



Key Innovative Industries in Taiwan

# Green Energy



Information  
Security

Next-Generation  
Vehicle

Communications  
Industry

Internet  
of Things

Semiconductor  
Industry

Biopharmacy  
Industry

Smart  
Machinery

Circular  
Economy

**Green  
Energy**

Service  
Industry



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# Policy Initiatives — Green Energy Technology Industry Innovation Promotion Plan

The Taiwanese government views green power and renewable energy as one of the core strategic industries for responding to rapid changes in the energy environment, global trends in greenhouse gas reduction, and the goal of creating a non-nuclear homeland by 2025. The "Green Energy Technology Industry Innovation Promotion Plan" is the core of the new energy policy announced by the government in October 2016. The Plan focuses on the three major goals of "green energy promotion," "industrial development," and "technological innovation," which go together hand-in-hand with the four major themes of "innovative capacity, energy storage, energy conservation, and system integration." In addition to aiming for the policy goal of attaining 30,161MW in renewable energy power generation capacity by 2025, it also seeks to promote green energy technology development and industry development, create green employment, and build a safe, stable, and efficient supply and demand system for clean energy in Taiwan. With an eye to the targets for installed renewable energy capacity in Taiwan set out in Table 1, Taiwan mainly focuses on solar photovoltaics and offshore wind power, which together are expected to account for more than 85% of Taiwan's renewable energy by 2025.

**Table 1 Targets for installed renewable energy capacity in Taiwan,  
and percentage of each type**

Unit: 10MW, %

Renewable Energy Category		2020		2021		2025	
		Capacity	Percentage	Capacity	Percentage	Capacity	Percentage
Photovoltaics		650	57.4	875	57.1	2,000	66.3
Wind power	Land-based	81.4	7.2	83.5	5.5	120	4.0
	Offshore	97.6	8.6	267.4	17.5	573.8	19.0
Geothermal energy		15	1.3	16	1.0	20	0.7
Biomass		76.8	6.8	77.5	5.1	81.3	2.7
Hydropower		210	18.5	210	13.7	215	7.1
Fuel cell		2.2	0.2	2.5	0.2	6.0	0.2
Total		1,133.1	100.0	1,531.9	100.0	3,016.1	100.0

Source: Announcement of the Ministry of Economic Affairs (September 9, 2019).  
[https://gazette2.nat.gov.tw/EG\\_FileManager/eguploadpub/eg025170/ch04/type1/gov31/num7/Eg.htm](https://gazette2.nat.gov.tw/EG_FileManager/eguploadpub/eg025170/ch04/type1/gov31/num7/Eg.htm).

## 1 | Thousand Wind Turbines Promotion Office |

The Ministry of Economic Affairs established the "Thousand Wind Turbines Promotion Office" in May 2012. Its primary missions are to integrate policy formulation and promotion, and develop and expand technologies. Operators can learn about the application procedures for setting up wind power in Taiwan (including land-based and offshore wind power) through the Office. They can also obtain information on the planned sites, distribution mechanisms, selection, and price competition results for offshore wind power in Taiwan. In addition, the Office also provides information on important regulations such as the feed-in tariff for renewable energy in Taiwan and the calculation formula.

### Contact Information

#### Thousand Wind Turbines Promotion Office

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(R.O.C.)

## 2 | Shalun Smart Green Energy Science City |

The construction of the "Shalun Smart Green Energy Science City" in Tainan is expected to be completed in 2020, and it began soliciting investors at the end of 2019 (Figure 1). The Science City includes core areas A, C, and D. It will establish an interactive industrial exchange platform with the Greater Tainan Convention and Exhibition Center, and incorporate green energy development technologies and pilot program sites for "clean energy centers," "smart green communities," "energy management," and "process verification links" to help strengthen the competitiveness of industries and expand international markets. In addition, the National Applied Research Laboratories, the Industrial Technology Research Institute, and the Institute of Nuclear Energy Research will also set up operations in Areas C and D to use the results of high-tech research and development to power the development of the green energy industries and form a sustainable cycle for the green energy industry innovation ecosystem.

