

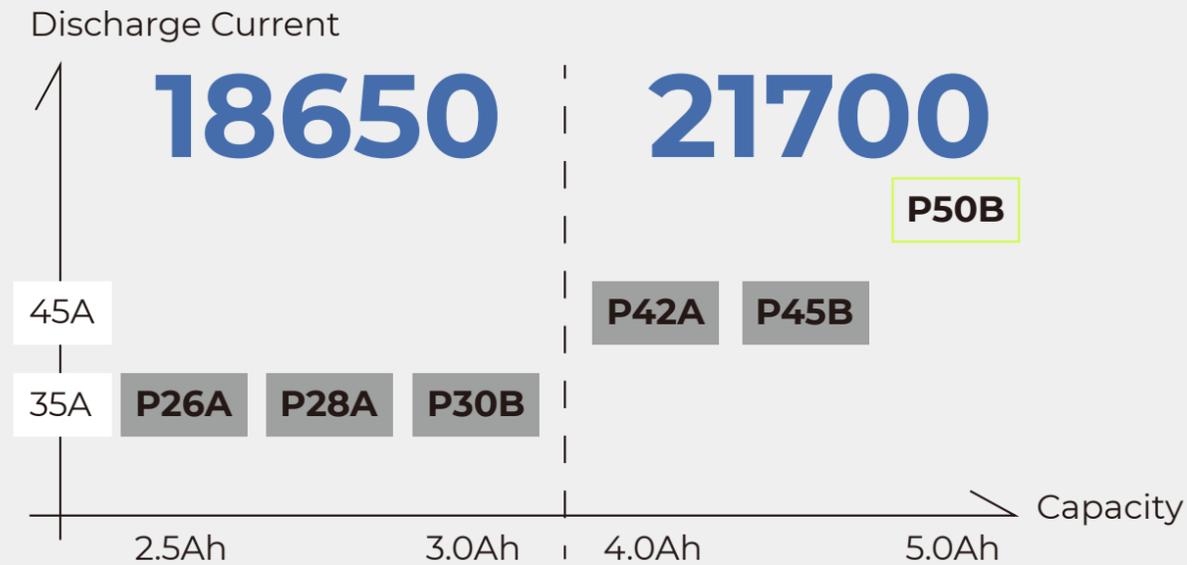
# Product R&D and Innovation

In line with our commitment to offering users enhanced and prolonged usage time and range, while promoting a more sustainable and eco-friendly planet, Molicel prioritizes the following key features in its product development:

**HIGH EFFICIENCY | ENERGY CONSERVATION | SAFETY**

- ✓ High power
- ✓ High capacity
- ✓ High reliability
- ✓ Low impedance
- ✓ Thermal management
- ✓ Extended life cycle (2nd use)

## Product Road Map



## Research and Development Highlights

<b>Cathode</b> Ni-rich NCA	Energy Density <b>&gt;242Wh/kg/643Wh/l</b> Discharge <b>&gt;45A</b>	Fast Charge <b>&gt;3C</b>	<b>High efficiency &amp; high rate anode</b>
<b>Multi tab/tabless &amp; thinner electrode</b>	Low Impedance <b>&lt;13.8mΩ</b>	Wide Operating Temperature <b>-40°C~70°C</b>	<b>Patented electrolyte</b>

