資源循環績優廠物

成果手冊電子書

THE BEST PRACTICES OF RESOURCES CYCLE

環境友善化・資源循環的實踐者

FRIENDLY OUR EARTH / 65 ENVIRONMENTAL COMPANIES

有機生物資源 / 有機化學資源 / 金屬資源 / 非金屬殘渣資源 / 循環租賃模式

中華民國 111 年 12月

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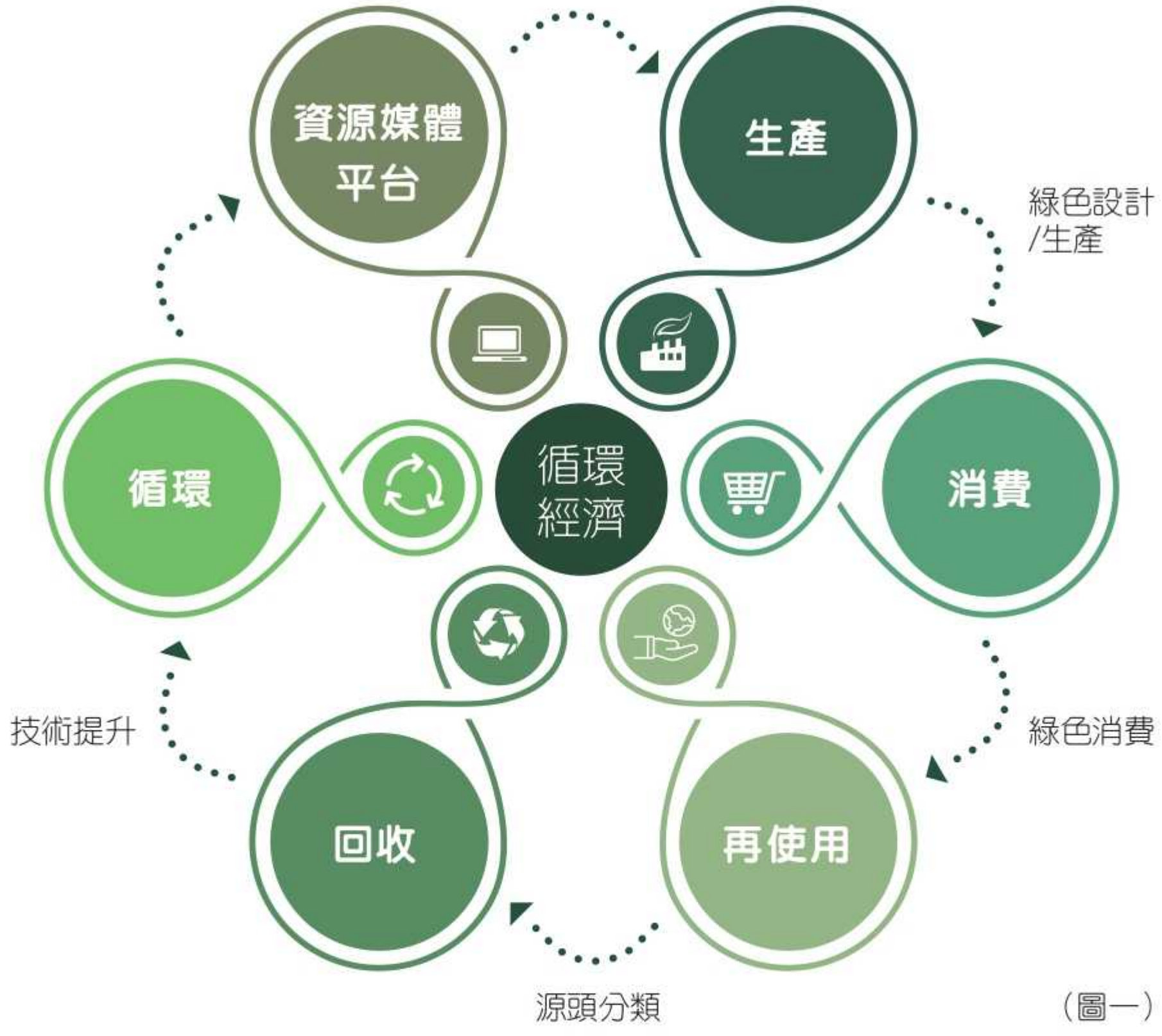
序言 I

