December 2022-2023

Taiwan Energy Market Briefing: Net-Zero Plan and Aggregated PPAs

中華經濟研究院 CHUNG-HUA INSTITUTION FOR ECONOMIC RESRARCH

EUROPEAN CHAMBER OF COMMERCE TAIWAN 歐洲在臺商務協會

Supported by

RE100 CLIMATE GROUP | CDP

中華經濟研究院
CHUNG-HUA INSTITUTION FOR ECONOMIC RESRARCH

Founded in 1981, Chung-Hua Institution for Economic Research (CIER) is an international policy think-tank in Taiwan for economic and industry-related research. As an independent research institution, CIER is internationally recognized for its studies on domestic and global economies and is known for valuing professional knowledge and expertise. It is trusted as an objective source that is concerned with social welfare and sustainable economies and will offer sincere and constructive policy recommendations. Aligning with its efforts to work towards a sustainable economy, CIER has worked with Climate Group as the Local Campaign Partner for RE100 in Taiwan since 2019.
Visit www.cier.edu.tw

EUROPEAN CHAMBER OF COMMERCE TAIWAN
歐洲在臺商務協會 LOW CARBON INITIATIVE

The ECCT established the Low Carbon Initiative (LCI) in 2011 to introduce European policies and showcase the best European low carbon solutions across a broad range of industries, to raise awareness about sustainable development and promote the adoption of low carbon solutions in order to help Taiwan to reduce its carbon emissions. With the support of its 100 members from corporations, trade offices, and universities, the LCI functions as a platform to bring together leaders and experts to design and facilitate high level roundtable meetings, conferences, workshops, and site visits where members can showcase their best practices and share insights with government and key stakeholders. The LCI currently focuses its efforts in seven categories and four working groups, covering the areas of green energy, energy efficiency, green financing, green mobility, smart cities, smart manufacturing, and circular economy.

CLIMATE GROUP

Climate Group drives climate action. Fast. Our goal is a world of net zero carbon emissions by 2050, with greater prosperity for all. We focus on systems with the highest emissions and where our networks have the greatest opportunity to drive change. We do this by building large and influential networks and holding organisations accountable, turning their commitments into action. We share what we achieve together to show more organisations what they could do. We are an international non-profit organisation, founded in 2004, with offices in London, Amsterdam, Beijing, New Delhi and New York. We are proud to be part of the We Mean Business coalition. Follow us on Twitter **@ClimateGroup.**

RE100 | CLIMATE GROUP | CDP

RE100 is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity. Led by Climate Group, in partnership with CDP, our mission is to drive change towards 100% renewable grids, both through the direct investments of our members, and by working with policymakers to accelerate the transition to a clean economy. The initiative has over 370 members, ranging from household brands to critical infrastructure and heavy industry suppliers. With a total revenue of over US$6.6 trillion, our members represent 1.5% of global electricity consumption, an annual electricity demand higher than that of the UK.

Cover photo: Chiguang Project, Site No. 8-20 in Taoyuan, Taiwan is supported by Cathay Financial Holdings. The floating photovoltaic (PV) system generates 2,477 MWh annually.

01 Executive Summary

In 2020, the RE100 global survey listed Taiwan as one of the top 10 most challenging markets to source renewable electricity (RE). Separately the Taiwan Market Briefing determined the key barriers as high cost, low supply, and lack of market transparency. At the time, Taiwan had only just begun its transition to clean energy and had set some ambitious goals for its grid transformation.

However, companies are still struggling to procure RE in Taiwan and are continuing to seek further insight into the market. As of now, there are 22 Taiwanese members in RE100, a promising increase from 6 members at the end of 2020. Additionally, there are over 100 RE100 members with operations in Taiwan.

A significant move in the future of the Taiwan grid is its net-zero by 2050 plan which was announced in 2022. However, Taiwan will likely fall short of its RE goals for 2025, and the grid is not meeting demand in supply and in access. While these issues have not notably improved, the demand for RE has certainly grown as RE100 members are continuing to make progress on their targets, more Taiwanese companies are committing to using RE, and large electricity consumers are being pushed to source RE through legislation.