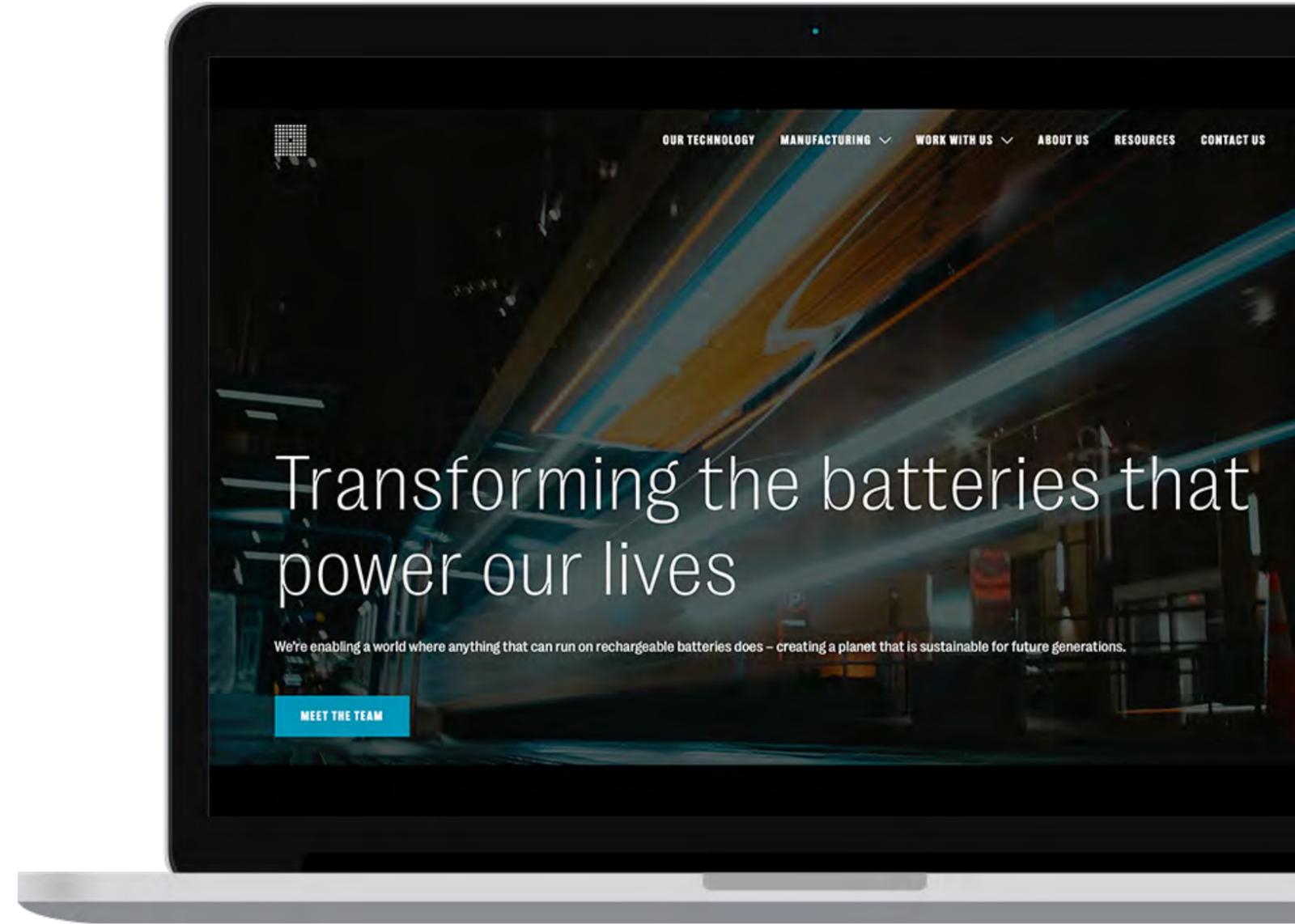
## Partnership

Our key strategic partner, Group14, is a materials supplier for silicon batteries. They specialize in creating porous carbon particles within polymer materials, which are then combined with silicon to form silicon-carbon composites.

This innovation significantly boosts battery capacity while maintaining high-power charge and discharge capabilities. By incorporating these custom materials from Group14 into our future product development, we aim to comprehensively enhance the competitiveness of Molicel's battery cells.

In addition to the development of Molicel's high-capacity P series and the newly introduced ultra-high discharge X series, Group14 began construction of their second facility, BAM-2, in Washington state in 2023.

This facility, expected to be operational in 2024, will produce 2,000 tons of battery powder annually, providing an estimated 20 GW of silicon battery capacity each year.



## AI Super Factory

To address rising battery market demand, Molicel's Xiaogang factory is integrating smart manufacturing and automation to enhance efficiency and industry leadership. Utilizing IoT, big data, and AI, smart manufacturing improves production efficiency and quality control.

Automation technologies like robotic arms and automated assembly lines enhance product consistency, reduce errors and costs, and predict maintenance needs, minimizing downtime. These advancements boost production efficiency, provide flexibility, and enable quick responses to market changes and customer demands, maintaining a competitive edge in the global battery market.



## Smart manufacturing enhances production efficiency



### Automated Guided Vehicle (AGV) system

- Productivity is expected to increase by 2.25 times.
- Labor costs will be reduced by approximately 60%, boosting production efficiency.



