chapter 3

Energy Transition

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7 AFFORDABLE AND CLEAN ENERGY

Corresponding SDGs

TCC C.F. Koo Building's
Solar Charging & Storage Integrated system

Cement and Power Integration Leading Global Markets

There can be no uncertainty in energy!
High temperatures are inherent to the cement production process, so the managing and balancing of fire is a core competency TCC has honed for decades
---Chairman Nelson An-ping Chang

TCC leveraged its cement expertise to enter the energy sector, developing fire- and weather-resistant UHPC for EnergyArk storage cabinets. By integrating experience in batteries, storage, and power systems, TCC provides the stable, safe energy infrastructure cities urgently need.

Cement Plants as the Optimal Application Sites

Cement plants, with dedicated land and high-voltage feeders, are well-suited for energy storage to support peak shaving, demand response, and electricity trading. By aligning production with load management, they become regional energy hubs. Charging & Storage Integrated Charging Station reduce peak loads and costs, while data platforms and AI enable smart energy management, including price prediction and equipment monitoring.

Power feeders
Support high-power equipment power input/output to reduce connection costs

Available space
Extensive areas conducive to deploying large-scale energy storage systems

Controllable loads
Controllable loads that can participate in demand response according to grid requirements

TCC GROUP HOLDINGS

The renewable energy retailer in Taiwan with the most diverse renewable energy types and the largest E-dReg capacity

能元超商

Green Charge & Storage Integrated Charging Station

NHΩA .TCC

Targeting European and American markets to provide charging solutions for various scenarios.

atlante

Providing integrated services for green electricity, energy storage equipment, energy management, charging, and smart microgrids

NHΩA .TCC

Global Tier 1 Energy Storage Supplier

NHΩA ENERGY

Building Urban Grid Stability through Distributed Energy and Virtual Power Plant

TCC centers its operations on virtual power plants. EnergyArk systems and fast-charging stations offer safety and urban adaptability, supporting load balancing, black start, and islanded operation. By integrating electricity trading and fast-charging services, it helps ease peak demand and support microgrid operations.

Comprehensive New Energy Integration Solution

TCC, as a virtual power plant operator, offers versatile energy integration solutions across user types and continually refines its product portfolio with modular EnergyArk systems tailored for diverse applications.

- Energy Storage
- Electricity Trading
- Charging
- Renewable Energy

Tech Plants & Factories

Backup Power:
During emergencies, a black start or uninterruptible power system mode is used to stabilize factory grid and reduce power outage risks

Energy Storage Peak Shaving:
Peak loads are regulated and contract capacity is reduced to help save electricity costs and additional grid charges.

Launched power service solutions offer 10% discount on peak electricity rates to help large power users reduce electricity costs and eliminate the investment burden of energy storage.

Charging Station Operators

Low-Carbon Fast Charging:
Green Charge & Storage Integrated Charging Station energy storage with EV chargers to ensure stable fast charging and deliver low-carbon charging services.

One-Stop Smart Management:
Charging and storage equipment is monitored, managed and maintained centrally, providing real-time charging and operational performance settlement

Save Contract Capacity Costs:
Energy storage is installed to reduce charging pile contract capacity, equivalent to saving about 50% in costs

Low-carbon Buildings

Pure Green Virtual Power Plant Towards RE100:
The smart energy management platform integrates green power and energy storage to increase green power usage.

AI Dispatch Driving EV100:
Integrated charging stations with energy storage meeting EV100 standards are established to achieve low-carbon transportation transformation

Grid Side

Distributed Power Stabilizes Grid:
Modular design enables quick installation and scalability, reducing the impact of intermittent renewable energy to ensure reliable Electricity supply

Participate in Power Auxiliary Service Trading: Energy storage systems respond quickly, can adjust grid frequency effectively over long periods, and supply power according to dispatch needs, reducing national grid resource waste

3.1

Energy Storage
Key to Energy Transition

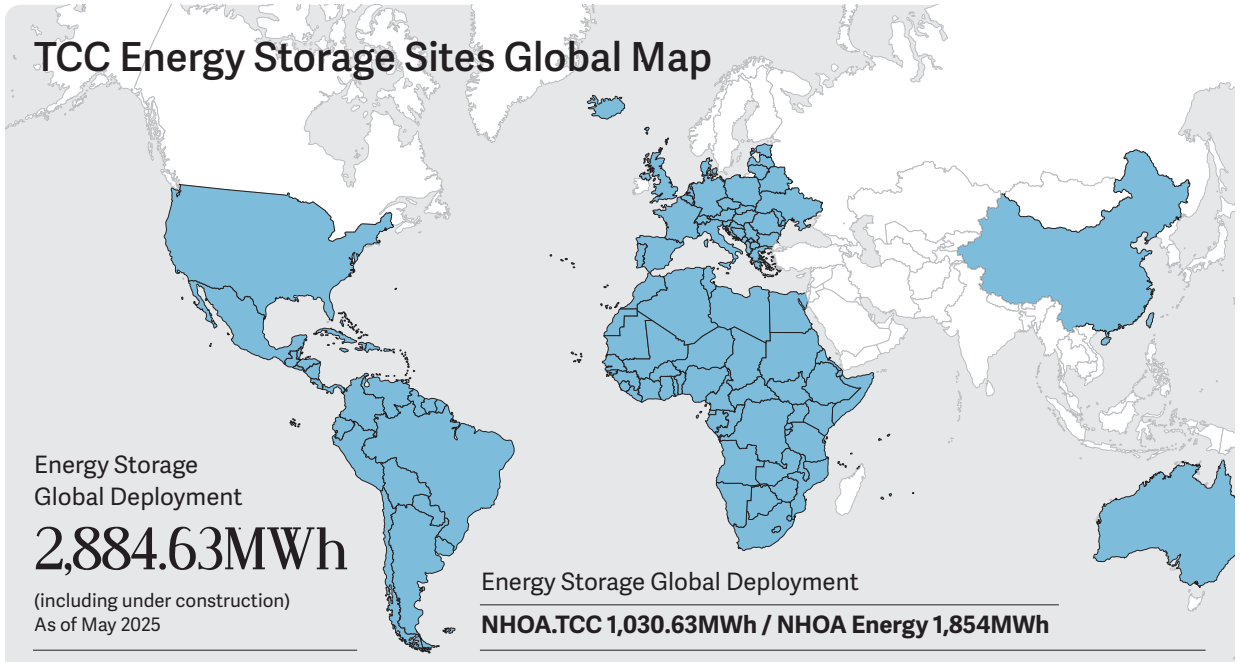
Energy storage is crucial in stabilizing energy transition. The International Energy Agency (IEA) indicates that global energy storage capacity needs to increase by 1,500GW before 2030 to regulate green power fluctuations. Recent large-scale power outages in Spain and Portugal further highlight the urgency of this challenge. TCC established NHΩA.TCC in 2020, and in 2021 acquired European EngieEPS which was renamed to NHΩA, integrating global energy storage technologies. Positioning itself as a virtual power plant operator, it focuses on urban small-scale energy storage scenarios, building distributed power systems across countries to accelerate global energy transition.

