



# Strategies to Achieving a Green Economy in Taiwan

中華經濟研究院 綠色經濟研究中心

THE CENTER FOR GREEN ECONOMY, CHUNG-HUA INSTITUTE FOR ECONOMIC RESEARCH

Chun-hsu Lin, Ph.D.

Research Fellow / Deputy Director

August, 2016



# Introduction

---

- Paris agreement leads to a new era of GHG management
- Governmental measures encouraged to achieve a green economy
- GHG management, Green Trade, Business Models: perspectives from government and academia



1. Status of Taiwan
2. Greenhouse Gas Management for Green Economy
3. Green Trade for Green Economy
4. Business Models for Green Economy
5. Conclusions



1

# Status of Taiwan



# Taiwan Basics

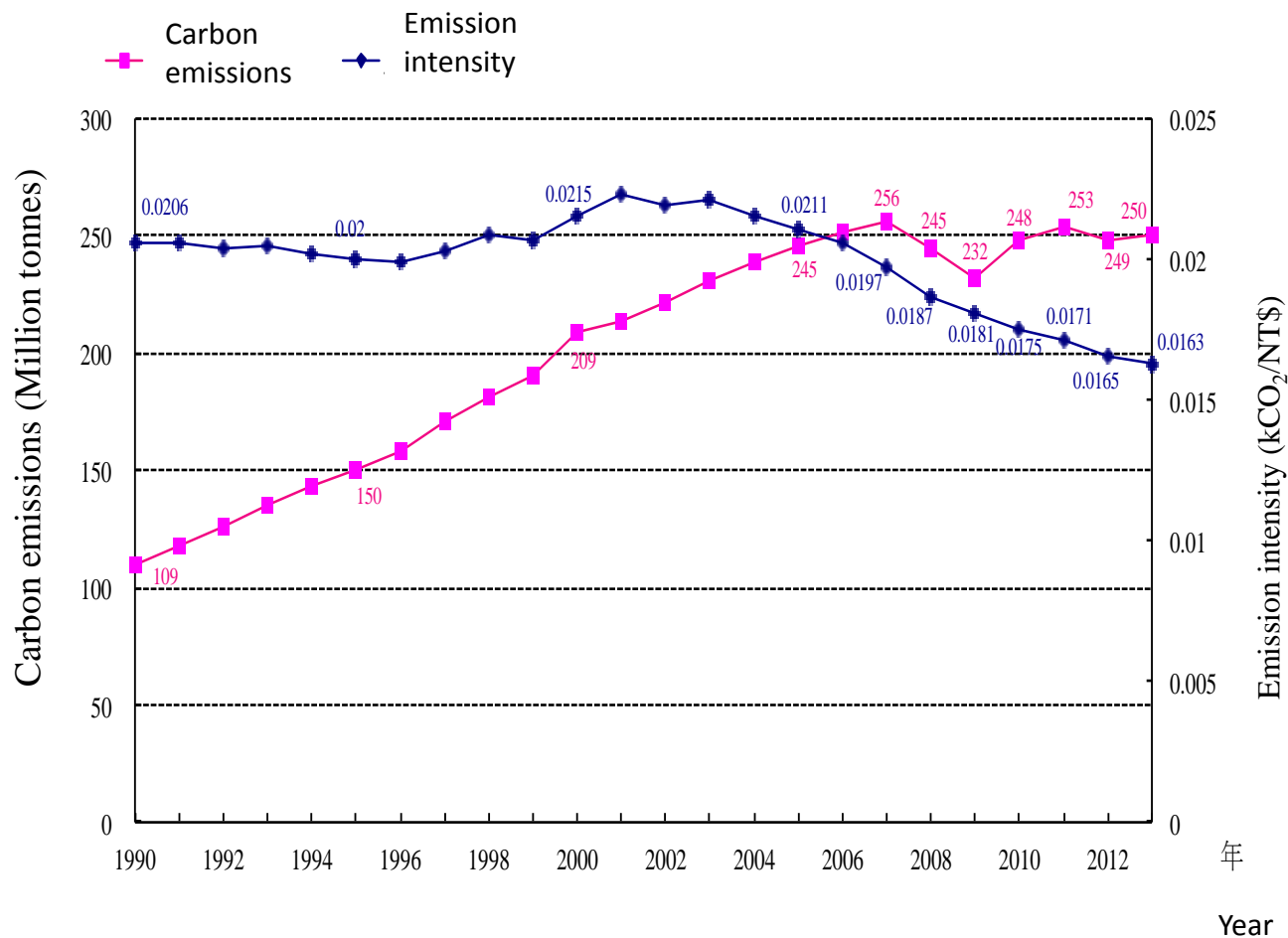
***Taiwan*** is an export-driven economy,  
*Ranked 20<sup>th</sup> largest economy in the world.*

Item	Data of the year 2014
Population	23.43 million
Gross National Product (GNP)	529.5 billion (country comparison to the world: 20)
Per Capita GDP	US\$ 40,537
Economic Growth Rate*	3.7%
Total Exports / Imports**	US\$ 314 billion / US\$ 274 billion

Source : \* IMD World Competitiveness Yearbook 2015

\* \* Department of Statistics, Ministry of Finance, "Summary of Exports and Imports for March, 2015"

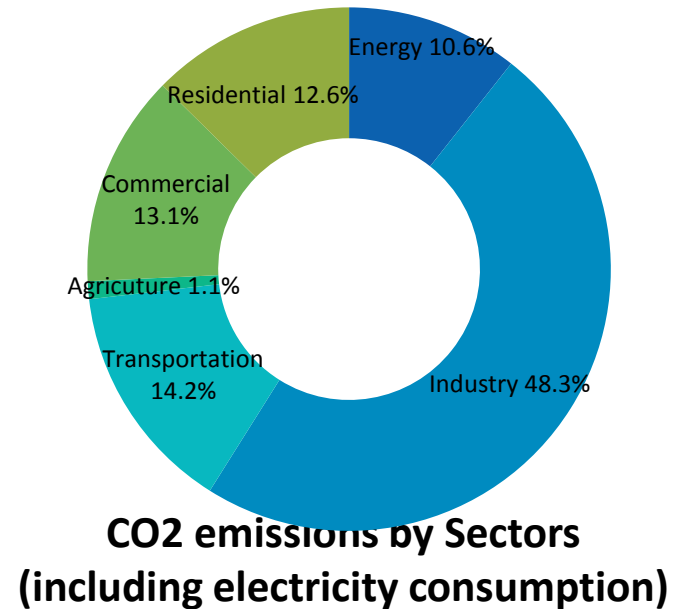
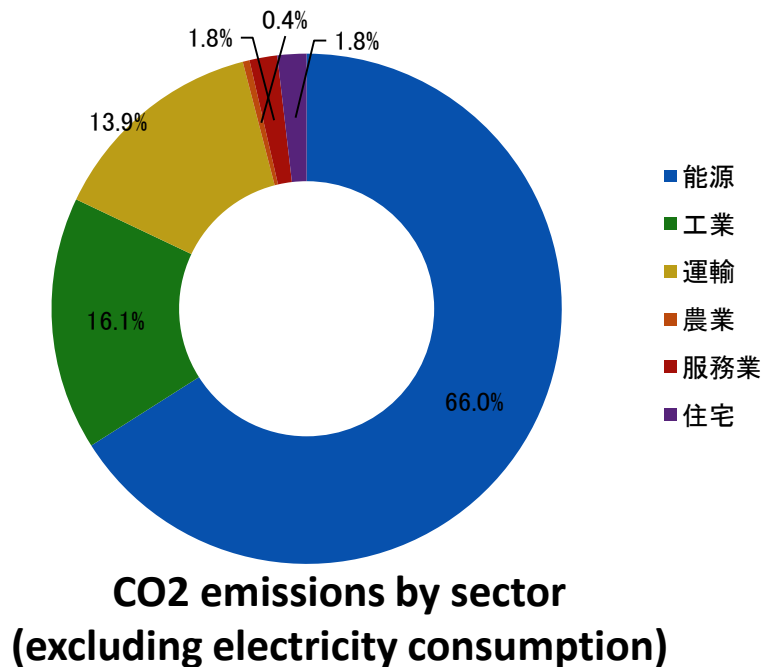
# Carbon Emission & Intensity