面對地球資源耗竭，各國逐漸以循環經濟作為主要施政方向，歐盟、日、韓等國近年均積極提出資源循環相關行動方案及計畫，據以實現未來10年資源循環願景。2020年歐盟委員會即提出《新循環經濟行動方案》，為實現2050年歐洲國家達到環境保護及經濟成長之目標，以建立循環經濟之戰略框架：不產生廢棄物、減少浪費、以及提高回收材料的品質用於歐盟市場，使歐盟國家對於廢棄物承擔相對責任。日本以建構「循環型社會」為目標，擴大廢棄物資源回收量，減少中間處理成本以提升生產力，並協助資源循環產業海外合作發展。

台灣面臨自然資源不足、廢棄物缺乏去化管道等難題，如何提高資源效率，並達到有效應用，推動循環經濟，更是蔡總統「五加二產業創新」政策之一。因此，環保署訂定「資源回收再利用推動計畫」，強化整體推動循環經濟政策力道，並於2021年7月成立「資源循環辦公室」，從全面盤點政策法規、整合行政資源等，以「資源循環最大化，廢棄處理最小化」為目標，穩健邁向資源全循環。行政院並通過「循環經濟推動方案」，要創造經濟與環保雙贏，達成2050年零廢棄、零污染的終極目標。國內產業更自主成立五大循環經濟聯盟、簽署綠色協議，交流分享如何進行產業轉型經驗，創造新的產業鏈與價值，除了減少廢棄物處理的問題，同時也降低自然資源的開採與使用，最終希望產業能一同履行對環境永續的責任，邁向綠色復甦，臺灣也能成為亞洲循環經濟熱點國家。

為鼓勵國內積極推動資源再利用及循環經濟之企業，環保署自2018年起辦理資源循環/循環經濟績優企業遴選活動，期透過遴選建立模範並帶動民間製造業、服務業等產生循環型鏈結，減少線性生產或服務所造成資源的損失，創造新經濟價值。本手冊即彙整過去獲選的65家績優企業案例，以精簡且系統化架構，整理績優企業推動循環經濟作法與效益，供國內外各界參考，希冀藉由績優案例，鼓勵並引導同產業其他業者提升技術或推廣使用再生物料，並期許已獲獎業者能持續以系統性的規劃設計，將工業生產過程中排放的廢棄物，妥善收集、再生及循環利用，以創造循環經濟產值、產業共生、資源共用、環境共享，逐步達到資源永續循環再利用目標，給未來的臺灣一個有效運用資源且減少廢棄物的全循環願景。

我國資源循環政策說明



（圖一）

環保署為節約自然資源使用，減少廢棄物產生，促進物質回收再利用，減輕環境負荷，建立資源永續利用之社會，特制定「資源回收再利用法」並設「再生資源回收再利用促進委員會」，負責審議主管機關及目的事業主管機關所擬資源循環重大政策、措施等事項與執行運作之協調、評估，並自93年分期訂定「資源回收再利用推動計畫」作為促委會之推動依據，110年起更名為「資源循環行動計畫」，期推動物質循環利用最大化、環境衝擊最小化。

