

# OPPORTUNITIES FOR RENEWABLE ENERGY AND CLEANTECH INDUSTRY IN TAIWAN

---

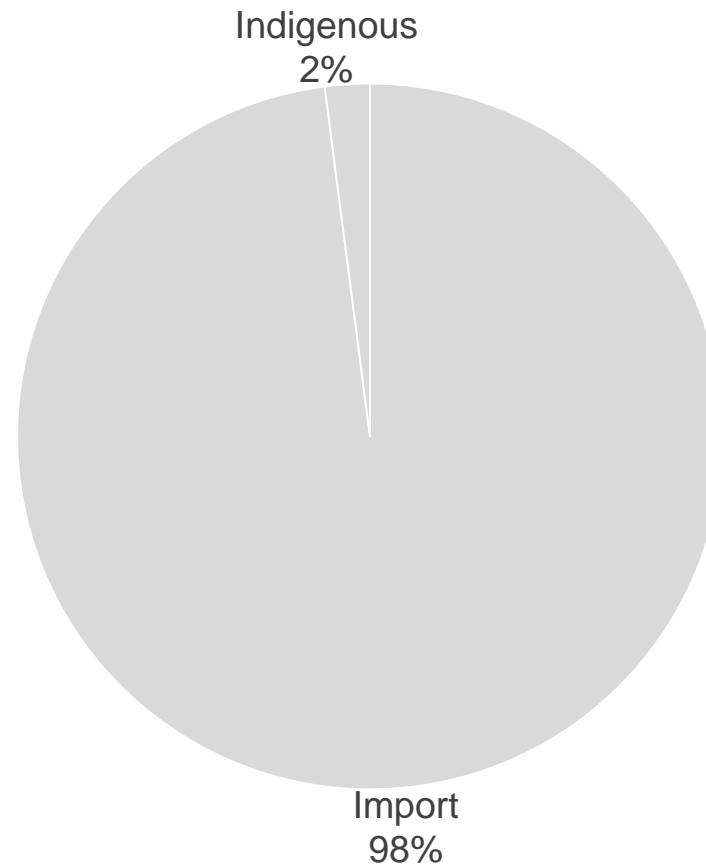
BUSINESS SWEDEN TAIPEI

---

May 2015  
Taipei

# OVER 98% OF ENERGY IS IMPORTED IN TAIWAN

BREAK DOWN OF SOURCE OF ENERGY SUPPLY, 2013

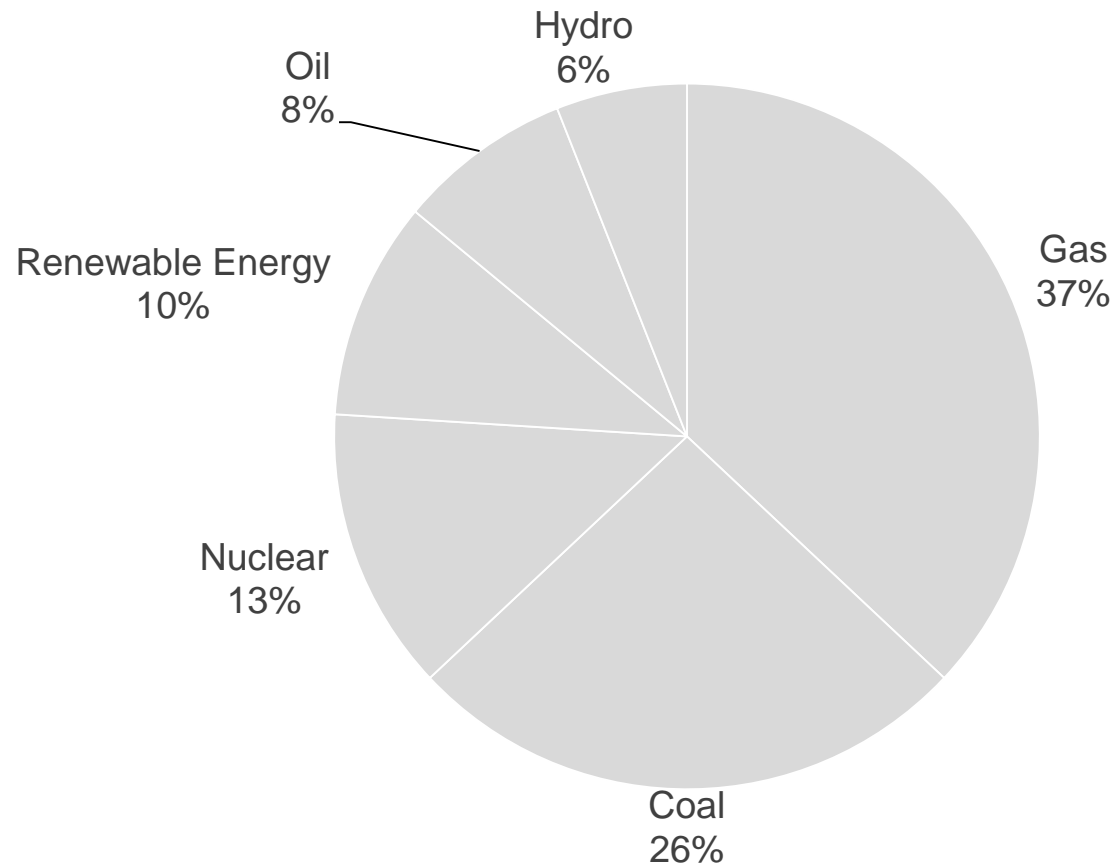


HEAVY RELIANCE ON IMPORTED ENERGY THREATS ENERGY SECURITY AND INCREASE ECONOMIC RISK

SOURCE: 2013 ENERGY STATISTICS YEARLY BOOK, BUREAU OF ENERGY

# ABOUT 70% OF ELECTRICITY CAPACITY IS FROM FOSSIL FUEL POWER PLANTS IN TAIWAN

INSTALLED ELECTRICITY CAPACITY BY SOURCE OF ENERGY, TAIPOWER, 2015, MARCH, TOTAL 40857MW



FOSSIL FUEL BASED ELECTRICITY CAUSES CO2 EMISSION ISSUE IN TAIWAN

SOURCE: TAIPOWER, 2014/01/29



# TAIWAN PROMULGATED RENEWABLE ENERGY ACT IN 2009 TO PROMOTE USE OF RENEWABLE ENERGY





# OFFSHORE WIND POWER AND SOLAR PV WILL BE KEY SOURCE OF RENEWABLE ENERGY IN 2030

TARGET OF INSTALLATION CAPACITY OF RENEWABLE ENERGY (2014) (MW)

Source of energy		MW				
		2014	2015	2020	2025	2030
Wind	On shore	637	814	1,200	1,200	1,200
	Offshore	0	15	320	1,520	3,000
Hydro power		2,081	2,089	2,100	2,150	2,200
