

Group I
the cognition and
the vision of energy

Cognition :

Green Energy

- Geothermal
- Tide
- Solar power
- Wind power
- Biomass energy
- Hydro power



Advantage

- Renewable
- Environmental friendly
- The substitution for those
who are lack of energy

Drawback

- The cost is higher
- Limited by the environment
- Technological difficulties
- Inefficient
- Unstable

Traditional energy

- Fossil fuel
 - Coal / Peat
 - Petroleum
 - Gas
- Nuclear power



Advantage

- Lower the cost of the power plants
- Stable
- Efficient

Drawback

- Greenhouse gases
- Pollution
- The amount of resource is limited
- Some need to depend on import
- Risky

Production costs of electricity in Taiwan

items	2013 final account	until 2014 Dec.
Other (A)		
CHP	2.13	2.23
IPP	3.31	3.22
Coal	2.31	2.14
Gas	4.66	4.56
Green energy	2.76	3.32
Water power	1.69	1.83
Wind power	2.23	2.25
Solar power	7.73	7.21
average B	3.05	3.04
average(A+B)	2.45	2.47

items	2013 final account	until 2014 Dec.
TPC(B)		
Fossil fuel	2.73	2.74
Petroleum	6.97	6.63
Coal	1.39	1.30
Gas	3.91	3.92
Nuclear power	0.95	0.96
Pumped-storage hydroelectricity	3.02	4.81
Green energy	1.56	1.90
Water power	1.22	1.54
Wind power	3.39	3.48
Solar power	11.36	10.14
average A	2.27	2.30

(NTD / kW × h)

※IPP =independent power producer
CHP=combined hear and power

Vision

Present Circumstance In Taiwan

- **Some** myths about energy
 - People are commonly afraid of the nuclear power because of nuclear wastes, radiation and nuclear explosion
 - People think that it will make no pollution by using green energy
- Lack informations of energy
 - People don't know what kind of energies are available in Taiwan

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Coal Ash Is More Radioactive than Nuclear Waste

By burning away all the pesky carbon and other impurities, coal power plants produce heaps of radiation

December 13, 2007 | By Mara Hvistendahl

Over the past few decades, however, a series of studies has called these stereotypes into question. Among the surprising conclusions: the waste produced by coal plants is actually more radioactive than that generated by their nuclear counterparts. In fact, the fly ash emitted by a power plant—a by-product from burning coal for electricity—carries into the surrounding environment 100 times more radiation than a nuclear power plant producing the same amount of energy. * [*See Editor's Note at end of page 2*]

Present Circumstance In Taiwan

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Solar Energy Isn't Always as Green as You Think

Do cheaper photovoltaics come with a higher environmental price tag?

By Dustin Mulvaney

Posted 26 Aug 2014 | 15:00 GMT

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Present Circumstance In Taiwan

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ENERGY > RENEWABLE ENERGY

Environmental Impacts of Wind Power

Contents

- [Land Use >](#)
- [Wildlife and Habitat >](#)
- [Public Health and Community >](#)
- [Water Use >](#)
- [Life-Cycle Global Warming Emissions >](#)

Harnessing power from the wind is one of the cleanest and most sustainable ways to generate electricity as it produces no toxic pollution or global warming emissions. Wind is also abundant, inexhaustible, and affordable, which makes it a viable and large-scale alternative to fossil fuels.

Despite its vast potential, there are a variety of environmental impacts associated with wind power generation that should be recognized and mitigated.

- For more on wind power technologies, see [How Wind Energy Works](#).
- For more on the benefits of wind power and other renewable energy technologies, see [Benefits of Renewable Energy Use](#).

