



Key Innovative Industries in Taiwan

Green Energy



Information Security

New Generation Automobiles

Communications Industry

Circular Economy

Green Energy

Biopharmacy

Smart Machinery

Semiconductors

Internet of Things

International Logistics and E-commerce



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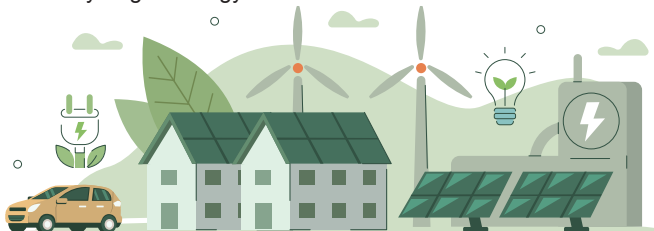
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Policy Initiatives

1 | Taiwan's Pathway to Net-Zero Emissions by 2050

In the face of challenges from international net-zero emission trends and stricter carbon control around the world, Taiwan's National Development Council (NDC) announced "Taiwan's Pathway to Net-Zero Emissions by 2050" on March 30, 2022 and an estimated NT\$900 billion invested by 2030. The Pathway will rely on four strategies to fulfill Taiwan's long-term vision of net-zero transition: "Energy Transition," "Industry Transition," "Lifestyle Transition," and "Social Transition."

For Energy Transition, the Taiwanese government has developed three aspects: "building a zero-carbon energy system," "Improving energy system resilience," and "creating green growth" Measures to support Energy Transition include maximizing renewable energy, promoting low-carbon energy generation and decarbonization of gas and fuel, building a zero-carbon fuel supply system, introducing advanced technologies to increase the space for zero-carbon energy utilization, etc. The Taiwanese government will also improve energy system resiliency, especially focusing on expanding energy-storage facilities for renewable energy; investing in the research and development of advanced technologies to create a green energy industry ecosystem; and promoting decarbonization investment and international cooperation. On the other hand, to support the development of hydrogen energy, the Taiwanese government will also build a supply and demand system for hydrogen energy to expand hydrogen energy suppliers, build up infrastructure for hydrogen energy storage and transportation, and strengthen the technological developments and industrial applications of hydrogen energy.



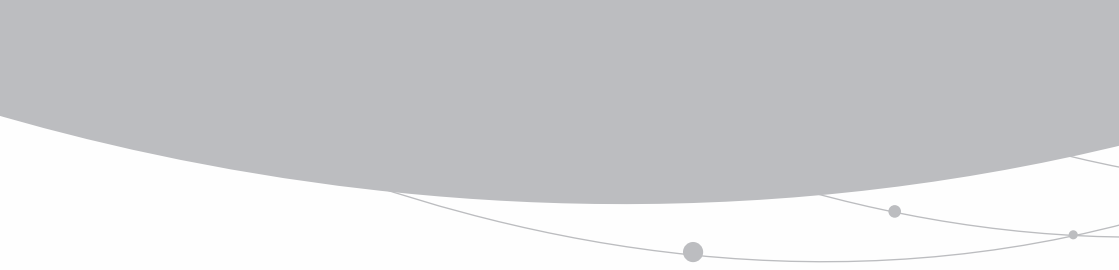


2

Green Energy Technology Industry Innovation and Promotion Action Plan

The Taiwanese government considers green energy and renewable energies to be one of the core strategic industries that can help Taiwan respond to the challenges of a rapidly changing energy landscape, global greenhouse gas reduction trends, and vision of achieving a Nuclear Free Homeland by 2025. To such ends, the Taiwanese government announced one of the core components in October 2016 – a new energy policy named “Green Energy Technology Industry Innovation and Promotion Action Plan.” 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 29,424MW 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.

In Taiwan, green energy development is largely focused on solar photovoltaics and wind energy. By 2025, it is estimated that Taiwan will have a total of 20 GW in solar photovoltaics and 6.5 GW in installed wind energy capacity. The 20 GW in solar photovoltaics will consist of 8 GW from roof-mounted solar systems and 12 GW from ground-mounted solar systems. The 6.5 GW in wind energy will consist of 886 MW from onshore wind farms and 5.6 GW from offshore wind farms. To develop offshore wind energy, the Ministry of Economic Affairs (MOEA) issued the Directions of Application for Offshore Wind Zonal Development and Directions of Grid Capacity Allocation for Offshore Wind Energy Zonal Development in 2021, officially kick-starting wind zonal development. In 2022, it is estimated that many offshore wind farms will be completed and connected to the grid. In 2022 Q3, the MOEA will initiate the Phase 3 Offshore Wind Zonal Development Selection Process, which is estimated to create up to 3GW in new installed capacity. Taiwan will continue to develop offshore wind farms beyond Phase 3, unleashing 1.5 GW each year and 15 GW in total between 2026 and 2035. By 2035, it is estimated that wind energy will have generated NT\$3.2 trillion in investments and created 74,000 jobs.