NHΩA is derived from the name NOAH of Noah's Ark, symbolizing hope for emerging from disaster and the creation of a new era. The lines beneath NHΩA's logo represent a new horizon, while the O is replaced by the Greek letter Ω, resembling a rising sun. Ω is also the unit of resistance in Ohm's law related to electricity. Facing the horizon of new green energy, NHΩA brings a new beginning and mission, revitalizing the energy business brand.

NHΩA .TCC NHΩA ENERGY

NHOA.TCC NHOA Energy

TCC Energy Storage Sites Global Map



Energy Storage Global Deployment
2,884.63MWh
(including under construction)
As of May 2025

Energy Storage Global Deployment
NHOA.TCC 1,030.63MWh / NHOA Energy 1,854MWh

America
NHOA Energy Expansion of the microgrid in California for ANZA Electric Cooperative

Europe
NHOA.TCC First European Virtual Power Plant At A.Roma Hotel In Rome, Italy

Taiwan
NHOA.TCC's Latest Energy Storage Site – TCC Hualien Plant

Mainland China
NHOA Energy TCC Yingde Plant, the Largest Energy Storage Site in Mainland China's Cement Industry

Action Spotlight

Strategic Deployment In Mainland China's Urban Power Grids

NHΩA.TCC Energy Storage Team

To meet Mainland China's strict GB/T standards for energy storage safety and grid stability, NHOA.TCC launched a new EnergyArk for high-power charging, urban centers, and industrial users. Integrating solar-charging-storage systems, with the first station established at Operations Center in Hangzhou.

Hangzhou Operations Center- TCC C.F. Koo Building uses a 6.18MWh EnergyArk and an 824 KWh Solar Charging & Storage Integrated system, with 54 low-carbon fast chargers. The storage system powers chargers, building operations, and emergency backup, achieving peak shaving and valley filling. A 16.6 MWh system will follow at Jurong plant for solar stabilization and electricity trading. NHOA.TCC will also establish an Ultra-High Performance Concrete (UHPC) factory in Jurong, producing low-carbon EnergyArk cabinets in partnership with local suppliers to expand the market.

TCC C.F. Koo Building uses NHOA.TCC EnergyArk-1000 energy storage cabinet, the illustration on the cabinet was created by China Academy of Art, themed on "Growth." It depicts a young girl and a tree growing together toward a better future

Innovative Energy Storage Leasing Service

In 2024, NHOA.TCC launched energy storage cabinet installations and an innovative pay-as-you-go leasing model. By deploying storage systems at Volkswagen dealership charging stations and partnering with Energy Helper TCC Corporation to support Taipower's ancillary services, the initiative helps reduce peak electricity costs and cut carbon emissions — achieving over 40 metric tons of annual carbon reduction per station.

NHOA Energy Storage Deployment Strengthens Global Market Leadership Position

In 2024, NHOA received AUD 87 million in performance bond support from BNP Paribas and Italian insurance and financial group SACE.

- **Asia:** Total online capacity exceeds 550MWh, with expected annual power generation to reach approximately 1000MW
- **Europe:** Completed a 50MWh energy storage system for ERG Power in Italy, supporting wind farms in Sicily. Also collaborated with Statkraft, Europe's largest renewable energy producer, to provide 113MWh battery storage services for UK grid stabilization. Partnered with Spanish power companies to build Southern Europe's largest transmission asset (SATA) projects with 140MW and 105MW capacity, demonstrating solid strength in European green energy deployment
- **Oceania:** In 2024, successfully delivered the 238.5MW/477MWh Blyth Battery in Australia for Neoen, stabilizing South Australia's power grid and providing 70MW of renewable power to BHP

Patented EnergyArk Provides A Secure Home For New Energy

EnergyArk™

The safety of lithium battery storage systems has raised growing concern. In response, NHOA.TCC developed the EnergyArk cabinet with 2-hour fire resistance at 1,050°C, a thermal runaway system capable of injecting 9,000 liters of water in 5 minutes, and a 24/7 EMS smart monitoring platform. With triple-layer protection covering materials, structure, and systems, it ensures both efficiency and safety.

FIREPROOF & EXTINGUISHING GUARANTEE	Fireproof and Explosion-proof Multi-Level Anomaly Detection Fire Suppression Assurance Flood Barrier
TEMPERATURE & WEATHER RESISTANT	Suitable for a wide range of environments Low thermal conductivity Low energy consumption Low carbon emissions, high durability
FLEXIBILITY & TENACITY	Single-unit modular design Flexible modular integration Suitable for a wide range of applications
COMPREHENSIVE PROTECTION	24/7 EMS system monitoring Comprehensive 24/7 after sales service Product insurance

Patents for movable cabinet and energy storage device: I813064, I800157, TW111145031, TW111142615, TW111130061, TW110142301, TW111138119

EnergyArk-1000 received Carbon Footprint Verification in 2025
Cabinet: CNS12514-1&-8 (2HR 1000°C Fireproof)
System Certification: IEC62933-5-2, UL1642, UL1973, UL9540A, IEC62619, IEC62477-1, UN38.3, UL9540

According to Taiwan's 2050 Net-Zero Emissions Pathway and Action Plan, distributed energy systems are key to building smart urban grids and enhancing grid resilience. NHOA.TCC is committed to deploying distributed energy storage systems across cities in Taiwan, Europe, and Mainland China. Deployment speed, product stability, and cloud-based operation systems are critical to success.

