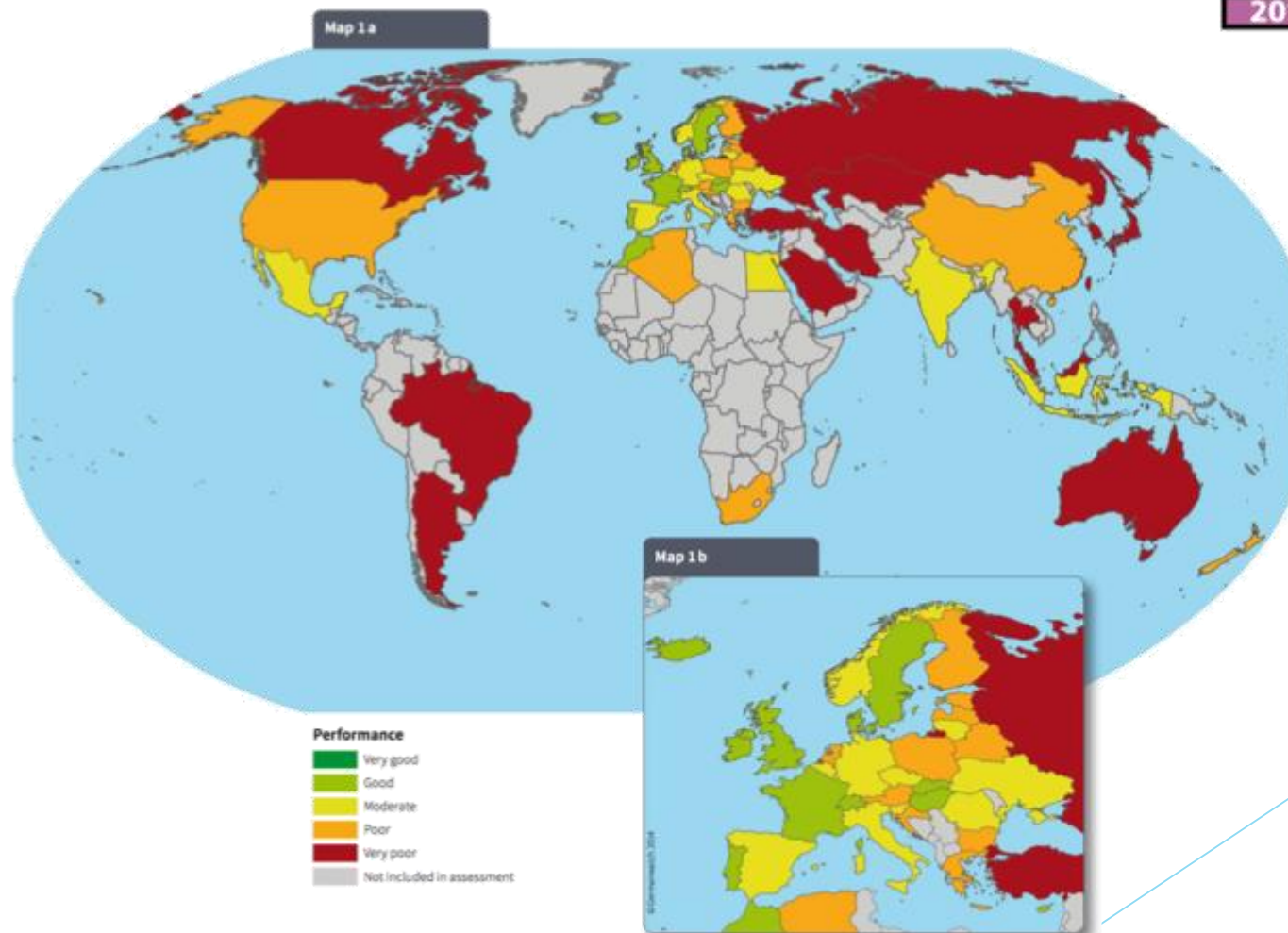
54 ▼	Chinese Taipei	45.03	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
55 –	Korea	44.15	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>