Solar PV		615	902	2120	4100	6200
Biomass		739	741	768	813	950
Geothermal		0	4	66	150	200
Total		4,074	4,569	6,574	9,933	13,750

GOVERNMENT AIMS TO DEVELOP LOCAL COMPETENT INDUSTRIES FOR RENEWABLE ENERGY

# GOOD POTENTIAL TO TURN AGRICULTURAL AND ANIMAL WASTE INTO BIOENERGY IN TAIWAN

## ANNUAL AGRICULTURAL AND LIVE STOCK WASTE

2014	Total production	Unit of waste	Total waste (M.T.)
Rice	1600 t M.T.	86Kg/M.T.	136 t
Sugar	500 t M.T.	250Kg/M.T	125 t
Pig	8 million	2.4Kg/Head /Day	7 million
Poultry	370 million	0.15Kg/Head /Day	20 million

## CURRENT STATUS AND THE VISION

- ▶ Currently the agriculture waste is burned which result in air pollution
- ▶ Animal waste is used to produce fertilizer currently
- ▶ Strategy and Vision
  - ▶ Goal of 2030: 950 MW for biomass
  - ▶ Encouraging **biogas** development
  - ▶ Biomass waste incineration transformed to Energy Center with **advanced technology** to increase power yield
- ▶ Currently installed biomass power is total 740 MW
  - ▶ Municipal Solid Waste Incineration: 625 MW
  - ▶ Biogas: 19MW
  - ▶ Waste from industry and agriculture: 97MW