NHOA.TCC has developed a range of products, from the EnergyArk 1000 for large-scale applications to the compact EnergyArk 400 for urban and commercial use, meeting diverse customer needs and supporting distributed energy deployment. Development also continues on smaller, indoor-friendly units with optimized height.

Action Spotlight

TCC's EnergyArk 400 is deployed at the Oncle Scott's Bretteville energy storage site in France

New Model EnergyArk 400 Accelerates Urban Energy Storage Deployment

In 2024, NHOA.TCC launched the new EnergyArk 400 model, a compact energy storage system occupying only one parking space. Its plug-and-play design accelerates deployment and reduces installation costs, making it suitable for charging stations, shopping centers, and commercial buildings. In 2025, 65 units of EnergyArk 400 are planned for deployment across Europe.

EnergyArk-400 Energy Storage Cabinet Highlights

Click to see more

Lower Environmental Impact	Optimized product design and transportation to reduce lifecycle carbon emissions. Fire suppression uses eco-friendly gas-fused gel instead of gas.
Lower Site Restrictions	Required water volume for fire suppression is significantly reduced, lowering the floor load requirement from 3.4 tons/m² to 2.4 tons/m² for installation sites
Improved System Durability	Battery cycles increased from 3,650 cycles to 7,300 cycles, doubling the durability compared to EnergyArk-1000

Innovative Business Model Reduces Energy Storage Investment Threshold

NHOA.TCC offers flexible models:
the Power Regulation Service, where NHOA.TCC fully invests and operates electricity trading for zero-cost usage; and the Co-sharing model, which sells equipment at preferential prices and shares electricity trading profits, improving capital flexibility and return predictability.

3.2

Energy Solution

Energy Helper TCC Corporation offers integrated green energy services, including RECs, green power transfer, online consulting, and carbon management. By combining energy storage and electricity trading, we help businesses cut carbon costs and use more green energy. We ensure a stable supply to support SMEs toward RE100 and sustainability goals.

TCC KEY FACTS

Over 50million kWh

of green electricity sold

485 members on the green ETP

— An annual growth rate of 33%

Energy Helper TCC Corporation

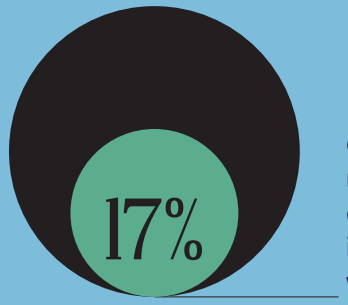
Energy Helper TCC Corporation Assists Users With Contract Capacity Over 5,000kw, Customers With RE Goals, Private Power Plants, Or Self-Use Electricity Generation Equipment Users

Energy Helper TCC provides integrated services for major electricity users, covering green electricity, storage, and carbon management, and uses AI matches users with optimal sources to reduce surplus and costs, while idle electricity is traded via Taipower to cut expenses and generate income. The Online Green Energy Consultant leverages big data to boost procurement efficiency.

TCC KEY FACTS

94%

of clients are non-affiliated companies, covering a wide range of industries including technology, semiconductors, manufacturing, optoelectronics, finance, and medical device and supply manufacturing.



of electricity resale customers in 2024 was SMEs

18% Semiconductor

9% Technology

36% Manufacturing

9% Optoelectronics

Aggregating Energy - The Largest Ancillary Services Provider in Taiwan

Energy Helper TCC Corporation integrates green and storage sites from both TCC Group and clients to build a unified platform covering all Taipower trading services. By December 2024, trading capacity reached 226.2MW, including 170MW from E-dReg, capturing 39.4% market share and ranking first.

AI Optimization Flowchart

Action Spotlight

Hualien 4/3 Earthquake

Cloud EMS Stabilizes Post-Disaster Power Grid In Real-Time

In April 2024, Taiwan experienced its strongest earthquake in nearly 25 years. During the crisis, the Cloud EMS responded effectively, with Molicel's Molie Quantum Energy Corporation energy storage system instantly executing s-Reg, discharging 4MW for 13 minutes to stabilize grid frequency and prevent system failure. That month, three grid-connected sites in Yilan and Hualien also supported Taipower's emergency dispatch, executing E-dreg discharge reaching 263.75MWh. The energy storage system at E One Moli Corporation also supplied 7 MWh through Spinning Reserve to help stabilize the grid.