In terms of the user end, the MOEA implemented the Regulations for the Management of Setting up Renewable Energy Power Generation Equipment of Power Users above a Certain Contract Capacity (commonly known in Taiwan as the Big Energy Consumer Law) in January 2021 to encourage big energy users to start using renewable energies. According to the Regulations, power users with a chartered of 5,000 kW shall install renewable energy systems with an installed capacity that is at least 10% of their chartered capacities within 5 years, to accelerate the use of renewable energy power generation equipment in companies. Big energy users can choose to perform their obligations by (1) installing renewable energy power generation equipment: installing renewable energy power generation equipment such as solar energy systems on company properties such as factories or office buildings; (2) installing energy storage facility: if companies are unable to install renewable energy power generation equipment, they may consider installing energy storage facility to store energy for later use; (3) purchasing renewable energy: the annual purchase amount required is calculated by multiplying the compulsory installed capacity by the annual amount of electricity sales per kW for the selected category of renewable energy, which will also help companies comply with green supply chain trends around the world; or (4) paying monetary substitution: companies can also opt to pay NT\$4/ kWh for all unfulfilled compulsory installed capacity, but monetary substitution yields no additional benefits and should be the last resort for companies. Additionally, to support the Executive Yuan's energy policy targets for 2025, which calls for renewable energies to account for 20% of total power generation, the Bureau of Standards, Metrology and Inspection of MOEA has established the National Renewable Energy Certification System to build a trading system for renewable energies. One of the special focuses is to ensure free trading for renewable energy sellers and to open up and ensure green energy autonomy, stable power supply, and maximized energy use efficiency. Global companies can reach out to the following agencies or assess if they wish to open a location in the following units:

1. Single Service Window for Solar PV

The MOEA has established the “Single Service Window for Solar PV” to carry out complementary measures promoting solar PV, help Taiwan achieve the 20 GW solar goal by 2025. It helps the central government, local government, businesses, and the public with applications, installations, regulations, taxes, etc. by providing professional technical consulting and referral services, and establish a communication platform to thereby construct a robust environment to support green energy.

Contact Information

Single Service Window for Solar PV

Telephone : +886-6-3636879, +886-6-3636887

Address : No. 248 14F-1, Nanjing East Road Section 3, Songshan District, Taipei City

2. Thousand Wind Turbines Project

MOEA established the “Thousand Wind Turbines Project” in May 2012. The Project’s primary missions are to integrate policy formulation and promotion as well as research, develop, and promote technologies. The Project helps businesses understand the application process for installing wind energy systems (both onshore and offshore) in Taiwan and provides information on offshore wind potential zones, allocation mechanisms, selection processes, and bid opening.

Contact Information

Thousand Wind Turbines Project

Telephone : +886-2-87723415

Address : No. 378 4F, Fuxing North Road, Zhongshan District, Taipei City

3. Shalun Smart Green Energy Science City

“Shalun Smart Green Energy Science City” in Tainan was completed and commissioned at the end of 2020 (Image 1). Upon completion, the Science City started recruiting businesses to open locations within the Science City. The Science City is home to seven core zones, all of which are industrial zones: A, B, C, D, E, F, and X. It intends to strengthen industrial competitiveness and open up the international market. The South Campus of the Academia Sinica and other research institutes have already relocated into Industrial Zone E. The F/X Zone is the Shalun Medical Services and Innovation Area, while Areas A1 and B are still currently available and recruiting businesses. The Science City aims to drive development in the green energy sector through research and development of new technologies, thereby creating an innovative ecosystem for the green energy sector that is sustainable and circular. The Tainan City Government has already made plans to establish medical parks and industrial parks in surrounding areas to accelerate the development of the Science City and strengthen amenities in the area.



Source: Bureau of Energy, Ministry of Economic Affairs

Figure 1 Shalun Smart Green Energy Science City

The Information Security and Smart Technology R&D Building, managed by the National Science and Technology Council, is located in Area C and will become an important hub for developing the information security sector and cultivating international talents. Managed and spearheaded by MOEA, Area D is a “Green Energy Technology Demonstration Site” and will be connecting energy suppliers with energy users to engage in energy storage and regulations. The “Green Energy Technology Demonstration Site” will also provide highly efficient decentralized renewable energy systems, facilitate stationary energy storage facilities with diverse electricity dispatch and installation methods, and provide demonstrations of integrating smart and low-power technologies (Image 2).

To develop “Green Energy Technology” as part of the demonstration site, four schemes are integrated using “Research and Development Technologies”: energy creation, storage, conservation, and smart systems to comprehensively integrate domestic and international research and development technologies and serve as a site for industrial testing, verification, and matchmaking. This

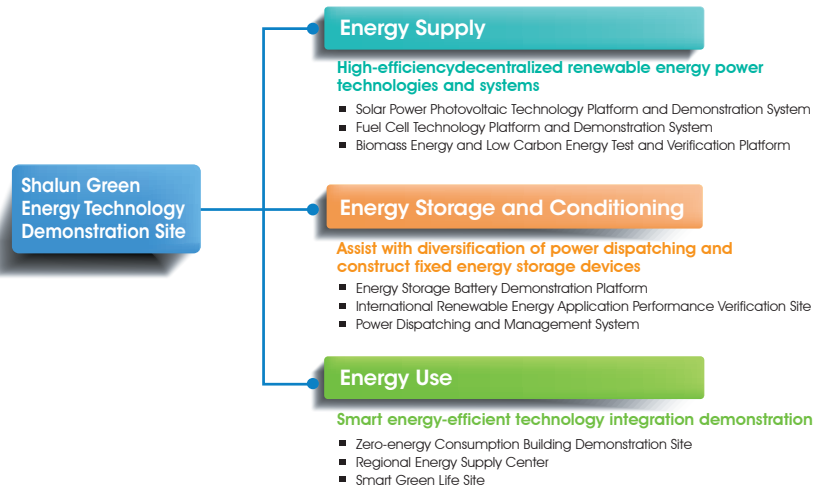


Figure 2 Shalun Green Energy Technology Demonstration Site

includes the Energy Control Center, SPINLab, and Green Energy Living Experience Community, which integrates smart energy conservation and energy control technologies to showcase applications of green energy. In addition, the Shalun Green Energy Science City's office is also located in Area D, where it provides business recruiting services to all areas. Currently, the Science City is home to 28 companies (please refer to Table 1) and partners, including Motech Industries, Dyna Rechi, Formosa Plastics Group, e-Formula Technologies, United Renewable Energy, and others.

