- PV CYCLE member of the international photo-voltaic organization: Ensuring that United Renewable Energy energy modules can all be properly recycled
- Received many international product certifications from TÜV Rheinland, TÜV SÜD, VDE, UL, etc.
- Solar module awarded Taiwan Excellent PV(2013-2024) for twelve consecutive years
- Solar module acquired VPC (BSMI PV Taiwan Plus)
- Bloomberg Tier 1 Solar Panel Ratings

R&D Planning

United Renewable Energy's talented technical team has 20 to 30 years of experience in solar cell research and development, covering upstream and downstream silicon materials and wafer manufacturing, cell components, module packaging and system applications. United Renewable Energy mass-produced M10 TOPCon cells in Q3 2024, with an initial average production efficiency exceeding 24.8%. In the second half of 2024, we obtained the module VPC certification, officially launching high-power, high-reliability dual-glass modules in the Taiwanese market.

United Renewable Energy is also actively collaborating with domestic and foreign research institutions and is cautiously forming strategic alliances with domestic and foreign industry players on technology. United Renewable Energy is actively laying out its patented technologies, with a total of 105 patents as of the end of 2024 (cumulative number of patents held for R&D).

	2022	2023	2024
Number of Patents Granted (Cumulative)	144	134	105

Note: In 2024, 29 patents expired due to term expiration or other reasons

New Business Group (Energy Storage System)

United Renewable Energy has completed construction of the automatic frequency control (AFC) energy storage system at the Tainan plant and is prepared to participate in Taipower's AFC service.

Short-term goal: To build energy storage sites and new energy storage equipment for solar photo-voltaic power stations due to excess capacity.

Medium-term goal: To actively develop a combination of containerized energy storage products to support the top-of-the-line dReg0.25 frequency regulation service for the Taipower electricity trading platform.

Long-term goal: To participate in the construction of distribution and transmission level storage sites, providing products and services at different levels from 5 MW to over 100 MW.

7.3 Energy, Resource Management and Recycling

In addition to producing high-efficiency solar cells, modules, and power station systems that reduce greenhouse gas emissions for the planet, United Renewable Energy is also actively engaged in water and electricity conservation efforts. Our plants in the Hsinchu Science Park, Zhunan, and Tainan have all obtained ISO 14001 Environmental Management System certification. An energy-saving project team is dedicated to promoting energy-saving management programs in offices, public areas and production lines. The energy-saving project team is subdivided into electrical machinery, air conditioning and exhaust, gas chemistry, water supply and drainage, etc. Each plant appoints an engineer to participate, with one of them serving as the convener of the team and the appointed supervisor in charge of counseling. United Renewable Energy has been implementing energy and water saving programs since 2011, and has been awarded the water and energy saving excellence awards by National Science and

Technology Council. Over the past three years, we have achieved cumulative energy savings of 25,994.7 gigajoules. This achievement translates into a reduction of 3,607 metric tons of CO_2 emissions and savings of NT$16.61 million in electricity costs, underscoring Union Regeneration's steadfast commitment to sustainable energy practices.

7.3.1 Energy Management GRI 302-1, 302-3, 305-5

As the leading solar power plant in Taiwan, United Renewable Energy not only generates profits, but also has a high ethical standard for energy management. Energy saving is definitely an important issue for United Renewable Energy.

United Renewable Energy uses energy from both renewable and non-renewable sources. Non-renewable energy is primarily purchased electricity, followed by a small amount of diesel fuel (used in power generators). In 2024, our total energy consumption was approximately 291,616.7 gigajoules. Renewable energy, generated primarily through solar panels installed since 2014, accounted for a self-generated total of 1,075.6 gigajoules by the end of 2024.

The total energy consumption statistics are as follows

Unit: Gigajoule

Energy Type	2022	2023	2024
Purchased electricity	452,361.6	318,470.4	291,616.7
Self-generated and self-used solar power	61.7	0.0	0.0
Total consumption	452,423.3	318,470.4	291,616.7
Intensity (GJ/NT$1 million)	27.7	31.4	67.8

Note 1: Joule conversion unit is 1 degree of electricity = 0.0036 gigajoules.

Note 2: The unit has been converted from terajoules (TJ) to billion joules (GJ), rounded to one decimal place.

Note 3: Density = Total consumption / Revenue (in million NT dollars).

Note 4: The Hsinchu Science Park Plant's self-consumed solar power has been without maintenance since September 2022, and there is no data available for the year 2023. The Tainan plant sells its self-generated solar power to Taiwan Power Company.

Energy saving measures and performance over the years

By comparing energy efficiency in cross-plant meetings and identifying the best mode of operation, the energy saving team launched operations in all plants in parallel to improve energy efficiency in all plants. In 2024, the main electricity consumption was for plant systems and production equipment. Energy-saving measures included load management, energy efficiency initiatives, and production capacity transformation, resulting in savings of approximately 5,449.4 gigajoules, equivalent to reducing 747.8 tons of carbon emissions.

Note: When the United Renewable Energy conducted the confirmation of the 2024 warming plate in March 2025, the Bureau of Energy, Ministry of Economic Affairs had not yet announced the 2024 Coefficient of Carbon Emission for Electricity, so the data on the certificate of the warming plate, Scope 2, still followed the Coefficient of Carbon Emission for Electricity in 2023 (0.494 kilograms of CO_2e per kilowatt-hour of electricity generated), and in order to ensure the consistency of the disclosure of information, the United Regeneration resolved to adopt the data on the certificate as the basis (i.e., the 2023 Coefficient of Carbon Emission for Electricity is still used for 2024) .