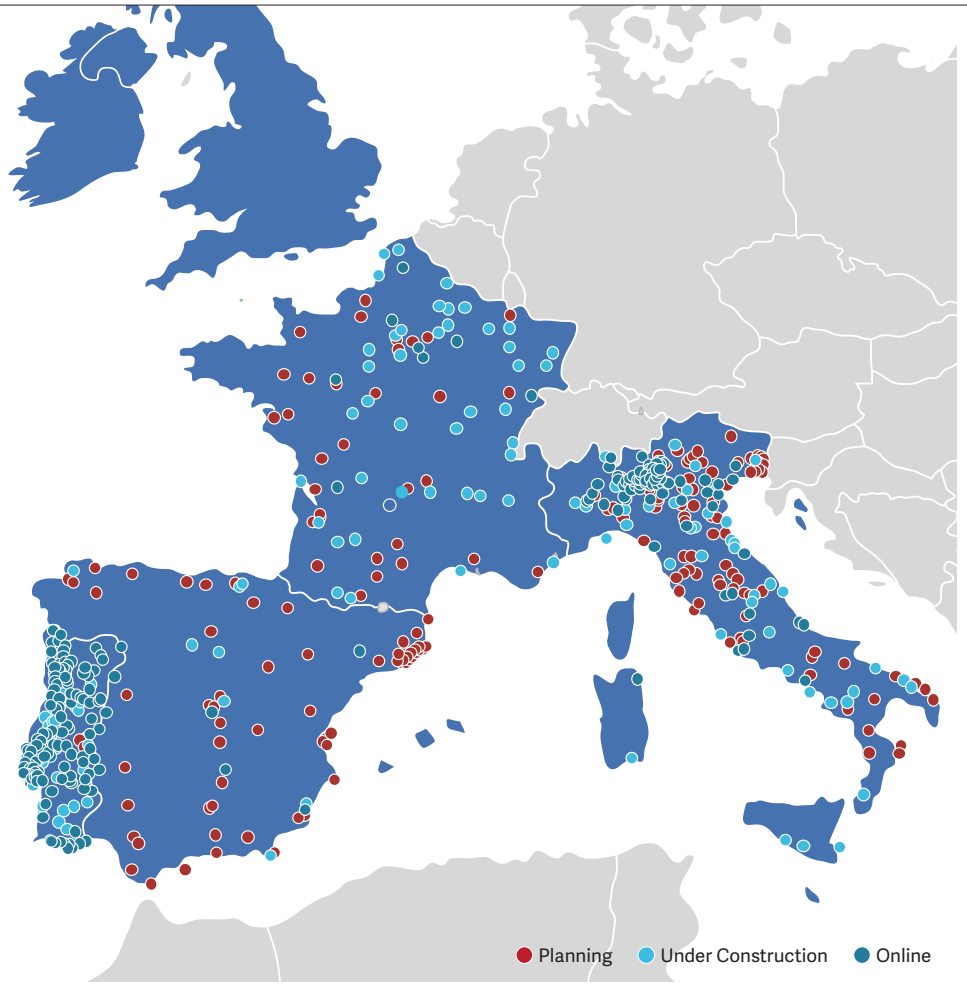
3.3

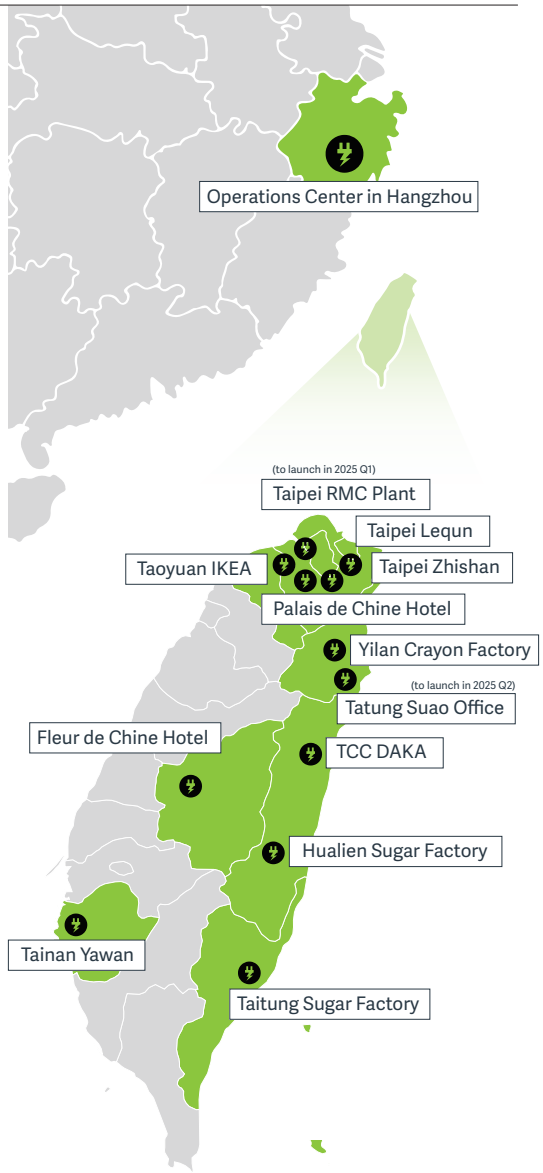
Energy Supply

Transportation accounts for 23% of global carbon emissions, with 70% from land transport. The electric mobility revolution is crucial to achieving net-zero. NHOA.TCC launched its charging brand, deploying Green Charge & Storage Integrated Charging Station that store electricity during off-peak hours and prioritize discharging to EVs during peak hours, easing grid load. Under the leadership of TCC Chairman Nelson An-ping Chang, European subsidiary Atlante was established in Italy in 2022 to promote electric mobility. Aiming to become Southern Europe's largest fast and ultra-fast charging network operator, Atlante integrates charging stations with national grids and actively advances the global energy transition.

NHOA.TCC | Atlante

NHOA.TCC | Atlante





Over 1,000
charging stations

3,500
Charging Points | Worldwide

2025
Build 70 EnergyArk Charge & Storage Integrated Fast Charging Station

2030
Build 35,000 fast-charging & ultra-fast-charging points

Action Spotlight

Virtual Power Grid Service

EV charging demands as much electricity as four convenience stores, placing stress on the grid. With growing renewable penetration, voltage fluctuations at grid endpoints are becoming harder for traditional distribution systems to manage. Enhancing grid resilience, control, and energy storage is key to energy transition. NHOA.TCC, approved by Taipower, is studying reverse power flow from low-voltage charging stations to supply electricity during shortages, strengthening grid endpoint resilience. The goal is for all stations to function as distributed power systems, supporting Taiwan's future virtual grid and electricity trading models. The Yilan Crayon Factory station will officially begin service as the first pilot sites in March 2025.

Yilan Crayon Factory Station

Invited To Participate In Load Enhancement Trials

By Taiwan Power Company & Industrial Technology Research Institute

To ease ramping pressure on traditional power units during evenings, Taipower and ITRI are testing load enhancement during high renewable penetration periods, aligned with Taipower's demand response program. From December 2024 to February 2025, six NHOA.TCC charging stations participated ein the trial, using AI to auto-adjust charging and discharging. Further optimization will follow Taipower's official program.