Table 1. Companies Located in the Demonstration Site

Date of Entry	Companies
2019-2020	Pre-entry of ITRI Green Energy and Environment Research Laboratories
2021.2	ITRI College, Yuan Kang Green Energy, Bigwood Systems, TQ Optoelectronics, Chailease Holding, AA EMC Tech, Ysolar, and EVOASIS.
2021.5	Wiess, Solar Piggy, Truewin, and the Green Energy Industry Promotion Center (Institute for Information Industry)
2021.8	Taiwan Energy Efficiency Technology Services, Tainan City Government Economic Development Bureau, and Taiyen Green Energy
2021.12	CONNEXION Systems
2022.2	ITRI Southern Region Campus and Greenfilm
2022.5	ITRI Materials and Chemical Research Laboratories, Weixin Electronic Applications, LRU Technology, Truewin, and Green Shepherd
2022.8	GreenHarvest, NIDEC Taiwan, Insynerger, and Taiwan Drone 100

Contact Information

Shalun Green Energy Technology Demonstration Site

Telephone : +886-6-363-6777

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Overview of Industrial Development

1 | Output Value |

Outcomes and estimated output values from promoting green energy in Taiwan can be found in Table 2 below. Since the announcement of the “Green Energy Technology Industry Innovation and Promotion Action Plan,” Taiwan has reached a cumulative installed capacity of 8,701 MW in solar PVs as of June 2022. Though the solar PV industry has, in recent years, experienced impacts and decreased output values from the trade war and Mainland China’s “531 Policy,” the industry has been able to quickly shift its organizational structure and invest aggressively into innovative research and development. Coupled with growing market demands, Taiwan’s solar PV industry is estimated to sustain an output value of over NT\$70 billion in 2022. As for wind energy, Taiwan has reached a cumulative installed capacity of 1,062 MW as of June 2022. Overseas investors have also increased investments in Taiwan as they predict high industrial growth potential, leading to estimated growth in output value from NT\$35.5 billion in 2020 to NT\$56.9 billion in 2022.



Table 2 Estimated Output Value & Cumulative Installed Capacity of Solar PVs & Wind Energy in Taiwan

Industry	Output Value (or Demand)				2003~2022/06 Cumulative Installed Capacity (MW)	
	2020 (NT\$1M)	2021(e) (NT\$1M)	2022(f) (NT\$1M)	2021(e)/2020		
Solar PV	Solar wafers	1,423	1,180	1,262	-17.1%	8,701
	Solar cells	22,233	22,678	24,265	+2.0%	
	Silicon modules	32,507	38,085	41,132	+17.2%	
	Related materials	9,781	10,039	10,598	+2.6%	
	Polycrystalline silicon, thin-film modules, others	340	122	134	-64.1%	
	Total	66,284	72,104	77,391	+8.8%	
Wind Energy	33,548	40,654	56,915	+21.2%	1,062	

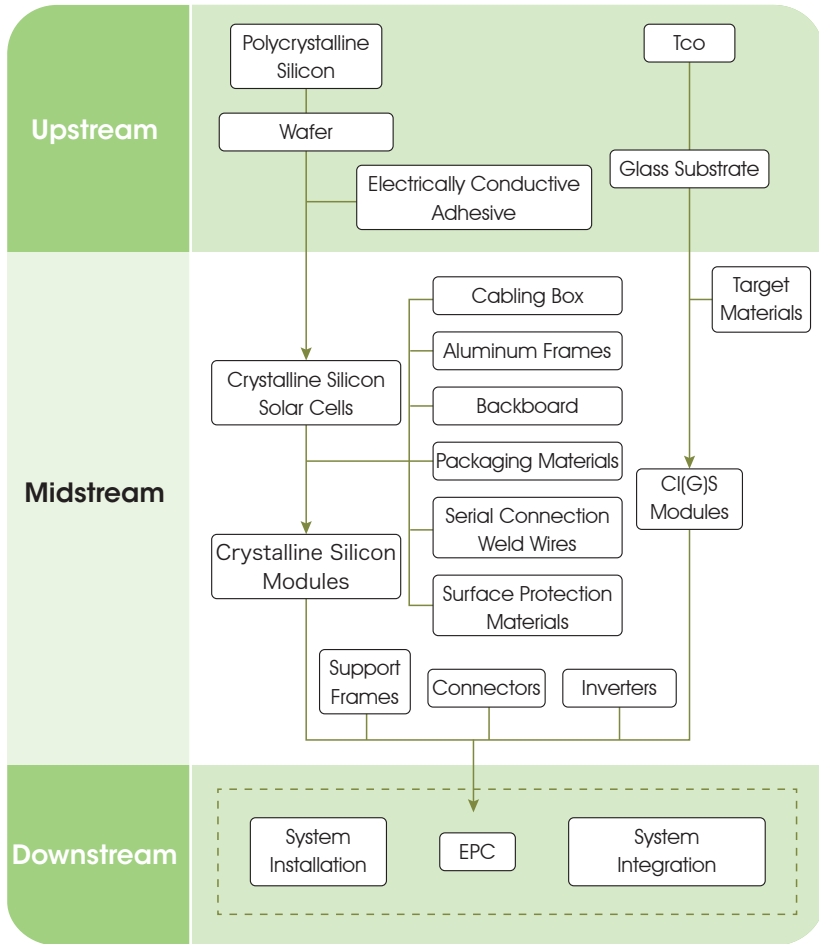
Source: 2021 Emerging Energy Industry Yearbook by the Industry, Science and Technology International Strategy Center, ITRI (2021); monthly Taiwan energy statistics by the Bureau of Energy, Ministry of Economic Affairs (2022/08).





