



 中華經濟研究院  
CHUNG-HUA INSTITUTE FOR ECONOMIC RESEARCH

# Taiwan's Solutions to Your Green Future



經濟部推動綠色貿易專案辦公室  
GREEN TRADE PROJECT OFFICE  
MINISTRY OF ECONOMIC AFFAIRS

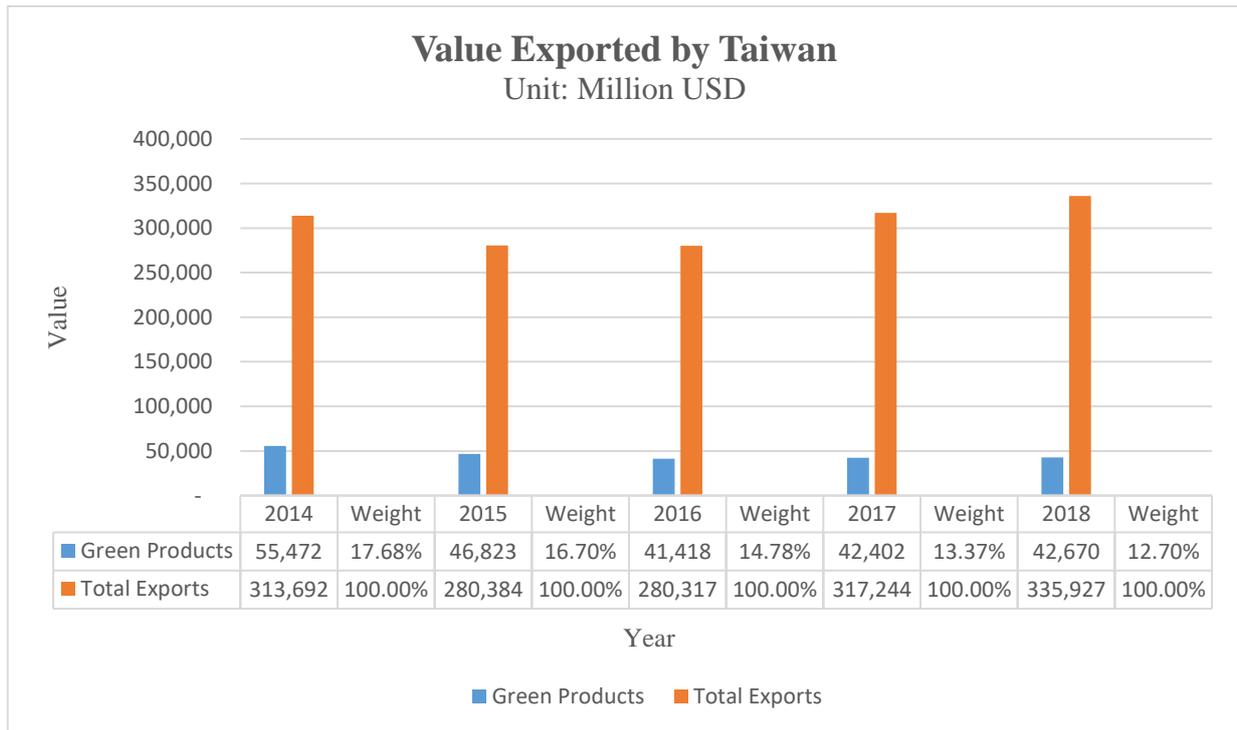
# Taiwan's Solutions to Your Green Future

## Overview of Taiwan's Green Industries

Taiwan is utilizing its high-tech and manufacturing expertise to introduce an era of green industries and help the environment become more sustainable.

Taiwan is an export-driven economy. According to data from the IMF<sup>1</sup>, Taiwan was the 21<sup>st</sup> biggest economy in the world in 2018 even though it only spans an area of 36,104 km<sup>2</sup> including nearby islands.