TCC KEY FACTS

Test data shows that NHOA.TCC's energy storage equipment effectively reduces

90% of grid load during peak periods

In February 2024 NHOA.TCC's Yawan station achieved 100% green electricity usage during peak hours through green electricity transfer, becoming Taiwan's first fast-charging station to achieve

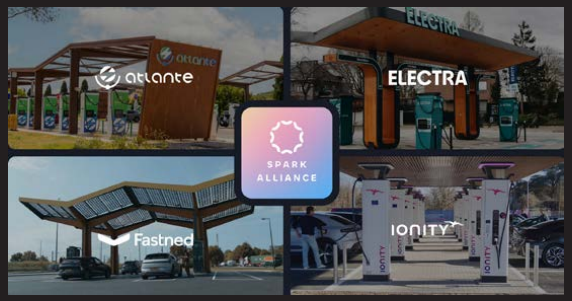
RE 100

during peak periods

Action Spotlight

Atlante and European Charging Leaders Launch Spark Alliance

Connecting EV Networks In 25 Countries



In 2025, Atlante partnered with France's Electra, the Netherlands' Fastned, and Germany's IONITY to form the Spark Alliance—Europe's largest EV charging alliance. Covering 25 countries with over 1,700 stations and 11,000 high-power charging points powered entirely by renewables, the alliance supports carbon-neutral electric mobility. Starting from June, EV drivers can use any member app for cross-border charging and payment, with integrated station data improving long-distance travel convenience. The alliance aims to build stable cash flow and a scalable business model, accelerating the EV transition from early adoption to mass adoption.

International Collaboration Between Atlante & EV Platform Chargemap

In 2024, Atlante partnered with Chargemap to improve charging accessibility and convenience. Through Chargemap, two million users can seamlessly access Atlante's charging network with features such as location navigation, real-time station updates, and in-app payments. In high-share markets like France, Italy, and Spain, users can plan routes, monitor station availability in real time, and start charging with one click. The two companies will continue deepening data integration and developing value-added services.

TCC KEY FACTS

Installation of 19 fast and ultra-fast charging facilities powered by

100% Renewable Energy

Turin Airport, Italy

REN

Established a partnership with REN, Portugal's power grid operator, utilizing Speed-E grid connection patented technology to directly connect charging stations to 9,000 kilometers of transmission network for high-power charging

3.4

Energy Transmission

Molicel, the first firm to commercialize rechargeable lithium batteries, leverages innovation to build Next-Generation High-Performance Ternary Lithium-Ion Batteries for cutting-edge energy-transition applications. As a high-power pioneer, we support low-carbon transformation of various industries.

Molie Quantum Energy Corporation reported a fire incident on July 15, 2025. Please refer to the TWSE and TCC's official website for updates.

Molicel designs battery solutions that deliver high performance and reliability tailored the specific needs of three key areas: **AI applications, energy storage, and electric vehicles.**

AI Data Centers

To ensure uninterrupted computing, AI data centers invest in backup power systems. Molicel developed a dedicated BBU cell series for high-discharge and heat-resistant environments—ideal for generative AI and hyperscale data centers. These solutions enhance uptime and energy efficiency. In 2024, Molicel entered the AI data center supply chain, delivering 5kW modules to a major U.S. cloud service provider and co-developing next-gen batteries with three others. Leveraging its battery expertise and North American presence, Molicel continues regional expansion.

Energy Storage

The development of energy storage focuses on improving the space utilization of storage systems and reducing the overall carbon footprint. Molicel batteries excel in both energy density and cycle life, delivering high-efficiency, long-lasting solutions especially suitable for large-scale energy storage applications like industrial facilities, communication base stations, and off-grid systems.

Electric Vehicles

Molicel supports breakthrough applications in high-power, lightweight, and certified EV technologies. The Spéirling PURE, co-developed with McMurtry Automotive, set multiple track records, showcasing top-tier energy density and power. Molicel also powers Stark Future's VARG electric motocross bike, which beat combustion models at the UK indoor championship and received over 18,500 pre-orders. For FlyingBasket, a European heavy-lift drone maker, Molicel batteries extended flight range by 9% while carrying 100 kg payloads, enabling offshore and last-mile logistics.

Supporting
Electric Vertical Takeoff And Landing Aircraft (Evtol)

To Accelerate The Development Of The Low-Altitude Economy

Molicel's aviation-grade lithium batteries uniquely combine high-rate performance with aviation safety certifications. Their long cycle life boosts efficiency and mileage revenue. Molicel partners with global electric aviation startups. In 2024, Archer Aviation earned FAA certification and was named exclusive air taxi provider for the 2028 LA Olympics. Vertical Aerospace won the UK Aerospace Technology Institute's Shaping the Future Award, highlighting its market potential.

Product Lifecycle Management

Molicel adopts product lifecycle management as its core strategy, actively promoting a more resilient and forward-looking sustainable operation model through the adoption of international standards, local supply chain collaboration, and material recycling and reuse.

Carbon Reduction Target:
Decrease carbon footprint per battery by 5% by 2025 and 20% by 2030 Base year: 2023

Implementing ISO 14067 Carbon Footprint and EPD

To Enhance Carbon Competitiveness
Since 2023, Molicel has adopted ISO 14067 product carbon footprint certification.
In 2025, Type III Environmental Product Declarations (EPDs) will be introduced for P22S (E One Moli Corporation) and P45B/P50B (Molie Quantum Energy Corporation) to meet EU regulations and global brand requirements.

ISO 14067 Progress

- **E One Moli Corporation:** P42A certification obtained; P22S and P30B in progress
- **Molie Quantum Energy Corporation:** P45B and P50B in progress