Source: Bureau of Energy, MOEA,  
Taiwan (2014)

# Taiwan's CO<sub>2</sub> emissions

- In 2014, CO<sub>2</sub> emissions from fuel combustion: 251 million tons of CO<sub>2</sub>e, ranked 31<sup>st</sup> in 2014, 28<sup>th</sup> in 2015 in the world.
- Main: energy and industrial sectors,



Source: 2013 CO<sub>2</sub> emissions from fuel combustion, estimation by Bureau of Energy



# 2

## GHG Management Approaches



# The New Government

since May 20th 2016

- More aggressive in global GHG reduction, fulfilling Paris Agreement
- Green Energy as one of the six focused industries for development by the new government
  1. Green Energy
  2. Health Care
  3. Biological Technology
  4. Quality Agriculture
  5. Tourism
  6. Cultural and Creative Industry



# Low-Carbon Legislations

- National Sustainable Energy Agenda
- Renewable Energy Development Statute
- Energy Management Act
- **GHG Reduction and Management Act**
- Energy Tax Bill (draft)
- National Climate changes Adaptation Guidelines



# Greenhouse Gases Reduction and Management Act

## ◆ Taiwan's commitment to combat climate change

## ◆ Emission target:

- 80% of emission in 2030 compared to 2005
- 50% of emission in 2050 compared to 2005

## ◆ Most important features:

- Target revised every 5 years
- Cap and trade scheme
- GHG management fund

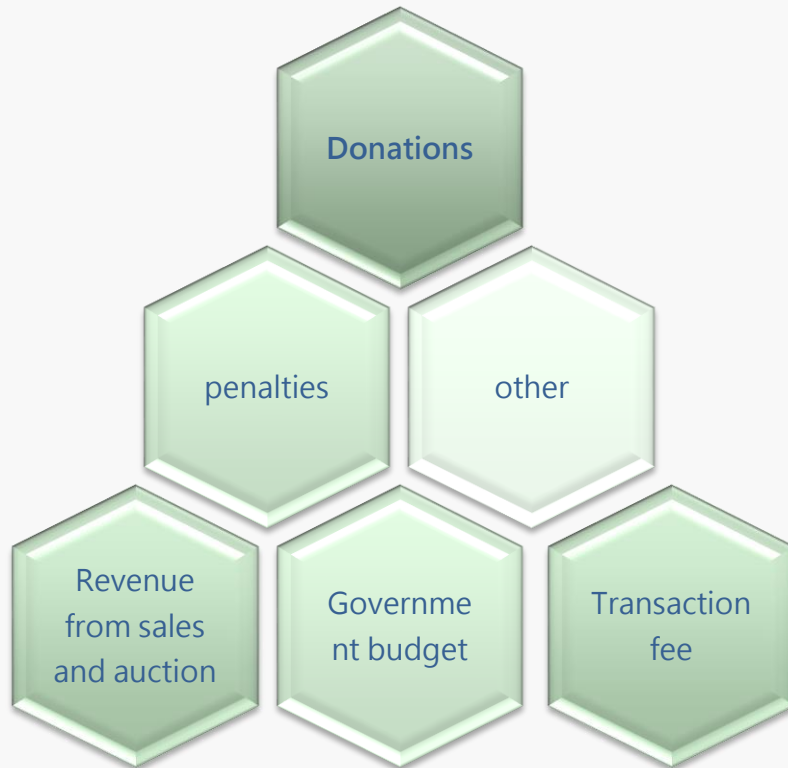
Green  
Growth

Adaptation

Mitigation

# GHG Management Fund

From:

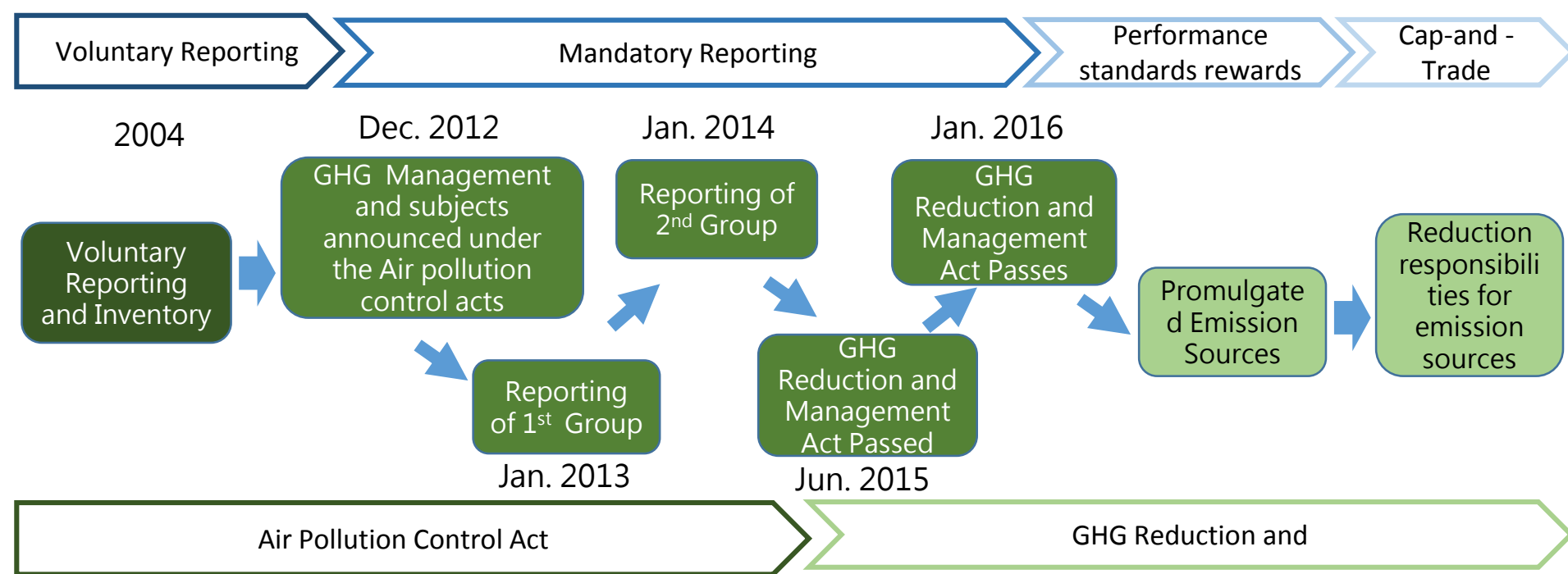


To:

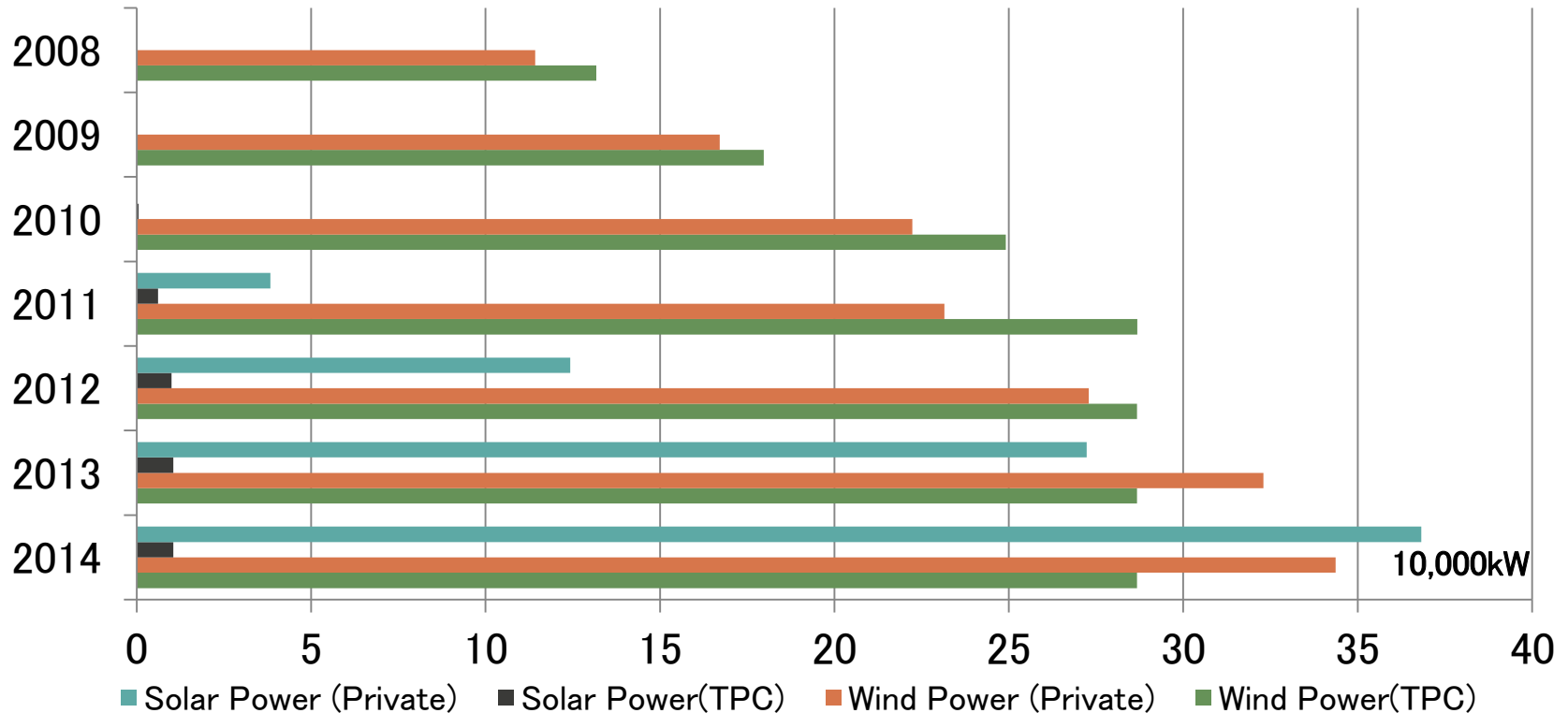
- These funds must be used to reduce carbon emissions at the national level acts.
- Adapt to climate change.

# Mandatory GHG Reporting

- 262 emissions sources reported, covering about 88.8% of industrial and energy sector emissions, totaling 226.49MT CO<sub>2</sub>e.



# Domestic Renewable Energy Installed



The total capacities of wind and solar power generated by private companies have increased faster than before because the authority announced the preferential feed-in-tariffs to which renewable energy equipment can apply under article 9 of the Renewable Energy Development Statute.

【範例】

3

# Green Trade



中華經濟研究院  
綠色經濟研究中心  
THE CENTER FOR GREEN ECONOMY  
CHUNG-HUA INSTITUTE FOR ECONOMIC RESEARCH





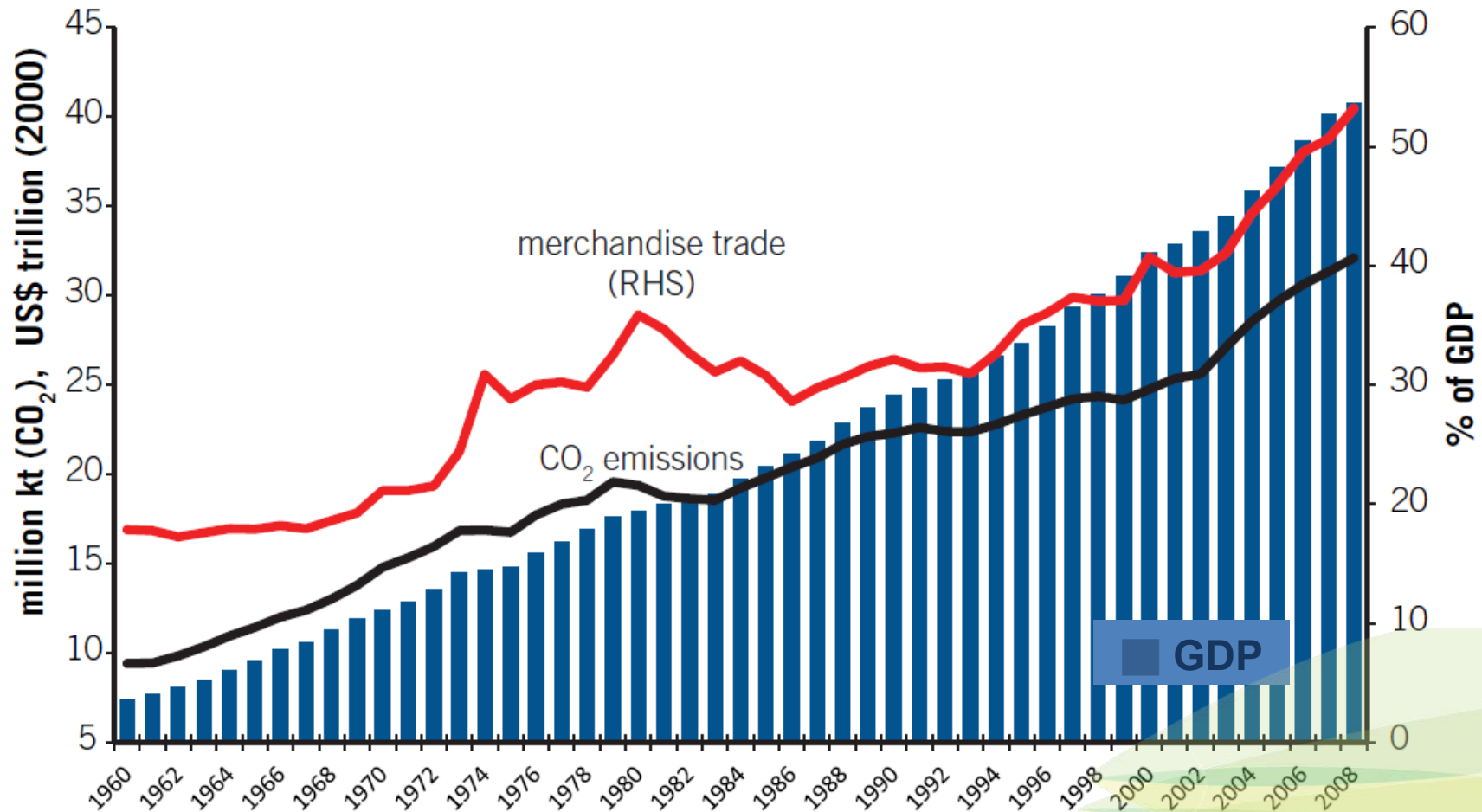
# Taiwan Green Technology Competitiveness

**7<sup>th</sup>** in Asia, and **20<sup>th</sup>** in the World.

(Source: IMD World Competitiveness Yearbook 2015)

Category	Our Achievements
Green Energy	<ul style="list-style-type: none"><li>• PV production ranked 2<sup>nd</sup> worldwide (2014).</li><li>• LED production ranked 3<sup>rd</sup> worldwide (2014).</li></ul>
Green ICT	<ul style="list-style-type: none"><li>• ICT products got the world's first carbon footprint certification, e.g., notebook computers, desktop computers, LCD panels, ICs.</li><li>• The world's first LEED (Energy and Environmental Design) Gold-Certified green TFT-LCD plant.</li></ul>
Green Building	<ul style="list-style-type: none"><li>• Taiwan has the highest density in Green Building worldwide.(4532 green buildings in 2014)</li></ul>
Green Consumer Staple	<ul style="list-style-type: none"><li>• Bike production ranked 1<sup>st</sup> worldwide.</li><li>• Quality of green Fabric ranked 1<sup>st</sup> worldwide.</li></ul>

# Trade Liberalization, Economic Growth and Climate Change



Source : World Bank (2012) Trade and Climate Change: An Analytical Review of Key Issues

# Trade Liberalization and Climate Change



**Trade Liberalization** ↑

**Climate Change** ↑

Trade liberalization increases the production, transportation and consumption.

... Traditional Trade

**Trade Liberalization** ↑

**Climate Change** ↓

Trade liberalization boosts the transactions of Low carbon products and technologies.