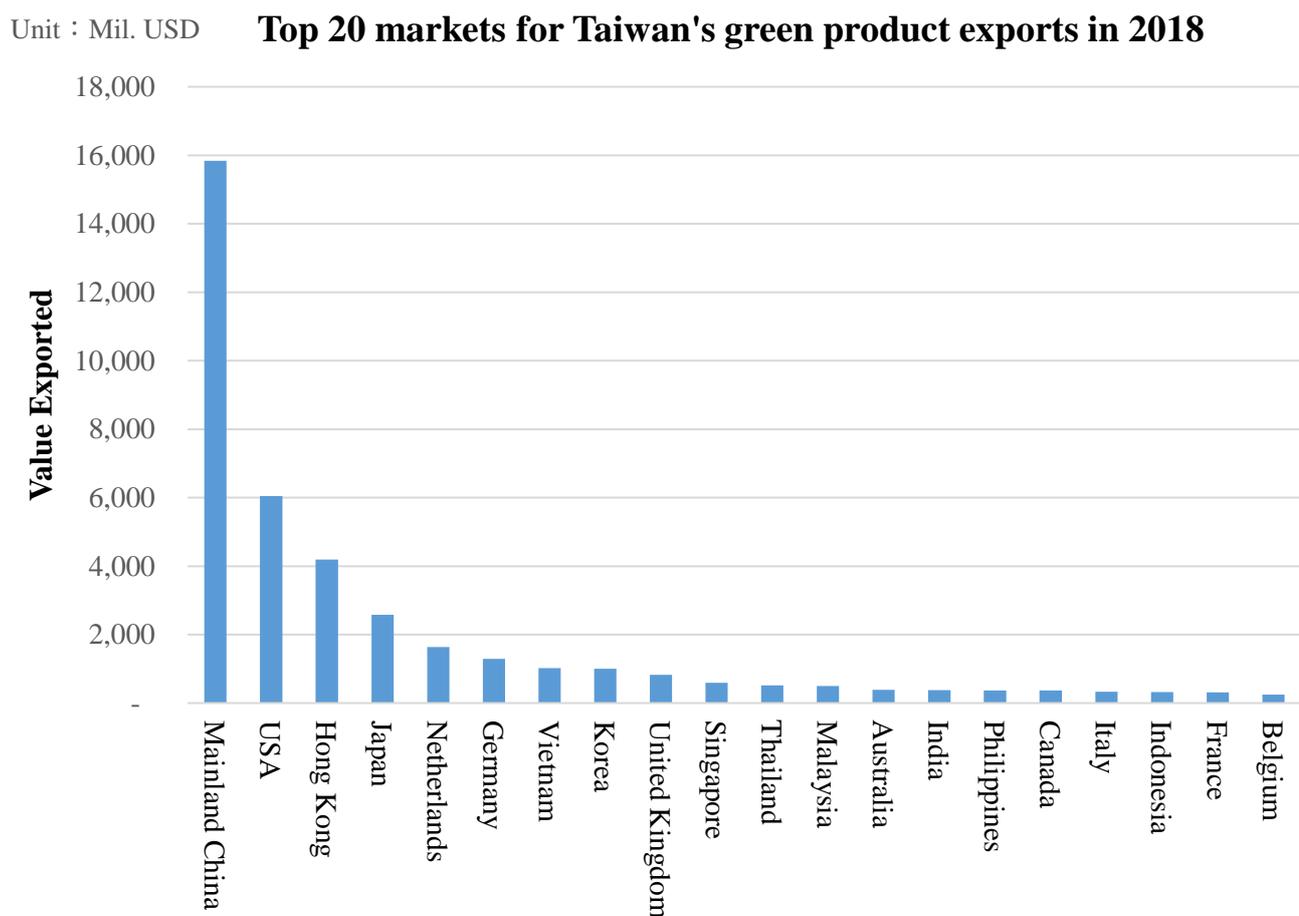
Between 2014 and 2018, the value of exported Taiwanese green products was around 13~18% of total exports. It can be said that Taiwan's green products receive considerable recognition in global markets.



<sup>1</sup> GDP, CURRENT PRICES,

<https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEO/JPN/FRA>

Observing the top 20 markets for green products exported by Taiwan in 2018, many of those countries, such as USA, Japan, Netherlands, Germany, United Kingdom, Singapore, etc. have advanced or strict environmental regulations. This shows that the quality of Taiwan's green products has been recognized by these advanced countries.