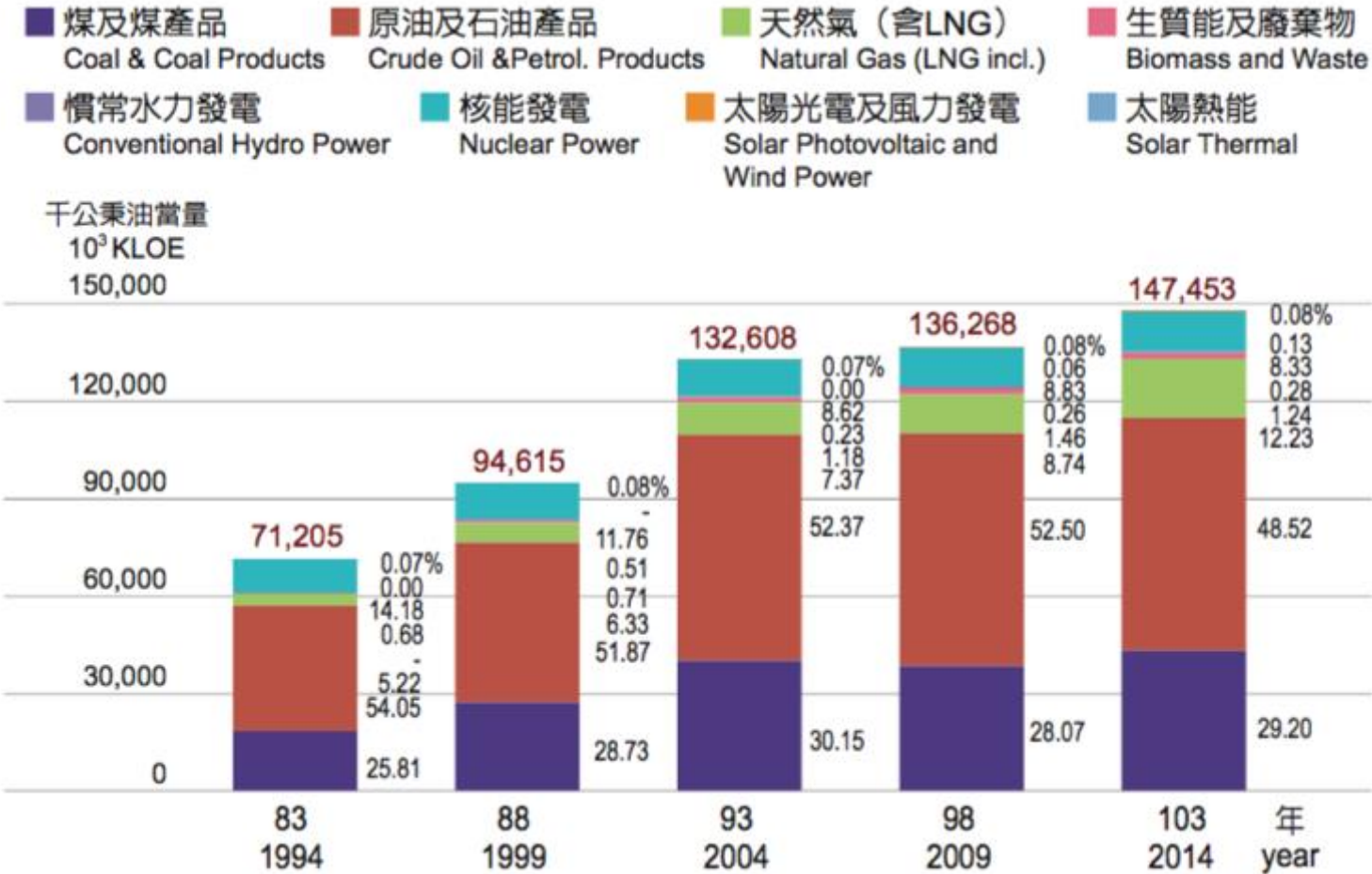
## Key data for all countries covered by the CCPI

Country	CCPI Rank*		Share of Global GDP	Share of World Population	Share of Global CO <sub>2</sub> Emissions**	Share of Global Primary Energy Supply
	2015	2014				
Chinese Taipei	54	53	0.97%	0.33%	0.76%	0.78%
Korea	55	55	1.69%	0.71%	1.75%	1.97%

## CCPI 2015 • Overall Results • World Map



# Energy Structure in Taiwan





year	Institution	year	Environmental Crisis and Movement
1998	National Energy Conference	1986	Anti-Dupont Movement
2001	National Council for sustainable development	late 1980s	Anti-nuclear movement
2005	The 2 <sup>nd</sup> National Energy Conference	1995	Anti-Binnan Industrial Park
2006	National Sustainable Economy Conference	1998	Anti-Bayer Chemical Plant movement
2009	The 3 <sup>rd</sup> National Energy Conference	2008	Taichung High-tech Park Pollution
2009	Green Economy and New Energy Industry Flagship Plan	2010	Anti- Kuokuang Petrochemical Plant movement
2010	Low Carbon Economy and Society Plan	2012	Taichung High-tech Park and water crisis
2012	Development Guideline for Energy Policy		
2012	National Climate Change and Adaptation		



The map illustrates the distribution of power generation facilities across Taiwan. Key locations labeled include:

- Nuclear Power Plants:** 核能二廠 (Nuclear 2), 核能一廠 (Nuclear 1), 核能三廠 (Nuclear 3).
- Coal Power Plants:** 林口新火力(施工中) (Linyi New Coal Plant (Under Construction)), 長生火力 (Changsheng Coal Plant), 大潭火力 (Datan Coal Plant), 國光火力 (Guoguang Coal Plant), 石門火力 (Shimen Coal Plant), 新桃火力 (Xintaohua Coal Plant), 通霄火力 (Tongxiao Coal Plant), 通霄新火力(施工中) (Tongxiao New Coal Plant (Under Construction)), 台中火力 (Taichung Coal Plant), 星能火力 (Xingneng Coal Plant), 馬鞍水力 (Ma'an Hydro), 谷關水力 (Guguan Hydro), 德基水力 (Deji Hydro), 大觀二廠抽蓄 (Daguan 2nd Pumped Storage), 大觀一廠 (Daguan 1st), 明潭抽蓄 (Mingtan Pumped Storage), 萬大擴充暨松林水力 (Wanda Expansion and Songlin Hydro), 萬里水力(政府審查) (Wanli Hydro (Government Review)), 一和平火力 (Yiheping Coal Plant), 碧海水力 (Bishui Hydro), 龍門電廠(封存中) (Longmen Power Plant (Sealed)), 深澳電廠更新改建計畫(規劃中) (Shan'ao Power Plant Update and Reconstruction Plan (Planning)), 協和電廠更新改建計畫(規劃中) (Xiehe Power Plant Update and Reconstruction Plan (Planning)).
- Hydro Power Plants:** 翡翠水力 (Feicu Hydro), 碧海水力 (Bishui Hydro), 一和平火力 (Yiheping Coal Plant), 萬大擴充暨松林水力 (Wanda Expansion and Songlin Hydro), 萬里水力(政府審查) (Wanli Hydro (Government Review)), 一和平火力 (Yiheping Coal Plant), 碧海水力 (Bishui Hydro), 德基水力 (Deji Hydro), 谷關水力 (Guguan Hydro), 天輪水力 (Tianlun Hydro), 馬鞍水力 (Ma'an Hydro), 星能火力 (Xingneng Coal Plant), 通霄新火力(施工中) (Tongxiao New Coal Plant (Under Construction)), 通霄火力 (Tongxiao Coal Plant), 台中火力 (Taichung Coal Plant), 大潭增建火力(規劃中) (Datan Expansion Coal Plant (Planning)), 國光火力 (Guoguang Coal Plant), 石門水力 (Shimen Hydro), 新桃火力 (Xintaohua Coal Plant), 長生火力 (Changsheng Coal Plant), 林口新火力(施工中) (Linyi New Coal Plant (Under Construction)), 核能二廠 (Nuclear 2), 核能一廠 (Nuclear 1), 核能三廠 (Nuclear 3).
- Pumped Storage Power Plants:** 大觀二廠抽蓄 (Daguan 2nd Pumped Storage), 大觀一廠 (Daguan 1st), 明潭抽蓄 (Mingtan Pumped Storage).
- Other Power Plants:** 尖山火力 (Jianshan Coal Plant), 森霸火力 (Senba Coal Plant), 曾文水力 (Zengwen Hydro), 興達火力 (Xingda Coal Plant), 南部火力 (Nanpu Coal Plant), 大林火力 (Dalin Coal Plant), 大林新火力(施工中) (Dalin New Coal Plant (Under Construction)), 塔山增建火力(規劃中) (Tashan Expansion Coal Plant (Planning)), 塔山火力 (Tashan Coal Plant), 金門 (Kinmen), 馬祖 (Matsu), 澎湖 (Penghu), 綠島 (Lüdao), 雙溪 (Shuangxi).