## EXPERIENCE AND TECHNOLOGY REQUIRED TO TURN WASTE INTO BIOENERGY

SOURCE: COUNCIL OF AGRICULTURE, 2014

# FOCUS ON FOUR GREEN INDUSTRIES DEVELOPMENT

SOLAR PV, WIND POWER, LED AND ENERGY ICT

Taiwan feasible renewable energy development

- Solar
- Wind
- Bioenergy
- Hydrogen and Fuel cell
- Ocean energy
- Geothermal

**Green Energy Low Carbon Economy**

**Renewable Energy**

**Energy Savig**

Taiwan possible ways of energy saving

- Lighting
- Air condition
- Transportation
- Energy management

**The dawning green energy industry program**  
(solar, wind, LED, biofuel, energy information, EV, fuel cell )

**Green Energy Industry Advancement Program**

Resources Focus

**Solar PV and LED**  
Export oriented with global competitiveness

**Wind Power, Energy ICT**  
Industries with potential, the government push projects for development

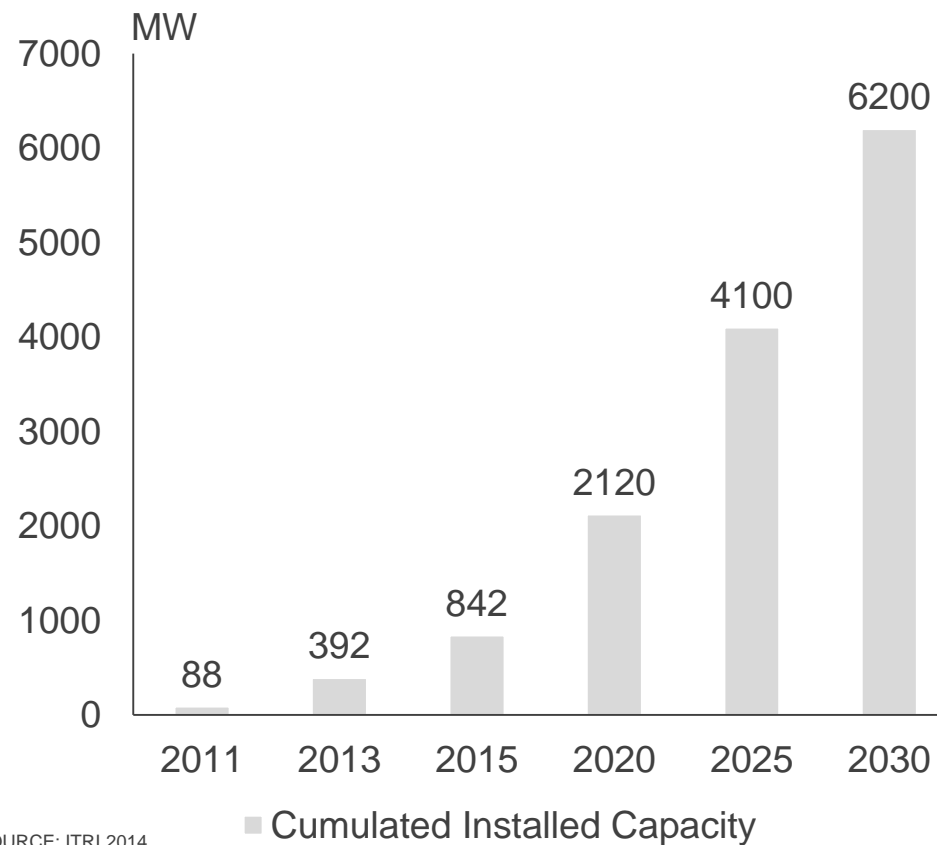
**Four key industries: Solar PV, Wind power, LED, Energy ICT**



# GOAL FOR PV IS FURTHER INCREASED TO 6,2 GW

“MILLION SOLAR ROOFS” PROJECTS IS KEY TO REACH THE GOAL

## GOAL OF INSTALLED SOLAR PV, 2014



SOURCE: ITRI 2014

- ▶ Strategy: Gradual expansion/incentivizing roof-tops prior to ground installations
- ▶ Goal: 6,200 MW developed by 2030 (Roof-top 3,000 MW and Ground 3,200 MW)
- ▶ Buildings will be installed with PV panels through the incentives of feed-in tariffs
- ▶ BOE assists local governments on Solar Roof-top Program and Solar community Program to facilitate public participation



BIPV :Building Integrated Photovoltaics

Left: National Museum of Marine Biology and Aquarium (104kWp)