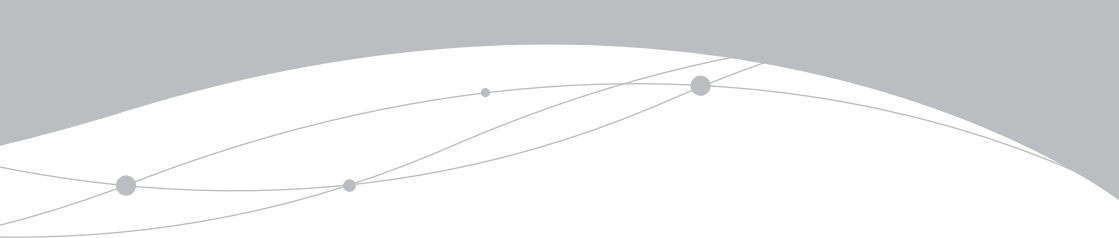
2 | Industry Chain |

Solar PVs and wind energy are the most developed green energies in Taiwan. The solar PV industry can be separated into upstream silicon, midstream solar cell and modules, and downstream solar PV systems. The majority of Taiwan's capacity has exited the upstream silicon segment before 2020. Currently, Sino-American Silicon Products still has production capacities, while AUO Crystal largely fabricates N-type monocrystalline silicon wafers. In the midstream, though Taiwan excelled in manufacturing solar cells in the past, in recent years, manufacturers have shifted their focus to domestic markets and selling to local module manufacturers rather than overseas buyers. Major manufacturers in the midstream include United Renewable Energy, Motech, Sino-American Silicon Products, TSEC, Taienergy Tech, Inventec Solar Energy, E-Ton Solar Tech, etc. The domestic market's rapid growth and Taiwan's voluntary product certification approach that allows businesses to increase their feed-in tariffs by an additional 6% has led to rapid growth in Taiwan's silicon module capacity. Spearheaded by United Renewable Energies, AUO, TSEC, Gintung, and TSMCC, the percentage is expected to continue increasing in the future. In the downstream, government policies supporting solar systems and overseas investments into system developments in Taiwan have resulted in a strong system end that is spearheading Taiwan's green energy industry. Major downstream suppliers include Tatung Forever Energy, AUO, Sinogreenergy, ANJI Technology, and SunEdge PV. (Image 3)



Source: Industry, Science and Technology International Strategy Center, ITRI.

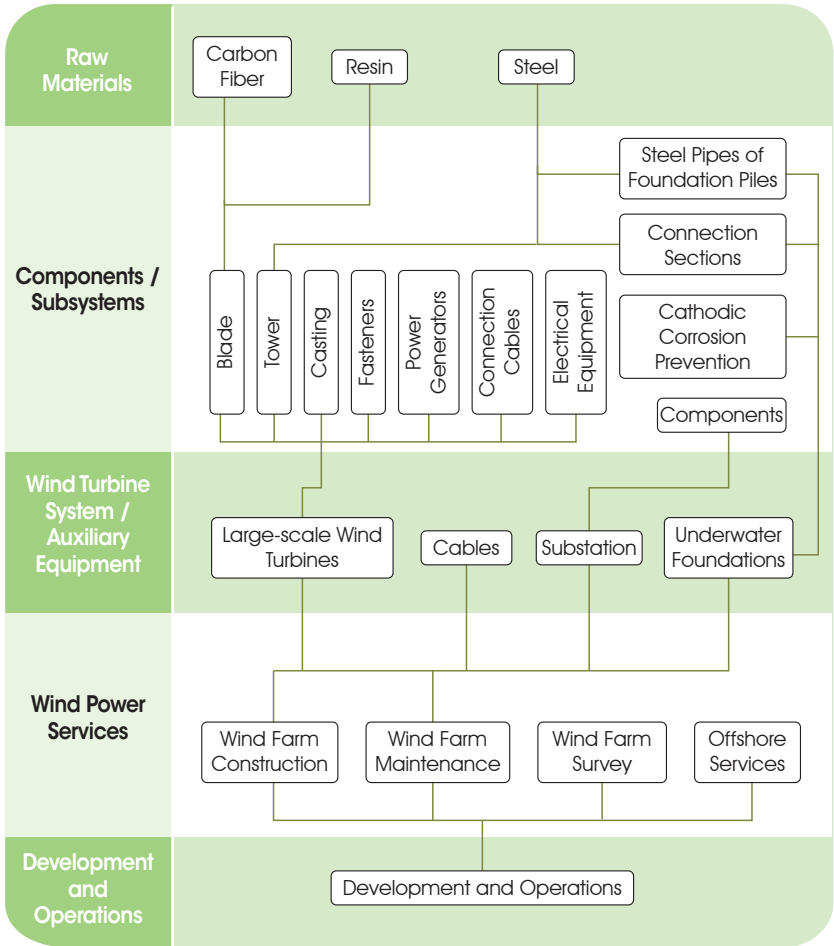
Figure 3 Taiwan's Solar PV Industry Chain



