

Digital Empowerment for a Low-Carbon Future : Dual Transformation for Paper and Board Industry

Charles Chang, President
Cheng Loong Corporation
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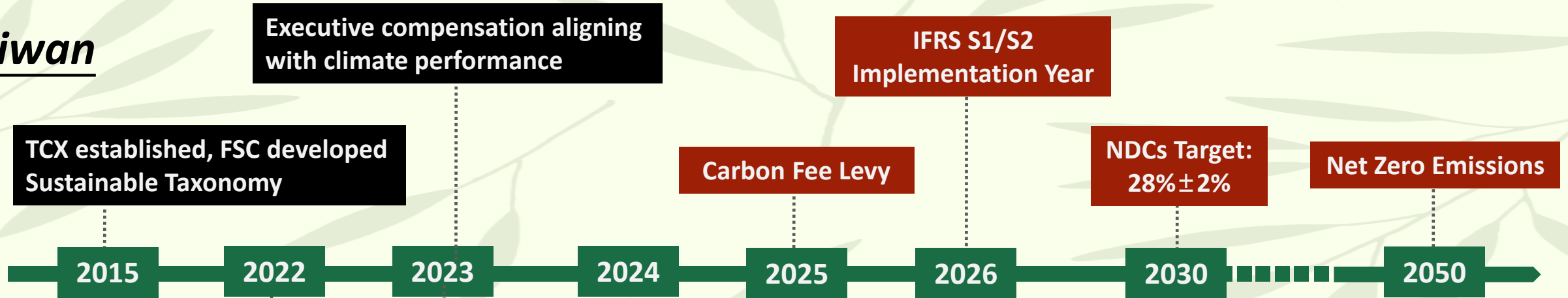
Outline

- 1 Key Challenges for Paper and Board Industry in Taiwan
- 2 CLC Strategic Initiatives
- 3 Conclusion



Carbon Risk: An Emerging Risk driven by Increased Climate Compliance Costs

Taiwan



Global

G20 claimed climate-related financial disclosure
TCFD

Financial institution established **GFANZ**

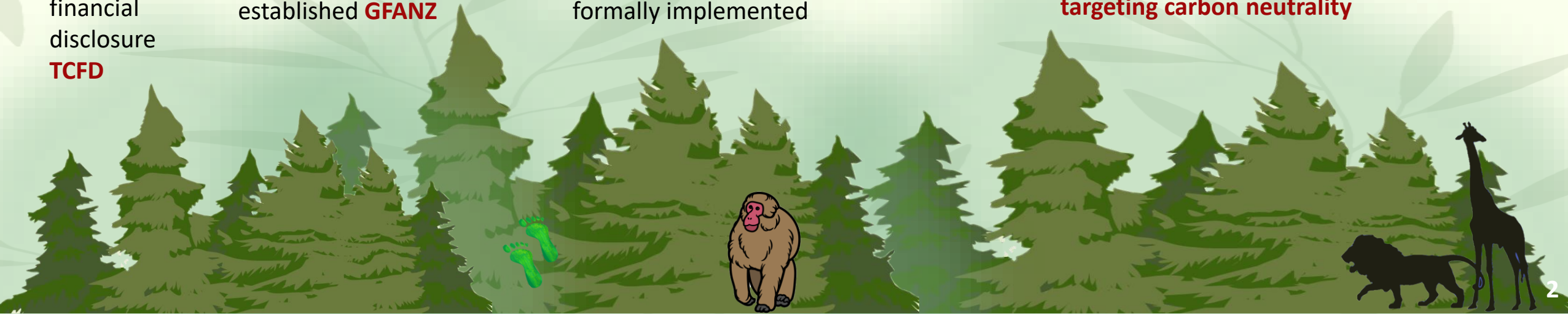
US proposed 4 climate-related legislative drafts