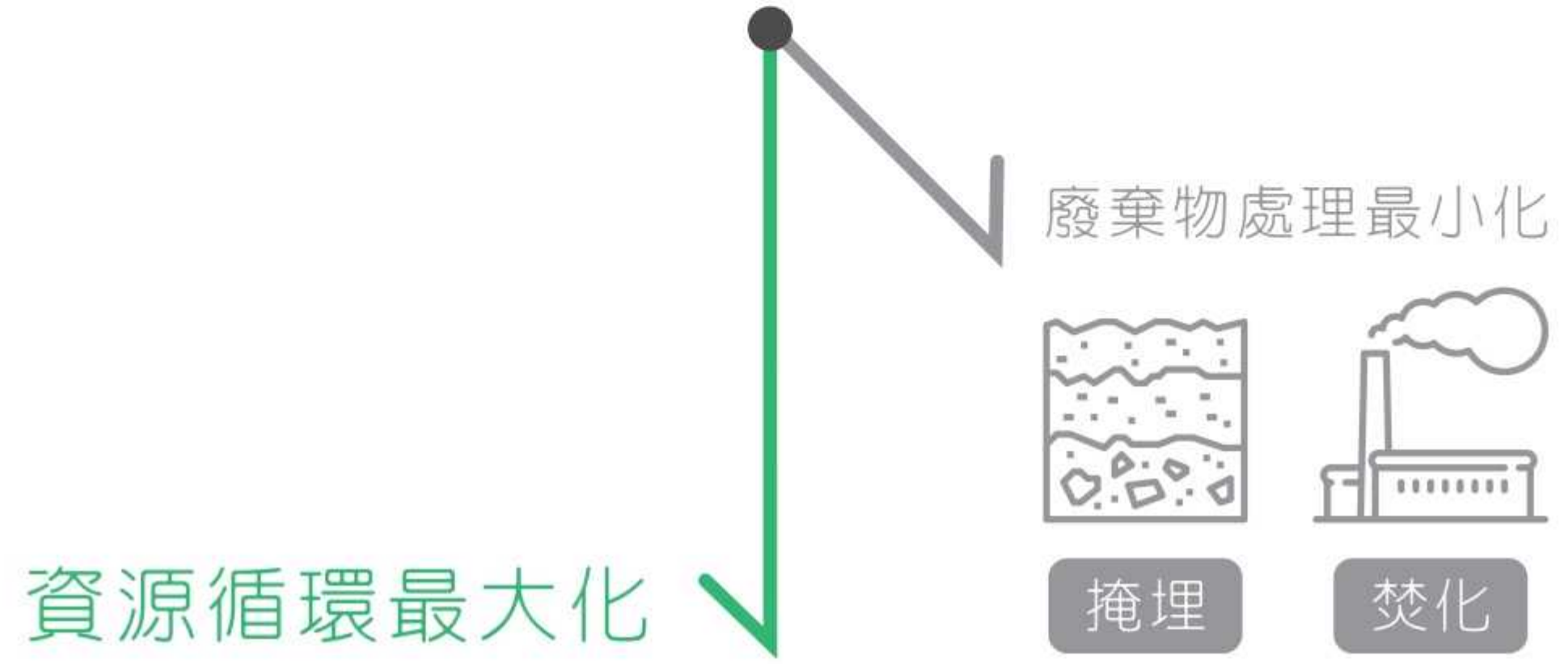
臺灣與國際同步，於2022年3月30日正式公布「臺灣2050淨零排放路徑及策略」，其中「資源循環零廢棄」為關鍵戰略之一。環保署則以「綠色設計源頭減量」、「能資源化再利用」、「暢通循環網絡」、「創新技術與制度」4大推動策略，來達成「永續消費與生產」、「提升資源使用效率」、「加值化處理廢棄物」等目標。

（圖二）

為有效加速資源循環利用，環保署成立資源循環辦公室，專責辦理整體資源循環政策規劃及管理。不同於過往廢棄物管理視角，以生物質、有機化學物質、金屬及化學品、無機再生粒料四大物料角度，擬定資源循環政策。從物質生命週期四大面向，擬定總體指標與推動策略，健全基礎法規政策計畫與資料庫，盤點關鍵議題，制定具體行動措施，整體推動策略如圖上所示。而在技術推動架構如圖下所示，包括有機生物資源、有機化學資源、非金屬殘渣資源、金屬資源循環等重點工作，並建立相關推動平台及智庫。