Wind energy can be separated into manufacturing, services, and development/ O&M. For the manufacturing segment, major manufacturers include Swancor (turbine resin), Fortune Electric (transformers), Yeong Guan (casting), and Sinbon (interconnect materials). Offshore wind farms in the Taiwan Strait are currently under development, prompting emerging manufacturers to become a part of the supply chain. Short-term developments have largely focused on the manufacturing of underwater foundations, onshore substations, and towers. In the mid-to-long term, developments expanded to blades for turbines, castings, and power systems, making Taiwan's offshore wind energy supply chain more robust. Major underwater foundation manufacturers include SDMS, Century Iron & Steel, Ming Rong Yuan Business, and CSC, while power system manufacturers include Fortune Electric, Delta Electronics, and Shihlin Electric. (Image 4)

3 | Industry Clusters |

Taiwan has an advantage over other countries in developing green energy industries thanks to a strong ICT industry, a comprehensive semiconductor supply chain, and industrial capacities in metals, electromechanics, compound materials, and electronic control. In addition, to make Taiwan's wind farms competitive in the global market, the government has heeded industry demands and built a heavy cargo port to import underwater foundations and other components required to develop wind energy. The government is also transforming the Port of Taipei (underwater foundations), Port of Taichung (offshore wind turbine parts and components), and Xingda Port in Kaohsiung (underwater foundations) to serve as hubs to support offshore wind energy in Taiwan. In the future, these areas will become important green energy industry clusters.



Source: Industry, Science and Technology International Strategy Center, ITRI.

Figure 4 Taiwan's Wind Energy Industry Chain



Potential Investment and Collaboration Opportunities in Taiwan

1

Capitalize on Green Energy Opportunities Generated from Energy & Industrial Policies

To fulfill the vision of a Nuclear Free Homeland, the Taiwanese government has formulated green energy development targets that are estimated to bring in NT\$2.2 trillion in green energy-related investments by 2025. With the “Green Energy Technology Industry Innovation and Promotion Action Plan,” Taiwan has been able to attract investments from domestic and overseas businesses to turbines, castings, towers, nacelle assembly, and wind farm maintenance for offshore wind energy; power inverters and energy storage systems for solar PVs; and electrical energy, chassis, and total vehicle systems for electric vehicles. International businesses can increase investments in Taiwan or establish partnerships to build a green energy industry chain with Taiwan.

2

Expand Potential Wind Farm & Offshore Wind Energy Opportunities in Taiwan

Taiwan is gifted with a wealth of offshore wind resources. Research from 4C Offshore, a leading market intelligence organization targeting global offshore renewable energy markets, shows that the Taiwan Strait is home to 16 of the top 20 offshore wind farm locations in terms of wind resources in the world. Potential sites for offshore wind farm developments in Taiwan can be found in Image 5 below.

Regional distribution of capacity allocation of Potential Zones

Area	Selection capacity	Rate
Taoyuan	350 MW	6.3%
Miaoli	378 MW	6.9%
Changhua	4,064 MW	73.9%
Yunlin	708 MW	12.9%
Total	5,500MW	100%

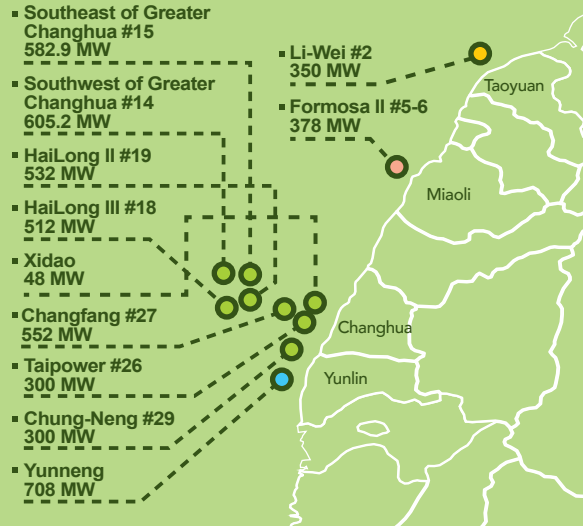
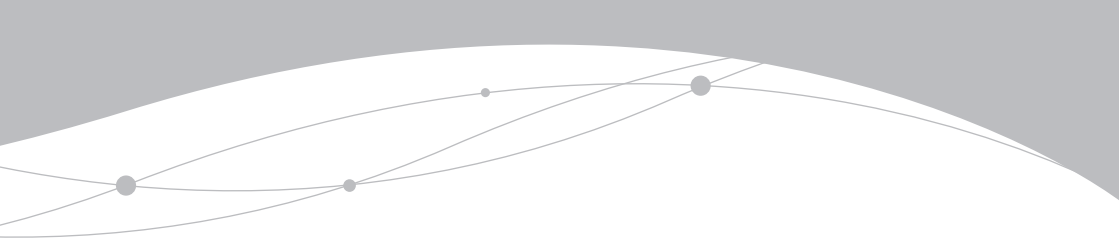


Figure 5 Potential Sites for Offshore Wind Farms in Taiwan

To attract domestic and overseas businesses interested in capitalizing on the potential business opportunities in Taiwan’s offshore wind energy market, the government has established a reasonable feed-in-tariff system and selected 36 potential offshore wind farm locations. In addition, the government has plans to build a heavy cargo port on the west coast that will be dedicated to offshore wind energy and an industrial park for fabricating, assembling, constructing, maintaining, and operating parts and components related to turbines. The government’s efforts aim to facilitate a comprehensive offshore wind energy industry chain and are estimated to generate up to NT\$1 trillion in investments and business opportunities by 2025.