The one desired change that RE100's Local Campaign Partner in Taiwan, Chung-Hua Institution for Economic Research (CIER), and the European Chamber of Commerce Taiwan's Low Carbon Initiative (LCI) hear the most often is for Power Purchase Agreements (PPAs) to become more feasible. The high costs of RE compounded with the developer's requirement to purchase large capacities eliminates most companies from the opportunity to purchase PPAs. Given this, there is discussion and eagerness amongst companies to understand how they could form an aggregated PPA (APPA) in Taiwan. This prospect is entirely novel to Taiwan, but it is worth exploring in the second half of the report for companies that cannot wait for the market to improve.

02 RE Market and Policies

2.1 Renewable Energy Development Act

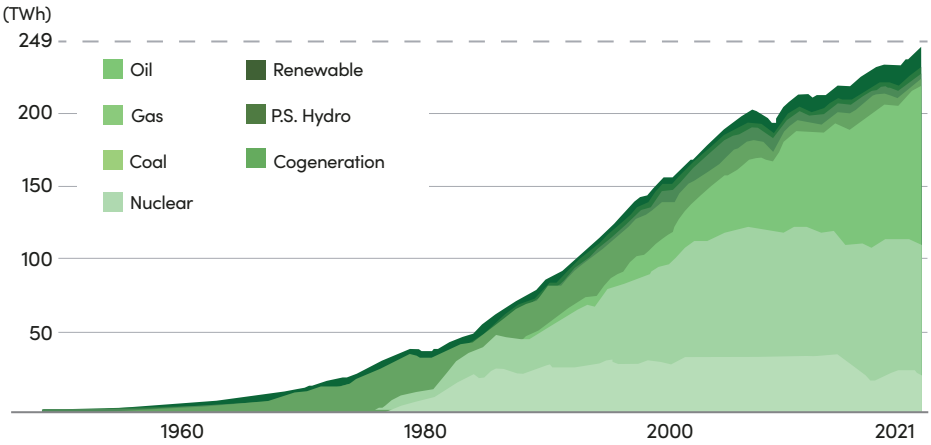
Taiwan had previously committed to sourcing 20% of its total electricity from renewable sources by 2025. This goal is now more likely to be met in 2026 or 2027, with the impacts of COVID-19 being one of the factors for this in halting and preventing development and investment into renewable energy.

According to Taiwan's electricity provider (Taipower), the total renewable energy generated by the end of 2021 was 17,428,320 MWh with a capacity of 11,585 MW. This is broken down into the following types of renewable energy (figure 1).[1]

When comparing this to Taiwan's total electricity generated in 2021, renewables accounted for 6.3%, a slight increase from 5.8% in 2020 (figure 2).[2]

Figure 1. Breakdown of renewable energy types in 2021.