The Shalun Smart Green Energy Science City includes the "Green Energy Technology Pilot Program Site" and the "Green Energy Technology Joint Research Center." The Pilot Program Site will be used for the establishment of energy supply, storage, power conditioning, and usage supply chains which shall be exported to foreign countries once they mature. The Research Center will be used as a platform for value creation for industry and the academia, which will work together to commercialize the results of research and development.

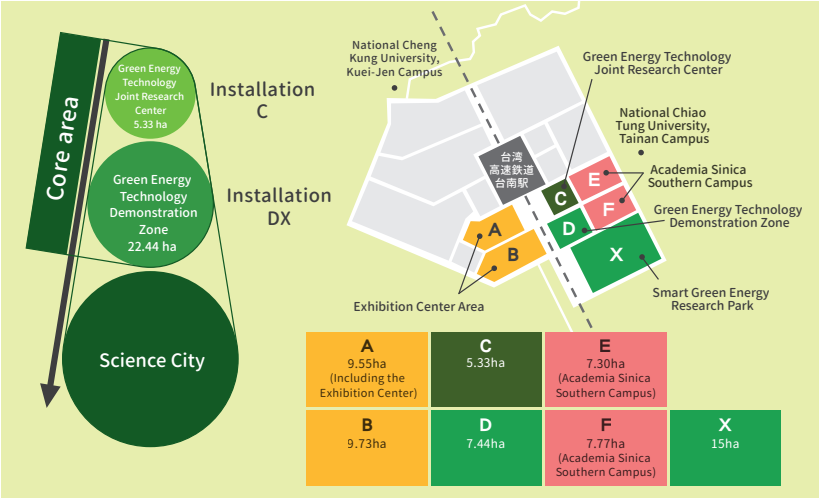


Figure 1 Shalun Smart Green Energy Science City

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# Overview of Industrial Development

## 1 | Output Value |

Recent figures and future forecasts for Taiwan's green energy output value are shown in Table 2. Since the announcement of the "Green Energy Technology Industry Innovation Promotion Plan," Taiwan's solar photovoltaic power installed capacity has reached 4,478.80MW as of April 2020. The total output value reached NT\$1.11 trillion in 2018. Although the output value of solar photovoltaic equipment declined significantly in 2019 due to the US-China trade war and the launch of the "531 Policy" in mainland China, market demand has continued to grow. As industries rapidly restructure and actively invest in innovative research and development, the output value in 2019 and 2020 is still expected to exceed NT\$60 billion. The cumulative wind power installed capacity as of April 2020 was 852.40MW. As foreign investors continue to view the industrial development favorably and continue to expand investments in Taiwan, the output value in 2020 is expected to grow from NT\$3.16 billion in 2018 to NT\$17 billion in 2020.

**Table 2 Output value and cumulative installed capacity of the solar PV and wind power industries in Taiwan**

Sector		Output value (or demand)				Capacity installed capacity from 2000 to April 2020 (MW)
		2018 (million NTD)	2019(e) (million NTD)	2020(f) (million NTD)	2019(e)/2018	
PV industry	Wafer	25,066	13,477	14,450	-46.2%	4,478.80
	Crystalline silicon solar cells	66,019	29,101	30,202	-55.9%	
	Crystalline silicon modules	9,313	10,044	10,769	+7.8%	
	Related materials	11,432	8,453	5,250	-26.1%	
	Polycrystalline silicon, thin-film solar cell modules, and others	209	196	143	6.2%	
	Total	1,112,039	61,271	60,814	-45.3%	
Wind power industry		12,283	14,125	17,657	+15.0%	852.40

Source: Emerging Energy Industry Yearbook 2019, Industry, Science and Technology International Strategy Center, Industrial Technology Research Institute (May 2019); Energy Statistical Monthly Report, Bureau of Energy, Ministry of Economic Affairs (June 2020).



## 2 | Industrial Clusters |

Compared to other countries, Taiwan has advantages in the development of green energy industries, including a solid foundation in the ICT industry, a comprehensive semiconductor industry supply chain, and strong industrial capacity in metallurgy, mechanical engineering, composite materials, and electronic controls.<sup>1</sup> Taiwan has developed large-scale solar PV, light emitting diode (LED) lighting equipment, wind power, and other green energy industries, and formed industry clusters.