Right: National Stadium, Kaohsiung, 1 MWp

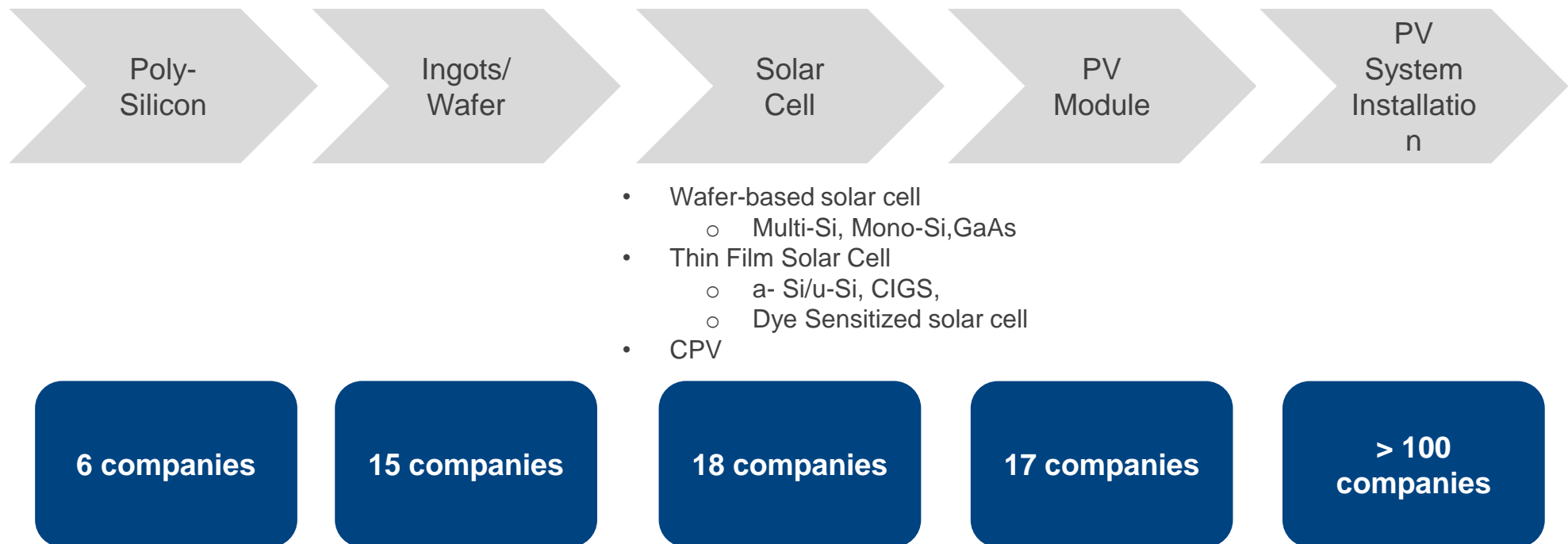
## CREATE HOME TEST MARKET FOR EXPORT





# TAIWAN IS THE 2<sup>ND</sup> BIGGEST COUNTRY FOR PV SOLAR CELL PRODUCTION

## Supply chain of Taiwan PV industry

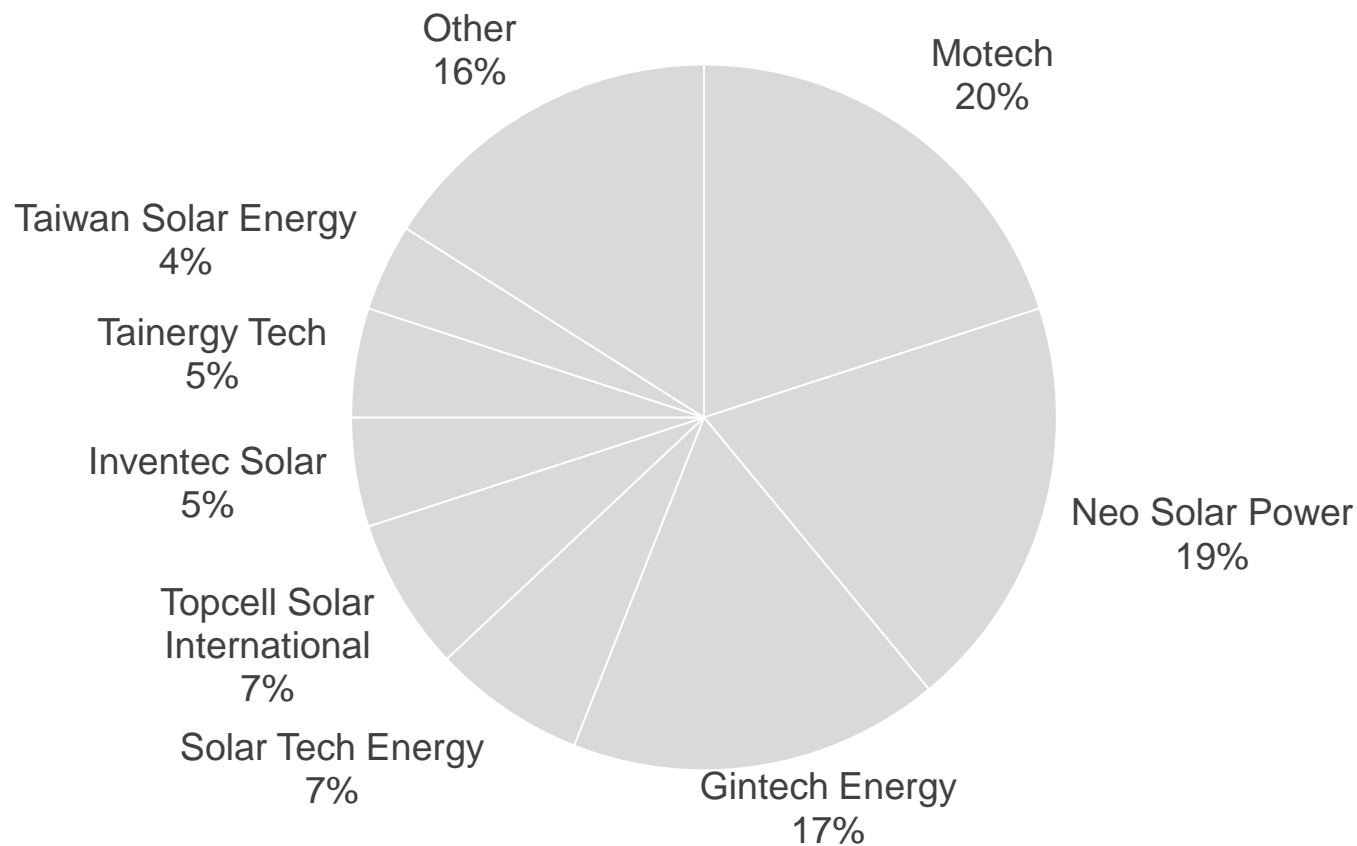


- ▶ Taiwan PV industry ranks number two worldwide for PV solar cell production with 8,3GW production volume in 2013 and 42% growth rate in 2013
- ▶ Taiwan has a complete PV industry supply chain. Develop high efficiency and low cost technology is the key strategy to increase competitiveness

SOURCE: INDUSTRY TECHNOLOGY RESEARCH INSTITUTE, 2014

