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Overview of Renewable Energy in Chinese Taipei

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Outline



- Energy Situation in Chinese Taipei
- Sustainable Energy Policy
- Master Plan on Energy Conservation and Emission Reduction
- Development of Renewable Energy
- Concluding Remarks



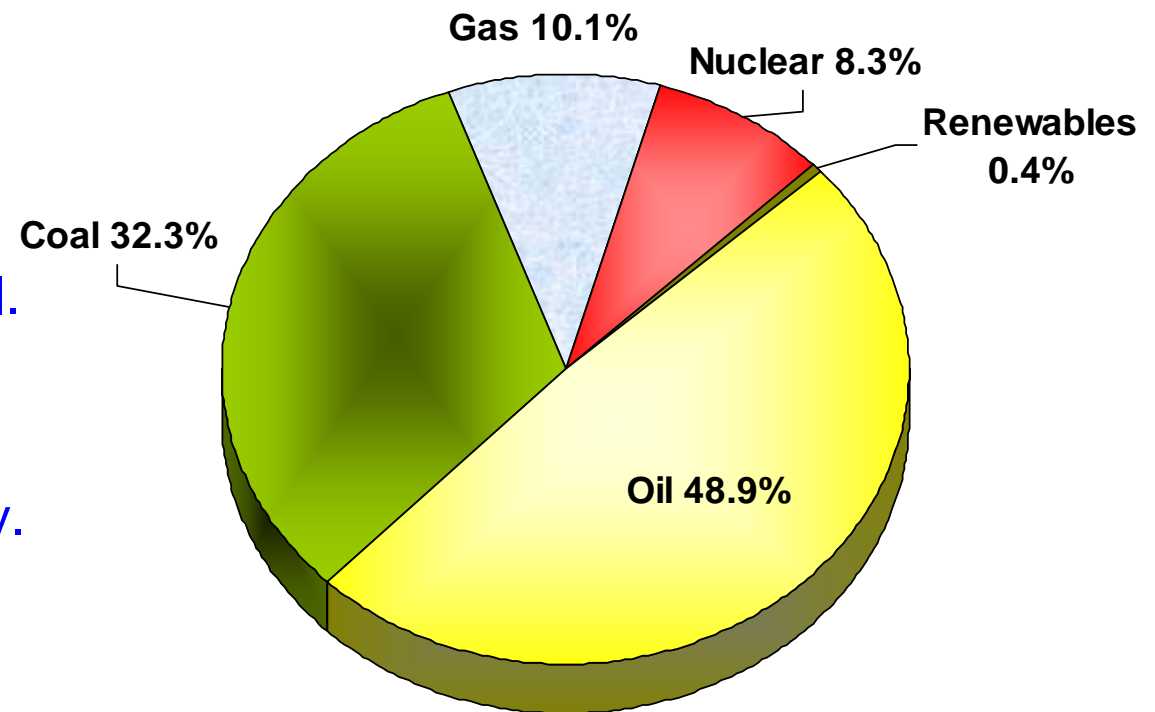
Energy Situation in Chinese Taipei

- **Vulnerable energy supply system**
 - High dependence on imported energy supply and fossil fuels
- **Key to reduce energy supply vulnerability**
 - Developing indigenous energy supply acceleratively
 - Developing diversified energy supply system
- **Acknowledging importance of renewable energy**
 - Renewable Energy shall contribute 15%, in terms of installed power generation capacity by 2025

Energy Situation in Chinese Taipei

■ High Dependence on Imported Energy & Fossil Energy

- 99.4% of total energy supply is imported in year 2010 and most of the energy supply is fossil fuel.
- Fossil fuels accounted for 91% of total energy supply.