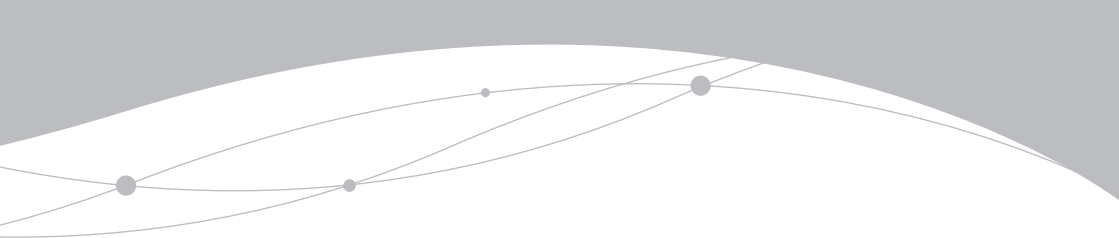
In solar PV, the overall industry includes upstream silicon materials, midstream solar cells and modules, and downstream solar PV systems. Taiwan mainly focuses on solar cell and modules, for which the best known manufacturers include Motech Industries, Tatung, Gigastorage, Mospec Semiconductor, Giga Solar, and Neo Solar Power. In LED lighting equipment, Taiwan has a comprehensive supply chain with upstream companies that specialize in sapphire wafer and chips including Tatung, Genesis Photonics, AimCore Technology, Sino-American Silicon Products, and Rigidtech Microelectronics. Midstream companies that specialize in manufacturing processes and testing include Chroma, Tyntek, Sanlien Technology, MPI, Polytronics Technology, Lextar Electronics, EPILEDs, Epistar, and Arima Optoelectronics. Downstream companies that specialize in LED packaging, modules, and lighting equipment include Genius Electronic Optical, Bright LED Electronics, Excel Cell Electronic, Everlight, ADATA, Delta Electronics, High Power Lighting, and Soaring Technology.

In wind power, although Taiwan got off to a late start, more companies have entered the industry since the issuance of the "Directions for Allocating Installed Capacity of Offshore Wind Potential Zones" and the announcement of the "Offshore Wind Power Industry Policy" in 2018. New entrants in the industry include companies that specialize in underwater foundations such as Sing Da Marine Structure,

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<sup>1</sup> <https://www.mol.gov.tw/media/1702/at03.pdf>





Century Steel, CTCI Machinery, and CSBC Corporation. Companies that specialize in electrical equipment include Fortune Electric, Chung-Hsin Electric & Machinery, Shihlin Electric, Allis Electric, and Nan Ya. Companies that specialize in shipbuilding include CSBC Corporation, Lung Teh Shipbuilding, and Jong Shyn Shipbuilding. To provide in an integrated way for the needs of the industry, the government has transformed ports into development bases for the offshore wind power industry, including the Port of Taipei (underwater foundations), the Port of Taichung (offshore wind power components), and the Kaohsiung Xingda Fishing Port (underwater foundations).



# Potential Investment and Collaboration Opportunities in Taiwan

1

## Grasp Green Energy Business Opportunities Powered by Energy and Industry Policies

To attain the goal of building a non-nuclear homeland, the government has established green energy installed capacity goals which are expected to drive approximately NT\$2.2 trillion in related green energy investments by 2025. With the support of the "Green Energy Technology Industry Innovation Promotion Plan," the government has attracted domestic and foreign companies in investments in the blades, castings, tower, nacelle assembly, wind farm maintenance, inverters, and energy storage systems in the solar PV industry, and electrical power, chassis, and entire vehicle investments for electric vehicles. Foreign companies can expand their investments in Taiwan or form partnerships to jointly create a green energy industrial chain.

2

## Expand Wind Potential Zones and Offshore Wind Power Business Opportunities in Taiwan

Taiwan has abundant offshore wind power resources. According to survey data on the professional offshore wind power website 4C Offshore, nine out of the top ten offshore wind power sites with potential for development lie along the coast of Taiwan (Figure 2).

To help domestic and foreign businesses invest in business opportunities in Taiwan's offshore wind power development, the government has provided a reasonable feed-in tariff system and planned 36 offshore wind potential zones. In addition, it plans to set up ports along the west coast of Taiwan dedicated to

heavy parts used for the construction of offshore wind farms as well as industrial parks for the production, assembly, construction, and maintenance of wind turbines to fully support the construction of a comprehensive offshore wind power industry chain. The government expects to create NT\$1 trillion in business opportunities through investments by 2025.