資料來源：環保署資源循環網

（圖三）



有機生物資源

- 禽畜糞、水肥、廚餘、下水污泥、稻草、樹枝等動
- 堆肥、厭氧發酵&甲烷發電/熱回收

有機化學資源

- 塑膠、橡膠&ASR、廢溶劑/礦油&食用油等
- 熱解/氣化/焚化&純油/轉化、油/氣/熱回收

金屬資源

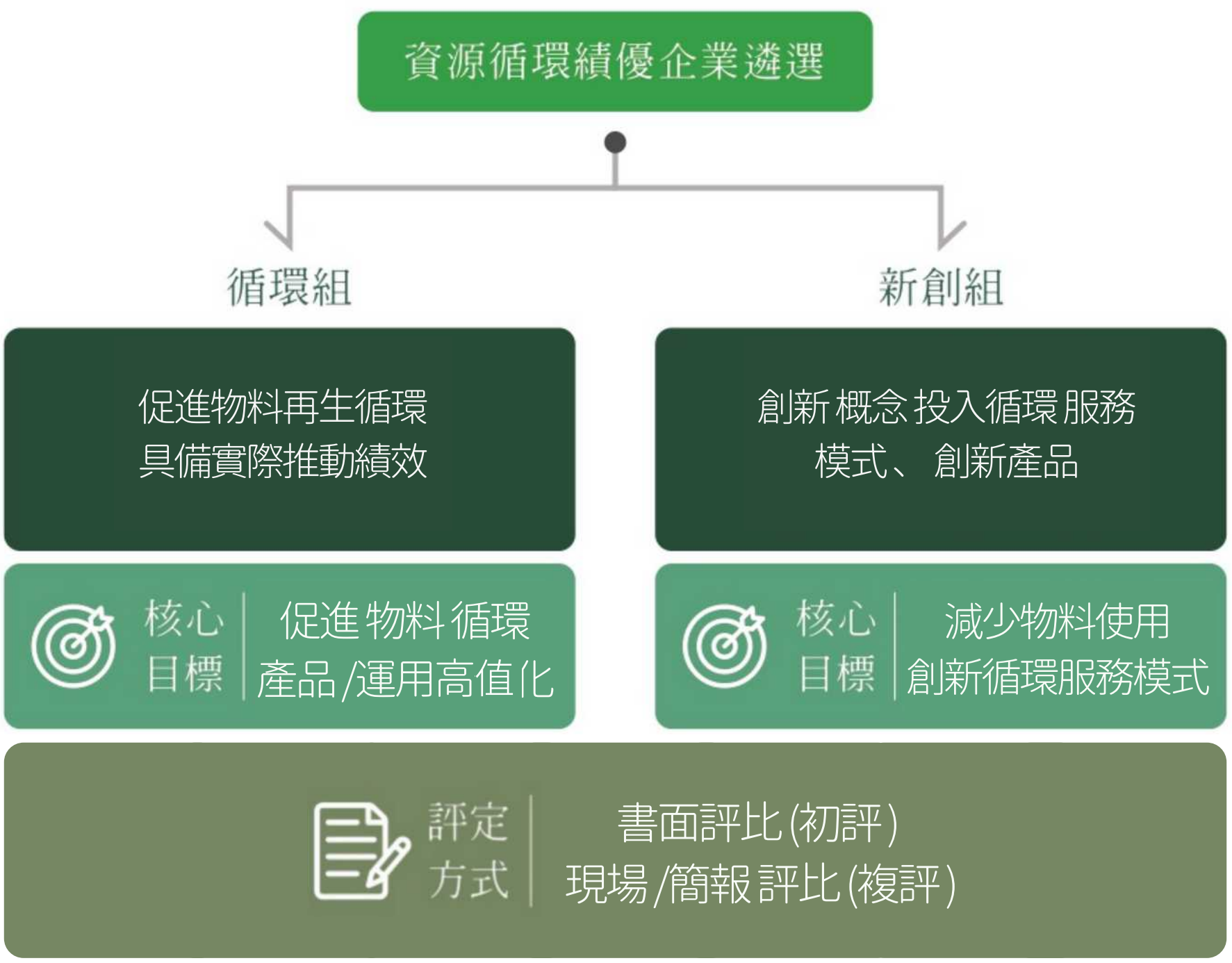
- 四機一腦/廢家電/光電板等含金屬電機電子廢料、殘渣、污泥、銅（下腳料、污泥/廢液）
- 回收銅及稀貴金屬

非金屬殘渣資源

- 高溫爐石/碴/渣，淨水污泥、煤灰、都市更新混凝土塊/磚、土石材、瀝青刨除料等
- 道路工程、都市建材

資源循環績優企業遴選｜

推動循環經濟政策，促進政府跨不同管理權責共同努力，以政策引導方式，期讓民間製造業、服務業等產生循環型鏈結，減少線性生產或服務所造成資源的損失，同時，亦期能創造新經濟價值，使環保、永續及經濟等各面向均能兼顧，環保署於107年起分年舉辦「廢棄資源循環經濟評鑑」、「循環經濟_促進再生物料循環利用評鑑」及「資源循環績優企業遴選」，期藉績優企業遴選鼓勵國內積極再生粒料之業者，並朝向探討建立再生物料品質規範及管理方式，同時亦鼓勵處於萌芽階段之創新商業服務模式或尚未量產之工業，以為推廣、宣傳及發展臺灣循環經濟而努力。遴選對象及等級評定如下：



為拓展國際交流以及讓有意推動循環經濟之國內企業了解國內產業推動循環經濟的進程，促進產業間相互觀摩與成長，本手冊將彙編107年至110年近4年績優案例成果手冊電子書，以精簡且系統化架構整理績優企業推動循環經濟作法與效益，希望凝聚企業、政府與各界共識，有共同努力的目標。