IFRS S1/S2 standards formally implemented

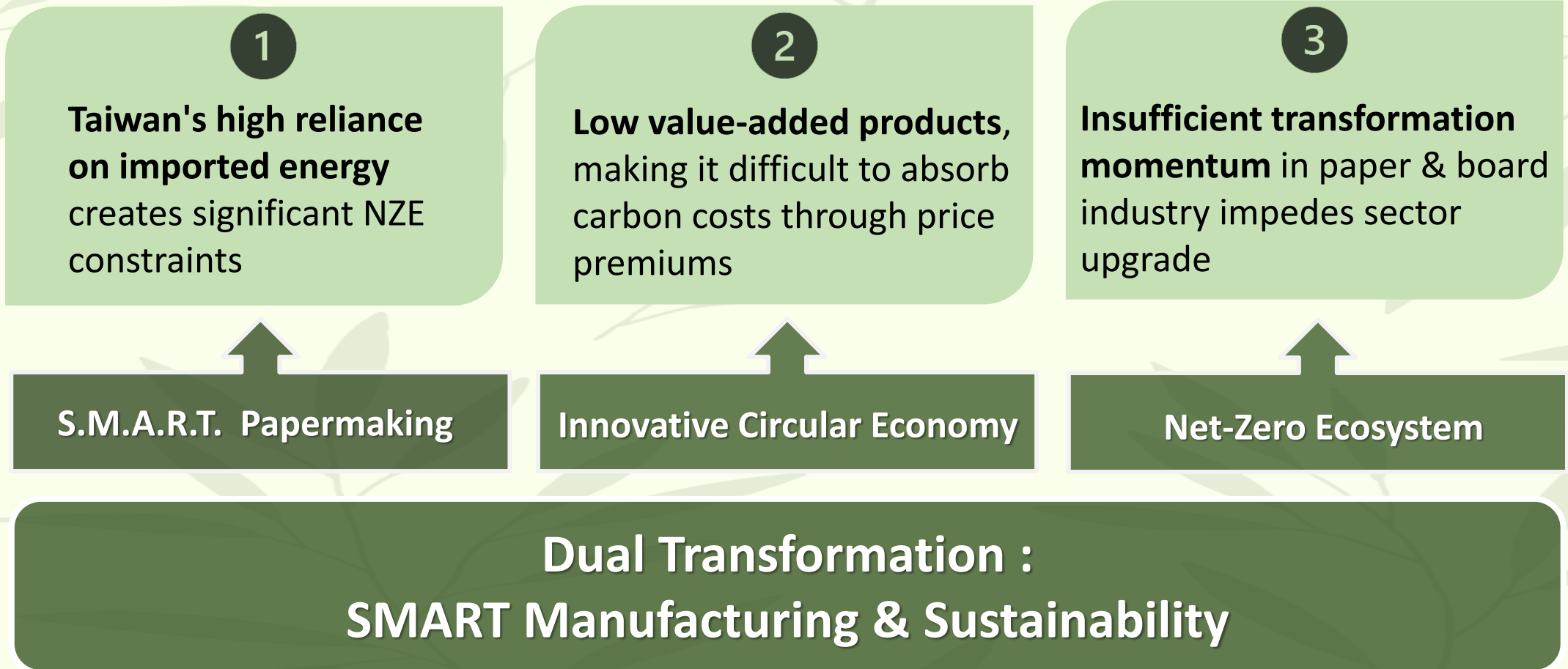
EU CBAM Carbon Border Tax officially implemented

International brands targeting carbon neutrality

130+ Countries, 929 companies from Forbes TOP 2000



3 Major Carbon Risk Issues for Taiwan's Paper and Board Industry



Strategy 1 : S.M.A.R.T. Papermaking

Implement S.M.A.R.T. Papermaking Strategies to Optimize Resources Circulation

S.M.A.R.T.