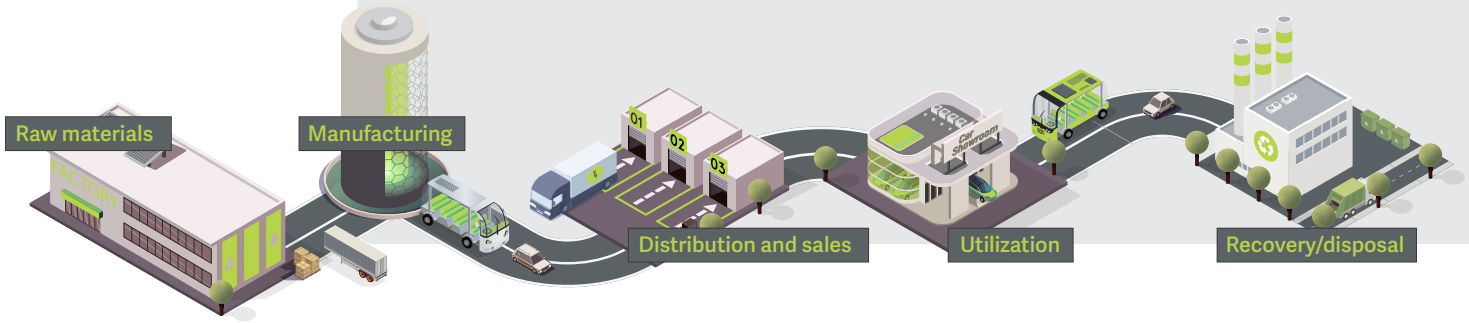
Eu Battery Regulation Response Plan

Building A Local Circular System With 75.2% Cathode Recovery Rate
Molicel works with local recyclers and suppliers in Taiwan to build a circular system for scrap and waste battery cells. In 2024, closed-loop trials recovered 126.3 metric tons of cathode scrap and produced 95 metric tons of black powder (75.2% recovery rate). The powder was sent for precursor testing and may be reused in cathode materials. Anode carbon is repurposed in cement production, reducing waste and emissions.

Supplier Collaboration

To Increase Recycled Material Rate
Molicel prioritizes the procurement of recycled materials and actively engages with suppliers, ensuring steady increases in the recycling rates of all critical materials.

Material Categories	Recycled Material Usage Ratio
Cathode Materials	Approx. 30%(precursor)
Anode Materials	Using low-carbon byproducts
Wooden Pallets	70%
Electrolyte Packaging Containers	100%
Copper Foil	80%
Aluminum Foil	17.5%
Steel Cans/Trays	10%



Molicel promotes sustainability through full life cycle management, advancing green production and resource circulation from design and manufacturing to recycling

Molicel Carries Out Conflict Minerals Management To Ensure That All Supplies Of Raw Materials Comply With International Regulations

Molicel follows OECD guidelines to manage conflict minerals, avoiding sources linked to illegal mining or armed conflict. New suppliers must submit CMRT/EMRT reports and sign non-use declarations. Existing suppliers undergo regular due diligence and audits to ensure full compliance, supported by ongoing internal monitoring.

3.5

Energy Generation

Taiwan's diverse terrain presents vast potential for renewable energy. Established in 2018, TCC Green Energy Corporation has actively invested in wind, solar, geothermal, and marine renewable energy development. It pioneers hybrid project sites and is dedicated to advancing geothermal and ocean thermal energy conversion. With a focus on the coexistence of project sites with nature, TCC has invested in big data management and partnered with professional aquaculture teams to support industry transformation.

AI Smart Optimization of Power Plant Management

The International Energy Agency (IEA) estimates that global renewable energy capacity must triple by 2030 to meet the 1.5°C target. In 2018, the Changbin wind and solar power site delivered its first kilowatt-hour of green power. By 2020, TCC launched the Chiayi aquavoltaics and Vakangan geothermal projects, providing steady momentum for Taiwan's energy transition. TCC Green Energy applies big data management, with 100% of site equipment transmitting generation and environmental data in real time. AI analyzes historical output and weather patterns to issue alerts and guide timely maintenance, enhancing operational efficiency.

TCC KEY FACTS

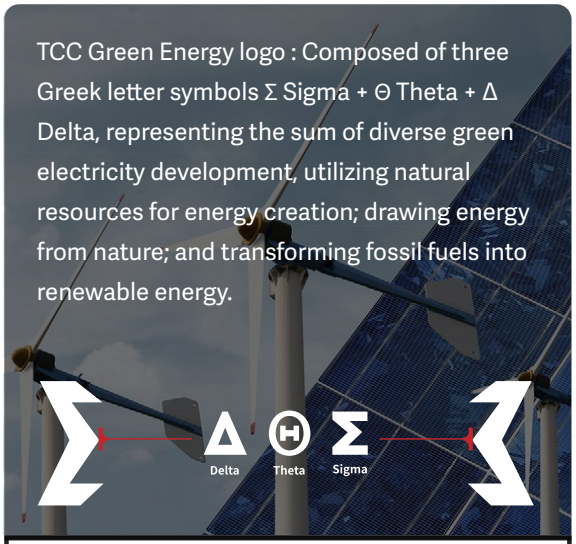
2021-2024

Total of 20

energy project sites currently generating power or under construction.

Already generated 408 million kWh of green electricity, equivalent

-193,378 metric tons of CO_2e



TCC Green Energy logo : Composed of three Greek letter symbols Σ Sigma + Θ Theta + Δ Delta, representing the sum of diverse green electricity development, utilizing natural resources for energy creation; drawing energy from nature; and transforming fossil fuels into renewable energy.

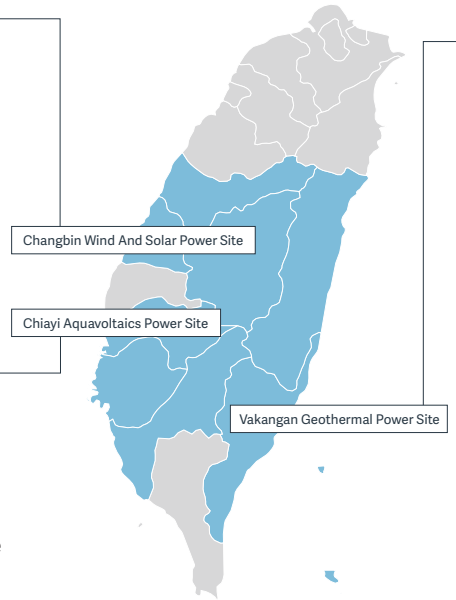
TCC Green Energy

Changbin Wind And Solar Power Site

Phase II wind energy was connected to the grid and began operation in 2024. TCC is also committed to biodiversity, promoting solar grazing alongside solar energy development.

Chiayi Aquavoltaics Power Site

The full-area grid connection is expected to be completed in 2025.
TCC not only engaging in commercial farming but also exploring refined aquaculture practices through its aquaculture team.