Land Use

The land use impact of wind power facilities varies substantially depending on the site: wind turbines placed in flat areas typically use more land than those located in hilly areas. However, wind turbines do not occupy all of this land; they must be spaced approximately 5 to 10 rotor



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[How Wind Energy Works](#)

[Renewables: Tapping Into Wind Power](#)

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[Detective or Scientist? Fingerprinting the Ocean to Estimate Global Sea Level Rise](#)

UCS SCIENCE

NETWORK | FEBRUARY 6, 2015

[A Bridge Over Troubled Waters: How the Bay Bridge Was Rebuilt Without Considering Climate Change](#)

JULIET CHRISTIAN-SMITH | FEBRUARY 6,

take notes from : Climate Progress

FutureGen Dead Again: Obama Pulls Plug On 'NeverGen' Clean Coal Project

BY JOE ROMM POSTED ON FEBRUARY 5, 2015 AT 9:09 AM

The U.S. Department of Energy has finally pulled the plug on FutureGen 2.0, which was an attempt to reboot a failed Bush-era “clean coal” project. The final death of this troubled 12-year effort to capture CO₂ from a coal power plant and bury it underground is more evidence that we shouldn't expect large-scale deployment of carbon capture and storage (CCS) before the 2030s at the earliest.

This post will review the ongoing challenges that CCS (aka carbon capture and sequestration) has had, why FutureGen died twice, and why CCS is unlikely to provide more than 10 percent of the answer to the carbon problem by 2050 — especially if the coal industry maintains its suicidal indifference to responding to climate change.

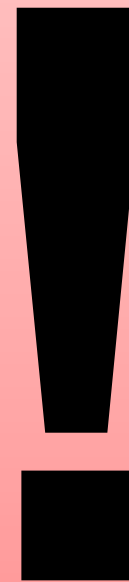
In 2030 , we hope (Taiwan will)

- Use less traditional energy
- Find a safer way to manage nuclear waste
- Develop more stable ways to generate green energy
- Increase Taiwan's GDP
- Stabilize the price of electricity in Taiwan
- People around the world can work together and solve the environmental problems which we are facing

Before



After



What kind of energy
should we increase
or cut down the use?



2030 Electricity Vision



Start

**Group II Presentation :
Manipulate & Illustrate**

2015/02/10



Something Before the Drama

About the game :
2030 Electricity Vision

CHOOSE THE KING

☆☆☆☆☆

King of Green



King of Wealth



King of Stability



King of Stability



King of Low-Carbon



King of No-Nukes



Enter Your Name :

Taiwan

Reset

NEXT

My2030

2030 Electricity Vision

Level One



To next level

King Taiwan
Kindness value: 79



The price of electricity is too high and the industries are leaving while the public's living burden increases substantially.

? Demand Side Investment

2235
Billion NTD/Year

323.3 TWh/Year

? GDP per Capital

35184
USD/Year

? CO2 Emission

136
% of year 2000 level

? Electricity Price

3.65
NTD / kWh

? Electricity Shortage Hours

1
Hour

323.4 TWh/Year

Demand



Domestic Sector



Service Sector



Industrial Sector



Transport Sector



Economic Growth



Coal-fired Power



Gas-fired Power



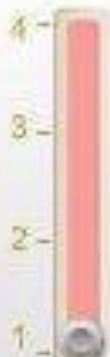
Solar PV Power



Wind Power



Other Green Power



CCS



Nuclear Power

Supply

Environmentalist :