循環組

已運作一年以上執行資（能）源循環之事業，對象包含：

- 產源：廢棄物產生源，具有轉費為能或自行處理及循環模式之企業。
- 中間處理/再利用機構：具有資源化產品之企業，其處理/在利用後產品質及流向管理良好。
- 再生物料使用者：將再生粒料適材適所應用，即利用再生物料產製相關再生產品之企業。

新創組

符合資源循環理念之企業(非個人)，對象包含：

- 創新的材料、產品、技術或尚未具體量產之產業。
- 循環租賃模式或服務之企業
- 延長產品壽命之企業。

其他符合上述理念且主動報名之業者。

等級評定

金質（二星）：成效卓越績優企業

銀質（一星）：優良績優企業

資源循環亮點作法

大愛感恩科技

「資源變黃金、黃金變愛心、愛心化清流、清流繞全球」

大愛感恩科技作為國內第一家環保社會企業，期許成為國際綠色環保品牌的典範，自成立以來以環保人文、愛心接力、完全回饋為三大核心價值，帶動社會愛與善的循環，並致力開發推廣環保再生材質的產品，於製程中嚴格落實環境保護，減少資源消耗，避免環境污染，展望廿一世紀的綠色潮流善盡企業的社會責任。

秉持著「與地球共生息」的環保理念，大愛感恩環保回收系統分佈全台近 7,000個環保/教育回收站，同時在大愛感恩平台上接引超過200家合作夥伴發揮專業及愛心串成愛心的綠色供應鏈/綠色產業聚落。每年約使用6千萬支的回收寶特瓶，經由物理法製作高品質大愛環保紗、大愛環保布，減少石油開發，讓子孫留下更美好的環境，再生製程與原生製程相比，再生能節省能源84%、減少碳排放77%。每年皆有研發亮點同時產品開發不僅著重在各式回收再生紡織品，現階段更積極研發回收聚酯 (PET、PP) 塑膠產品的開發，並致力開拓資源回收站裡其他跨領域的研發技術。

從 CSR、ESG到SDGs17在地化到全球化，大愛感恩科技投入永續發展目標治理與時俱進，自2013年開始自主撰寫CSR報告書，重視對利害關係人的責任，近年來因全球經濟快速發展之下，產生許多與環境議題E (Environmental)、社會責任S (Social) 以及公司治理G (Governance)相關問題。身為全球唯一綠色環保社會企業的大愛感恩科技，也將ESG標準進行內部的自我檢視鞭策，全方位提升環境社會倫理與責任，持續往永續發展邁進。

大愛感恩科技除了致力於綠色研發設計，建立全台灣獨一無二綠色供應鏈的回收系統外，同時注重環境教育與社會關懷，以地球唯一、環境正義、世代福址、永續發展為理念，提升全民環境素養、實踐負責環境行為，創造跨世代及資源循環利用之永續台灣社會

雙循環服務模式，產品零廢循環+靈循環的教育推廣。
大愛感恩科技以環保人文、愛心接力、完全回饋為核心價值，期待成為全環保立足的典範、台灣軟實力的展現，更是代表台灣之光。每件環保心品背後都有深厚的意義與愛的溫度，重點傳達每項內涵的教育意義。

京冠生技

轉農餘為健康，京冠打造農食循環新經濟！ ONE'S TRASH, OTHER'S TREASURE

早上一杯連鎖超商的咖啡下午一杯清涼的手搖茶飲，早已是台灣的日常生活風景。但您想過這些飲品產生的咖啡渣、茶渣等餘料去了哪裡嗎?看似無用的食物殘渣，經過特殊技術處理，就可搖身一變成對健康有益的高價值產品，其實一點都不「渣」!京冠生技長期投入農食副產物高值化研發應用，發展獨特的逆境固態發酵專利技術，將茶渣、豆渣、咖啡渣等餘料再製成具精準營養特色的機能性動物飼料原料與保健產品。

楊青山董事長表示，「每一個副產物的上游原料蒐集模式都不同，未來希望成為一個生命共同體，重新洗牌，形成新的產業生態圈，創造共贏的機會。」過去講3R —Reduce（減廢）、Reuse（再利用）、Recycle（回收），已不足以應付當前的氣候與環境危機，應該再加上2R —Redefine（重新定義）、Redesign（重新設計），形成5R策略，「以終為始」，透過農食副產物高值化來整合循環經濟、預防醫學、綠色行動、精準營養，從台灣出發促成亞太大健康共榮圈。