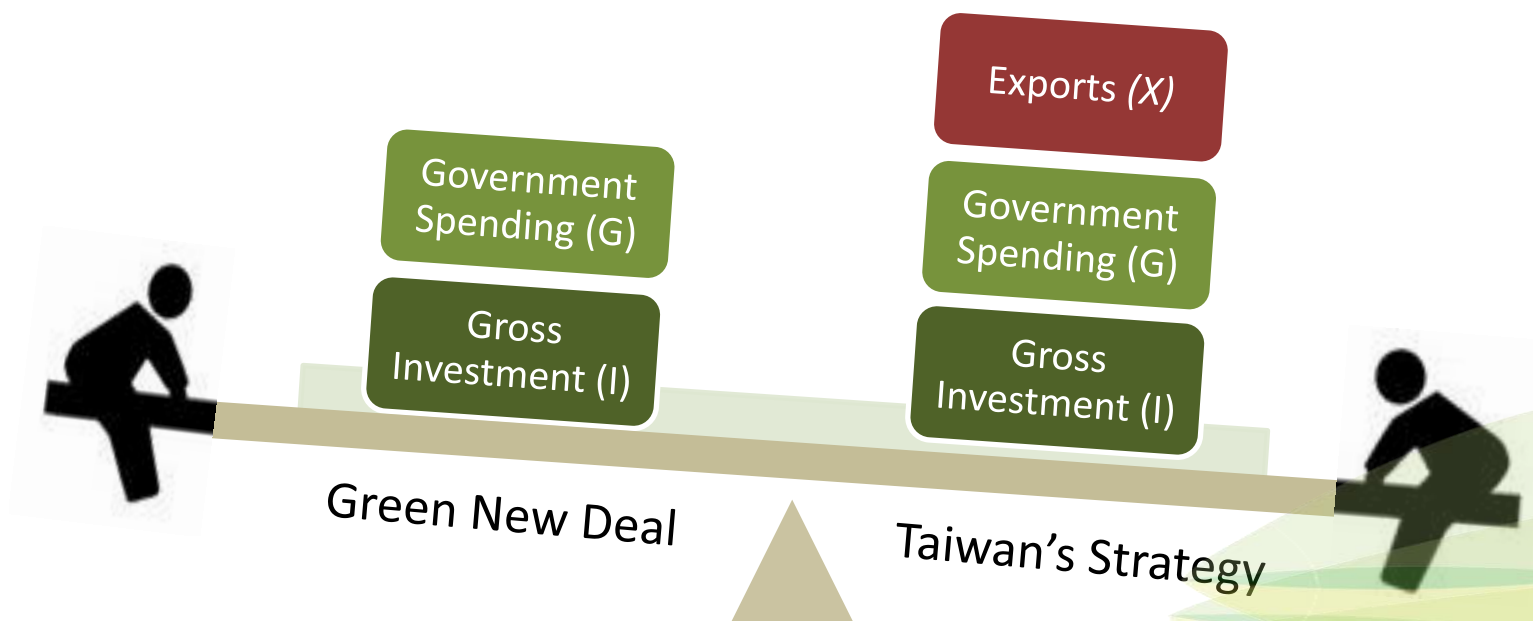


... Green Trade

# Green New Deal vs. Green Trade

$$GDP = C + \textcircled{I} + \textcircled{G} + \textcircled{X} - M$$

Private Consumption      Gross Investment      Government Spending      Exports      Imports



※ Taiwan's total export value (X) takes **60% of GDP**, net export value (X-M) takes 10% of GDP.  
Taiwan is an export-oriented economy.

# Definition of Green Trade

- General Definition

The cross-border trades of products, services, resources, and rights, which support sustainable development of environment and ecology.

- Defined Definition

The trades of green products and services.

- Type A

The products or services for environmental protection or environmental recovery, such as pollution abatement facilities and services, waste water management, resource recycling , technology of carbon capture and storage.

- Type B

The products or services that produce less impacts than the traditional products to the environment and ecology in their life cycles.



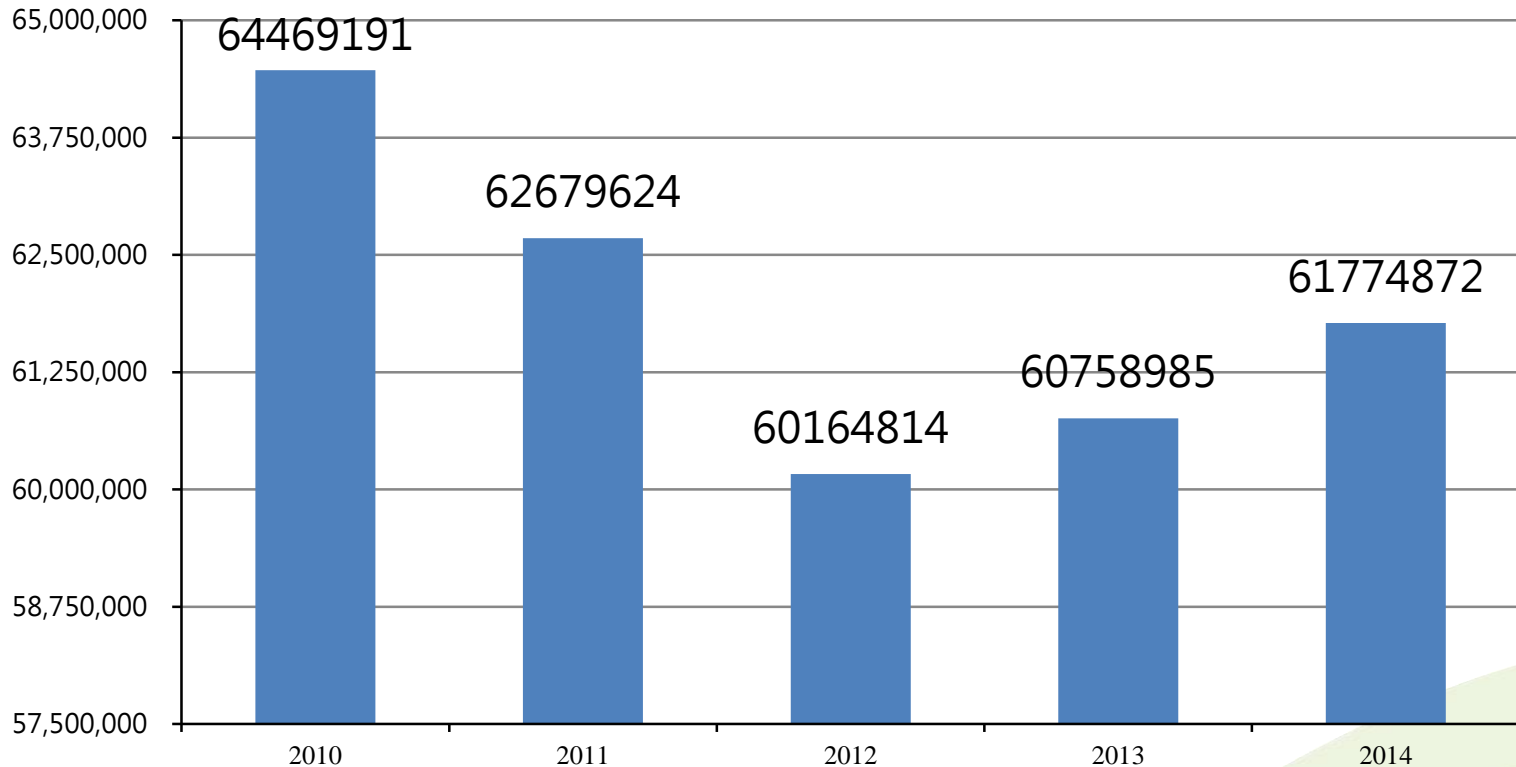
# Green Trade vs. Traditional Trade

- The trade is not only determined by price and function, but also by “green level” of goods
- The comparative advantages of trade is determined by production cost plus environmental cost.
- The environmental goods are normally considered as public goods; so governments are deeply involved in green trade
- As providing green products and services is part of enterprise’s social responsibility, the procurement policies of international enterprises change gradually.
- Green trade redefines the national competitiveness and changes the rules of trading.