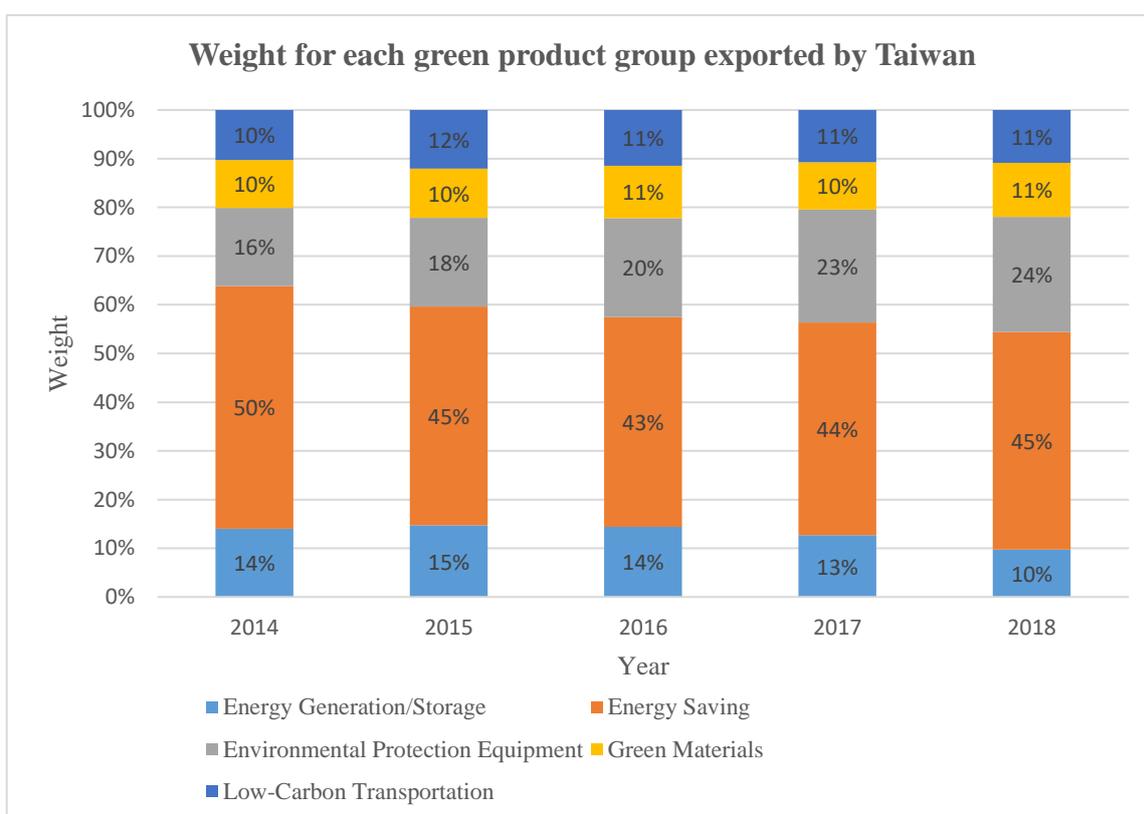


The Taiwan's green product exports are classified into 5 main groups:

1. Energy generation/storage products
2. Energy-saving products
3. Environmental protection facilities

4. Green materials
5. Low-carbon transportation products

Energy-saving products account for the largest proportion of all exported green products while environmental protection facilities and energy generation/storage products account for the second and third largest, respectively. Taiwan’s energy-saving products are favored by international buyers.



## 1. Energy Generation/Storage Products

Taiwan’s top 20 export markets for energy generation/storage products include developing countries such as China, Vietnam and developed countries such as the USA, Japan.

In the field of energy generation and storage, Taiwan’s renewable energy technologies and industrial chains are highly developed, especially in the solar energy industry.

In the solar industrial chain, there is a total of around 250 companies which provide a silicon wafer capacity of more than 5GW, silicon cell capacity of more than 12 GW and module capacity of more than 2GW, which rank second among global photovoltaic manufacturers. Even though China ranks first for manufacturing capacity, Taiwan is still leading the world in cell technology and overall quality.



Image Source: eqmagpro.com

The wind industry is also developing quickly in Taiwan. In the past, the key technologies were controlled by European or USA companies. However, many foreign companies have been collaborating with Taiwanese companies in operating the wind farms on the Taiwan Strait in recent years.



Image Source: www.csbcnet.com.tw/cdwe/en/strategy.html

Considering the much higher wind speeds and frequency of earthquakes

in Taiwan, the designs and strengths of wind turbine structures need to be much improved compared with those used in Europe or the USA. For any country that needs stronger high-quality wind turbines, Taiwan-made products would be the first option.

## **2. Energy-saving products**

Energy-saving products account for more than 50% of Taiwan's green product exports. Take LEDs as an example, Taiwan has a comprehensive LED value chain with a large pool of knowledge and know-how. Therefore, Taiwan's LED industry is considered the best platform for LED procurement throughout the world.