3 Sustained Growth Expected in the Solar PV Market

To meet the 20 GW solar PV installation goal set for 2025, the Taiwanese government has established comprehensive plans and control mechanisms to channel developments in suitable areas. Government agencies and local



governments are working together to eliminate challenges from administrative processes, and businesses can integrate land zones for solar PV projects, which is expected to bring in an estimated NT\$220 billion in investments and business opportunities and help develop solar PVs and related technologies. For example, Corning, a U.S. company, worked with AUO to install solar panels on the rooftops of their glass plants in the Central Taiwan Science Park and Southern Taiwan Science Park, supporting Taiwan's green energy initiatives through concrete actions. In March 2021, Ciel & Terre, a French company, built the first floating solar power plant in a privately owned water treatment pond to develop diverse applications of green energy facilities. In October 2021, IMERYS, another French company, supported Taiwan's green energy policy by leasing the rooftop of their wholly-owned Calderys Taiwan plant in Pingtung for a 1.7 MW rooftop solar system, the largest in the region. The solar system was the product of an international partnership consisting of companies from Taiwan, Japan, and France. It was funded by the Japanese company Vitec Enesta and installed by local Taiwanese businesses – Matsuei Energy and MST Solar. In the future, Vitec Enesta will also continue to invest in solar PV systems in Taiwan. We expect to see a stable growing demand in Taiwan's solar PV market that will help attract international systems providers to further collaborate with related businesses in Taiwan.

4

Decentralized Power Supply Trends to Drive Demands for Energy Technology Services & Energy Storage Facilities

As renewable energies such as offshore wind energy and solar energy begin to take up a larger portion of energy in Taiwan, Taiwan's energy supply is expanding towards diversified and regionalized development. Renewable energies are variable energies affected by the length of daytime and seasonal variations in wind speeds. As such, renewable energy generation equipment must be coupled with energy storage systems for storage and later applications. We expect this to drive demands for energy technology services and energy storage facilities to facilitate flexible energy dispatch across regions or peak/off-peak times and increase energy use efficiency. In December 2021, Taichung City launched the "Smart Energy Management System Grid Connection for Low-Carbon City" demonstration project. For the first phase, the project installed small

microgrids at the Taichung City Government's Hui Xin Parking Lot and Huizhong Hall. The small microgrid was installed in collaboration with Tesla, a renowned energy storage facility company. The smart energy management system is able to perform peak shaving operations and has become a demonstration for grid-connected renewable energy applications.

5 | Business Opportunities from Developing & Commercializing Renewable Energies

According to "Taiwan's Pathway to Net-Zero Emissions by 2050" issued by the National Development Council in 2020, it is estimated that by 2050, hydrogen energy in Taiwan will account for 9-12% of Taiwan's total generated energy. Considering that hydrogen energy will become an important emerging energy in the future, Taiwan, with support from the Bureau of Energy, Ministry of Economic Affairs, will be assembling a "Hydrogen Energy Team" that will integrate ITRI's hydrogen recovery system, Marketech's power generation integration technologies, and Asia Hydrogen Energy's fuel cells. Shalun Green Energy Technology Demonstration Site will serve as a testing site for the Team. The development and commercialization of hydrogen energy will generate various business opportunities in technology development, system installation, and industrial applications. International businesses interested in future hydrogen energy investments and partnerships are welcome to reach out for opportunities.



Investment Incentive Measures

1 | Tax Incentives |

The profit-seeking enterprise income tax rate is 20%, but to encourage international businesses in Taiwan, support industrial innovation, and facilitate industry-academia cooperation, international businesses are eligible for the following preferential tax rates (Table 3):

Table 3 Preferential Taxes

Item	Preferential Measures
Research, Development, or Introduction of Technologies or Machinery Equipment	<ul style="list-style-type: none">• Up to 15% of the company's R&D expenditures may be deducted from its profit-seeking enterprise income tax for current year; or up to 10% of such expenditures may be credited over three years against the profit-seeking enterprise income tax payable by the company.• Royalty payments to foreign companies for imported new production technologies or products that use patents, copyrights, or other special rights owned by foreign companies are, with the approval of the Industrial Development Bureau, MOEA, exempt from the corporate income tax.• Companies are exempt from import tariffs for importing any machinery equipment that local manufacturers cannot produce.
Employee Stock Compensation	<ul style="list-style-type: none">• A company employee who has obtained stock compensation worth a combined total of less than NT\$5 million and continuously held the stock while remaining in the company's employ for at least two years may choose to be taxed on the market price of the stock at either the time the stock was obtained or the time the stock is sold, whichever is lower.