# Statistics of Export of Taiwan's Green Products

## 2010-2014

Unit: thousand US\$



Source: ITC Trade Map Database

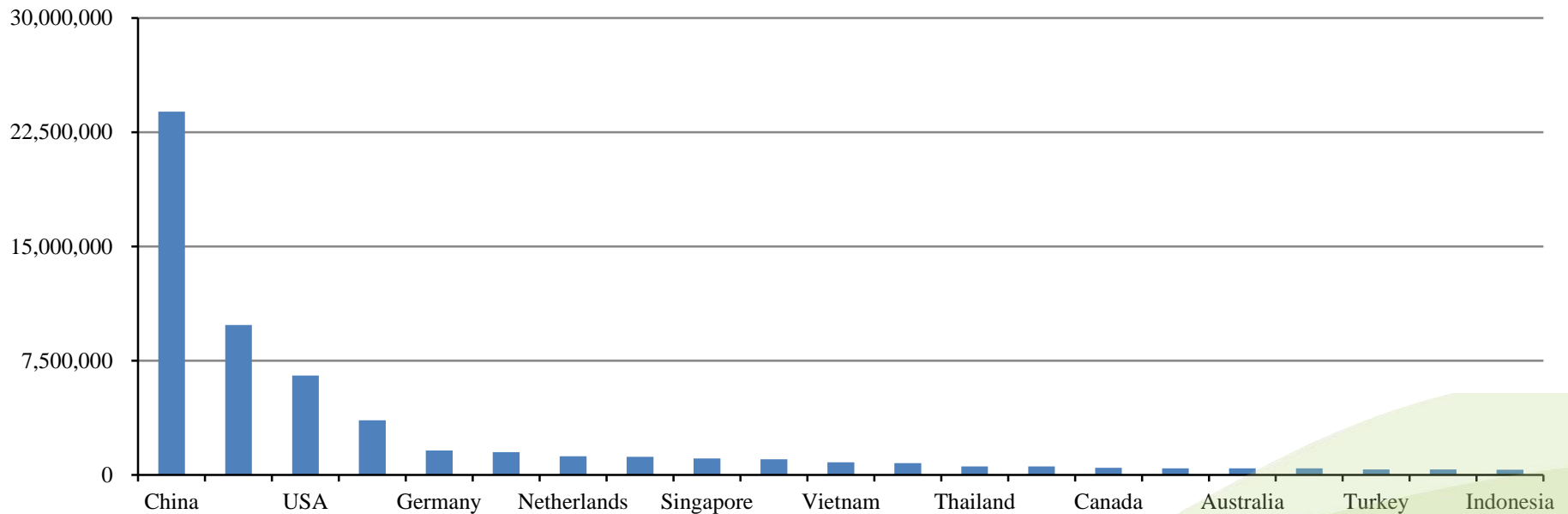


# TOP 10

## EXPORT Countries of Taiwan's Green Products

- Taiwanese green products go to
  - China, Honk Kong, the United States, and Japan
- EU28 as a whole is the third largest export market of Taiwan

Unit: thousand USD



Source: ITC TradeMap Database

# TOP 10

## ENVIRONMENTAL PROTECTION EQUIPMENT EXPORT COUNTRIES

- United States, China, and Japan. The proportion of total environmental protection equipment to these three countries was over 50%.
- In addition to these three countries, Germany and countries in south Asia were our important trade partners



# Taiwan Eco-Products Directory

Taiwan Eco-Products Directory is updated quarterly on-line and published annually since 2011. It covers the products that feature low chemical, waste reduction, pollution prevention, anti global warming, resource saving, and increase bio-diversity for the world. This English-written directory can be served as a reference for green procurement.























In the "2014-2015 Eco-Products Directory " published in July 2014, **489 eco-products** and **4 eco-service** from **195 companies** are included.



# How to classify

ISO 14024 - Type I Environmental Labeling  
 ISO 14021 - Type II Environmental Labeling  
 ISO 14025 - Type III Environmental Declarations  
 Other Types of Environmental Labels  
 Product Carbon Footprint Labels and Declarations

Table 1. Examples of Type I Environmental Labels in the World

Country/Region	Label Name	Logo	Country/Region	Label Name	Logo
Taiwan	Green Mark		EU	Ecolabel	
Canada	EcoLogo		Nordic Countries	Nordic Ecolabel	
USA	Green Seal		Germany	Blue Angel	
Thailand	Thai Green Label		Austria	Austrian Ecolabel	
Republic of Korea	Korea Eco-Label		The Netherlands	Milieukeur	
Australia	Good Environmental Choice Label		France	NF-Environnement Mark	
New Zealand	Environmental Choice New Zealand		Russia	Vitality Leaf	
Japan	Japan Eco Mark		China	China Environmental Labeling (Type I)	
Ukraine	Green Crane		Singapore	Green Label	
Czech Republic	Environmentally Friendly Product		India	Ecomark	
Philippines	Green Choice		Indonesia	Ekolabel Indonesia	

Taiwan Greening Your Life

Green Trade Project Office Website

Home

Services

GTPO News

Green Video

Eco-Products

Publications

Contact Us

Links

One-Side Coated Recycled Duplex Board with Grey/White Back

Environmental Performance

Chain-of-custody-certified by FSC™ and PEFC.

\* This product uses recycled pulp to attain resource reuse and to foster the development of the forest ecosystem.

\* This product contains at least 88% of post-consumer recycled materials and is certified by the Green Mark system of the Environmental Protection Administration of Taiwan.

Product Performance

\*Base weight ranging from 200 to 550 GSM.

\*Available in sheets or rolls.

\*Suitable for packing cartons, outer laminates of paper boxes.

YUEN FOONG YU PAPER MFG. CO., LTD. TAI-TUNG MILL

No.371, Sec. 4, Zhongxing Rd., Taitung City, Taitung County 950, Taiwan

Contact: Tse-Chung Wang

Telephone: +886-089382256 ext. 275

Fax: +886-089382256

E-mail: e4905@yfy.com

Website: http://www.yfy.com

Available in: China, Japan, Republic of Korea, Southeast Asia, Europe

310 Views Forward

Previous Back to List Next

Recyclability / Possibility

Resource Saving

Using Recycled Materials



# Taiwan Green Classic Awards

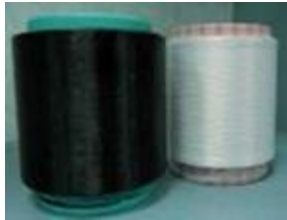
---



**台灣綠色典範**  
**TAIWAN GREEN CLASSICS**



# Example: Far Eastern New Century



## Introduction :

A multi-billion market cap company with polyester and textile business, now reinventing itself in green economy.

## Product Characteristics :

- Recycled/recyclable polyester products, such as food-grade recycled PET resin
- Recycled fiber, which is made from used PET bottles

## Far Eastern New Century

- The 1<sup>st</sup> Taiwan Green Classics Award Winner
- Far Eastern EcoARK, the world's 1<sup>st</sup> building with exterior walls made entirely by discarded PET bottles
- Football jersey made by recycled fabrics, used by Nike in the FIFA World Cup for two consecutive years



# Green Demo house

- Launched in 2013
- Modular approach to delivering various green quality products/services.