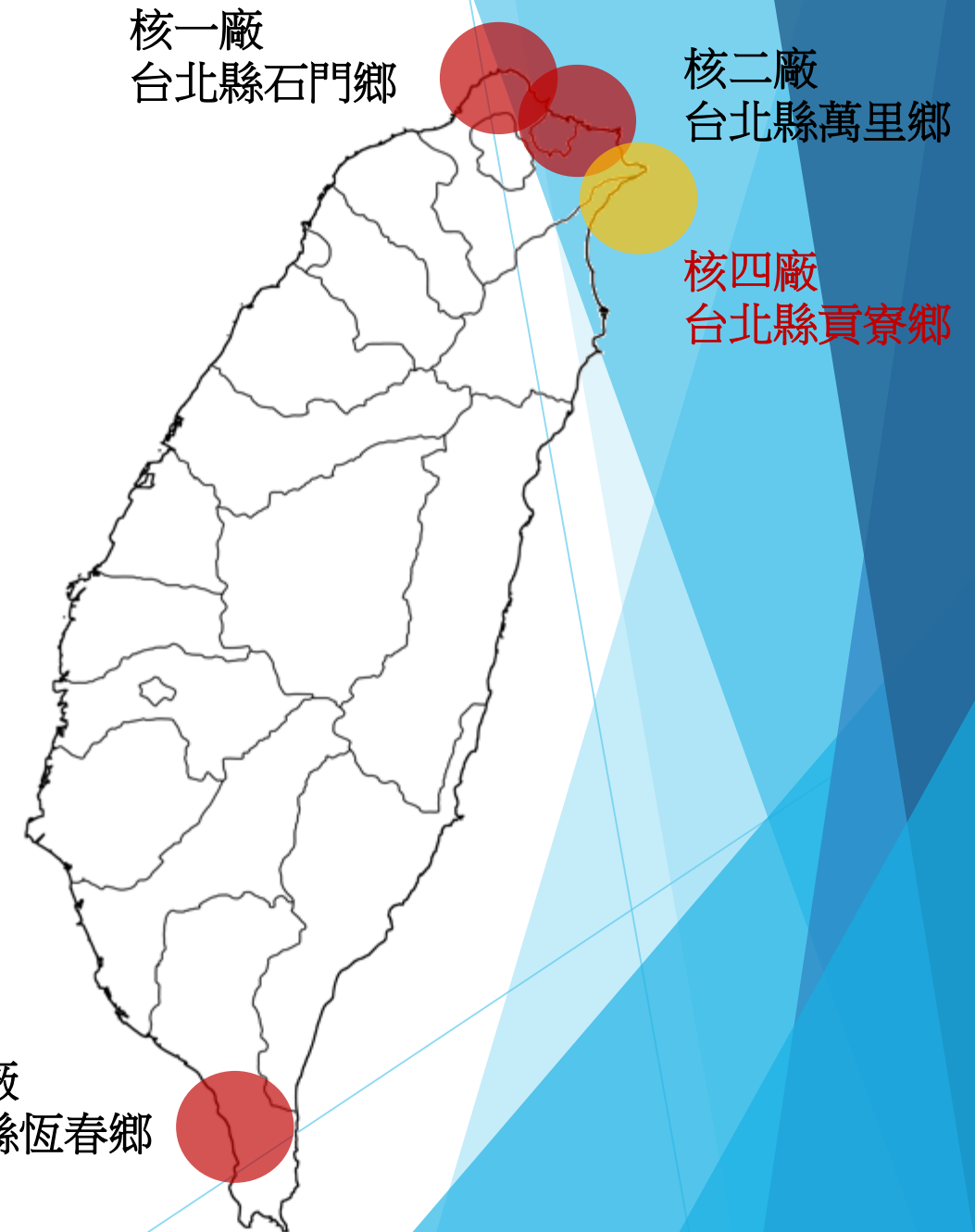
**Legend:**

- 核能電廠 (Nuclear Power Plant)
- 核能計畫 (Nuclear Plan)
- 火力電廠 (Coal Power Plant)
- 火力計畫 (Coal Plan)
- 水力電廠 (Hydro Power Plant)
- 抽蓄水力 (Pumped Storage Hydro)
- 超高壓變電所 (Ultra-high Voltage Substation)
- 一次變電所 (Primary Substation)
- 超高壓輸電線345KV (Ultra-high Voltage Transmission Line 345KV)
- 一次輸電線161KV (Primary Transmission Line 161KV)
- 民間電廠 (Private Power Plant)