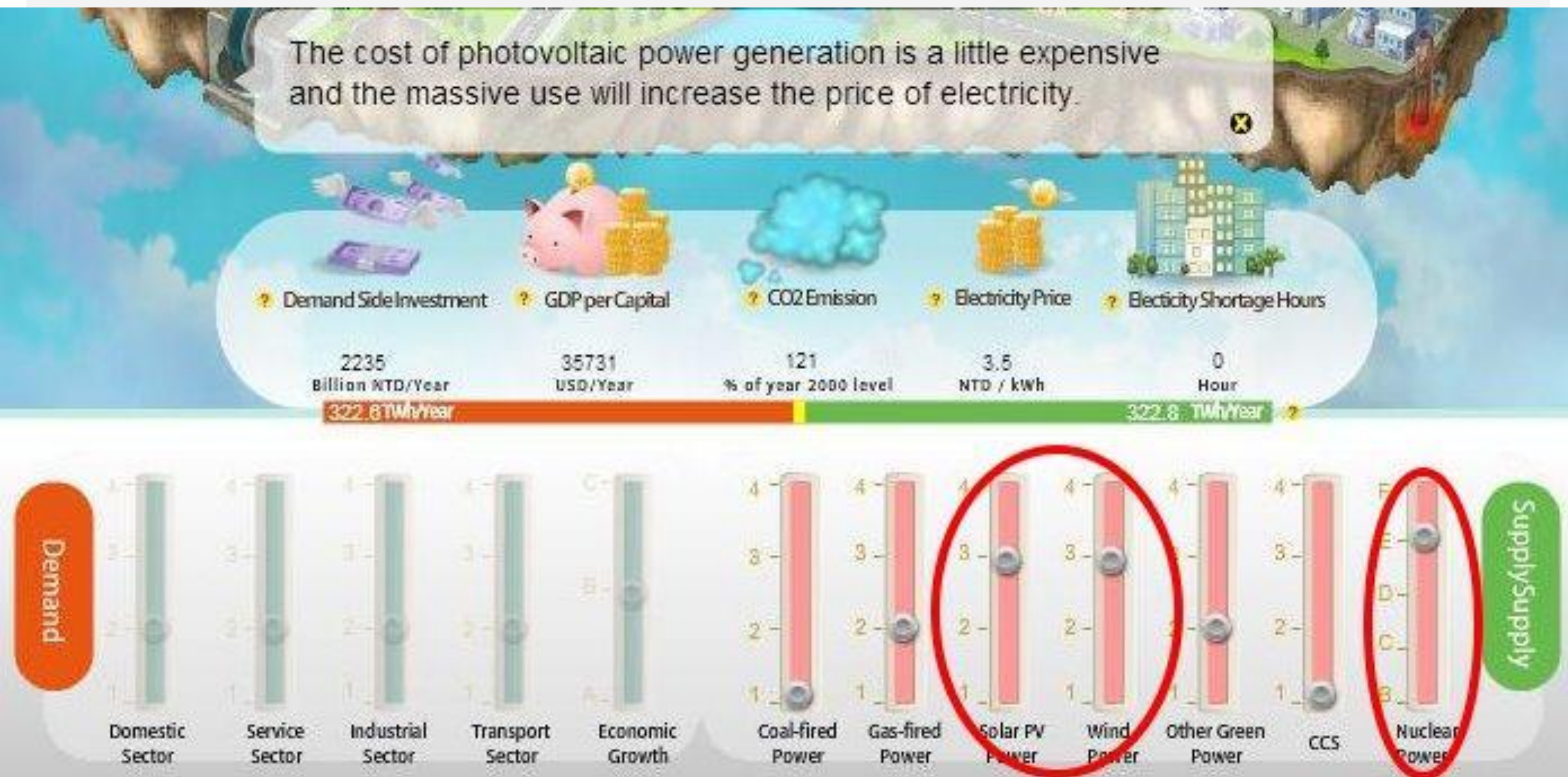
The electricity price falls within acceptable range but we can still try to lower it to reduce the stress for our industries.