Smart Green Home



Smart Green Appliances



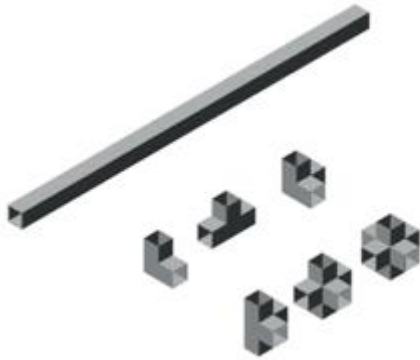
Green Building Materials



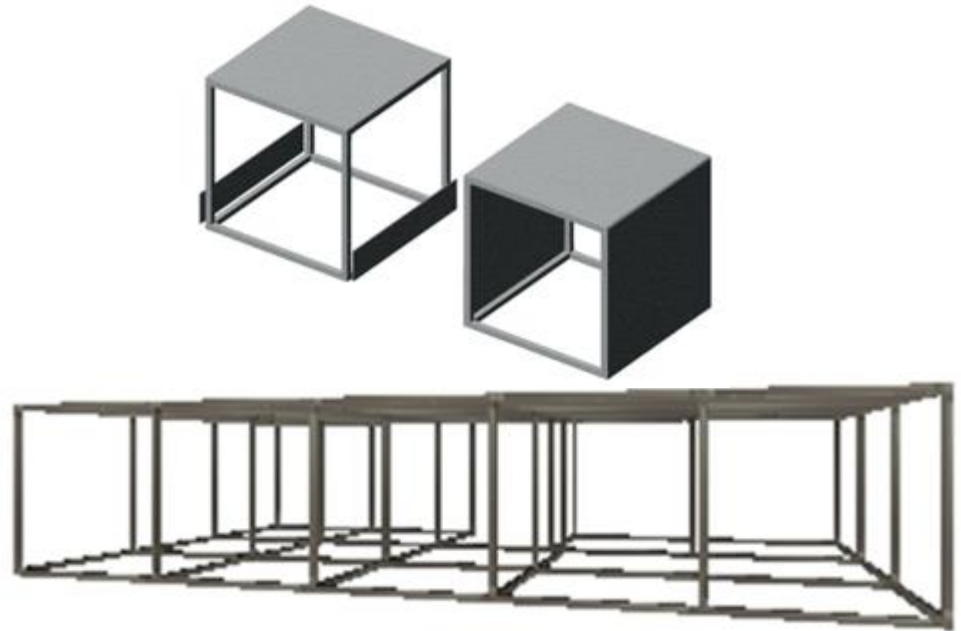
LED Lighting



# Demo House can be arbitrarily assembled and disassembled



Assembling parts



# Design I : Home Space



# Design II : Retailing Space





# Design III: Office Space



# Green Demo House Road Show



# Green Demo Site

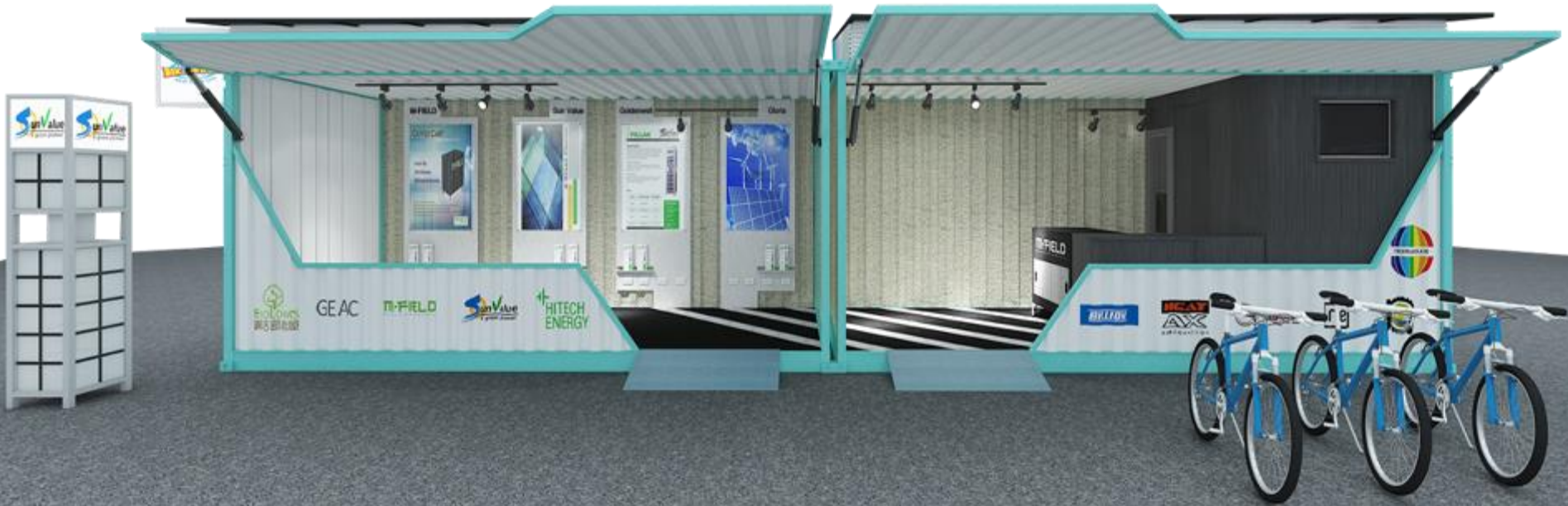
Off-Grid power system @  
Liberty State Park, NJ, USA  
Opened in July 2016