# Locations and Types of Power Plants



# Nuclear Power



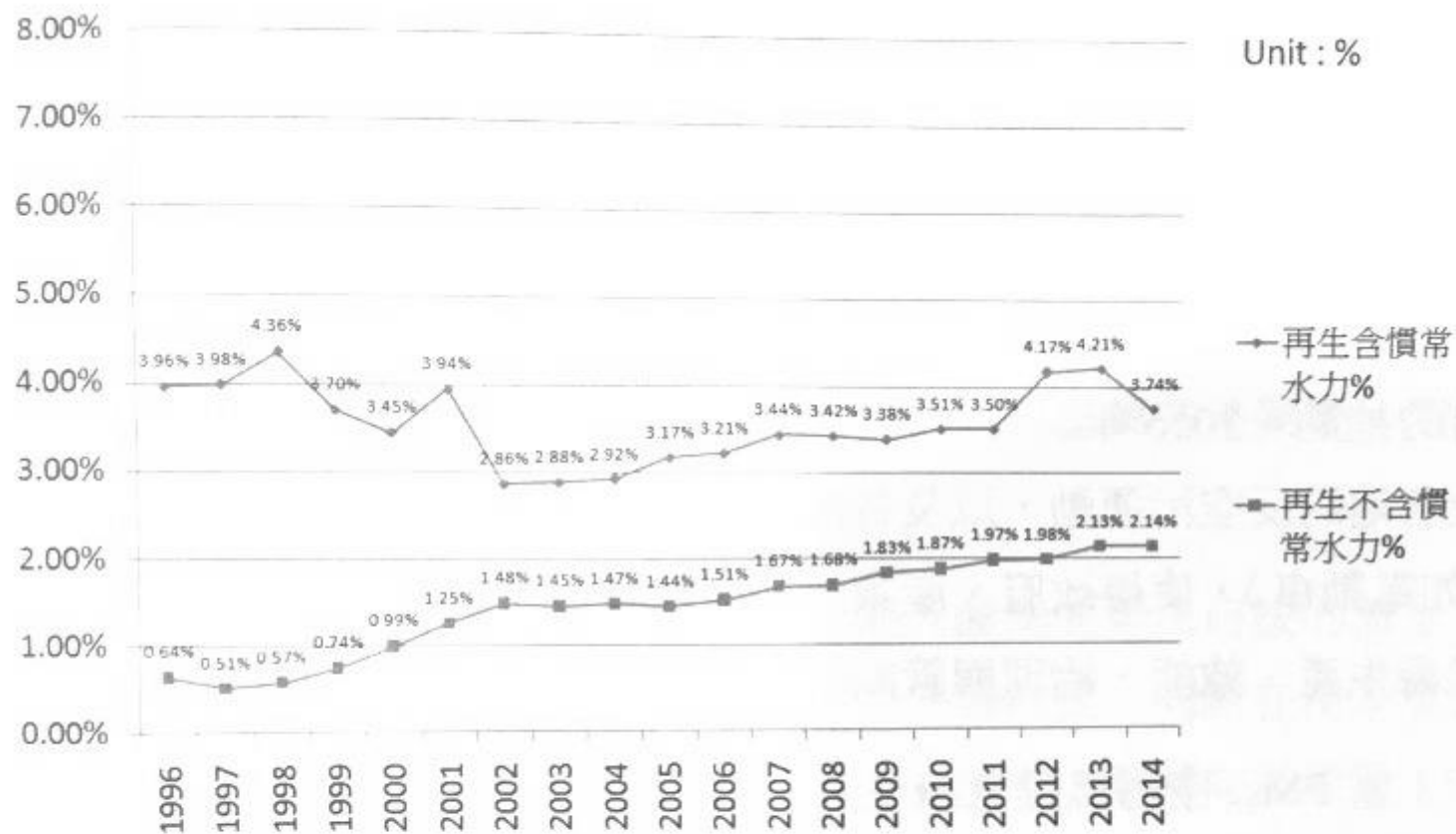
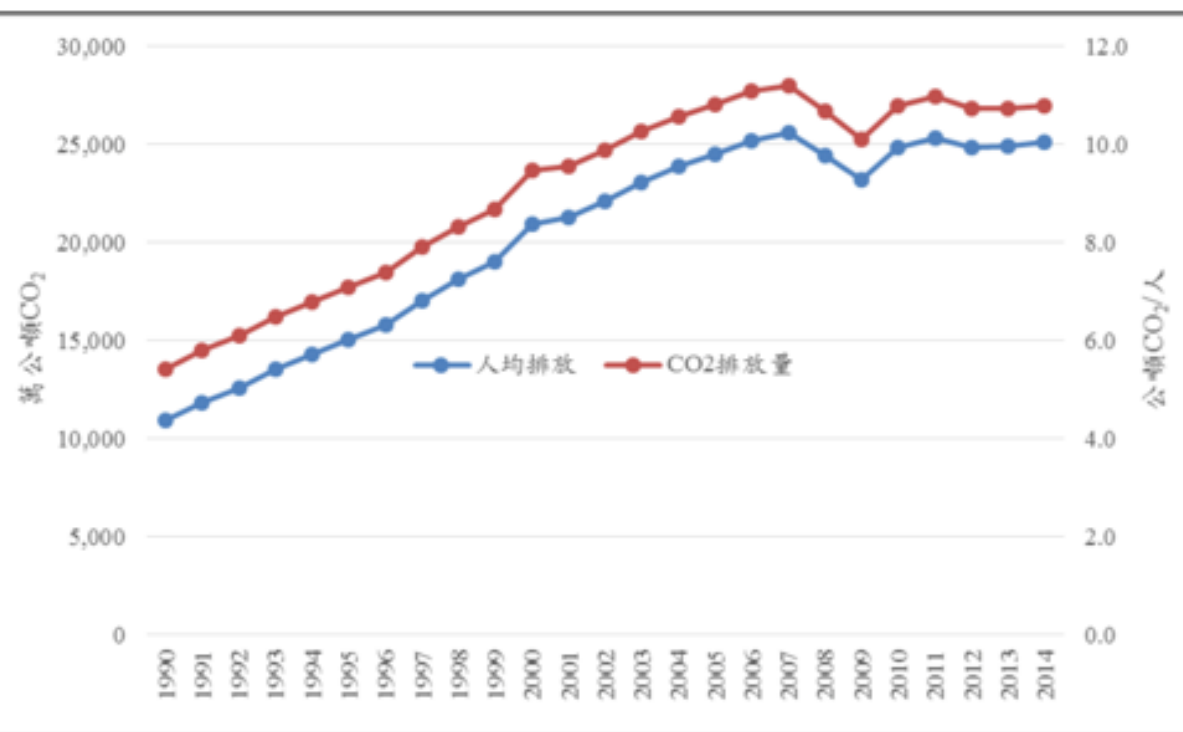