United Renewable Energy's efforts to invest in energy savings include:

1. Input resources (energy-saving measures) for the current year.
2. Adjust the frequency of GEX operation in accordance with tenants and production lines.
3. Installation of energy-saving switches for the escape elevator lighting system.
4. Adjust the number of cooling water tower units in operation and reduce the frequency of the pump according to the production line.
5. Change the office lighting to LED flat panel lights.
6. Adjust the frequency of clean room RCU operation according to the production line and abolish and close 9 RCUs in the M6 module factory.

7.Adjust the energy-saving production power consumption according to the current situation of orders.
8.Adjust the regeneration parameter of the dryer. Modify the original 24-hour regeneration to 48-hour regeneration.

The energy-saving results of each plant in the past three years are summarized as follows:

Unit: Gigajoule

Year	2022	2023	2024	Subtotal
Electricity (Terajoule)	8,817.2	11,728.1	5,449.4	25,994.7
Greenhouse Gas (Tonnes CO_2e)	1,246.6	1,612.6	747.8	3,607

Note 1: Energy saving calculation: Estimated energy saving before and after improvement of each project

Note 2: Each year, United Renewable Energy conducts its annual greenhouse gas (GHG) inventory and confirmation for the previous year. However, the Bureau of Energy, Ministry of Economic Affairs (MOEA) has not yet announced the coefficient of carbon dioxide (CO_2) of electricity for the previous year. Therefore, the carbon dioxide coefficient of the previous year is used for the inventory and confirmation data.

Note 3: The unit has been converted from terajoules (TJ) to gigajoules (GJ), rounded to one decimal place.

7.3.2 Water Resources Management GRI 303-1, 303-3

United Renewable Energy uses water from various reservoirs in each area, including the Baoshan Reservoir for the Hsinchu Science Park plants, the Yung-Ho-Shan Reservoir for the Zhunan plant, and the Tsengwen and Nan-Hua Reservoir for the Tainan plant. In terms of natural resource saving, the energy saving team not only invests in water recycling efforts, but also uses a small amount of water from rainwater recycling. Cherishing water resources is also an important part of the green industry, and United Renewable Energy's water saving efforts have resulted in the following:

Water Sources

Unit: thousand cubic meters

Water Sources	2022	2023	2024
Storage water (rainwater, recycled water)	269.7	104.1	108.6
Tap water	693.9	328.2	325.2

Note 1: The unit has been rounded to one decimal place.

Annual water recycled over the past years

United Renewable Energy has optimized the machine's water consumption by adapting its production capacity and designed the lowest water consumption model.

The following two main management guidelines have been established for water saving measures based on environmental considerations and evaluations:

- Process water reduction: Optimized process water evaluation and reuse of process recycled water
- Water recycling and reuse: Rainwater, cooling water and local scrubber drainage recycling and reuse

The following table summarizes the water saving benefits of each major plant in the past three years:

Unit: million liters

		2022	2023	2024
Hsinchu Science and Industrial Park Plant	Total water consumption	43.48	-	-
	Recycle and reuse	0.07	-	-
	Water saving improvement percentage	0.1%	-	-
Zhunan Plant	Total water consumption	293.03	106.66	105.36
	Recycle and reuse	132.81	36.49	54.49
	Water saving improvement percentage	45.3%	34.2%	36.2%
Tainan Plant	Total water consumption	357.41	221.53	174.83
	Recycle and reuse	136.85	67.61	54.16
	Water saving improvement percentage	38.3%	30.5%	31.0%

Note 1: The formula for calculating recycle and reuse is: the amount of water recycled / the number of days in the month.

Note 2: The data source is based on the meter reading data of each plant equipment flow.

Note 3: The Hsinchu Science Park Plant ceased production in April 2023; hence, relevant data for total water consumption, recycle and reuse, and water saving improvement percentage weren't disclosed in 2023 and 2024.

Note 4: Recycled water includes the amount of process wastewater recycled plus rainwater harvested.

Water saving measures over the years

United Renewable Energy has implemented a number of wastewater recycling system improvements, including: the use of pure water and recycled water system resin regeneration fast and slow wash water recycling, pure water system sand filter tower and activated carbon tower forward and reverse wash water recycling, rooftop rainwater recycling system and Fan coil unit cooling water recycling; process water saving improvements focused on adjusting the machine Taiwater parameters, process machine water reduction, plant annual maintenance water saving control, plant watering, water saving by cutting water supply by half, pure water system RO drainage recycling to the filter tank, wet process wastewater recycling, cleaning of machine filter board after mud dewatering, additional process wet cleaning tower recycling system, improved water recycling of wet process. In 2024, water conservation measures at our facilities included discontinuing automated irrigation in the plant area, switching to manual and irregular watering, converting process wet-type local scrubber machines to dry-type machines, recycling process wastewater, and adopting water-saving equipment. These initiatives resulted in an estimated annual water savings of approximately 70.16 thousand cubic meters.

Cumulatively, from 2013 to 2024, our plants have saved approximately 825.4 thousand cubic meters through water conservation efforts.