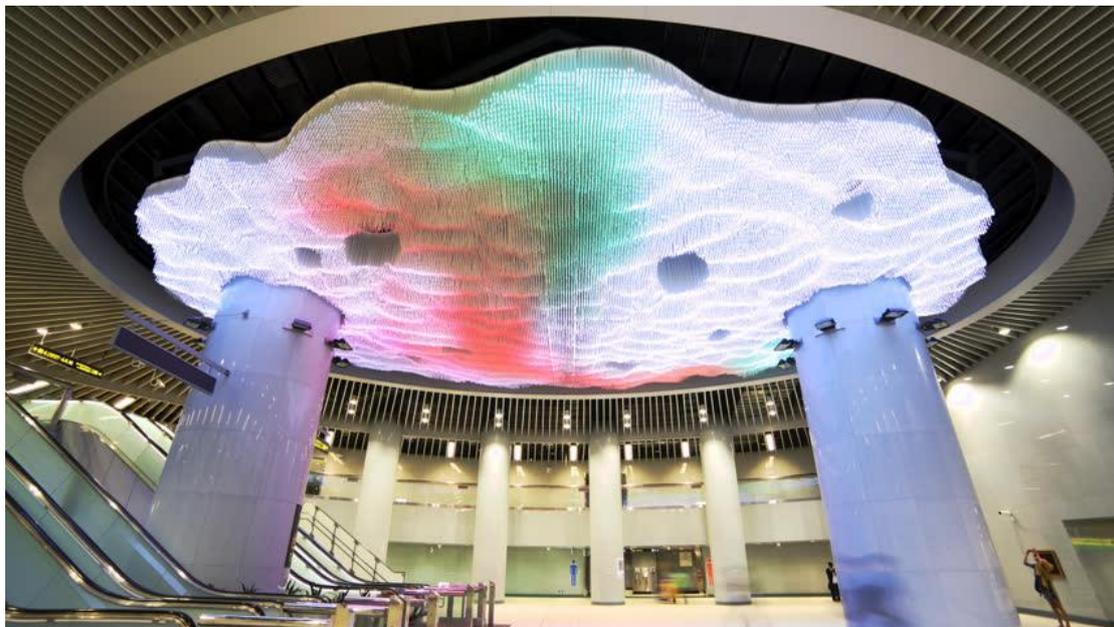


Image Source: Shutterstock.com

Not only are LEDs quickly developed and widely used by global customers, many energy-saving products such as home appliances, smart grid systems, remote control devices, smart lighting systems or other high-tech energy-efficient products are also favored by customers from various fields.



Image Source: Bureau of Energy, Ministry of Economic Affairs, R.O.C.

Nonvolatile Memory (NVM) is one of the most popular options for memory as a component of high-performance smart-phones. High-performance smartphone producers all compete to acquire advanced processors and NVM to enable high-speed data processing to satisfy their end users. Taiwan provides the most advanced and comprehensive portfolio of embedded NVM technologies, featuring the fastest computing capacity, smallest flash dimensions, and lowest power consumption.

To integrate energy-saving products and help them work more efficiently, ESCO (the Energy Services Company) is recently playing an important role in the energy-saving sector. Taiwan ESCO has successfully helped many domestic or international buildings/companies/institutions reduce energy consumption by 25~70%.

### **3. Environmental protection facilities**

Taiwan has done well formulating and executing its environmental protection policies since 1974. The policies to some degree have helped the environmental conservation industry prosper. So far there are more than 450 environmental conservation facility companies in Taiwan.

To deal with household waste, the Taiwan government promotes

recycling/circular projects which bring together community residents, recyclers, local governments, and recycling funds to implement resource recovery and waste reduction and encourages all to participate. Waste disposal, recycling and treatment facilities or technology in Taiwan, therefore, has been significantly upgraded from those projects. At the same time, agricultural and industrial waste are also recycled and treated under strict regulations.

Under these circumstances, the equipment and technology that deal with waste plastic, glass, home appliances or WEEE are of high quality. Recently, biomass and bio-energy facilities from Taiwan that solve the waste and energy-shortage problems have been another highlight on the world stage.



Image Source: Shutterstock.com

To prevent water pollution and improve water quality, Taiwanese companies have successfully developed high technology and performance in waste-water treatment and clean/drinking water facilities to comply with the high standards of treating household and industrial waste-water.

Because Taiwan's waste-water treatment companies usually have a higher price-performance ratio compared with other international competitors, more developing countries are asking for packaged whole-plant solutions. Of course, there are also companies that provide water-related components like pipes, fittings, valves or applications like FBR-Fenton. Some Taiwanese companies provide clean/drinking water facilities and help solve the drinking water problem in some places in the world.