Figure 2. History of net power generated and purchased by energy type

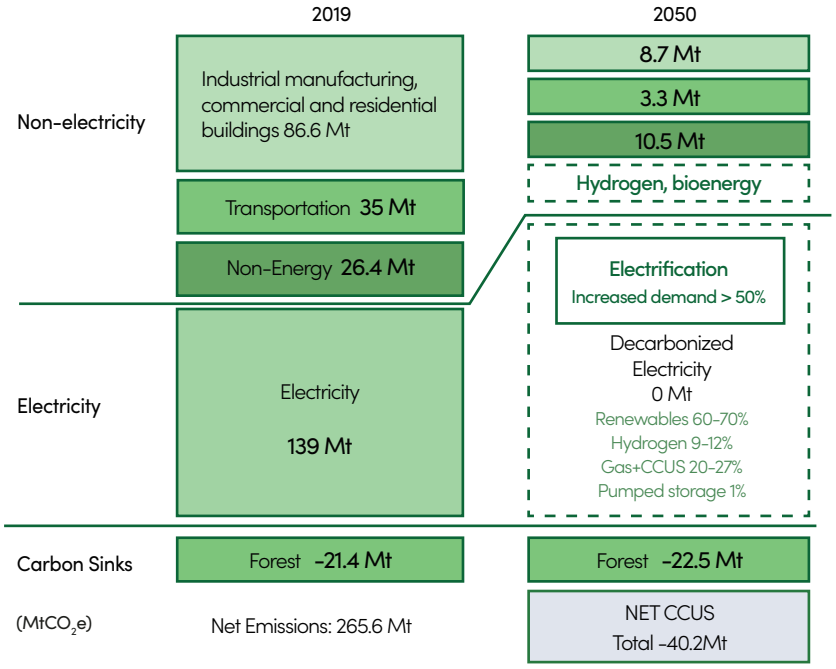


Taiwan falling short of its renewables targets is a concern for companies, as many had accounted for significant growth in supply by 2025 in their plans to transition to RE. However, Taiwan has announced its pathway to reach net-zero carbon emissions by 2050, and the Decarbonized Electricity Plan plays a crucial role to achieving this target.

2.2 Looking Forwards

In March 2022, Taiwan announced its plan to reach net-zero by 2050 (figure 3). The plan includes 60-70% of the grid being sourced from renewable energy. While the building of new coal-fired power plants will halt after 2025, 20-27% of the grid will still come from coal with carbon capture. The remaining 9-12% will come from hydrogen energy and 1% from hydropower. To expand from its 20% RE by 2025 goals, Taiwan has set a **solar power capacity target of 20 GW by 2025 and 40-80 GW by 2050.** Between 2026 to 2030, 2 GW per year will be added. **As for wind, the goal is set at 5.6 GW by 2025 and 40-55 GW by 2050** with 1.5 GW added per year from 2026 to 2030.[3]

Figure 3. Taiwan's plan for net-zero emissions by 2050.[4]



Taiwan will invest $32 billion USD between 2022 and 2030 towards its plan, with 23% of this fund going directly to renewable energy projects. The rest will be allocated to technologies and infrastructures, such as, carbon storage and expansion of the grid.

Taiwan's commitment to net-zero is in response to the need to become more self-sufficient and less reliant on imported energy. Taiwan has also felt the devastating impacts of climate change and extreme weather, including experiencing its worst drought in 56 years in 2021. Although most countries with net-zero targets are also aiming for 2050, it can be argued that this is not ambitious enough. RE100's mission, for example, is to have zero carbon grids globally by 2040

2.3 Corporate Demand and Price

The commitment for Taiwanese companies to transition to renewable electricity is significant because despite having very low energy prices, renewable electricity prices are very high. Nevertheless, demand for RE is growing, as is shown by RE100 members. An increase in demand is also in part due to the 2021 regulation that Taiwan's largest 300 electricity consumers (those with contract capacities over 5,000 kW) must source 10% of their electricity from renewable energy sources within five years.[5] This will approximately add 1 GW in RE demand.[6]

For small and medium-sized enterprises (SMEs), the cost differences of non-renewable and renewable electricity are even greater given that they have less negotiating power for more affordable RE prices than large consumers do.

Rising costs are not only a concern for buyers, but also for RE developers. Taiwan requires that developers source from local suppliers, known as localization, which has been a major reason for high costs. Additionally, developers have concerns over auction rules, one of the recent ones being a maximum capacity of 600MW. There has also been growing emphasis for projects to be more environmentally positive, such as responding to the impacts of RE development and contributing to biodiversity growth.

2.4 RE100 in Taiwan

Currently, there are 22 Taiwanese RE100 members. As a whole, RE100 has over 380 members, and within these, around 100 have operations in Taiwan. The first Taiwanese member did not join until 2018. Since then, many globally and locally influential companies have joined RE100 despite the known challenges of procuring renewable electricity. These include Taiwan Semiconductor Manufacturing Company (TSMC), which signed the world's largest PPA in 2020, and followed by other Taiwanese ICT giants - Acer, Asus, AUO, and Delta Electronics. In 2022, Cathay Financial Holdings was the first Taiwanese financial institution to join RE100.