減碳與獲利不是二選一，京冠串接農食減碳循環生態圈

放眼未來，京冠今年10月即將落成的農食副產物高值化碳中和示範工廠，不僅生產高附加價值、具預防醫學特色之動物飼料原料與保健產品，也是「廠中廠」系統化模組設備的前導試驗，將來得進行技術服務輸出、將高值化製程設備直接設置在上游農食品加工廠內，來縮短農餘原料轉換、保存、輸送等成本環節，既解決食品業者的廢棄物回收問題，也降低其產品的碳排放足跡。

京冠規劃中的「多元生態綠色工廠」，將更加乘碳中和示範工廠的循環經濟效益，預計每年可處理高達5萬噸的農食副產物、回收生產136萬度綠電與3.5萬噸蒸餾水，不只可自用、也可回饋給合作的上游食品與下游畜牧業者，更能形成碳權生態圈，協助上、下游廠商共享碳足跡資訊、打造綠色生產品牌形象，進而帶動國內農食產業鏈的淨零碳排經濟新模式。

面對食安問題與環境危機，越來越多消費者將環保意識融入日常消費行為之中，未來對低碳產品的需求也會更普及，而當更多在地業者願意成為綠色供應鏈的一員，台灣將更快達成「資源循環零廢棄」的淨零碳排目標。

楊董事長強調，京冠自2021年開始接受經濟部工業局產品環境足跡輔導，自我檢視飼料產品製程的環境衝擊指標並帶動整體供應鏈盤查，也持續投資綠趨勢科技研發能量，期許建立系統化模組設備的「廠中廠」高值化商業模式，為台灣農業淨零的臨門一腳做出貢獻，並引導整廠輸出模式打入國際舞台，進而打造循環經濟Taiwan can lead的綠色生產品牌。

遠東新世紀

隨著淨零碳排的時代到來，將石油原料轉向使用回收、生質、二氧化碳等新碳源材料已是全球趨勢，各企業和品牌商更是積極尋找各種環保減碳產品來達到永續目標。
遠東新世紀(FENC)是全球第二大再生酯粒(rPET)供應商、rPET-長纖維紡織品的第一大生產廠商，從1988年起便開始進行寶特瓶回收的事業，長期提供可口可樂、Nike、愛迪達等品牌將廢棄寶特瓶用物理回收方式再製成瓶子或纖維銷售國內外。在全球淨零碳排趨勢下，企業以提高使用回收產品的比例為重要的策略方向，要求更多rPET的供應來源，FENC除擴充rPET回收產能外，更投入從廢棄紡織品的rPET化學回收技術開發。

在不改變台灣織物回收商業模式的前提下，我們將原本要焚化的廢舊織物進行分類、分級，將PET含量高的織物透過聚酯「化學法」回收處理技術(TopGreen® ChemCycle Process)，還原為聚酯的原料(rTPA與rEG)，再製成高附加價值的機能性聚酯紡織品，完成工業循的環經濟理念，為具有減碳、綠能、環保之全球趨勢新創產品。ChemCycle Process於2020年獲得環保署『循環經濟_促進再生物料循環利用績優企業遴選』最高等級的績優二星級及第18屆國家新創獎獎項的肯定。

遠東新世紀廢舊紡織品化學回收循環製程

除提高使用回收產品的比例外，更希望能從原料減碳的技術著手，FENC持續不斷投入生質原料的研發與創新，減少石化原料的耗用，使用30%生質原料的Bio-PET早已開始投入聚酯包材及纖維產品的生產，2014年更與世界知名飲料大廠可口可樂合作，試產以植物為原料製成的100%生質寶特瓶， 2016年與美國知名公司Virent合作，成功製造出全球首批100%生質聚酯衣，更獲得第13屆國家新創獎獎項的肯定。

另一原料減碳技術，2019年FENC 與美國生技朗澤公司(LanzaTech)合作，以工業廢氣為原料，經由特殊微生物發酵技術的生物法產製乙醇，再製成乙二醇(waste-gas-based-MEG)，FENC將該乙二醇導入聚對苯二甲酸乙二酯(PET)的聚酯合成生產線，產出與一般PET相同性能及品質的Bio3-PET纖維。

2021年更與國際知名瑜珈服品牌廠lululemon合作，成功產出全球第一件利用煉鋼廠廢氣製成的衣服，並在今年的ISPO中，獲得最高榮譽的Best Product!