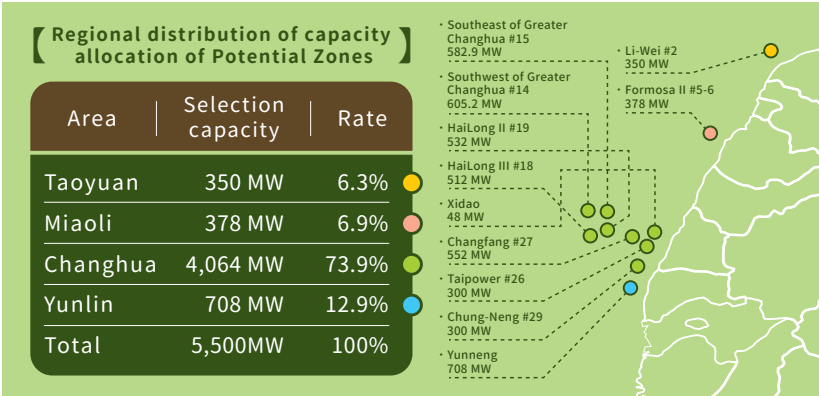


Figure 2 Overview of wind power siting in Taiwan

### 3 | Continuous Growth of Solar PV Market Demand

To achieve 20GW in solar PV installed capacity by 2025, the government is now promoting the "2020 Solar PV 6.5GW Target Plan." It is expected to generate approximately NT\$222 billion in investments and assist the development of solar PV and related technologies. The American company Corning actively responded to the Plan and worked with AU Optronics in 2018 to set up solar PV equipment on the rooftops of its glass substrate plants in the Central and Southern Taiwan Science Parks, thus taking concrete action to support Taiwan's green energy power generation policy. Taiwan's future solar PV market demand is expected to expand steadily, which will help attract international system companies into more intensive partnerships with related industries in Taiwan.

# Investment Incentive Measures

## 1 | Tax incentives |

Taiwan's profit-seeking enterprise income tax rate is 20%. To encourage foreign companies to invest in Taiwan, support industrial innovation, and promote industry-academia collaboration, foreign companies are eligible for the following preferential taxes (Table 3):

Table 3 Preferential taxes

Item	Incentives
R&D and introduction of technology or mechanical equipment	<ul style="list-style-type: none"><li>• Up to 15% of the company's R&amp;D expenditures may be deducted from its profit-seeking enterprise income tax for current year.</li><li>• Royalty payments to foreign companies for imported new production technologies or products that use patents, copyrights, or other special rights owned by foreign companies is, with the approval of the Industrial Development Bureau, MOEA, exempt from the corporate income tax.</li><li>• Imported machinery which local manufacturers cannot produce are eligible for duty-free treatment.</li></ul>
Technology investment / Stock-based employee compensation	<ul style="list-style-type: none"><li>• The worth of shares acquired through technology investment/stock-based employee compensation can be excluded from the taxable income for that year (up to NT\$5 million). In addition, those that meet related criteria are eligible for reduced taxes based on "acquisition price" or "transfer price," whichever is lower.</li></ul>



Item	Incentives
Investment in smart machinery / 5G	<ul style="list-style-type: none"> <li>• Smart machinery: Automatically scheduled, flexible, or mixed-model production lines that utilize big data, AI, and IoT.</li> <li>• 5G: Related investment projects include 5G communication systems, and new hardware, software, technology, or technical services.</li> <li>• For investments of no less than NT\$1 million and no more than NT\$1 billion, either "5% of investment spending deducted from profit-seeking enterprise income tax (current FY)" or "3% of investment spending deducted from profit-seeking enterprise income tax, if total spending spread over three years" may be selected, but the total amount deducted may not exceed 30% of corporate income tax that year.</li> <li>• The applicable periods are January 1, 2019 through December 31, 2021 (smart machinery) and January 1, 2019 through December 31, 2022 (5G).</li> </ul>
Foreign Special Professionals	<ul style="list-style-type: none"> <li>• Foreign special professionals who meet criteria are eligible for a 50% deduction of total income tax for amounts exceeding NT\$3 million.</li> </ul>
Setting up operations in industry parks	<ul style="list-style-type: none"> <li>• Companies that set up operations in export processing zones, science industrial parks, or free trade ports are eligible for exemptions on import duties, commodity tax, and business tax for the import of machinery and equipment, ingredients, fuel, materials, and semi-finished products for their own use.</li> </ul>
Others	<ul style="list-style-type: none"> <li>• Companies that use undistributed earnings to engage in substantive investments may exclude the amount when calculating their profit-seeking enterprise income tax.</li> </ul>