In Taiwan, there has been increasing interest in sustainability initiatives and commitments, such as RE100, pushing authorities to plan for increasing access and supply to renewable energy. As a manufacturing hub that is one of the world's most vital players in the global supply chain, there is also growing pressure from international companies for Taiwanese suppliers to reduce emissions in alignment with their sustainability goals.

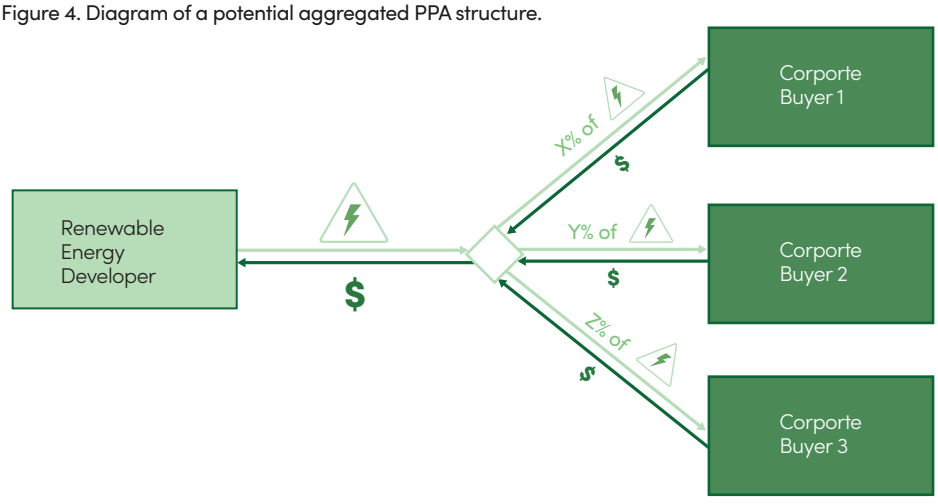
03 Research for Companies on Aggregated PPAs

Results from the 2020 Taiwan Market Briefing and the RE100 survey stated that the top two reasons for the lack of corporately sourced RE were high costs and low supply. Bundled Taiwan Renewable Energy Certificates (T-RECs), which account for 1 MWh of electricity, are expensive. Meanwhile, corporate PPAs (CPPAs) are also priced very high in addition to requiring that buyers are large electricity consumers and can sign a 10-to-20-year contract. In other words, purchasing T-RECs in bulk is not economically feasible, and PPAs are only offered to very few companies who meet the current requirements, which most RE100 members with operations in Taiwan do not meet.

One possible solution to the barriers of CPPAs for companies is an aggregated PPA (APPA). An APPA bands together two or more companies in negotiating and buying a PPA (figure 3). By doing so, these companies accumulate their energy usage to satisfy the requirements of developers, and the greater the total purchased energy, the greater the economies of scale for buyers.

CIER responded to the corporate interest in aggregated PPAs, and the following is a resource for companies in Taiwan. Stakeholders had expressed a lack of understanding about APPAs and an even greater lack of accessible information on how APPAs would fare in Taiwan. CIER conducted over 10 interviews with various stakeholders and experts in Taiwan, including energy producers, buyers, brokers, banks, and lawyers to gather research and to assist companies in their energy transition.

Figure 4. Diagram of a potential aggregated PPA structure.



3.1 Projected Benefits of APPAs

We will first look at the advantages of APPAs, followed by the barriers to APPAs in Taiwan and why despite the benefits, it is still a challenge. The affordability of APPAs will still be dependent on a decline in Feed-in Tariffs (FITs), especially for wind farms, which set minimum prices for power.