Item	Preferential Measures
Investment in Smart Machinery / 5G / Information Security	<ul style="list-style-type: none"> • Smart machinery: Use of big data, AI, and IoT in brand-new hardware, software, technology, or technical services for automatic schedules, flexible, or mixed-model production lines. • 5G: Investments in new hardware, software, technology, or technical services that are related to 5G communication systems. • Information security: Companies' investments and purchases of brand-new hardware, software, technology, or technical services for information and communication security products or services are included in the scope of investment offsetting. • For investments between NT\$1 million and NT\$1 billion, companies can choose from 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 the total spending is spread over three years" may be selected, but the total amount deducted may not exceed 30% of corporate income tax that year. • Applicable until December 31st, 2024.
Special Foreign Professionals	<ul style="list-style-type: none"> • Special foreign professionals who meet certain criteria are eligible for a 50% deduction of total income tax for amounts exceeding NT\$3 million.
Industrial Park Locations	<ul style="list-style-type: none"> • 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.
Others	<ul style="list-style-type: none"> • Companies that use undistributed earnings to engage in substantive investments may exclude the invested amount when calculating their profit-seeking enterprise income tax.



2 | Subsidies |

1. Global Innovation Partnership Initiatives Program

The Global Innovation Partnership Initiatives Program aims to encourage foreign businesses complementary to Taiwan's industry to come to Taiwan and engage in innovation, research, and development activities and work with Taiwanese businesses to develop cutting-edge technologies, critical technologies required by the industry, or integrative technologies that surpass Taiwan's existing industrial standards and has a critical impact on the industries in Taiwan. For example, the new technology facilitates the construction and development of the industrial technology R&D supply chain, enhances R&D efficiency, accelerates R&D to commercialization, and helps Taiwan open up international markets. Such businesses, upon approval by the Ministry of Economic Affairs, are eligible to receive subsidies of up to 50% of their total R&D expenses.

2. Pioneers for Innovation Leadership on Technology Program

The Pioneers for Innovation Leadership on Technology Program aims to enable Taiwan to become a high-tech R&D center, attract international leading enterprises to establish advanced R&D hubs in Taiwan, strengthen Taiwan's ability to develop leading technologies, and work with Taiwan's industry chain to create a collaborative system for research, co-innovation, and development to thereby strengthen Taiwan's competitiveness in leading industrial technologies and accelerate developments of emerging industry clusters. Such businesses, upon approval by the Ministry of Economic Affairs, are eligible to receive subsidies of up to 50% of their total R&D expenses.

3. Industrial Upgrading Innovation Platform Guidance Program

The Industrial Upgrading Innovation Platform Guidance Program aims to drive high-value industrial growth and encourages businesses to expand into advanced product application markets to enhance the industry's added value. The Industrial Development Bureau (MOEA) and Ministry of Science and Technologies are working together to promote the Program, providing subsidies of up to 40% to 50% of thematic R&D program budgets and up to 40% funding for R&D projects proposed by businesses to companies with R&D teams based in Taiwan.

Leading Taiwanese Companies

The following is a list and operations overview of major Taiwanese companies in solar PVs and wind energy:

1 | Solar PV |

1. Sino-American Silicon Products

Established in 1981 in Hsinchu Science Park, Sino-American Silicon Products (SAS) is Taiwan's largest 3" and 12" silicon wafer supplier. The company manufactures high-performance products, solar bricks, wafers, solar cells, solar modules, and solar systems. With a vertical integration strategy, SAS is capable of accessing and stretching its business into solar system development, which has made SAS a professional renewable energy solution provider in the solar industry.

2. United Renewable Energy

In October 2018, United Renewable Energy Co., Ltd. (URE) was established through the merger of Neo Solar Power Corp. (NSP), Gintech Energy Corp., and Solartech Energy Corp. URE mainly provides a vertically integrated business model across systems, modules, solar cells, and wafers in Taiwan's green energy supply chain. In the past two years, URE has held the largest market share in the Taiwan solar modules market. In the future, URE will expand into the energy storage market to provide total renewable energy solutions.





3. AUO

Established in 1996, AUO is a renowned solar energy solutions provider in Taiwan that provides high-efficiency solar modules, all-around solar power plant installation capability, and an innovative platform for power plant investments. AUO has helped build several utility-scale solar power plants and has a wealth of experience in installation, system, and O&M routes for MW-scale projects as well as roof-top projects for precision plants and working aloft.

2 | Wind Energy |

1. Swancor

Swancor is a leading enterprise in Taiwan's offshore wind energy industry. The company expanded into offshore wind farm development in 2012 and completed and commissioned its first offshore wind farm – Formosa I – in 2019. Formosa II is currently in the construction stage. Formosa I and Formosa II are estimated to have a total capacity of 504 MW.



2. Fortune Electric

Established in 1969, Fortune Electric has years of experience in designing and manufacturing extra-high voltage equipment, electrical substations, turnkey power system engineering projects, energy storage system engineering, and EV charging stations. Fortune Electric is the only extra-high voltage equipment and engineering provider in Taiwan with experience in onshore power system engineering for offshore wind farms and manufacturing experience in turbine tower equipment.

3. Yeongguan

Established in 1971, Yeong Guan Group is the major castings supplier for world leading manufacturers of wind turbines, plastic injection molding machines, machine tools, and other heavy industrial machinery. Yeong Guan Group is engaged in the manufacturing and distribution of casting products of ductile iron casting and gray cast iron. It offers castings used as the hubs and bases of wind turbines and steam turbines for power plants, gearbox parts, machine tools, and other industrial machinery.