# TOP 3 SOLAR CELL MANUFACTURERS ACCOUNTS FOR 55% OF TAIWAN PRODUCTION VOLUME IN 2013

BREAKDOWN OF PRODUCTION VOLUME BY TAIWANESE SOLAR CELL MANUFACTURERS IN 2013



SOURCE: ENERGY TREND, 2014



# 3GW OF OFFSHORE WIND POWER BY 2030

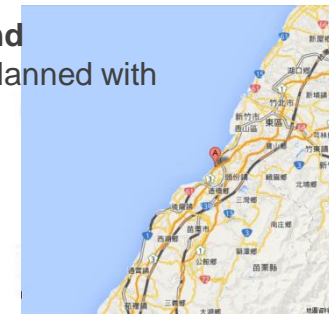
- GOVERNMENT INCENTIVE PROGRAM TO CREATE THE MARKET

## ABOUT THE GOVERNMENT INCENTIVE PROGRAM

- ▶ The incentive program subsidize 2 cases (4 platforms) from private sector and 1 case (2 platform) from a state-owned company
- ▶ The six demo platforms needs to be complete by 2016 and three demo parks needs to be complete by 2020
- ▶ Two private companies Fuhai Windfarm and Formosa Wind were awarded as winner of the government scheme project and also the state-owned utility Taipower