Economies of scale

Partnering companies in an APPA would add together their demands to total the generation capacity of a plant. This is important because producers are currently not interested in selling portions of their production total, as this is riskier and more complicated for them. Given that they have a guaranteed buyer that is Taipower (the main power grid authority) which will purchase it all, there is only one incentive for producers to break up the total - high prices, which are far too high for individual buyers. Therefore, the best current prices are for deals that include the total production. Prices will be more feasible when purchasing the entire plant's production, and partners will likely split these costs based on the percentage of electricity they are committing to.

Diversification

Buyers that purchase APPAs can diversify their renewable PPA portfolio, thus, also diversifying supply risk. Preventing the reliance on one project for its electricity load could provide backup to any developmental, operational, or market-related issues that may occur. APPAs may also reduce the risks associated with being the sole off-taker of a project.

Shared expertise and costs

Developing an APPA will likely require resources, such as external advisors, which may be particularly needed in Taiwan given that there is no template to follow and that inside knowledge is not readily accessible. Therefore, the shared financial contribution of the partners will reduce costs, and shared networks and knowledge would greatly help.

3.2 Projected Barriers to APPA

APPAs need to account for the usual risks of a PPA in addition to those that come with more stakeholders. For example, there is always the possibility of companies pulling out of talks and agreements at any stage of the process.

Bankability for lenders

Lenders are crucial in determining whether an APPA will be bankable or not. The amount that lenders offer is based on the evaluation of whether the terms of the agreement account for all possible risks to ensure that payments will still be made. Therefore, the agreement must be well-structured with plans for risks, including but not limited to, price changes, contract terms, termination, changes in laws and taxes, creditworthiness, and uncontrollable events.

Management

Common challenges to APPAs involve management of the group. Issues that could arise are around negotiating needs across the partners and long-term management of the group after an APPA is signed. Power dynamics may also contribute to problems, particularly when companies differ significantly in size or credit ratings.

Price of renewables in Taiwan

Due to FITs being high, prices of renewables are also high. Taipower is the main buyer of projects, so sellers could be more incentivized to sell to corporate buyers that can pay more than Taipower, which is generally an unreasonable ask.

Length of contracts

Due to the low risk and high price deals RE producers have with Taipower, producers are mostly interested in long-term contracts with corporate buyers. From our understanding, the desired time span of a contract is at least 10 years, and in some cases, 20 years.

Power wheeling

Power wheeling is when electricity is sent from the power producer to the main power grid and then transferred to the buyer. Although power wheeling has given more access to corporate PPAs, it could make APPAs more difficult because of the way Taiwan monitors electricity consumption. The current electricity reading mechanism in Taiwan is meter to meter. Given this, feasible APPA models do not include that of one main representative for a group of buyers.

Overview of Questions and Considerations of APPAs

Key question	Key stakeholder	Key considerations
Is it economical?	Buyer	• Price and length of contract • Costs associated with implementation and management of APPA • Costs of agreed risk responses
Is it profitable?	Developer	• Comparison to rates set by feed in tariffs • Length of contract • Prediction of market price changes
Is it bankable?	Lender	• Whether the agreement is well-structured • Whether all risks and responsible parties been accounted for
Is it low risk?	Developer, buyer, and lender	• Credibility of all stakeholders • Planning of unachieved promises from developer, buyer, and lender

04 Conclusion

4.1 The Market

Taiwan's announcement of its plan to be net-zero by 2050 and its display of commitment to reduce emissions is a significant step in the right direction. However, the demand for renewables is already here and the need for change is now. It is vital that Taiwan, at a minimum, stays on track with its targets for RE development. For corporations to have the ability to procure RE, a focus on decreasing price as supply grows is vital.

Taiwan needs to keep up with the demands as its largest electricity consumers need to meet their RE regulations and as more suppliers in Taiwan are required to transition to RE.

4.2 RE100 in Taiwan

Major pressure will also be coming from the growing Taiwanese corporations joining RE100 and the international members that need to meet their ever-nearing targets. With their large RE demands and their local and global influence, Taiwan's RE100 members are amongst the leaders that are pushing for change and are seeking policy and other solutions to issues in the market.