**Total Primary Energy Supply
146.0 Million KLOE (2010)**

Source: BOE (2011)

Developing a Low Carbon Energy Structure by 2025

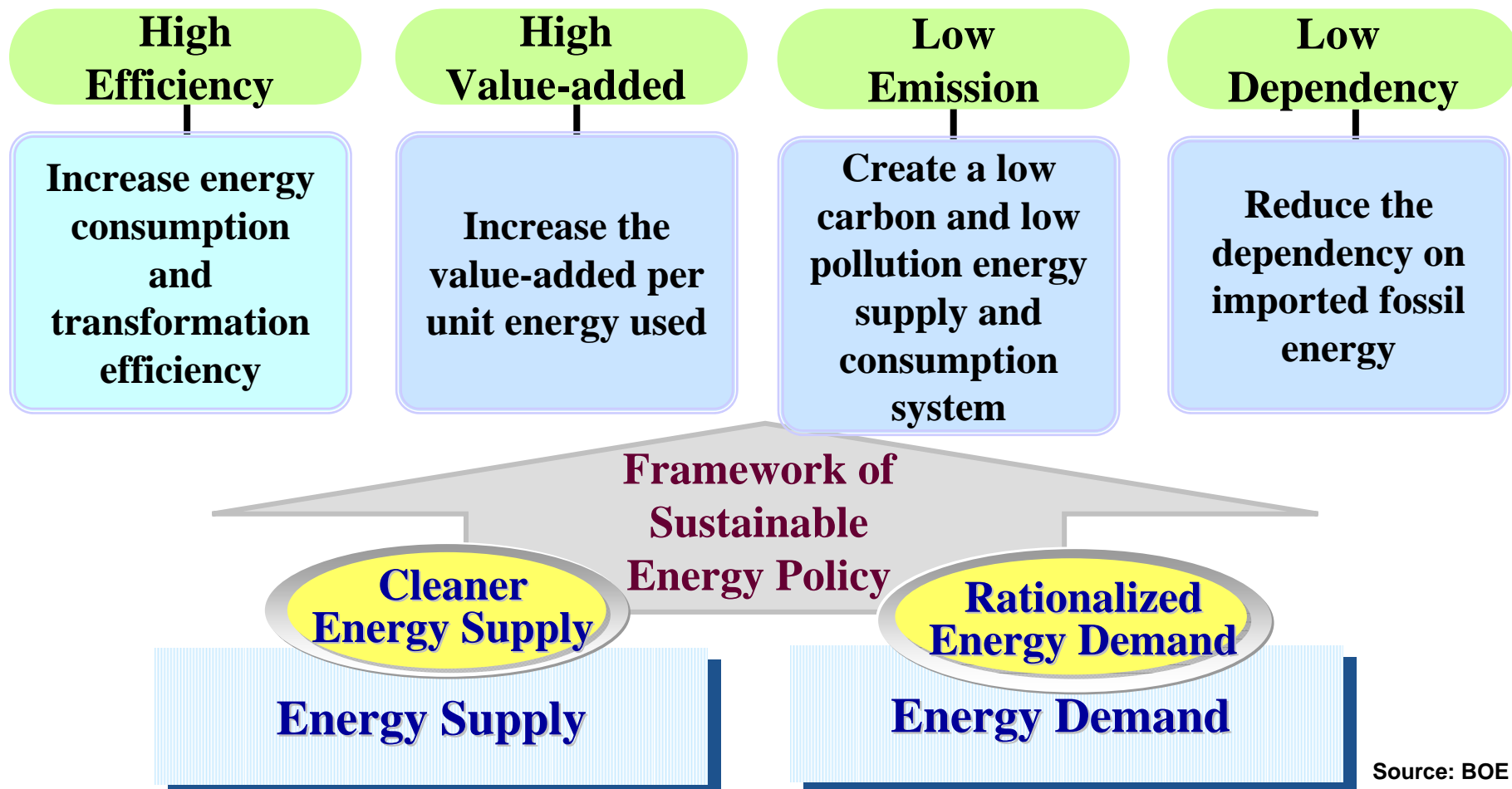


2010.05	■ Approval of the “ Master Plan on Energy Conservation and Emission Reduction ”
2009.12	■ Establishment of the “ Committee on Energy Conservation and Emission Reduction ”
2009.11.20	■ “ Special Report on Energy Conservation and Emission Reduction ” to President Ma. In this meeting, President Ma instructed the Executive Yuan to: <ul style="list-style-type: none">– Establish the “Committee on Energy Conservation and Emission Reduction” and– Formulate the “Master Plan on Energy Conservation and Emission Reduction”
2009.07.08	■ Renewable Energy Development Act ■ Amendment of “ Energy Management Law ”
2009.04	■ Green Energy Industry Program
2009.04.15-16	■ The 3rd “National Energy Conference”
2008.06.05	■ “ Framework of Sustainable Energy Policy ”