Capitalist



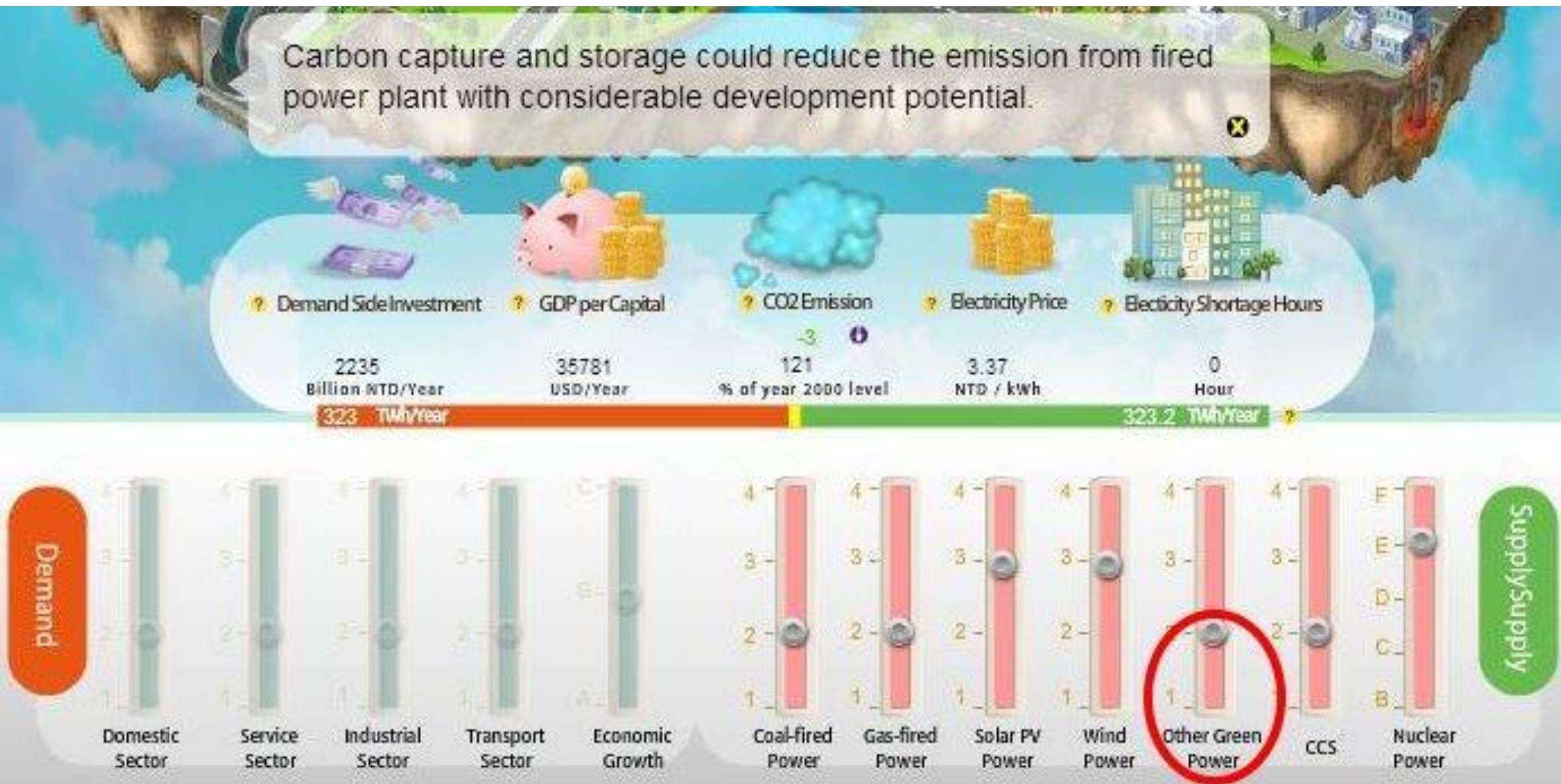
Public



Scholar



Environmentalist



Minister

Carbon capture and storage could reduce the emission from fired power plant with considerable development potential.

Demand Side Investment

2235
Billion NTD/Year

GDP per Capital

35781
USD/Year

CO2 Emission

124
% of year 2000 level

Electricity Price

3.33
NTD / kWh

Electricity Shortage Hours

0
Hour

323 TWh/Year

323.2 TWh/Year

Demand

Domestic
Sector

Service
Sector

Industrial
Sector

Transport
Sector

Economic
Growth

Coal-fired
Power

Gas-fired
Power

Solar PV
Power

Wind
Power

Other Green
Power

CCS

Nuclear
Power

Supply

May 2030

2030 Electricity Vision

Level Two



The capture demonstration site will only be promoted between 2008 and 2020. By 2030, there will not be any power plants that integrate carbon capture and