### Automated Warehouse System

- Enhancing storage operation efficiency.
- The material management system allows instantaneous tracking of location, quantity, and status of materials and products.



### Automatic Optical Inspection (AOI) system

- Checking the number of batteries on assembly trays prevents labor-intensive inventory reconciliation.
- Timely interception of trays with discrepancies reduces monthly reconciliation workload by about one man-day.
- The system improves inspection accuracy and efficiency while saving on labor costs.

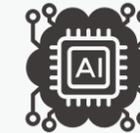


### The MES (Manufacturing Execution System)

- The real-time monitoring system tracks factory operations, including electricity usage and production status.
- It helps detect anomalies and implement corrective measures promptly.



**The QOCA AIR Quanta Artificial Intelligence Research Cloud Platform** handles structured data and image data. Through a user-friendly UI interface, it performs data processing, image annotation, and statistical analysis. This helps to validate and optimize products and production lines, assisting in identifying the key process parameters and optimal settings that affect battery performance. It analyzes the correlation between various parameters and diagnoses the causes of quality defects. This not only allows the vast amount of data to be valuable but also significantly shortens the product tuning time from several hours to 1 minute, saving test costs and improving product quality and competitiveness.



**With the increasing adoption and implementation of big data and artificial intelligence, Molicel is dedicating resources to developing an AI-powered big data learning platform to launch in mid-2024.**

**This initiative is designed to optimize resource allocation, boost production line efficiency, and advance the integration of innovative manufacturing techniques.**

**By harnessing the power of big data, Molicel aims to improve manufacturing processes and enhance operational intelligence significantly.**

# Sustainable Factory

Molicel actively implements GHG management in response to the international carbon reduction trend.

Simultaneously, Molicel embraces the "Cradle to Cradle" concept as our goal for resource recycling and reutilization.



## GHG Management

In 2023, Molicel prioritized the implementation of ISO 14064-1:2018 at its Tainan factory, setting 2022 as the baseline year for greenhouse gas emissions inventory, and completed third-party verification in the first quarter of 2024.