Source: BOE (2010)

Sustainable Energy Policy in Chinese Taipei

Building a Two High Two Low Energy Consuming and Supplying System



Source: BOE (2008)

Master Plan on Energy Conservation and Emission Reduction

1.Objective

Objective

(1)Energy Efficiency

- ❖ Reduce energy intensity by 2% per annum and totally reduce 25% in 2015.
- ❖ Further reduce energy intensity by 50% in 2025 with technological breakthrough and administrative measures.

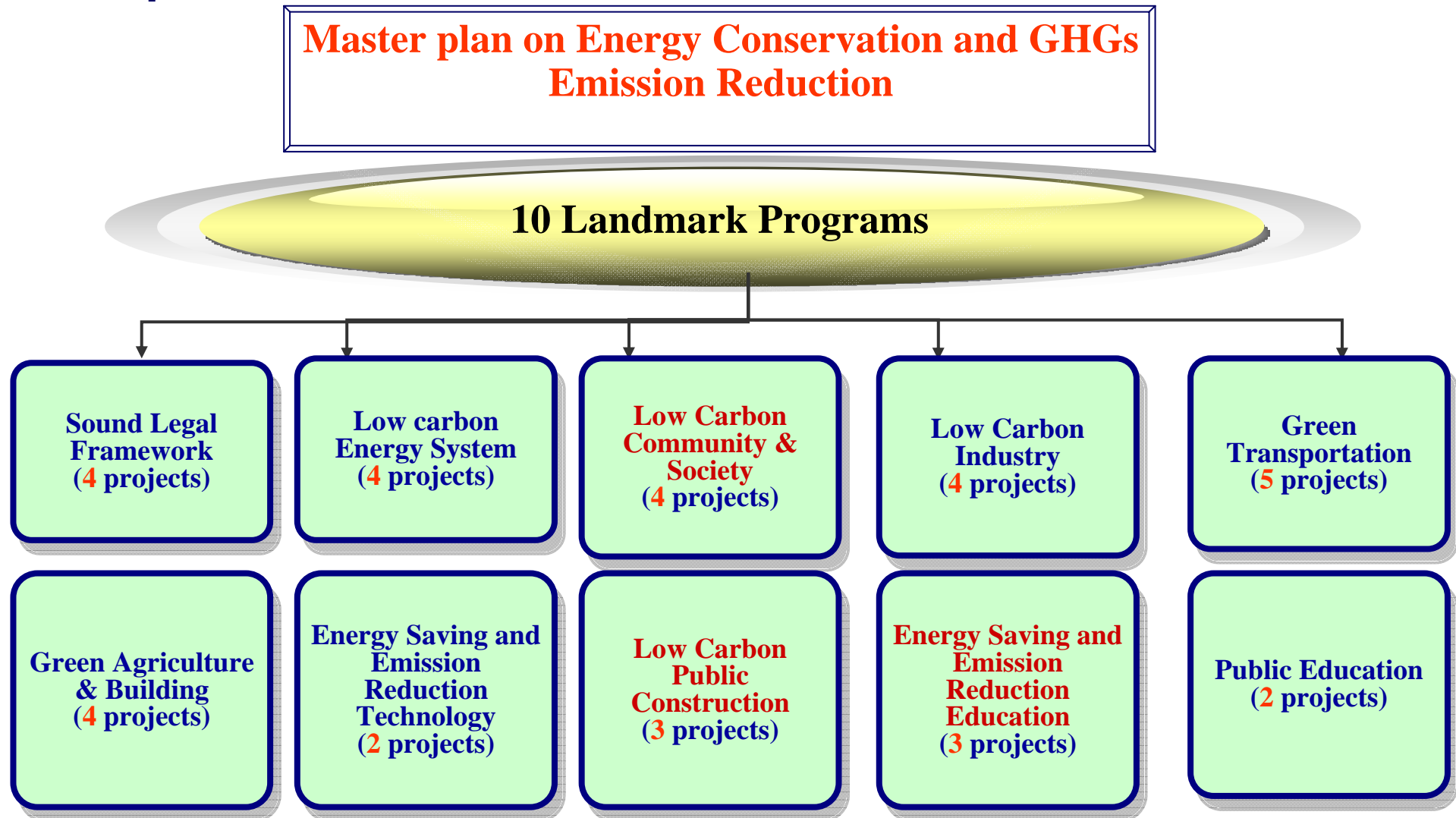
(2)Emission Reduction

- ❖ Reduce CO₂ emission to 2005 level in 2020, and further reduce to 2000 level in 2025.

(3)Low Carbon Energy

- ❖ Increase share of low carbon energy in electricity system to 55% by 2025.

2. Scope



Source: BOE (2010)

Development of Renewable Energy

- Renewable Energy Development Act approved on July 8, 2009

Target for rewarding renewable energy

Power generation: 6,500 MW to 10,000 MW
and the government to set up promotion goals
every two years.



Source: BOE (2009)

Targets of Renewable Energy Promotion in Chinese Taipei

	2008		2010		2015		2025	
	MW	%	MW	%	MW	%	MW	%
1. Hydropower	1,939	5.0	1,972	4.8	2,261	5.1	2,500	4.4