## 2 | Subsidies |

### 1.The Global R&D Innovation Partner Program

Some foreign companies have a high degree of complementarity with Taiwan's industries. To encourage them to engage in R&D and innovation activities in Taiwan, such companies, after gaining approval from the MOEA, will be eligible for subsidies of up to 50% of total R&D expenditures if they: (1) have technologies that are not yet mature in Taiwan or overseas, and could create strategic products, services, or industries over the course of future industrial development; (2) have potential to help Taiwan produce leading technologies or significantly enhance the competitiveness and increase the added value of important industries; or (3) engage in key and common technology R&D, vertical or horizontal technology integration, and can create an industrial value chain.

### 2.Integrated R&D Program

Companies, once approved by the MOEA, will be eligible for subsidies of no less than 40% but no more than 50% of total project funding if they: (1) engage in key and common technology R&D, vertical or horizontal technology integration, and can create an industrial value chain; (2) establish industry standards, protocols, or platforms; or (3) establish applications, services, and innovative business and marketing models with technological content, and increase industry's added value.

### 3.Taiwan Industry Innovation Platform Program

The MOEA Industrial Development Bureau and the Ministry of Science and Technology are jointly implementing the "Taiwan Industry Innovation Platform Program" to guide industries to develop towards greater value, and to encourage companies to enter high-end product application markets to increase industry's overall added value. For companies owning R&D teams in Taiwan, the program provides 40-50% of the funding required for theme-based R&D projects, and up to 40% of funding for R&D projects proposed by the companies themselves.





# Successful Examples of Foreign Companies

1

## Construction of solar power plants and related services and collaboration

Thailand's Mitr Phol Group and TSEC Corporation established a joint venture named Hou Ju Energy Technology Corporation to provide solar PV power plant development, construction, maintenance, and operation services. The "Taiwan Mingus Solar Project" built by the Singaporean company Vena Energy in Budai, Chiayi has commenced commercial operations. The Japanese thermal coal power generation developer Marubeni announced its NT\$2.7 billion acquisition of all the shares of Taiwan's Chenya Energy and its green energy equipment (with capacity of 270MW) in February 2020 in a bid to take advantage of business opportunities in solar PV development in Taiwan and increase the proportion of renewable energy in the Group's business.

2

## Wind Power Collaboration

The German company WPD has invested in land-based wind power in Taiwan since 2001. It will focus on offshore wind power and solar PV in its future investments. It has completed project financing for its 640MW Yunlin Yunneng Offshore Wind Farm, which is currently the largest offshore wind farm financing project in the Asia-Pacific region, with an investment of NT\$94 billion. It is expected to commence commercial operations by 2021.



The Australian company Macquarie Group and Danish company Ørsted are working with Taiwan's Swancor Renewable Energy in the development of Formosa I in Miaoli. Swancor Renewable Energy is responsible for the development, operations, maintenance, and management of the wind farm. Ørsted will provide consulting services for the wind farm development. Macquarie Group will provide financial consulting and financing services. In addition, Swancor Renewable Energy is also working with Macquarie Group on Formosa II in Houlong, Miaoli, and is working with Macquarie Group and EnBW of Germany in the development of Formosa III.

In addition, Ørsted has identified the crucial role of the Port of Taichung in the construction and operations of Taiwan's offshore wind farms and announced its lease of Taichung Port facilities and auxiliary land for 20 years in February 2020. The facilities and land will be used for the construction of the "Greater Changhua Offshore Wind Farm" and serve as its flagship O&M center in the Asia-Pacific region. The site is expected to be completed and inaugurated in 2022.





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