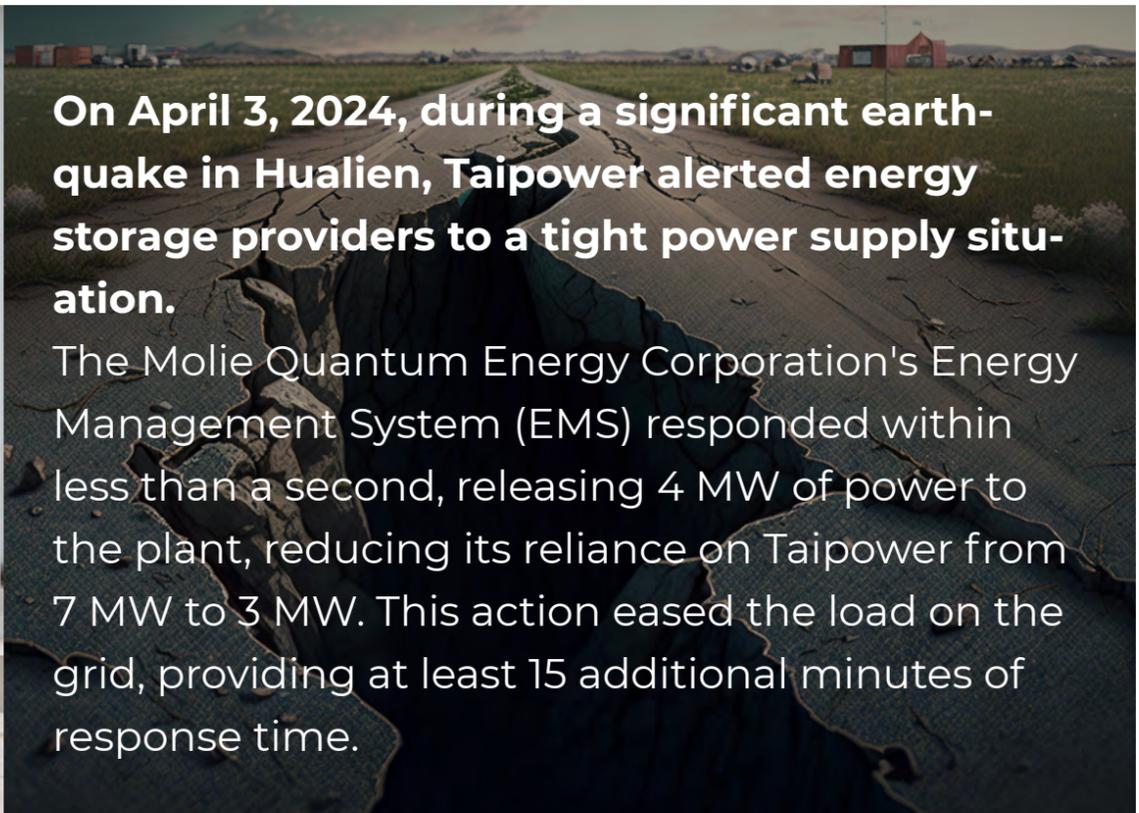


Based on the verification results, Molicel will develop more comprehensive carbon reduction plans, including the implementation of renewable energy, energy-saving improvements, smart manufacturing, and resource recycling. The Molie Quantum Energy Corporation is also scheduled to implement ISO 14064-1:2018 in 2024, continuously expanding GHG inventory to encompass all operational areas.



## Energy Storage Systems

Due to delays in renewable energy development and high raw material and electricity costs in Taiwan, Molicel has enhanced its energy storage systems. In 2023, E-One Moli Energy Corp. increased its storage capacity from 1.2 MW to 1.7 MW, while Molie Quantum Energy Corporation established an 8 MW system using Behind-the-Meter (BTM) technology. This system operates as a virtual power plant, saving on electricity costs and participating in Taipower’s trading platform to stabilize the grid. Molicel’s energy storage improvements have increased operational resilience and supported grid stability.



**On April 3, 2024, during a significant earthquake in Hualien, Taipower alerted energy storage providers to a tight power supply situation.**

The Molie Quantum Energy Corporation's Energy Management System (EMS) responded within less than a second, releasing 4 MW of power to the plant, reducing its reliance on Taipower from 7 MW to 3 MW. This action eased the load on the grid, providing at least 15 additional minutes of response time.

## Energy Management

Molicel's strategies for energy management focus on energy creation and storage, actively promoting the use of renewable energy and energy-saving measures.



**At the E-One Moli Energy Corp.,  
a 496.62 kW solar power system  
was installed**

**Achieving a renewable energy usage  
proportion of 7% in 2023.**

To increase the proportion of renewable energy usage to 13.9%, we plan to switch air conditioner dryers to steam heating and introduce ISO 50001 Energy Management.

Furthermore, at the Molie Quantum Energy Corporation, Molicel has cooperated with Taiwan Cement Company Green Energy (TCCGE), leasing rooftop space for installing a solar power system. The total installed capacity reaches 2,076.8 kW, which is sold to Taiwan Power Company, contributing to Taiwan's energy transition.

Molicel continuously undertakes energy-saving projects, achieving an energy-saving of 5.49% at the E-One Moli Energy Corp. in 2023. In 2024, the E-One Moli Energy Corp. plans to implement ISO 50001 to strengthen energy management and advance towards environmental sustainability.

## Waste Management

To achieve the goal of waste reduction target, reducing production at the source and improving recycling rate are both important aspects. Molicel effectively classifies the types of waste, and evaluates the feasibility of recycling and reuse to reduce the total output of waste and save waste disposal fees. Furthermore, the principles of reducing incineration and landfilling are implemented to reduce GHG emissions.

Molicel's main waste comprises other mixed chemical substances and their packaging containers. In 2023, by implementing waste reduction and recycling measures, including the recycling and reduction of waste space packaging, aluminum foil bags, carbon powder reclassification, and pulp material reclassification, the waste reduction reached 41%, with total cost savings of NTD 1,609,819.

Molicel will continuously conduct recycling and reuse assessments for process-generated waste, such as the noble metal recovery from the waste slurry project, as well as waste battery recycling. The goal is to reintegrate recycled materials back into the battery manufacturing supply chain, reducing environmental impact and saving on waste disposal costs.