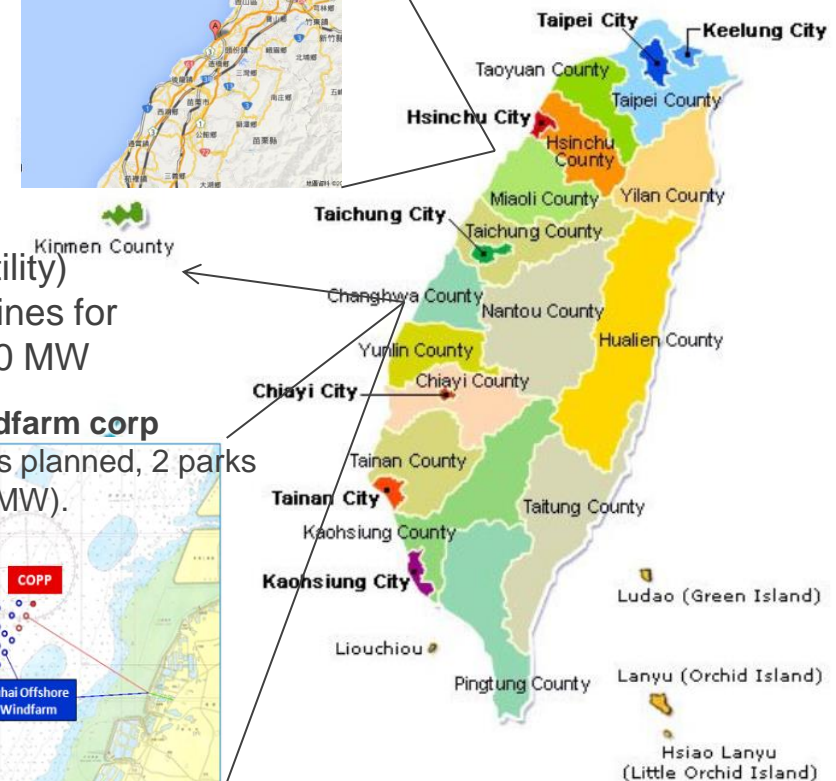
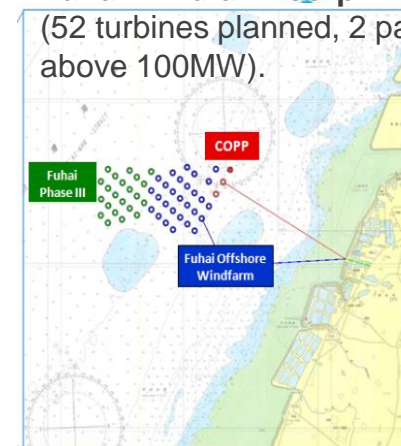
## PLANNED LOCATIONS FOR THE OFFSHORE WIND

**Formosa Wind**  
(30 turbines planned with  
108 MW)



**Taipower**  
(state-owned utility)  
plan 20-30 turbines for  
phase I with 110 MW

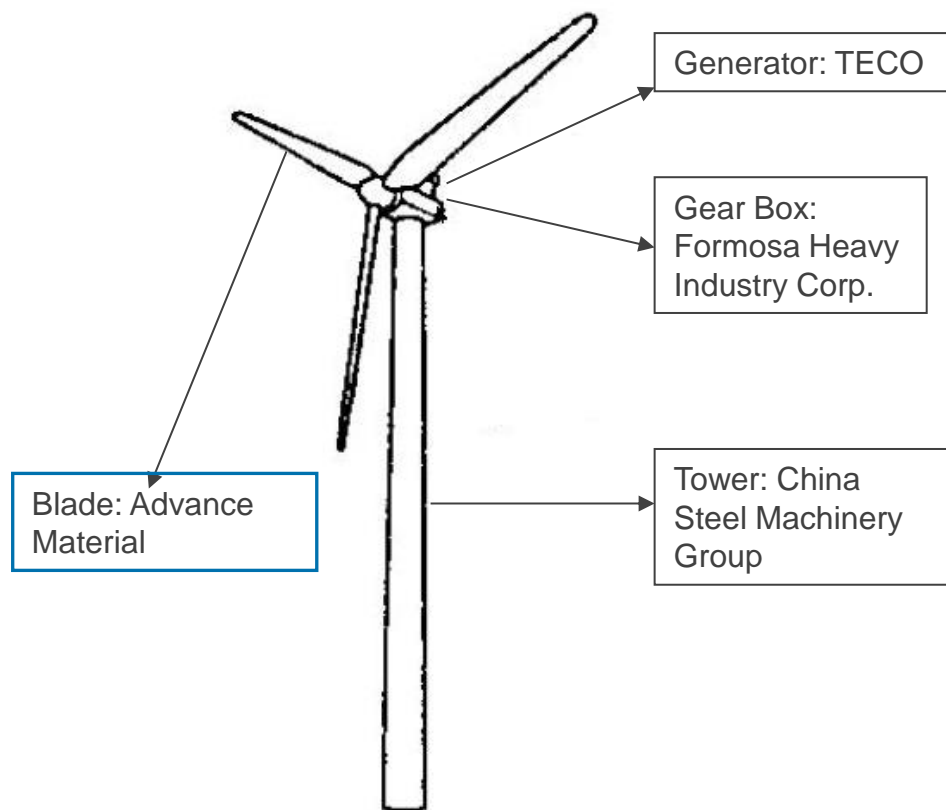
**Fuhai windfarm corp**  
(52 turbines planned, 2 parks  
above 100MW).