圖 1-2 歷年臺灣再生能源佔全國發電量比

資料來源：能源局（2015）。作者製表。

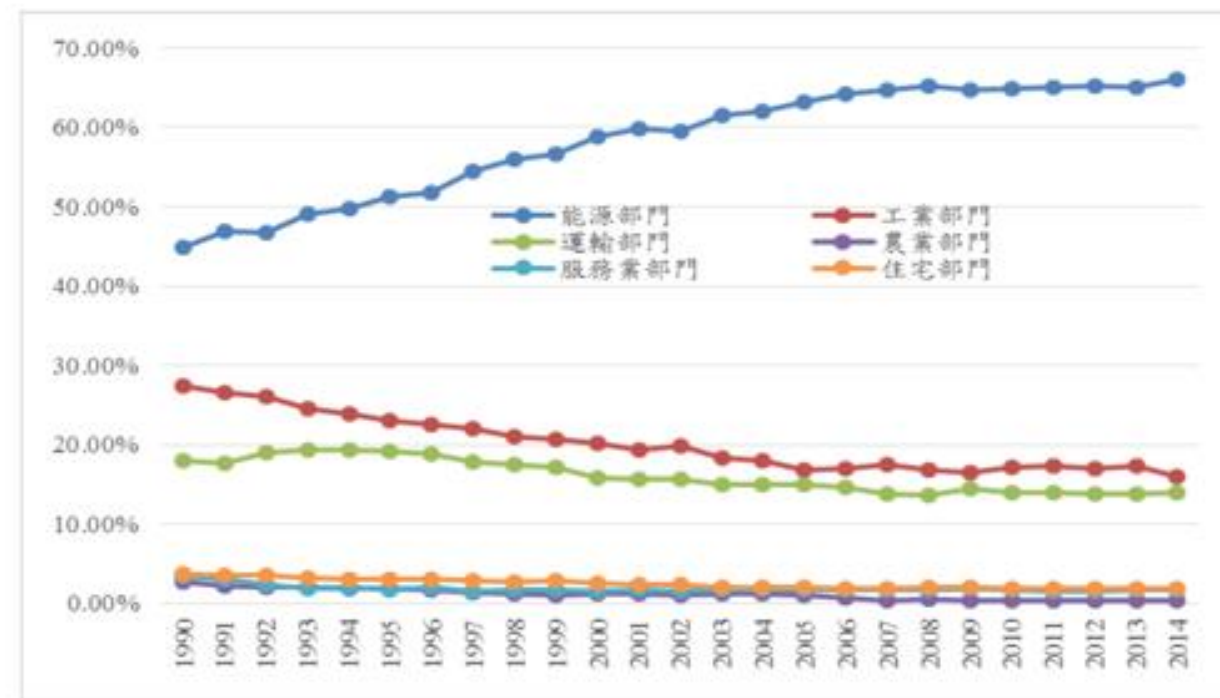
### （三）沒有藍天：空污 $PM_{2.5}$ 、運輸、禁燒生煤衝突

# GHG Emission



資料來源：經濟部能源局，2015年6月。

圖 1 燃料燃燒 CO<sub>2</sub> 排放量與人均排放趨勢圖

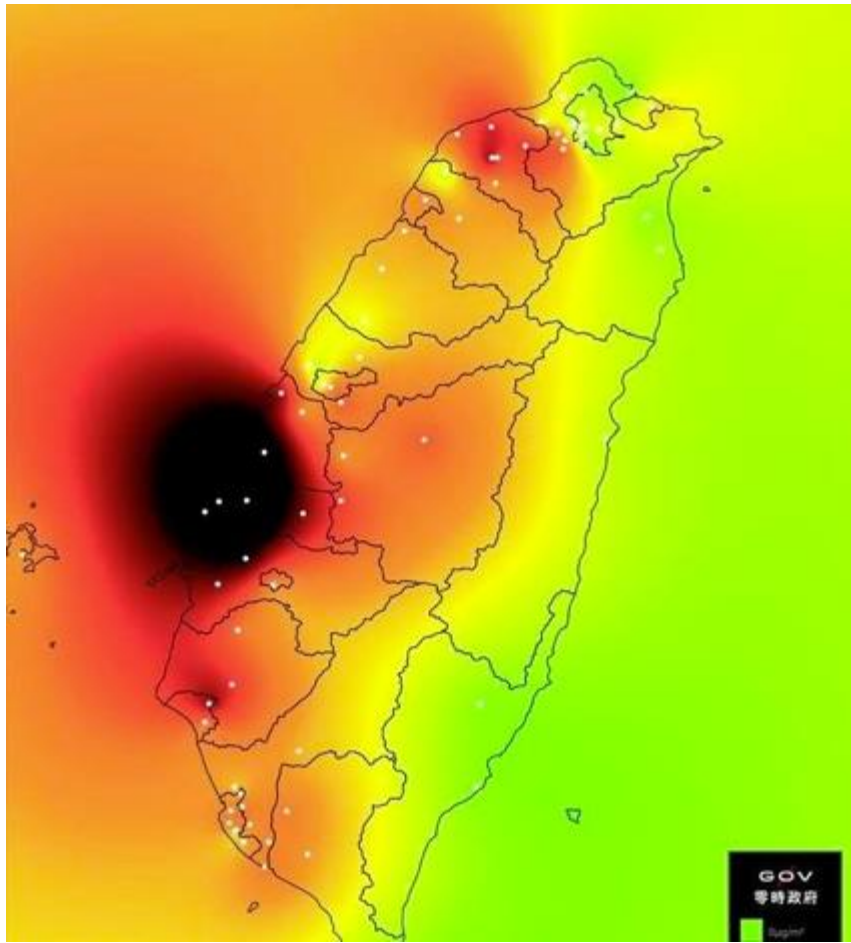


資料來源：經濟部能源局，2015年6月。

圖 3 各部門燃料燃燒 CO<sub>2</sub> 排放量趨勢(不含電力消費排放)



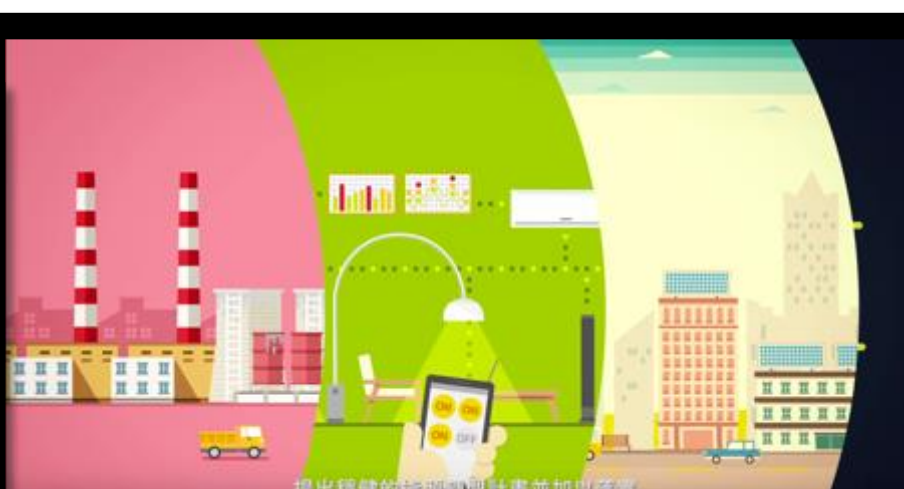
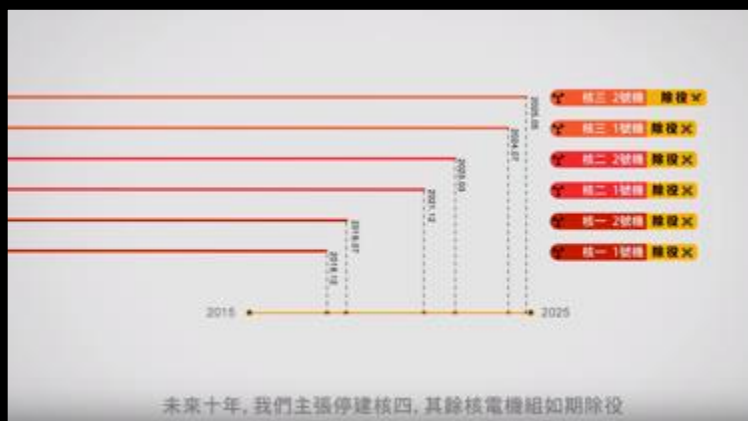
PM 2.5



南風







# Energy Governance at the Central Government Level

- ▶ Three decades of anti-nuclear movement represents ideological struggles without concrete progress for renewable energy
- ▶ Industrial transition: moving out to China replacing upgrading and innovation
- ▶ Energy **democracy, decentralization** or green empowerment issue hardly concerned

# Taipei as a Compact City

- ▶ (1) High density, small blocks, mixed land-use,
- ▶ (2) Barrier free and friendly design for pedestrians and bikes,
- ▶ (3) Open spaces links to various type of activities
- ▶ Other strength:
  - ▶ Recycling policies,
  - ▶ Protection of trees, monuments and historical buildings

# 2012: Climate Change Adaptive Plan by the Council for Economic Planning and Development + Taipei city

- ▶ Approach: strategic planning, rolling wave planning, and bottom-up approach
- ▶ Goal:
- ▶ (1) to establish the climate change adaptation planning framework and platform;
- ▶ (2) to analyzes the trends and the impact of climate change;
- ▶ (3) to clarify the impact of climate change in key sector with the concept of vulnerability;
- ▶ (4) analysis the impact of climate change vulnerability;
- ▶ (5) analysis of the key issues;
- ▶ (6) review both policy and related programs; (7) proposal of climate change adaptation strategy and action plan.