Subtraction is Addition

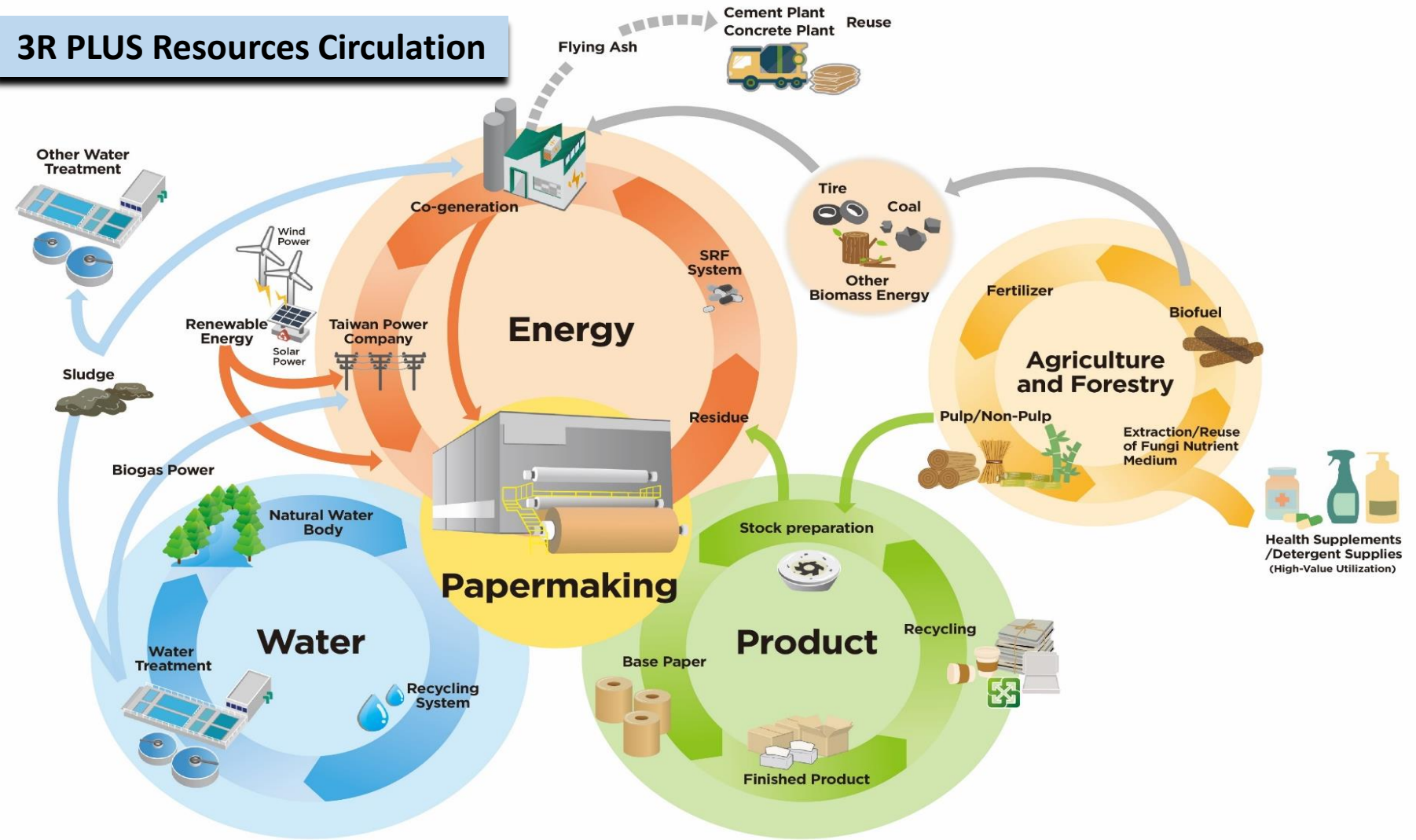
Waste to **M**aterial

AI leads in Digital Transformation

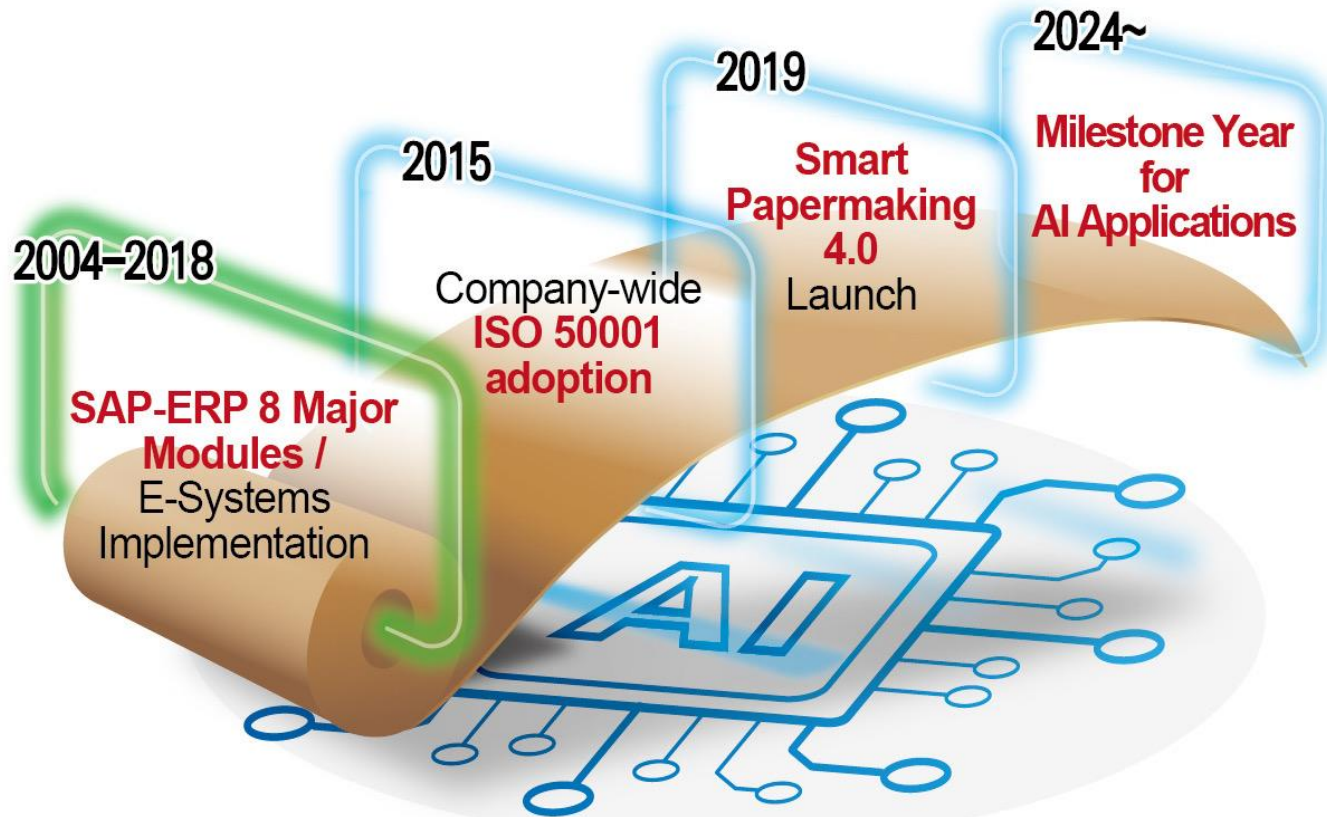
Recycling drives Circulation

Technologies innovate Manufacture

3R PLUS Resources Circulation



AI Pioneer in the Paper Industry to Accelerate Low Carbon Performance



- **First paper company in Taiwan** to implement smart production and sales integration, combining off-line intelligent inspection
- GHGs decreased by **9.38%** (Taiwan, base year: 2018)
- Carbon-abatement projects (2013-2024) have reduced electricity consumption by **127.97 GWh**, resulting in a reduction of **88,241 tCO₂e**