2. Wind power	35.8	1.0	518.7	1.3	1,480	3.4	3,000	5.3
3. Solar PV	4.1	0	21.5	0.1	320	0.7	1,000	1.8
4. Geothermal	--	--	--	--	10	0	150	0.3
5. Biomass	772	2	814.5	2.0	850	1.9	1,400	2.5
6. Fuel Cell	--	--	--	--	50	0.1	200	0.4
7. Marine Energy	--	--	--	--	1	0	200	0.5
TATOL	3,073	8.0	3,327	8.2	4,972	11.2	8,450	15.1
8. Solar Thermal Water Heater	1.76 million m ²		2.01 million m ²		2.80 million m ²		4.09 million m ²	

Source: BOE (2011)

Feed-in Tariffs for Renewables

Jan 1– Dec 31, 2011

Type of Renewable Energy			Feed-in Tariff (NT\$/kWh)
PV System	Roof Top	1-10 kWp	10.3185
		10-100 kWp	9.1799
		100-500 kWp	8.8241
		over 500 kWp	7.9701
	Land Based	7.3297	
On-shore Wind Power System: 1-10 kW			7.3562
On-shore Wind Power System: over 10 kW*			2.6138
Off-shore Wind Power System			5.5626
Streamflow Hydropower			2.1821
Geothermal Power Generation			4.8039
Biomass Power Generation			2.1821
Waste Power Generation			2.6875
Others			2.1821
* For systems required LVRT, the tariff increases to NT\$ 2.6574/kWh.			

(US\$ 1 = NT\$ 30)

Source: BOE (2010)

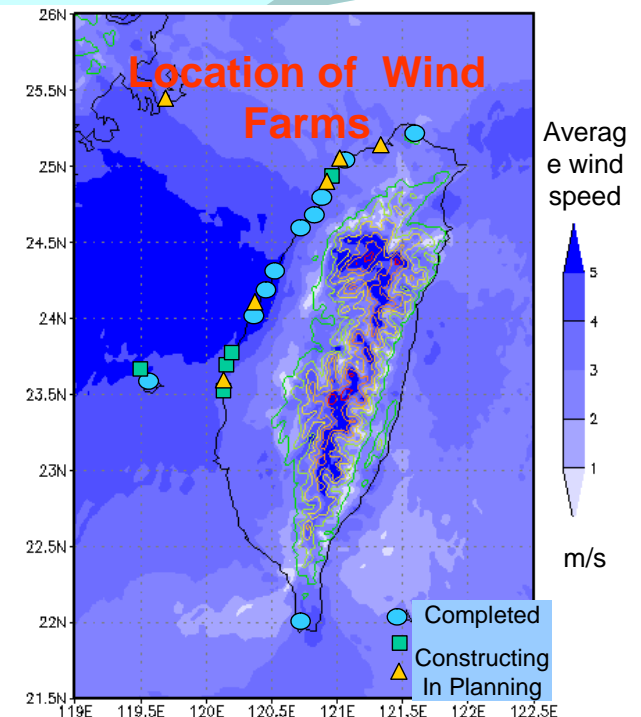
Current Development of Renewables in Chinese Taipei (by July 2011)