Planning Completed

King Taiwan
Kindness value: 99



? Demand Side Investment

? GDP per Capital

? CO2 Emission

? Electricity Price

? Electricity Shortage Hours

2235
Billion NTD/Year

35781
USD/Year

124
% of year 2000 level

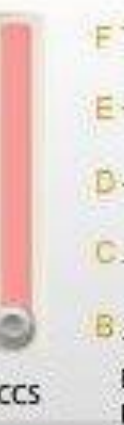
3.33
NTD / kWh

0
Hour

323 TWh/Year

323.2 TWh/Year

Demand



Supply/Supply

Environmentalist



Public



Capitalist



Scholar

The suppliers are requested to increase investment for industrial energy-conservation equipment, which will inevitably increase the

? Demand Side Investment

447
2682
Billion NTD/Year

? GDP per Capital

125
35906
USD/Year

? CO2 Emission

-7
117
% of year 2000 level

? Electricity Price

3.28
NTD / kWh

? Electricity Shortage Hours

0
Hour

311.9 TWh/Year

312.1 TWh/Year

Demand



Domestic
Sector



Service
Sector



Industrial
Sector



Transport
Sector



Economic
Growth



Coal-fired
Power



Gas-fired
Power



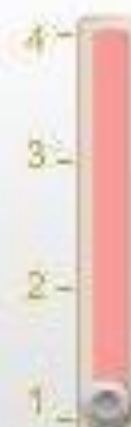
Solar PV
Power



Wind
Power



Other Green
Power



CCS



Nuclear
Power

Supply

The **Environmentalist** and the
public is getting angry!

The **Capitalist** doesn't give up his
points of view.

They are arguing loud, even
fighting.

The **Minister** is trying to
dissuade them from quarreling.

They stop arguing quite
reluctantly.

The **King** is too tired to continue
the discussion.

What do we want?

- 1.No nuclear energy
- 2.Low electricity price
- 3.Lots of electricity
- 4.Low carbon emission

What should Taiwan choose the
strategy in the future?

No one knows but very important.

~~The end~~

Thank you for watching.

The Big Fives – Our World, Our Future

- **Group Discussion!**
- **Future Expectation**
&
the Cruel Reality



Misconceptions & the Truth

❖ Renewable Energy

→ Economic Cost

❖ Carbon Capture and Storage

→ Feasibility, Efficiency

❖ Low-Carbon Economy

→ Substitute Energy?