- Take the lead in acquiring the **ISO 27001 certification** to enhance digital resilience



Integrating Container Box Plant Systems to Enhance Best Performance

**Smart Scheduling
System**

**Smart
Corrugator**

**Intelligent Logistics
System**

- Substantial Enhancement in Unit Labor Productivity
- Improved Overall Equipment Effectiveness (OEE)
- Optimized Energy Efficiency & Carbon Reduction
- Increased Customer Service and Satisfaction

Innovative Recycling Technique for Food Paperboxes

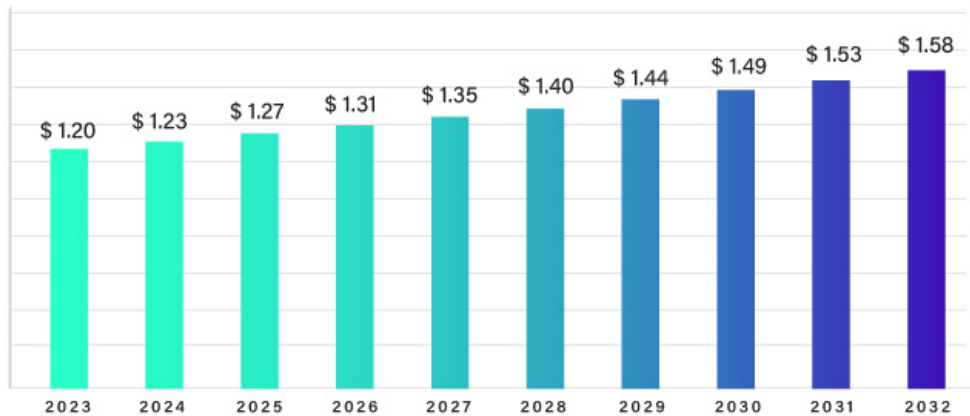
Converting Process Used Meal Box & Beverage Cup ≠ Trash !