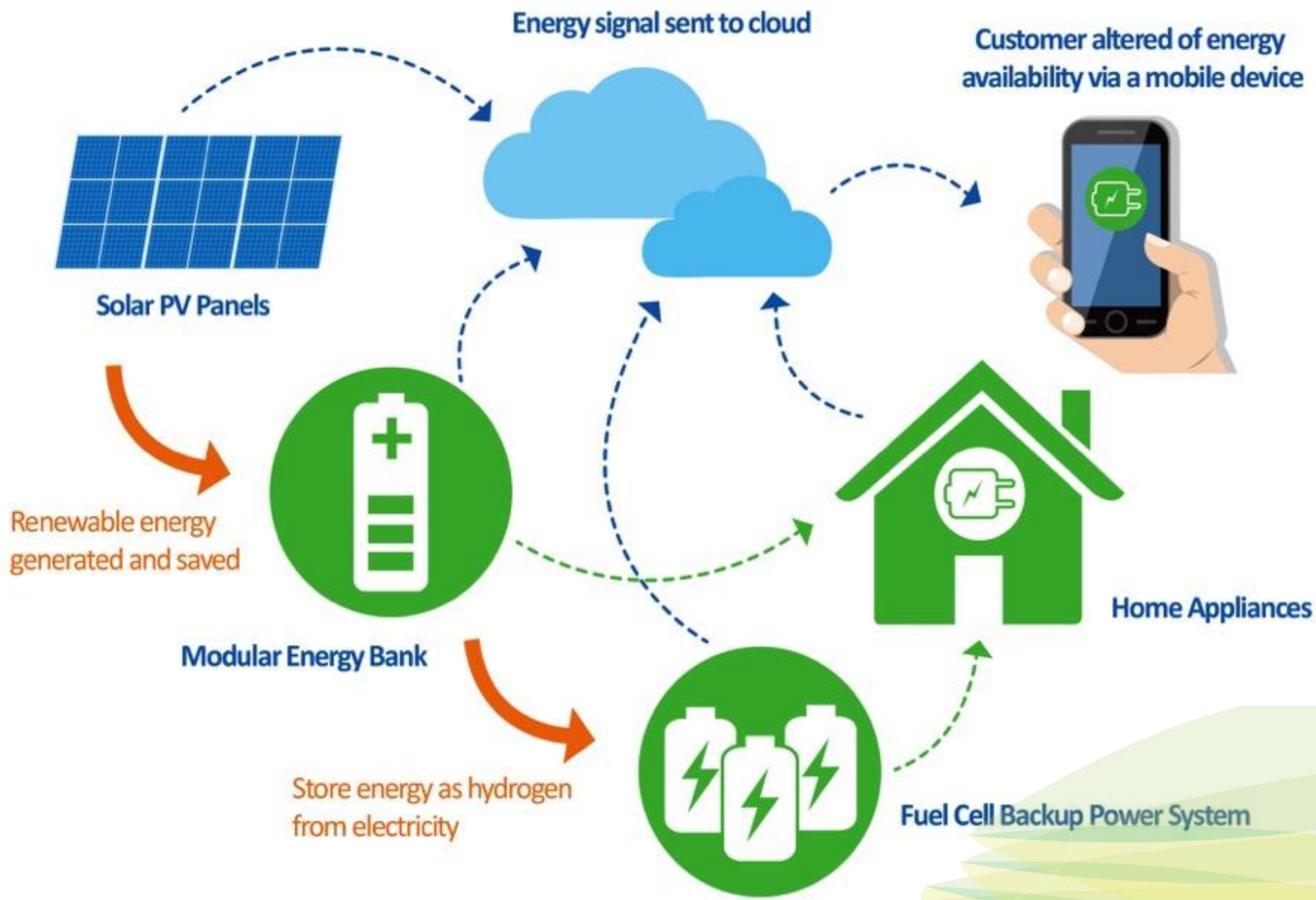


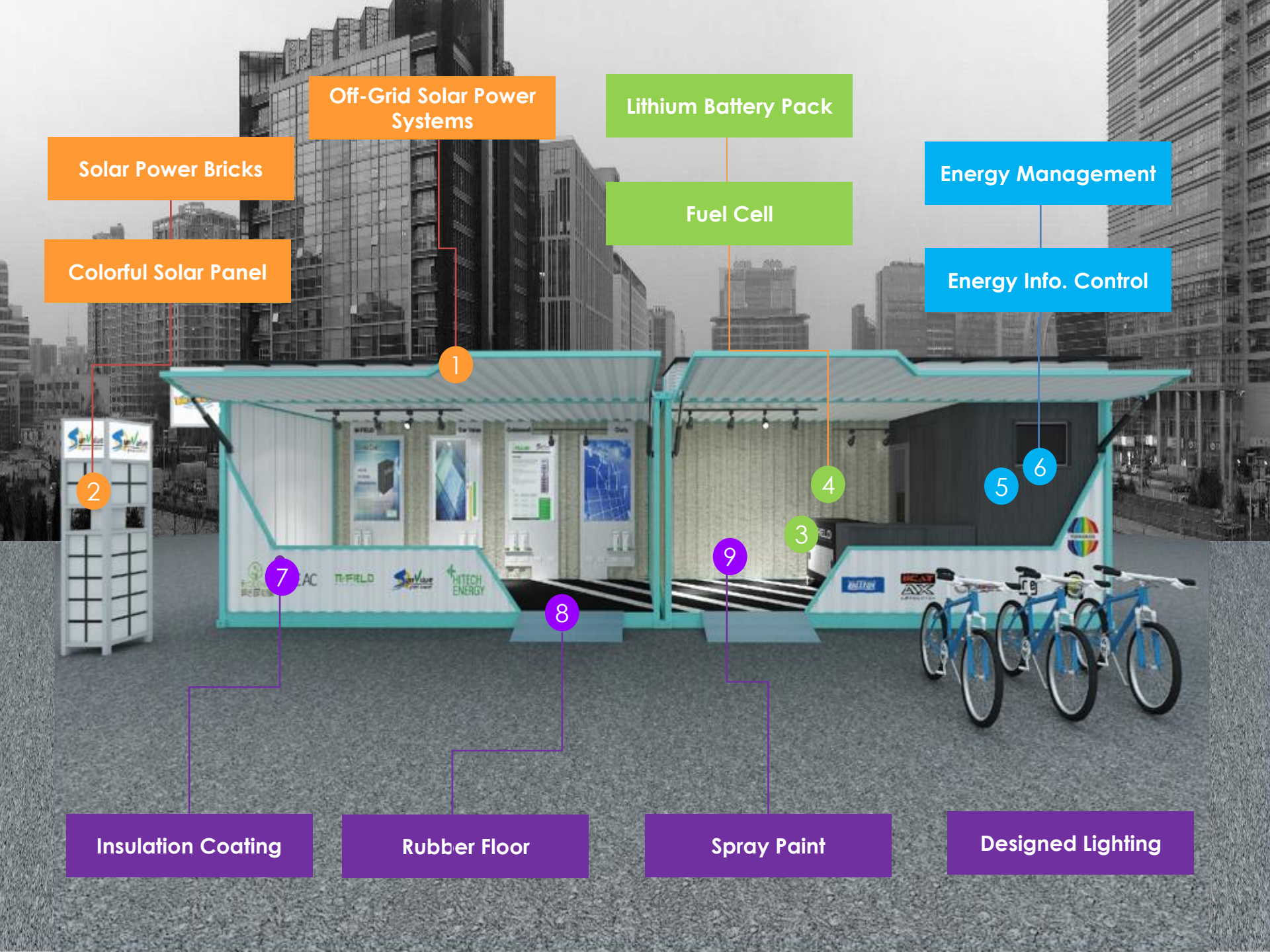
# Introducing *SKYENERGY*™

- A totally off-grid energy integration system with green materials
- Location: Liberty State Park, New Jersey.
- Replacing traditional diesel generator with solar PV generator for the supply of electricity
- 2 X 20 foot container with **5KW** of power