# Challenges for Energy Plan of Taipei

- ▶ Prone to flooding and landslide caused by frequent rainstorms
- ▶ Rising demand; stability of supply and diversity of sources
- ▶ Energy plan should be incorporated into urban planning development review and urban renewal review.





## 【羅斯福路-辛亥路段】

水波紋意象休憩廣場



自行車專用道

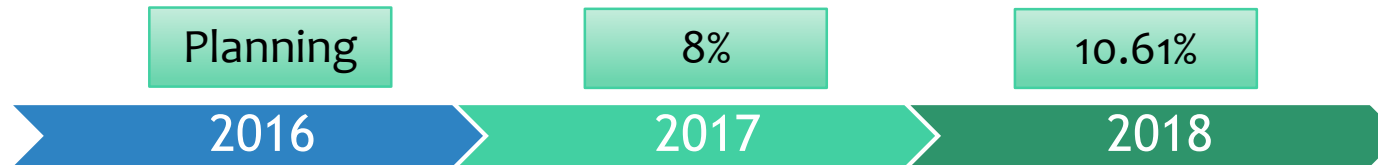
水波紋地磚  
瑠公圳意象

# Learning From Seoul



# Reduce Nuclear Power Consumption Plan Taipei 2016

Saving energy consumption to 18.61% by 2018



New Energy 0.28%

Energy Saving 11.17%

Building Energy Efficiency 2.98%

Green Transportation 4.19%

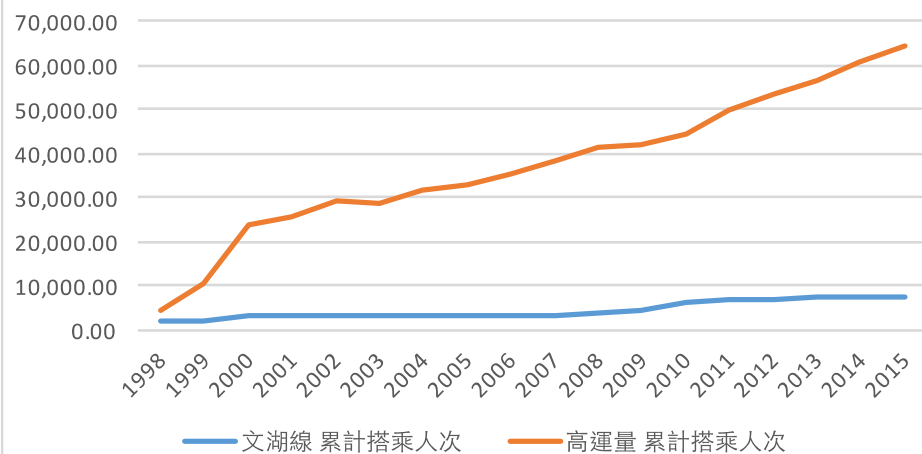
18.61%



# Green Transport in Taipei City: Mass Transit System

◦

台北市捷運各年度旅運量統計資料



各年度旅運量統計資料 (101年~104年)

年度		101年	102年	103年	104年
文湖線	累計搭乘人次	6,986.1	7,140.6	7,478.0	7,462.0
	平均每天搭乘人次	19.09	19.56	20.48	20.44
高運量	累計搭乘人次	53,233.9	56,355.5	60,472.6	64,289.2
	平均每天搭乘人次	145.45	154.40	165.67	176.13

各年度旅運量統計資料 (95年~100年)

年度		94年	95年	96年	97年	98年	99年	100年
文湖線	累計搭乘人次	3,146.9	3,156.4	3,382.2	3,535.3	4,272.3	5,915.1	6,802.8
	平均每天搭乘人次	8.62	8.65	9.27	9.66	11.70	16.21	18.64
高運量	累計搭乘人次	32,926.0	35,238.3	38,240.7	41,467.2	41,974.9	44,631.6	49,837.7
	平均每天搭乘人次	90.21	96.54	104.77	113.30	115.00	122.28	136.54

各年度旅運量統計資料 (87年~93年)

年度		87年	88年	89年	90年	91年	92年	93年
文湖線	累計搭乘人次	1,812.2	2,139.4	3,054.7	3,208.9	3,261.8	3,021.2	3,173.6
	平均每天搭乘人次	4.96	5.86	8.35	8.79	8.94	8.28	8.67
高運量	累計搭乘人次	4,261.6	10,555.8	23,817.0	25,755.4	29,181.6	28,597.7	31,840.6
	平均每天搭乘人次	11.68	28.92	65.07	70.56	79.95	78.35	87.00