- Total Installed Capacity: 3,350MW
- Power generation: 7.9 TWh/year
- CO₂ Emission Reduction: 4.90 million ton

(a) Wind Power

- Installed Capacity: 529.3 MW, 273 units.
- Power generation: 1.20TWh/year.
 - CO₂ Emission Reduction: 0.76 million ton
- Focus: **Off-shore wind power system**

Source: BOE (2011)



Wind Energy in Chinese Taipei

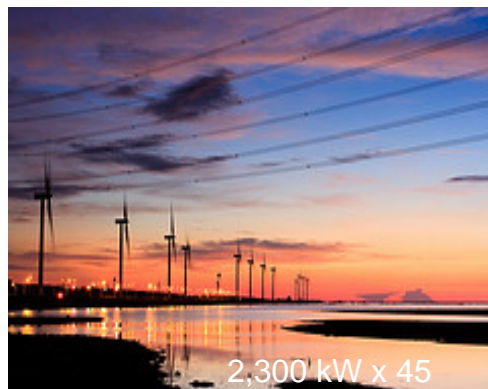
Source: BOE (2011)



Taoyuan County Wind Farm
Tai-Power Co.
(30 MW, 2007)



Taichung Wind Farm
Tai-Power Co.
(36 MW, 2007)



Changhua County Wind Farm
Infra Vest Co. (VWing AG)
(103.5 MW, 2008)



Taichung City Wind Farm
Infra Vest Co. (VWing AG)
(46 MW, 2008)



(b) Solar Thermal Water Heater System

- Installed Capacity: 2.10 million m², 530 thousand households, **ranked No. 5.**
- CO₂ Emission Reduction: 0.44 million ton



(c) Solar Photovoltaic System

- Installed Capacity: 45.5 MW, through Solar Roof, Solar Campus projects.
- **Solar Photovoltaic Power Plant: 4.6 MW,** expected to be installed by 2012.



Solar City 240 kWp in Chinese Taipei



Source: ITRI (2011)

(d) Biomass Power

- Installed Capacity: 798.5 MW, including biogas power plants
- Promote RDF systems fueled by industrial wastes for power generation.



Biogas Power Station
Sanzhuku Sanitary Landfill Site
Taipei

(e) Bio-fuel

- Bio-Diesel: apply mandatory **B2 scheme** in June 2010, blending 2% of bio-diesel into regular diesel, which could reduce 0.26 million ton CO₂ emission annually.
- Bio-Ethanol: promote **E3** in Taipei and Kaohsiung municipals since July 2009, which could reduce 2,250 ton CO₂ emission annually.



(f) Hydropower

- **Installed Capacity: 1,975 MW.**
- **Provide private sector the information for small hydro power generation where impact on ecology is minimal.**



(g) Geothermal Energy

- **Assist local government in exploring geothermal energy.**



Concluding Remarks

- 1. Benefits for promoting renewable energy: mitigating climate change, reducing impacts of high energy prices, ensuring energy security***
- 2. Accelerating promotion: demonstration at early stage, stable government policy, sound legislation framework***
- 3. Developing renewable energy industry while promoting the harnessing of renewables for improved social welfare***
- 4. International cooperation welcomed to facilitate bilateral benefits***

Source: BOE (2011)



Thank you for your attention.

Photo: National Geographic