Off-Grid Solar Power Systems

Lithium Battery Pack

Energy Management

Solar Power Bricks

Fuel Cell

Energy Info. Control

Colorful Solar Panel

1

4

5

6

3

9

7

8

2

Insulation Coating

Rubber Floor

Spray Paint

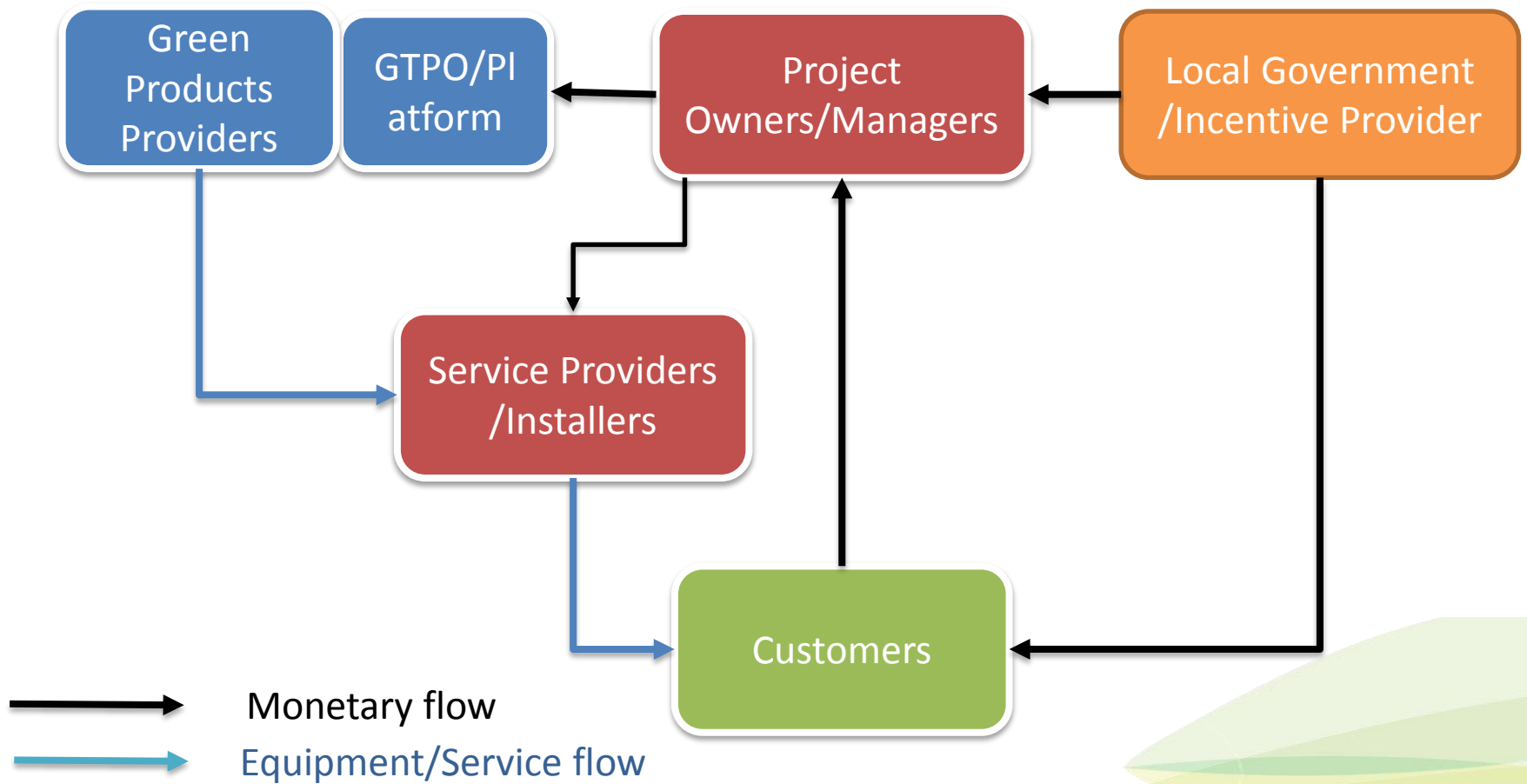
Designed Lighting

4

# Business Models to Facilitate Green Tech Deployment



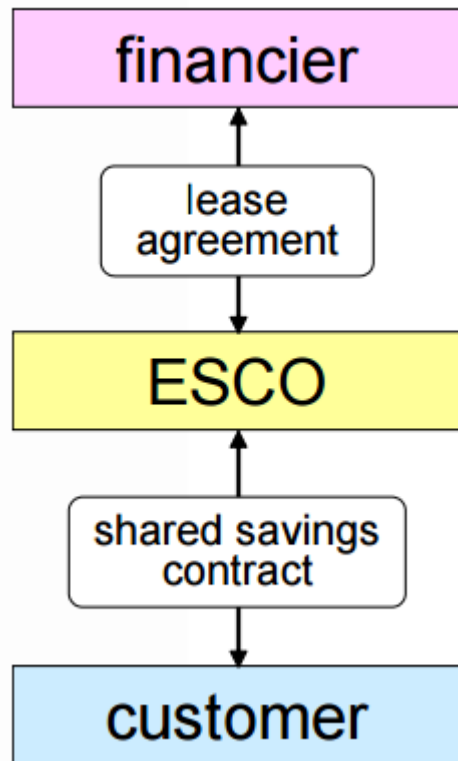
# Basic Structure of Partnership



# Energy Service Company, ESCO

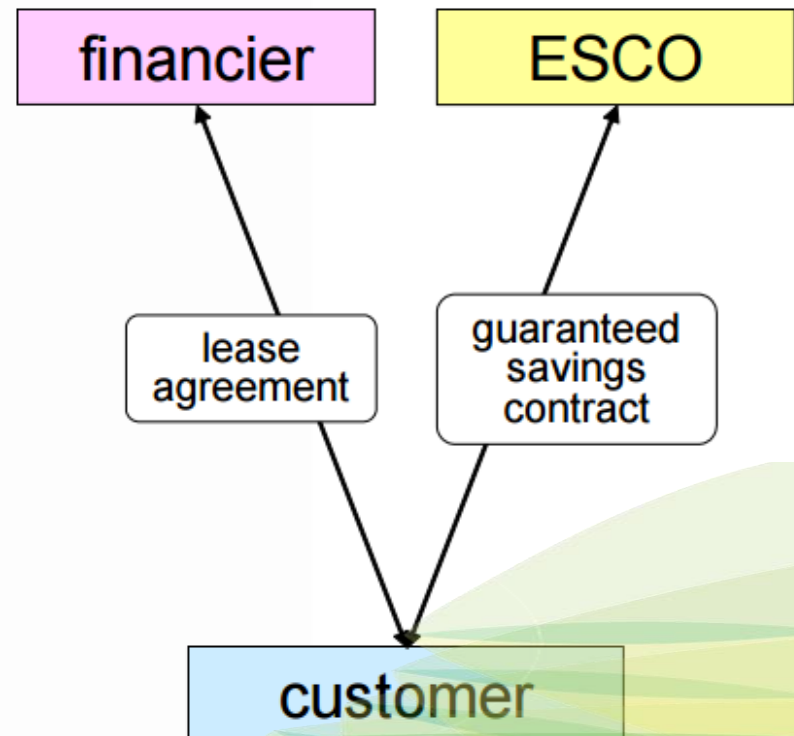
## Shared Savings Financing

- ESCO bears debt responsibility, execution risk and credit risk.

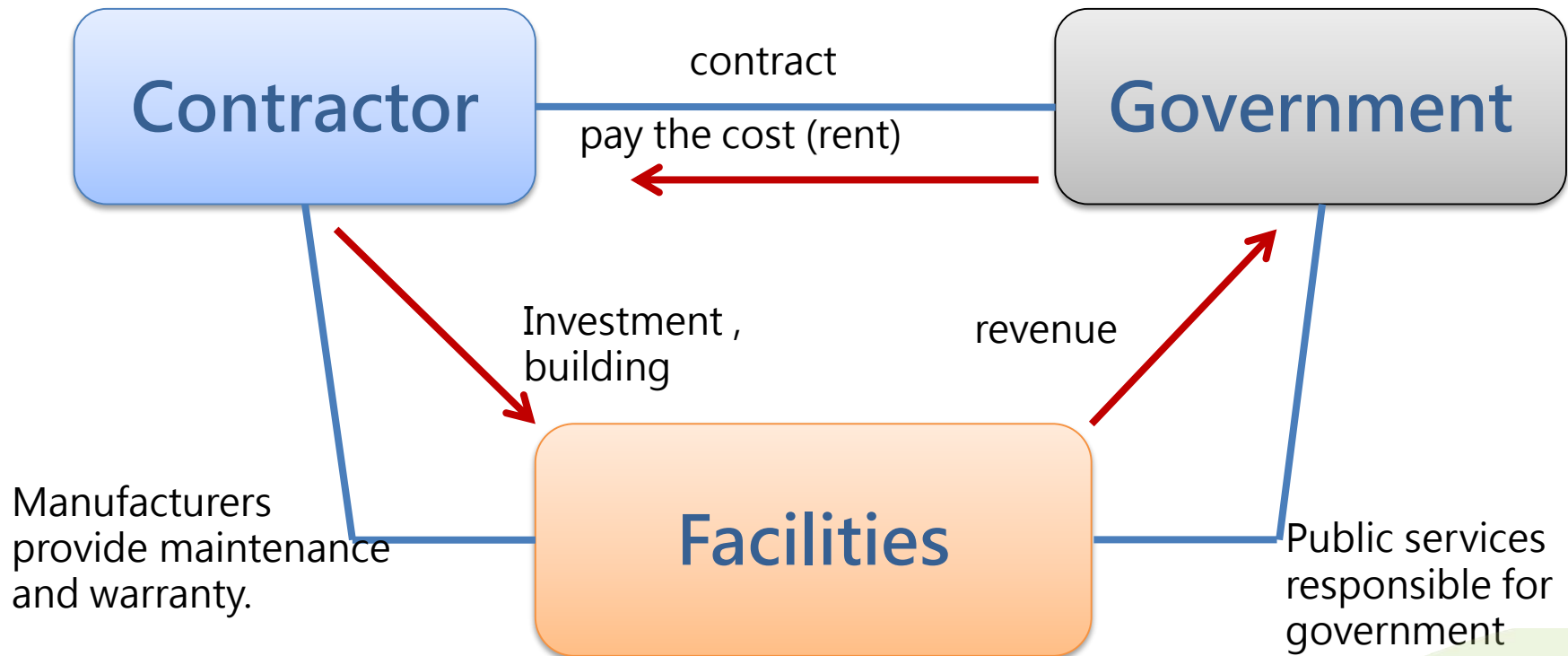


## Guaranteed Saving Financing

- ESCO bears project performance risk.
- Customer bears responsibility for the debt on the balance sheet.

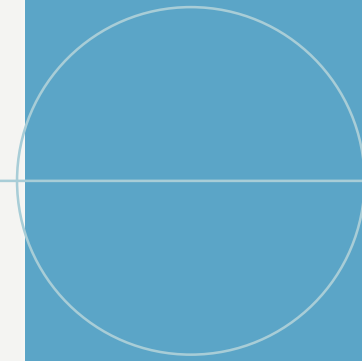


# Design, Build, Finance and Operate, DBFO





# Conclusions



- Green growth re-emphasized after Paris agreement
- Low-carbon society is a goal and a reality
- Innovative business models are key to the success of green economy, including different formats of partnership
- Public-Private Partnership unavoidable