Vakangan Geothermal Power Site

2024 local hiring rate

employee 86% | **contractor 100%**

Expected to complete grid connection for all units by 2025

Action Spotlight

Department of Sustainable Aquaculture Helps Upgrade the Aquaculture Industry

According to the UN FAO, climate change, overfishing, and warming seas may reduce global fish catches by 15% by 2050. With a short growth cycle and half the carbon footprint of livestock, aquaculture is seen as a sustainable protein source. TCC's Chiayi aquavoltaics site was the first to break ground. In line with the spirit as well as the letter of the tax laws and regulations, we worked with landowners—many of them former fish farmers to ensure continued aquaculture. With no existing model, we built a resilient framework and connected the project to the grid in 2022, supplying green power to Taiwan. Facing labor shortages and water quality challenges in fishing villages, TCC Green Energy established a "Department of Sustainable Aquaculture" with experts from Taiwan Ocean University and National Pingtung University of Science and Technology(NPUST). Rather than pursue industrial scale, the team focuses on quality, developing standard models to ease entry for young farmers and help experienced ones adapt. In 2024, TCC Green Energy began R&D on low-carbon feed and probiotics with NPUST, and started exploring bamboo powder reuse with the Bamboo Industry Association.

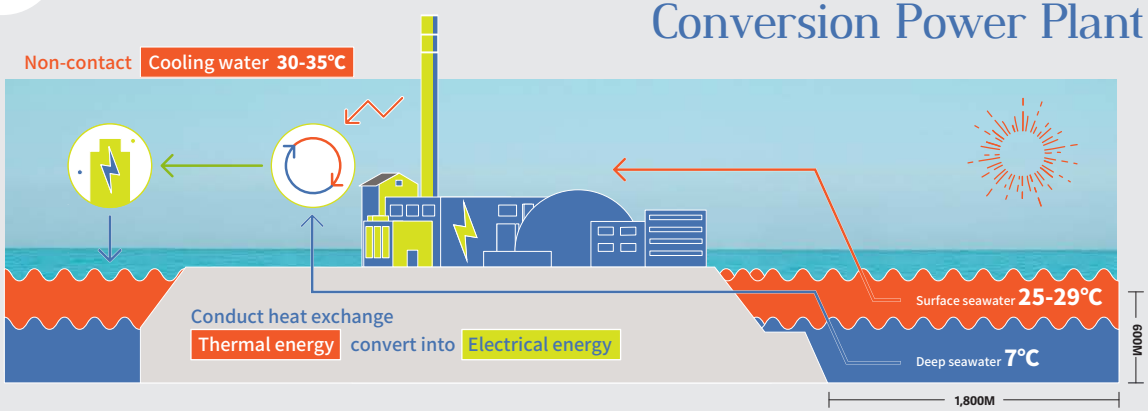
The Collective Achievements of Aquaculture Partners

In November 2024, TCC hosted a tasting event featuring bass and Thai shrimp from its aquavoltaics sites, prepared by LDC Hotels & Resorts chefs and paired with local produce. Aquaculture partners and community leaders joined the event. TCC's fishery-solar symbiosis sites steadily produce eel, bass, and milkfish. Around 100MW is under development. Beyond reducing deep-sea fishing's carbon footprint, the project also supports rural revitalization and encourages youth to return and grow aquaculture.

Aquaculture farmer Chen, Kuo-Wei said, "TCC's aquavoltaics site operates on a larger scale, which gives me greater confidence and motivates me to cooperate long-term.

They also assist with aquaculture product traceability certification, which could boost consumer trust in our products.

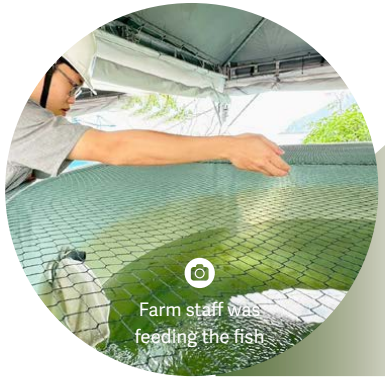
World's First Mw-Scale Ocean Thermal Energy Conversion Power Plant

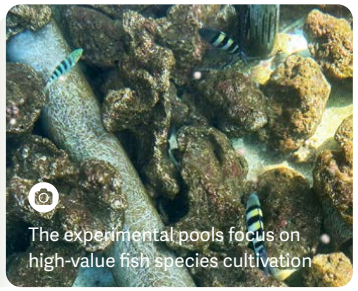


The consistent, 24-hour nature of ocean energy offers a reliable power source and a key enabler of the energy transition. TCC's main production site—the Hoping 3-in-1 of Port, Power, Cement Plant—sits near a 600-meter depth just 1.8 km offshore, making it ideal for ocean energy. TCC is investing in Ocean Thermal Energy Conversion (OTEC), using temperature differences between cooling water and deep seawater to drive turbines. Phase I targets 1–2 MW capacity, supplying 24,000 kWh daily — enough for 2,000 households. In 2024, underwater heritage review passed, and EIA for terrestrial and marine surveys was submitted to the Ministry of Environment. Grid connection is set for 2028, with commercial operation by end-2029.

Establishment of 4 Experimental Pools for Deep Sea Water Aquaculture Research

To explore high-value applications of deep seawater, TCC built four aquaculture pools in 2024, using seawater from Hoping EcoPort to cultivate sea grapes, gilt-head bream, grass shrimp, and local fish. In early 2025, a tasting event was held during the grass shrimp harvest to share the process with staff. TCC plans to collaborate with aquaculture tech firms and universities to assess the feasibility of land-based recirculating systems. After introducing power generation, efforts will continue to advance eco-friendly aquaculture.


Farm staff was feeding the fish


The experimental pools focus on high-value fish species cultivation

A Brief History of Ocean Thermal Energy Conversion

1973
large-scale research on Ocean Thermal Energy Conversion (OTEC) began with the first energy crisis.

1980
Saga University in Japan began investing in OTEC-related technology research and development.

2007
the United States and Japan restarted OTEC technology with the goal of developing commercial operation modules.

2008
the United States planned a 100MW commercial power plant construction project in Hawaii.