❖ Anti-Nuclear

→ Energy Usage Restriction

The Goodies

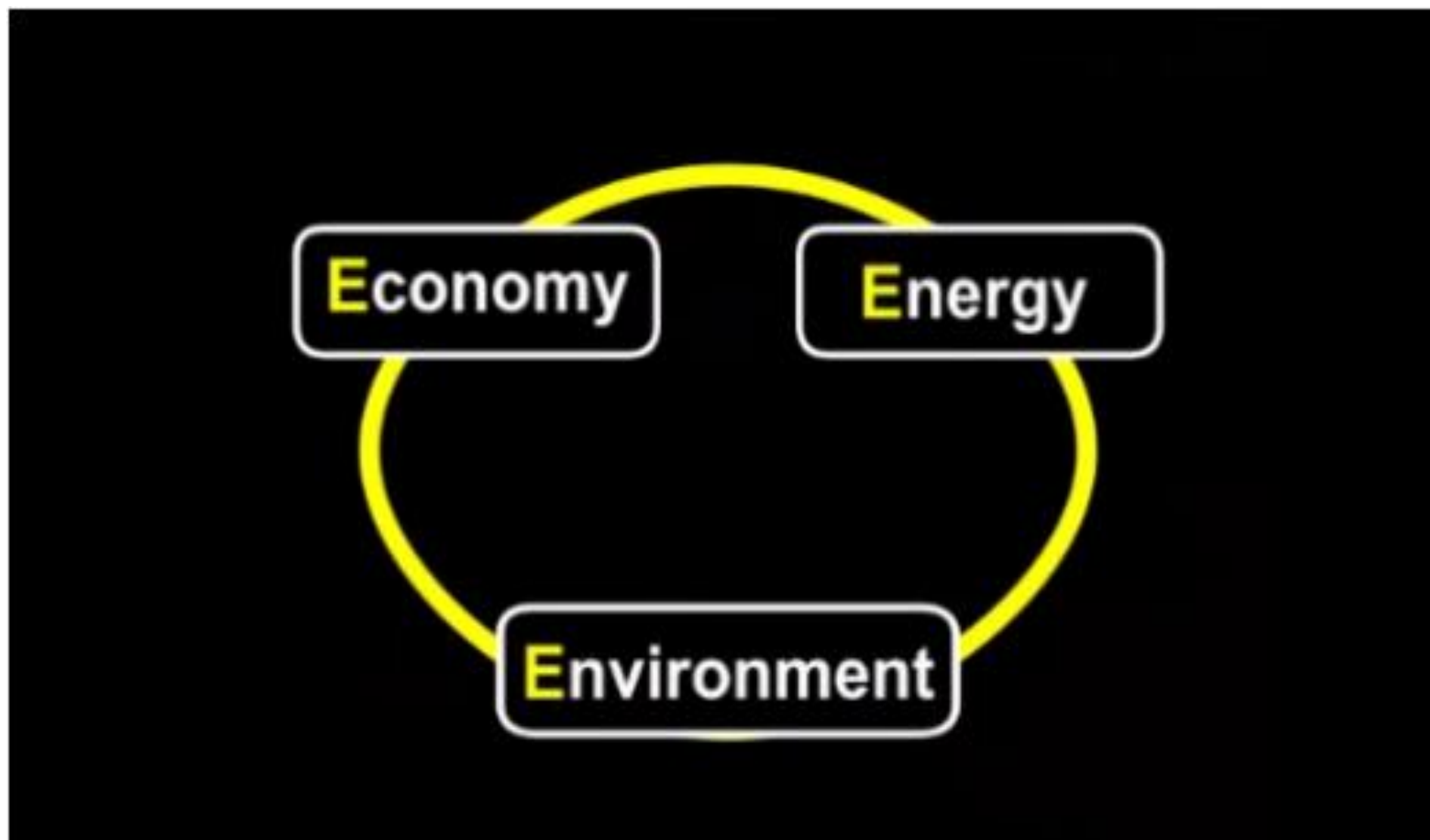
- ❖ Transparency
- ❖ Reference
- ❖ Stereotype? Not a problem anymore
- ❖ It's Fast-and-Furious!

To-optimized Problems

- ❖ Unrealistic, not rounded
- ❖ Game design – not impressive enough
(No chaos? No explosions?)

Never Hesitate

Strive For the Better Future





source of information

<http://www.slcss.edu.hk/eca/scisoc/water.html>

[http://kcs.kcjh.ptc.edu.tw/~spt/else/skyview/Denmark %20offshore%20wind%20farm.htm](http://kcs.kcjh.ptc.edu.tw/~spt/else/skyview/Denmark%20offshore%20wind%20farm.htm)

<http://www.justlight.com.tw/?wpsc->

[product=%E5%A4%AA%E9%99%BD%E8%83%BD%E6%9D%BF](http://www.justlight.com.tw/?wpsc-product=%E5%A4%AA%E9%99%BD%E8%83%BD%E6%9D%BF)

<http://www.taipower.com.tw/>

<http://www.worldjournal.com/>

<http://www.businessweekly.com.tw/KBlogArticle.aspx?id=9116>

<http://www.powermag.com/doe-pulls-the-plug-on-futuregen/>

<http://thinkprogress.org/climate/2015/02/05/3619195/futuregen-clean-coal-project-dead/>

<http://www.scientificamerican.com/article/coal-ash-is-more-radioactive-than-nuclear-waste/>

<http://my2050.twenergy.org.tw/>

<http://spectrum.ieee.org/green-tech/solar/solar-energy-isnt-always-as-green-as-you-think>