# TAIWAN WILL HAVE CAPACITY TO PRODUCE 5MW OFFSHORE WIND TURBINE

## TAIWAN SUPPLIERS FOR THE WIND TURBINES



## DEVELOPMENT OF THE INDUSTRY

- ▶ The onshore wind power turbines are mainly imported in Taiwan
- ▶ Taiwan company TECO has gradually developed as wind turbine system manufacturers which has the ability for onshore 2M wind turbine production
- ▶ Taiwan government would like to push local industry for offshore wind development. TECO will have a Joint Venture company with China Steel Machinery with focus on offshore wind turbine development and will test a 5MW offshore wind turbine in 2015
- ▶ Taiwan has needs to set up the indigenous working fleet for offshore wind park. The ship building company CSBC and China Steel Group has entered the marine engineering businesses to support government policy
- ▶ Small and Medium sized companies develop own brand wind turbines for export market

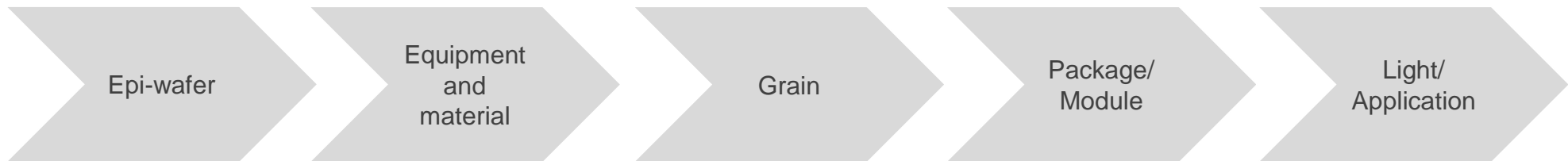
GOAL IS TO DEVELOP LOCAL COMPETENCE FOR MANUFACTURE, OPERATION AND MAINTENANCE



# VERTICAL DISINTEGRATION FOR LED INDUSTRY

- LED DEVICE AND MODULE PRODUCTION IS TAIWAN'S STRENGTH