Examples of Successes Achieved by Foreign Companies

1

Collaborations in Solar Power Plant Construction & Related Services

TSEC collaborated with Thailand's Mitr Phol Group to establish Hou Ju Energy Technology Corporation to provide construction, operations, and maintenance services for solar power plants. The Mingus Solar Project, a joint venture between Budai Township, Chiayi and Singapore's Vena Energy is now officially commissioned. Marubeni, a Japanese coal-fired power plant developer, announced in February 2020 that they will be acquiring all shares of Taiwan's Chenya Energy and their 270 MW of green energy facilities with NT\$2.7 billion in an attempt to capitalize on solar power businesses opportunities in Taiwan and expand the group's renewable energy business. In March 2022, Chengya Energy, a subsidiary of Japan's Marubeni, invested with China Life Insurance, TransGlobe Life Insurance, and Shin Kong Life Insurance in the solar PV industry, working together on Lunwei East No. 1, No. 2, and No. 3 Photovoltaic Power Station. The collaboration has accelerated developments in the domestic renewable energy industry as well as the green finance sector.

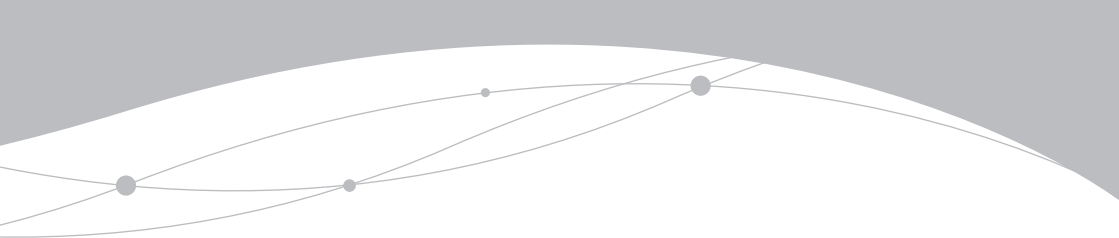
2 | Collaborations in Wind Energy |

In 2020, Northland Power Inc., a Canadian company, collaborated with Siemens Gamesa, the world's largest offshore wind turbine manufacturer and system provider. In accordance with the "Hailong Offshore Wind Project,"¹ Northland Power Inc. has identified the 300 MW Hailong Offshore Wind 2A Farm off the coast of Changhua County as the site of its "Anchor Project" to introduce the latest offshore wind turbine technologies. In May 2021, the collaborative project was expanded to include Hailong 2B (232 MW) and Hailong 3 (512 MW), increasing the total installed capacity of their project to 1,044 MW (=1.04 GW). The collaboration aims to work with Taiwan's local supply chain and create an offshore wind energy export center for the Asia Pacific region in Taiwan. Investments into the Hailong offshore wind farm project have now reached NT\$45~75 billion and generated over 5,200 jobs.

Macquarie, an Australian company, and Ørsted, a Danish company, are collaborating with Taiwanese company Swancor to develop Formosa I in Miaoli. Swancor has been tasked with developing, operating, and managing the wind farm; Ørsted serves as a consultant for wind farm development; and Macquarie will provide financial consultations and financing services. Swancor is also working with Macquarie to develop Formosa II in Houlong Township, Miaoli and Macquarie and EnBW, a German company, to develop Formosa III.

Ørsted believes that the Port of Taichung will play a vital role in offshore wind farm construction and operations in Taiwan and has therefore announced, in February 2020, that they will be signing a 20-year lease for wharfs in the Port of Taichung and land in Houxian for Greater Changhua Offshore Wind Farms and a flagship O&M center for Ørsted Asia Pacific, both of which have started construction in August 2022.

1 Hai Long offshore wind farm is a joint venture of Canada's Northland Power, Singapore's Yushan Energy Pte Ltd., and Japan's Mitsui & Co. Three wind farms are located 45 to 55 kilometers from the coast of Changhua and are expected to begin commercial operations in 2024.



Iberdrola, a Spanish energy group, announced in 2021 that they will be developing three new offshore wind farms in Taiwan to support Taiwan's Phase 3 Offshore Wind Zonal Development. The projects are named Da-Chung Bu Offshore Wind, Guo-Feng Offshore Wind, and Ju-Dao Offshore Wind and will be located in the county waters of Taichung, Changhua, and Penghu on the west coast of Taiwan. Water depths are appropriate for both fixed bottom and floating offshore wind technology, which will further diversify offshore wind energy generation in Taiwan.

3

Development & Applications of Hydrogen Energy Technologies

Air Liquide Far Eastern, a joint venture by the Air Liquide Group, a French company, and Taiwan Far Eastern Group invested €200 million (around NT\$7 billion) in 2021 to build ultra-high purity hydrogen and oxygen plants in Southern Taiwan Science Park and Hsinchu Science Park. Air Liquide Far Eastern also has plans to develop smart hydrogen mobility in Taiwan and conduct pilot projects on hydrogen-powered buses to provide low-carbon shuttling services between science parks, industrial parks, and HSR stations. In April 2022, Taipower and Siemens Energy signed the "Hydrogen Mixing Technology MOU" to launch the "Hydrogen Mixing Demonstration Project," which will rely on Siemens Energy's global experience in gas turbine engine technologies to upgrade and transform an existing gas turbine engine by introducing hydrogen mixing technologies to reduce carbon emissions. The goal is to achieve 5% hydrogen mixing power generation by 2025.



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