- Replacing Virgin Pulp with Recovered Fiber
- PE film converted into SRF (Solid Recovered Fuel)
- Resolve 50% of Taiwan's food paperboxes waste (since 2023)
- **Ranks among the top in Taiwan** for food paperboxes processing, with **176k tpa**





Packaging Market Size 2023 to 2032 (USD Trillion)



Source: www.towardspackaging.com

- Global E-commerce Growth Drives Packaging Demand: **CAGR: 3.1%**
- Market Value: \$ 1.2T (2023) → \$1.58T (2032)

Data Source : [towardspackaging](http://towardspackaging.com)

Reducing Packaging Carbon Footprint through Innovative Solutions

- ✓ **Developing Green Warehouse Solutions with Diverse Paper Partitions and Plastic-Free Picking Boxes.**
- ✓ **100% Recovered Paper** with Easy Assembly and Adjustable Dimensions.
- ✓ **Building a Sustainable Logistics Ecosystem: Minimizing Plastic Dependency in Warehouse Operations.**



Plastic-Free Pick-to-box



Paper Flex Partition

Strategy 2 : Innovative Circular Economy

Maximize Wastewater-to-Energy Conversion, Developing Renewable Energy and Reducing GHGs

- Through advanced anaerobic process technology and optimized wastewater system, Tayuan Mill now generates biogas with an annual output of **13M** kWh (= the usage of **3,000** households), annual carbon reduction **>14K** tCO₂e, and recovering **6,200** tons of steams (since 2022.5)
- Initiated the biogas generation system in Houli Mill



Strategy 2 : Innovative Circular Economy

Build CFB Boiler:

Utilizing Corporate-Wide SRF & Local Wood-Based Materials as Coal Substitutes

- Launching Taiwan's most efficient CFB boiler at Chupei Mill has increased alternative fuel rate to **18.63%**, replacing **103k** tons of coal
- Annual SRF usage amount reached 168,000 tons, generating **126M** KWh of electricity (equivalent to powering 35,200 households), achieving carbon reduction of **33,595 tCO₂e**
- In line with Taiwan's Carbon Fee Levy, **Houli Mill** is proceeding with CFB boiler installation



Adapting 4 Actions to Enhance Supply Chain Resilience

ACTIONS AND OBJECTIVES

- **Low-carbon Upgrade**

Optimizing the local recovered paper supply chain

- **Digital Management**

Deepen collaboration with key suppliers

- **Incentivize Co-creation**

Leading the 1+N Carbon Management Alliance

- **Talent Empowerment**

Establishing an industry co-learning talent pool

ACHIEVEMENTS

- Guide 14 recovered paper suppliers to upgrade
- Reach 56 waste food paperboxes suppliers
- 5 supplier conferences
- Complete on-site evaluations for 81% of key suppliers (totaling 251)
- Lead the industry with a "Climate Survey" for 44 key tier-1 suppliers

Strategy 3 : Net Zero Eco-system

Guide Local Recyclers to Improve the Quality of Domestic Recovered Paper through Training and Adopting Smart Technology – **Reduce Waste from the Original Source by nearly 40%**

On-site Guidance



(Since 2018)

Provided on-site guidance to 167 local recyclers
to promote proper sorting and classification

On-line Moisture Inspection



Tayuan Mill, Houli Mill

Introduce Smart Moisture Analyzer
Enhance the accuracy of recycled paper inspection

Profit Creation



- Reduced rejects by **nearly 40%** (vs 2017)
- Supported **14** recyclers in business transformation
- Recycled paperbox suppliers have reached > 56 companies

Strategy 3 : Net Zero Eco-system

Collaborating with 20 Partners to Establish the “CLC Carbon Neutrality Alliance” to Accelerate Low-Carbon Transition (2023)

- Carbon Reduction: **11,969** tCO₂e/year
- Cost Savings: **\$1.72** million/year
- Total Investment: **\$7.83** million
 - ☑ Taiwan's 1st carbon footprint assessment for industrial paper
 - ☑ Completed GHG inventory / energy analysis for 21 companies, cultivating 40 carbon management talents
 - ☑ Supported 3 companies in ISO 14064-1 organizational carbon inventory
 - ☑ Guided 4 companies in ISO 14067 product carbon footprint inventory



Strategy 3 : Net Zero Eco-system

Partnering with Government : Launch of the “CLC iPAS Supply Chain Program” to Cultivate Talents in Cybersecurity and Smart Manufacturing (2024)

- Goal :
Enhance smart manufacturing expertise across the industry and strengthen cybersecurity defense capabilities



- Action :
 - ☑ Connected **10** key supply chain partners
 - ☑ Cultivated **69** professionals with Ministry of Economic Affairs iPAS certification, specializing in ICS security and smart manufacturing





Conclusions

1

Transform Climate Compliance into Strategic Advantages

2

Maximize Value by Uniting Circular Economy and Smart Manufacturing

3

Build Collaborative Ecosystems Across the Value Chain for Long-Term Sustainability