4.3 APPAs in Taiwan

The accessibility and affordability of PPAs is key to RE growth in the market as well as for the transition to RE in companies. However, PPAs in Taiwan are currently not feasible for most companies and APPAs have never been executed before in Taiwan. The interest in APPAs demonstrates that the market is not growing as fast as companies need it to, as they are having to seek novel mechanisms to afford RE. There are significant barriers to APPAs in Taiwan, but the willingness of corporations and stakeholders to still engage in APPAs and to overcome these barriers is a promising sign of their determination to transition to renewable electricity.

References

1. "Renewable Energy Overview." Taipower. 27 June 2022. 20 July 2022. https://www.taipower.com.tw/en/page.aspx?mid=4495#:~:text=Installed%20capacity,power%20generation%20is%20631.93%20MW

2. "Power Development Planning." Taipower. 10 February 2022. 20 July 2022. https://www.taipower.com.tw/en/page.aspx?mid=4488&cid=2794&cchk=9ca22cf6-ec7f-484e-8268-a7cb3ff6d1ce#:~:text=Total%20Electricity%20generation%20of%20Taipower,and%20nuclear%20power%2C%2010.8%25

3. "Taiwan sets goal of boosting renewables in energy mix tenfold by 2050." Focus Taiwan. 30 March 2022. 15 June 2022. https://focustaiwan.tw/business/202203300019

4. "Taiwan's Pathway to Net-Zero Emissions in 2050." National Development Council. 30 March 2022. 15 June 2022. https://reurl.cc/ROLgyg

5. "High Electricity User Clause Announced Boost Corporates to Use Renewable Energy." National Renewable Energy Certification Center. 30 June 2021. 15 June 2022. https://www.trec.org.tw/en/hot-news/high-electricity-user-clause-announced-boost-corporates-to-use-renewable-energy

6. Oung, Angelica. "Rules To Tie Heavy Electricity Use To Renewable Power." Taipei Times. 2 January 2021. 15 June 2022. https://www.taipeitimes.com/News/front/archives/2021/01/02/2003749789

Authors

Alisha Lee, CIER

Dr. Shihfang Lo, CIER

Contributors

Sammy Su, ECCT-LCI

Peiyi Su, CIER

Reviewers

Nicholas Fedson, CDP

Andrew Glumac, CDP

Serena Gordon-Macleod, Climate Group

Madeline Pickup, Climate Group

Nick Ringrow, Climate Group

Maris Tebecis, Climate Group

Oliver Wilson, Climate Group

Lead Sponsor

國泰金控
Cathay Financial Holdings

Cathay Financial Holdings is one of the largest financial groups in Taiwan with total assets of over US $400 billion. Cathay Financial Holdings services 63% of Taiwan's population via dedicated subsidiaries including insurance, banking, asset management, securities brokerage and venture capital. The group has presence in 12 Asian markets and aims to become a leading financial institution in Asia Pacific. Cathay Financial Holdings is the first Taiwan financial institution becoming a RE100 member. The group is recognized by its ESG, responsible investment and climate actions. These include chairing Asia Investor Group on Climate Change and participating Climate Action 100+, CDP Non-disclosure Campaign, Asia Utility Engagement Program and Valuing Water Financial Initiative. Cathay Financial Holdings also participates in important climate initiatives including TCFD, TNFD and PCAF, while its 2050 net-zero transition plan has been approved by SBTi.

Supporting Sponsors

(by alphabetical order)

CRÉDIT AGRICOLE
CORPORATE & INVESTMENT BANK
東方匯理銀行

Crédit Agricole Group is one of the largest banking groups in Europe, and the biggest contributor of loans and advances to the French economy. It supports its 52 million customers' projects in France and around the world through its universal customer-focused retail banking model, based on cooperation between its retail banks and their related business lines. Crédit Agricole Group is sourcing 100% renewable electricity in France and has been a member of RE100 since 2016.