**The overall waste recycling rate reached 48%**  
**The target for 2024**  
**is to achieve a waste recycling**  
**rate to 50%**



**Water Resource Management**



Molicel primarily uses water in its manufacturing process for the air conditioning cooling towers. To optimize water resource management, Molicel has taken steps such as increasing the cooling towers' conductivity and controlling the calcium hardness of the cooling water.

These initiatives led to a 19.4% reduction in water usage and a 20.8% decrease in wastewater generation at the E-One Moli Energy Corp. in 2023 compared to 2022, effectively conserving water resources in the production process.



Additionally, Molicel utilizes a rainwater harvesting system, using collected rainwater for landscaping irrigation. These further decreases reliance on municipal water and promotes the effective recycling and reuse of water resources.

# Molie Quantum Energy Corporation

Certified as Gold-Level Green Building by LEED and EEWH



**In 2024, Molicel's Molie Quantum Energy Corporation achieved double gold certifications for green building from the US LEED and Taiwan EEWH.** As Taiwan's first high-end lithium battery plant to earn this recognition, it embodies the principles of low carbon, resource recycling, and sustainable development. These efforts not only promote employee health and well-being but also implement a human-centered and sustainable approach from design through to manufacturing and workplace operations. The plant emphasizes low carbon, energy efficiency, recycling, and ecological harmony, creating a high-quality environment that enhances employee well-being and health.

# LEED Hightlights



## Indoor Environmental Quality

- Monitoring of indoor air quality
- Increase air exchange rate and efficiency, improving indoor air quality
- Air washing and air quality testing for incoming and parked vehicles to ensure indoor air quality



## Sustainable base design

- Install an underground sewage treatment system to reduce stormwater runoff while maintaining environmental ecology
- Install bicycle lanes, carpool parking spaces, designated parking for eco-friendly vehicles, and electric vehicle charging stations to reduce automobile exhaust pollution
- Use high-reflectivity roofing materials or green roofs to reduce the urban heat island effect

## Energy-saving Design

- Utilize high-efficiency air system structure and variable frequency control, combined with heat recovery, improving energy efficiency by more than 42%
- Install renewable energy systems, estimated to cover 4% of annual energy consumption of the building
- Set up energy monitoring systems to monitor energy distribution for future implementation of ISO 50001



## Water-saving Design

- Choose water-saving sanitary equipment, and use rainwater 100% to replace natural water for toilet flushing
- Install water meters to monitor building water consumption, reducing water resource waste
- Choose cooling towers with low water consumption to reduce indoor water usage



## Resource Recycling and Reuse

- Recycle more than 75% of construction waste
- Use recycled and locally sourced building materials



# EEWH Green Building Highlights



## Ecology

- Utilize native plants and submerged reeds, which absorb CO<sub>2</sub>, increasing carbon fixation by 50% compared to typical buildings
- Use vertical greening and flower beds to enhance rainwater infiltration and reduce storm-water runoff, increasing infiltration by more than double compared to typical buildings



## Energy Saving

- Exterior windows use energy-saving glass, and the roof and walls use high-performance thermal insulation materials, increasing energy efficiency by more than 20% compared to typical buildings
- Use high-efficiency air conditioning systems and energy-saving equipment, saving approximately 30% or more in equipment capacity
- Combine open spaces with full natural lighting design and use energy-efficient LED lighting indoors, saving more than 30% on lighting energy consumption
- Install solar panels on the roof, saving over 1.3 million kilograms of carbon emissions annually

## Carbon Reduction

- Use high-strength concrete and reinforced concrete with added slag and fly ash to reduce cement consumption, lowering carbon emissions by more than 7% compared to standard designs
- Use lightweight partition walls for interior walls to reduce the overall weight of the building structure
- Use prefabricated building elements to reduce on-site construction, balancing and reducing environmental impact

## Indoor Environmental Quality

- Use interior materials and products with low formaldehyde and TVOC emissions, reducing these emissions by more than 15% compared to typical building materials
- Set up a 100% fresh air system in the office area to introduce outdoor fresh air and improve indoor air quality
- Use 100% airtightness-compliant exterior walls, achieving a soundproof environment and providing a comfortable acoustic environment



## Water Saving

- Use water-saving fixtures such as low-flow toilets and faucets, reducing water consumption by more than 30%
- Install a rainwater harvesting system, using 100% of the collected rainwater for landscape irrigation