Image Source: Kaohsiung City Government, R.O.C.

Currently, PM2.5 is a hot issue all over the world. Lowering pollutant concentrations and improving air quality are a priority for many governments. Taiwan's air pollution/quality control equipment in monitoring and emission treatment can help solve this difficult problem.



Image Source: Industrial Technology Research Institute, R.O.C.

In this high-tech era, waste solids, waste-water and waste gas are often produced simultaneously. For solving these problems immediately, many environmental conservation facility companies in Taiwan provide one-stop solutions. They are your best choice!

#### **4. Green Materials**

The construction industry is an industry with high carbon emissions, high energy consumption and high impact on ecology. In recent years, countries around the world have been quite active in transforming the construction industry into a low-carbon and high-value industry.

Excessive concentration of the urban population, impervious artificial environments, poor building ventilation, and improper designs of energy conservation have resulted in energy waste and the urban high-temperature climate. Green buildings are, therefore, the best solution to improve this situation.

According to the U.S. Green Building Council Announcement on Feb. 13, 2019, Taiwan is the 9<sup>th</sup> of the Top 10 Countries and Regions for LEED Green Building. Not only are green designs and smart systems in green buildings credited for this achievement, but Taiwan's green building materials also play a very important role in this award.

Since 2004, Taiwan has promoted the "Green Building Material Marking System". By 2018, more than 2,000 green building material marks have been issued for world-class green building materials including coatings, ceilings, flooring, partition wall materials, sound absorbing materials, tiles, permeable bricks, adhesives, energy-saving glass, and soundproof doors and windows, etc., making up a total of more than 149,000 serial products.



Image Source: Taiwan Architecture and Building Center

Currently, there are around 440 qualified green building material manufacturers in Taiwan. The creativity and high quality of Taiwan's green building materials are popular in many countries. The abundance of green building materials presents a more diverse range of choices for consumers.

Besides the high-quality green building materials, recycled paper, reused plastic, or degradable biomass materials are developing prosperously within Taiwan's green material industries. These green materials create limitless possibilities. For example, recycled paper, fallen leaves or dead wood can be turned into a camera. Chitin can solve the problem of formaldehyde in furniture.

## 5. Low-carbon transportation products

So far, bicycle rental stations can be seen in many cities in Taiwan, with rental easily done through a registered card (e.g. MRT card). It is a convenient and safe way to move in a city when one does not want to take a motorcycle or car. Recently in Taipei, another transportation rental system – the e-bicycle has been developing quickly and becoming more popular. These e-bicycles could be parked in any legal parking space instead of at a designated rental station.

Regarding bicycles, Taiwan is the 2<sup>nd</sup> largest exporter after China<sup>2</sup>. In addition to regular bicycles, Taiwanese manufacturers also make many high-performance, highly-priced bicycles. Supporting these bike manufacturers are successful component manufacturers, who continue to develop high-end parts for high-quality bicycles. For example, the world's exclusive chainless bicycle eliminates traditional chain-related malfunctions while making the bike body design more minimalist. Manufacturers have also combined fitness steppers into bike design to launch bicycles with upright pedaling, subverting the popular image of the regular bicycle.



Image Source: YouBike Facebook fan page

---

<sup>2</sup> Bicycles Exports by Country, <http://www.worldstopexports.com/bicycles-exports-country>, Oct. 7<sup>th</sup>, 2018

Driven by environmental and anti-fuel vehicle policies of various governments and the active development of major automakers, e-vehicles are bound to become the new trend of the future.

In fact, Taiwan's e-motorcycle or e-bike industrial supply chains are quite mature, which includes integration, battery systems, power systems, suspension systems, transmission systems, circuit systems, exterior parts, smart devices, and solution services.

For e-cars, the complex electronic control, detection, network interconnection, and autopilot technology make it difficult for traditional car manufacturers to develop and produce cars from beginning to end on their own. Nowadays companies with strong capital and innovative technology such as Tesla, Google, and Apple are pushing the automobile manufacturing industry to gradually move from a closed supply chain to a semi-closed or open manufacturing system. This provides many Taiwanese automotive electronic component manufacturers with strengths in technology and high quality with many opportunities.



Image Source: EBC screen picture( <https://fnc.ebc.net.tw/FncNews/video//63045> )

Taiwan self-develops and self-produces e-car products with an intelligent system that has a driving range of up to 304 kilometers. It can also remotely execute tasks such as roadside parking or parking into a garage. The performance of Taiwan's smart e-cars will help you move in a greener fashion.