葡萄王生技
GRAPE KING BIO

Grape King Bio is based in the Taiwanese market and is principally engaged in the manufacture and sale of health food supplements. Since it was established back in 1969, Grape King Bio has strived to be one of the top health food researchers and manufacturers in the Biotechnology industry. Using the latest technology available, we develops products to help consumers live healthier lives with a more prosperous future. Grape King Bio guarantees the highest standards in product safety, quality and manufacturing which meet international standards. As one of the earliest Taiwanese companies to join RE100, it has a target to use 100% renewable power globally by 2035.

華南商業銀行
HUA NAN COMMERCIAL BANK

Hua Nan Commercial Bank (HNCB) was founded in 1919 and provides a wide range of services in consumer banking, corporate banking, digital banking, wealth management and insurance agency. As one of the six subsidiaries of Hua Nan Financial Holdings, HNCB enjoys synergies rendered by the Group, which consists of banking, insurance, securities, and venture capital subsidiaries. Thanks to the Group synergies and diversified growth engines, HNCB is able to provide premium financial services while maximizing shareholders' equity, and is on track to become a leading financial institution in Taiwan as well as in the greater Asia-Pacific region.

Ørsted 沃旭能源

Ørsted develops, constructs, and operates offshore and onshore wind farms, solar farms, energy storage facilities, renewable hydrogen and green fuels facilities, and bioenergy plants. Ørsted is the only energy company in the world with a science-based net-zero emissions target as validated by the SBTi. Ørsted ranks as the world's most sustainable energy company in Corporate Knights' 2022 index and is recognised on the CDP Climate Change A List as a global leader on climate action. Headquartered in Denmark, Ørsted employs 7,292 people. Ørsted's shares are listed on Nasdaq Copenhagen (Orsted).

pwc

PwC is a network of professional service firms operating in over 150 countries around the world. PwC brings the best of people and tech to help its clients continue to build trust and deliver sustained outcomes. Building trust in society and solving important problems is at the core of everything it does. PwC joined RE100 with a commitment to source 100% renewable electricity across its global operations by 2030. Transitioning its largest firms first, PwC has an interim goal to power 70% of its operations with renewable electricity by 2022.

Taiwan Mobile

Taiwan Mobile is a leading Taiwanese telecom operator providing mobile, fixed-line, cable TV and broadband services. As a forerunner in digital innovation, TWM is repositioning itself as a next-gen technology company that lead the revolution in sectors of telecommunications, Internet, media & entertainment, and E-commerce (T.I.M.E.) With an overarching principle of "Think Sustainable, Act Responsible," the company prides itself on its sustainability objectives and accelerates business transformation while keeping sustainability promise. TWM has committed to sourcing 100% renewable electricity across its entire operations by 2040 and pledge by reaching Net Zero emissions by 2050 to build a brighter future.

TCI
IBD
Pioneer
Verification
Partnership
TCI Co., Ltd.
Join & Delight consumer's life!

TCI Co., Ltd is a Taiwan based CDMO company (TWSE8436) manufacturing dietary supplements, pet supplements, medical device, and personal care products. It combines research and development resources of its 12 main laboratories to create high-efficiency products for customers in 63 countries around the world. TCI was the first Taiwanese member of RE100 and has committed to sourcing 100% renewable electricity by 2030, through the development of economy, environment, and society, TCI has created sustainable value for enterprises and social prosperity.

wpd
think energy

Founded in Bremen in 1996, wpd plans and operates global onshore wind and solar projects. wpd supports projects for their whole duration and constitutes a comprehensive value chain in the wind energy sector. It plays a pivotal role in converting energy supplies and contributing towards protecting our climate. wpd not only contributes to the supply of green electricity but also fully offsets the CO2 emissions caused by the company. wpd is working in 28 countries and has accumulated experience from setting up 2,550 turbines with an installed capacity of 5,740 MW.