- 單位為萬人次
- 高運量包含淡水信義、松山新店、中和新蘆、板南線

# MRT Taipei





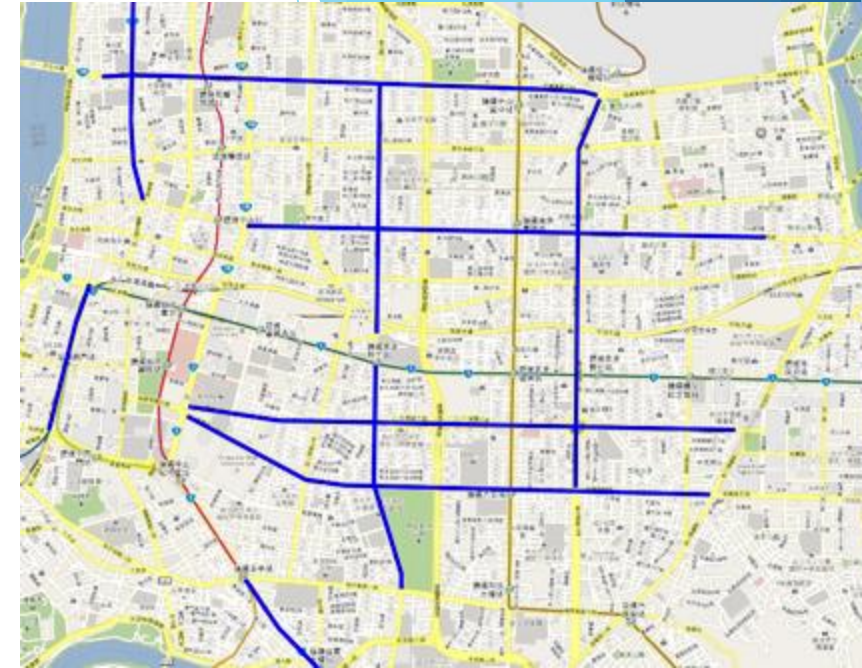
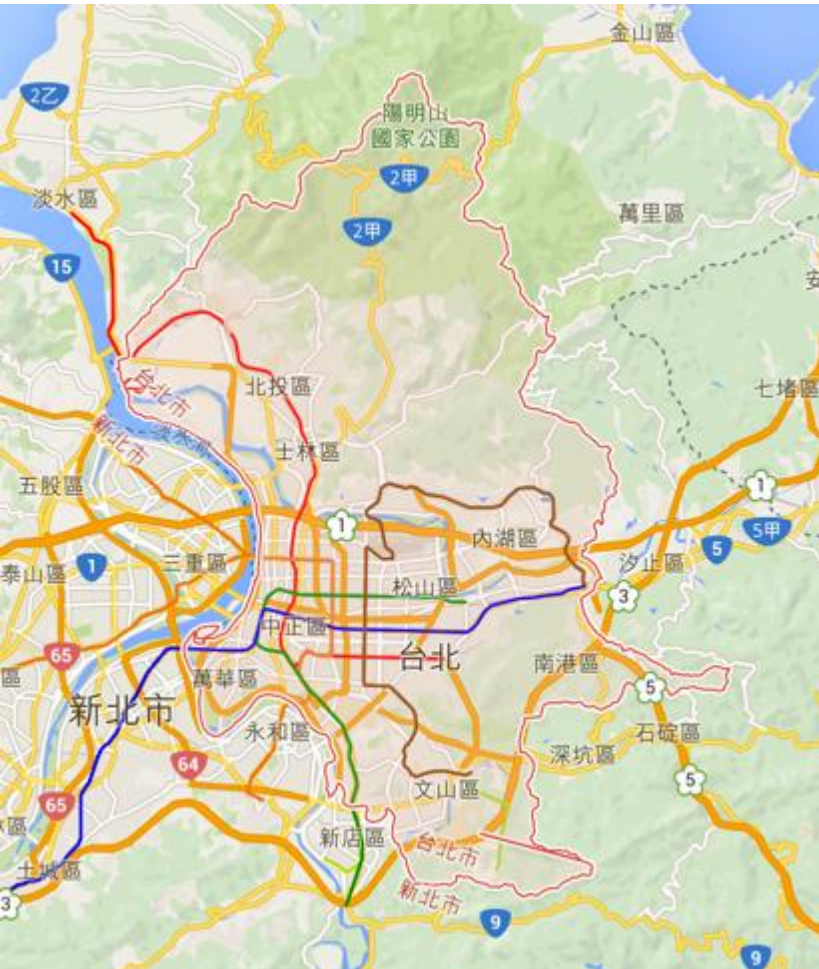
# MRT Taipei

- ▶ 500 meter walk distance to MRT station





# Bus Exclusive way





# You-Bike

- ▶ You-bike成長以及使用
- ▶ 自行車專用道共：572條
- ▶ 總長度：379769公尺

2015-03-16	YouBike使用次數突破4000萬人次
2014-10-22	YouBike使用次數突破3000萬人次
2014-07-19	YouBike 完成163站 5350台車
2013-11-08	YouBike使用次數突破1000萬人次
2013-08-14	YouBike 突破100站
2013-06-28	YouBike使用次數突破500萬人次
2012-11-30	YouBike試營運期結束已超過百萬騎乘數
2012-08-30	「臺北市公共自行車租賃計畫營運」試營運啟動
2009-03-11	「臺北市公共自行車示範計畫營運」啟用



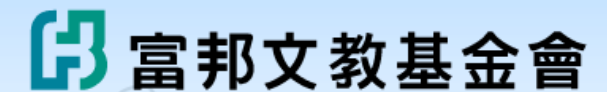




## NGOs: multi-mobilization roadmap + social robustness



TREN A  
台灣再生能源推動聯盟



# HAND e V.:

## Citizen solar power plant

### 汗得在做的三件事

汗得「說到做到」，戮力推動「能源教育」。

公民，就是能源。透過協力，我們一起改變生活與世界。



協力造屋

懷抱理想，堅持方向。蓋房子是我們的溝通方式。讓每一個參與者都可以發現夢想與熱情，體驗居住與能源的手作感，在舊文化中建立起新文化。



小小建築師

一個孩子參與的「蓋房子」計畫。從「好好作一個我」開始，動手量測、計算比例，拿起工具，鑿榫眼、削木釘、鋸木頭、玩泥巴。用自然的色彩與健康的方式，一起蓋「自己的房子」。



一人一千瓦

太陽能不僅無所不在，也是我們最初與最後的再生能源。從在地實踐到國際連結，讓我們一起不只「說」再生能源，更要「做」公民電廠，成就自己的能源未來。



# Energy Empowerment



# Energy Governance in Taipei city

- ▶ Weak linkage between vision plan, action plans and policy
- ▶ Little cross-bureau collaboration within the government
- ▶ Not challenging developmentalist urbanization based on high energy consumption