2009
the United States received Navy funding to build plants in Hawaii, Guam, Puerto Rico, Ryukyu, and Diego Garcia.

2013
Saga University in Japan collaborated with industry to build two 50kW OTEC demonstration power plants on Kumejima Island.

2015
the NELHA park in Hawaii completed the construction of a 105kW OTEC power plant.

2022
Ho-Ping Power Company visited Kumejima Island, Japan, planning to invest in MW-scale Ocean Thermal Energy Conversion.

3.6

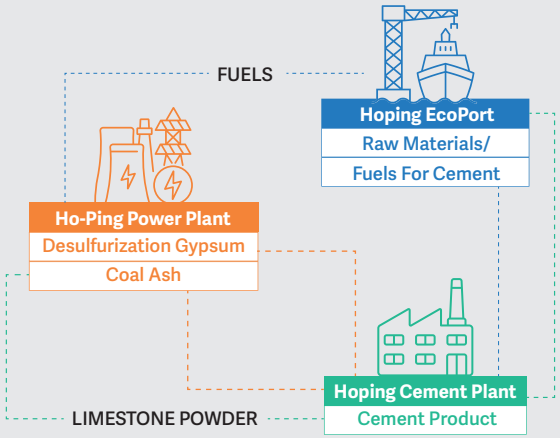
Social Aspects of the Energy Transition

Ho-Ping Power Company Assumes Responsibility for Power Supply

According to Taiwan's latest National Power Supply and Demand Report, TCC's Ho-Ping Power Plant remains the only large-scale provider in eastern Taiwan and a vital power source for the northeastern grid until thermal coal power plant decommissioning begins in 2033. Through discussions with Taipower, Ho-Ping recognizes the challenges of energy transition under resource constraints. While committed to net-zero goals, TCC ensures the plant's continued operation to safeguard grid stability, supplying 95% of Yilan, 20% of New Taipei, and nearly 4% of Taiwan's electricity. In line with IEA recommendations and Taipower's contract and grid needs, coal-fired units will operate until the end of their design lifespan, ending in 2040. A just transition plan will be launched to address stakeholder concerns, with ocean thermal energy conversion (OTEC) included in future transformation efforts.

The Only Zero-Waste, Ash-Lagoo-Free Power Plant In The World

Ho-Ping Power Plant was built on zero-waste and environmental principles. Co-located with a cement plant and industrial port. Fly ash produced during power generation is transported to the cement plant via a sealed pneumatic conveying system, while boiler bottom ash and desulfurization gypsum are delivered by trucks. Coal ash and gypsum from the desulfurization process are fully recycled raw materials, making Ho-Ping Power Plant stands out as the world's only thermal coal power plant without ash lagoo.



Energy Transition Plan

Subcritical Unit Retrofit Plan

A retrofit starting in Q4 2024 will convert existing coal units to subcritical ones. Feasibility will finish in 2025, with construction in 2027. The upgrade will cut 728,500 metric tons of CO_2 annually and reduce coal use by 9%, saving 310,000 metric tons without lowering output.

Biomass Fuel Feasibility Study

In 2024, TCC began studying the co-firing of wood pellets and SRF. Due to bottom ash reuse issues, a second phase on gasification was launched to produce syngas for boiler use, targeting a 10% coal reduction. If the Q2 2025 feasibility study proves viable, TCC will assess boiler design, fuel logistics, port handling, and environmental impacts for full-scale planning.

TCC KEY FACTS

Pollution Emissions of −41%
| 2016 Base Year

Rainwater Recovery 53,082 cubic meters, with 100%utilization rate
| Independently developed nanofiltration membrane water recovery of 59,746 cubic meters.

Ho-Ping Power Plant was honored as an outstanding enterprise at the Ministry of Environment's 2nd Water Purification Sustainability Award in 2025.

Ho-Ping Power Company

Air Emission Management

SOx≦ 0.310Kg/MWh
NOx≦ 0.260Kg/MWh
Total Suspended Particulates
≦0.032 Kg/MWh

Waste Management

General Industrial Waste Recycling Rate 94%
(excluding coal ash, catalysts)

Taiwan's Only Thermal Coal Power Plant

With Patented Nanofiltration Technology For Wastewater Recycling

Ho-Ping Power Plant generates about 533 metric tons of operational wastewater daily. To reduce environmental impact, the plant has committed to cutting chemical agent usage in water treatment by over 70%. In 2021, Ho-Ping Power Plant independently developed and co-researched a solution with National Ilan University, and in 2024 implemented the patented nanofiltration and reverse osmosis membrane system (Patent No. I832462), enabling wastewater recycling and mineral separation. Calcium and magnesium ions are reused in the desulfurization system, reducing the need for additional limestone powder.

Comprehensive Sustainable Management

From the initial construction, Ho-Ping Power Plant has upheld standards that exceed regulatory requirements, following the principle of source reduction and waste-to-resource conversion. Ho-Ping Power Plant has established environmental management objectives in line with ISO14001.
Ho-Ping Power Plant has implemented flue gas treatment equipment. Since 2022, Ho-Ping Power upgraded its AQCS, GGH, AIG, and denitrification systems. Rooftop solar and a 10.8kW wind tree turbine support on-site renewables. Cooling seawater is reused for a 576kW micro-hydro project, set for 2026, generating 3.9 million kWh annually.

The Ho-Ping Power Plant with the Taroko Tribe totem

Implementing Human Rights Management:
Ho-Ping Power Plant Initiates CSDDD Survey For Suppliers

Ho-Ping Power Plant must keep coal ash below 12% and sulfur under 1%, stricter than the 20% ash limit at most Taiwanese coal plants. To meet this, it blends coal from Australia, Indonesia, and Russia. Russian coal offered low sulfur, moderate ash, and proximity. In September 2024, TCC clarified to ERF, CREA, and Ecodefense that its contract with Ashon was not renewed. The last shipment arrived in October, delayed by April earthquake damage at Ho-Ping EcoPort. TCC has launched EU-aligned human rights and environmental due diligence, expanding in 2025 to all subsidiaries' suppliers and contractors. See CH5.5 Human Rights Protection for details.