## Supply chain of Taiwan LED industry



## Number of listed company in Taiwan stock market

**12 companies**

**20 companies**

**12 companies**

**37 companies**

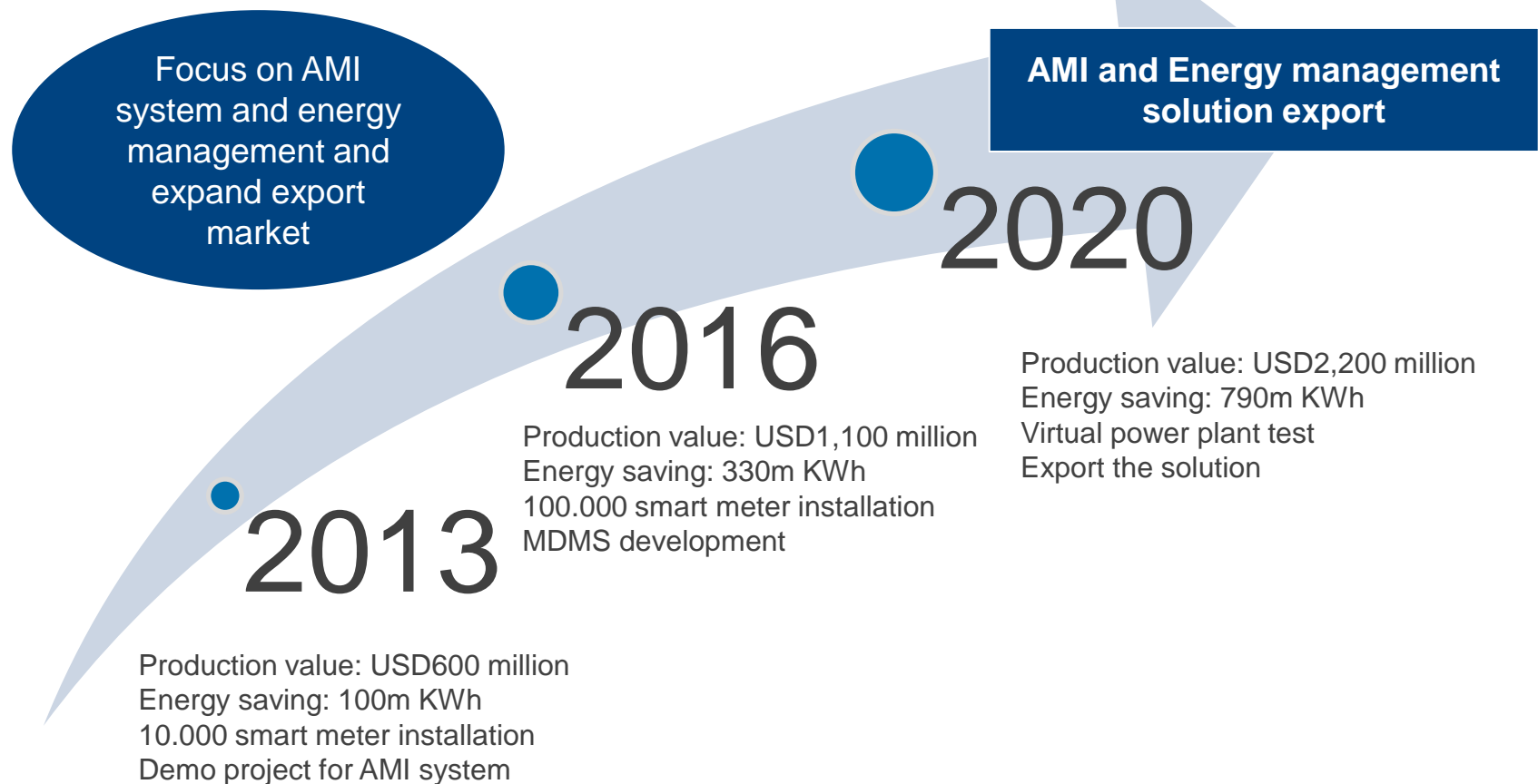
**47 companies**

- ▶ The local government promotion of the local LED lighting market and also the global demand for LED lighting keeps drives the market.
- ▶ Production value of Taiwan LED industry is about USD 7.3 billion in 2013. The growth rate of Taiwan is expected to be 9% in 2014.
- ▶ Taiwan LED device production ranked world number 3 (23% of global market share) and module ranked global number 2 (26% of global market share)
- ▶ Taiwan LED industry is weak at the LED lighting and LED automotive lighting and lack of own lighting brand and channel experience

**BECOME GLOBAL KEY LED DEVICE AND MODULE SUPPLIER AND TO BUILD WORLDWIDE CHANNEL FOR LIGHTING**



# ICT STRENGTH GIVES TAIWAN GOOD BASE TO ENTER ENERGY ICT MARKET



LACK OF SYSTEM INTERGRATION EXPERIENCE IS THE CHALLENGE FOR TAIWAN



# CONTACT US

## BUSINESS SWEDEN IN TAIPEI

Business Sweden

Rm. 2406, International Trade Building  
333., Keelung Road, Sec. 1, Taipei 11012, Taiwan

T +886-2-2757-6573

[taipei@business-sweden.se](mailto:taipei@business-sweden.se)

[www.business-sweden.se](http://www.business-sweden.se)