FENC的Bio3-PET，不只減碳，更達到「固碳」的目標，同時也降低對石化原料的使用依賴，並可減少約30%的GHG溫室氣體排放，最重要的，這種技術製成的PET一樣可進入現有回收PET(rPET)的回收體系，持續為淨零碳排提供更多的解決方案。

FENC具有聚酯生產及回收的豐富經驗，生產事業更涵蓋聚酯PET的所有下游應用產品，在rPET、Bio-PET的基礎下，創新技術ChemCycle Process及工業廢氣Bio3-PET的導入，更可協助企業與品牌商達成減碳的目標。

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
中華紙漿股份有限公司台東廠	廢紙回收	110 ★★ 107 ★	
正隆股份有限公司	廢紙回收	新竹廠 110 ★★ 大園廠 109/107 ★★ 后里廠 107 ★★ 竹北廠 107 ★★	
永豐餘消費品實業股份有限公司清水廠	廢紙回收	110 ★★	
京冠生物科技股份有限公司	咖啡渣再利用	110 ★★	
玩艸植造股份有限公司	蒲草吸管	110 ★★	
臺灣菸酒股份有限公司竹南啤酒廠	麥粕/廢棄玻璃瓶再利用	110 ★★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
那顆炭國際有限公司	廢棄菱角殼再利用	109 ★★	
榮成紙業股份有限公司	廢紙回收	109 ★★	
台灣糖業股份有限公司	廢棄牡蠣殼再利用	110 ★	
瑩迪企業股份有限公司	廢木資材再利用	110 ★	
環意有限公司	家庭DIY堆肥機	110 ★	
同益企業股份有限公司	羽毛回收	107 ★	

有機生物資源

中華紙漿股份有限公司
台東廠

公司簡介

中華紙漿股份有限公司台東廠成立於民國58年，主要營業項目：銅西、單銅T、白銅、灰銅、灰紙板。

製程說明及推動循環經濟做法

主要以回收紙及紙容器散漿後作為漿紙原料，供抄紙機再製為文化用紙、工業用紙及包裝用紙。散漿過程會產出製程排放水、塑膠淋膜及漿紙餘泥，首先排放水進入排放水處理系統，以物理及生物處理方法分解污染物，以符合放流水標準方能排放，接著塑膠淋膜經由破碎及造粒後作為再生燃料，並與污泥混合，投入汽電共生鍋爐進行再利用。

塑膠淋膜不僅可取代高污染物燃料煤炭使用，漿紙污泥更能利用其含氧化鈣成份減少硫氧化物排放，最後產出蒸汽及電回歸供廠內抄紙製程使用，除減少自然資源消耗外也能達到固體製程餘料自行處理、減量及資源化訴求，完成循環經濟的理念。

推動循環經濟效益及未來展望

持續維持回收紙處理量，並配合政府推廣回收紙及紙容器分類處理政策，逐步增加廢紙容器之處理量，提高廢紙容器回收率，落實資源分類初衷並減少一般垃圾之產出，達到永續經營之目標。

Company Introduction

Chung Hwa Pulp Corporation's Taitung Plant was founded in 1969. The main products include C2S art board, C1S ivory board, coated duplex board with white back, coated duplex board with grey back, and chipboard.

Product Introduction & Circular Economy Practices

CHP Corporation Taitung Plant uses recovered paper and corrugated paperboard containers as its raw materials for pulp for the production of specialty paper, industrial paper and paperboard, using the calendering process to re-form the products. During the pulping process, wastewater, plastic chips and clay are produced and discharged into a water treatment plant. In order for the water quality to conform to regulation standards, it undergoes a physical and biological treatment process. After being crushed and granulated, the plastic chips can be regenerated to produce renewable fuel; this renewable fuel can be used in fluidized bed combustion (FBC) boilers and mixed with the wastewater sludge into the cogeneration boiler for reuse. Not only can the reprocessed plastic chips replace high-polluting coal, the waste water sludge can also reduce sulfur oxide emissions, on account of the calcium oxide (CaO) present in the sludge. Finally, the boiler steam and electricity can be utilized in the paper manufacturing process. This is a prime example of a circular economy, through which we can reduce both the consumption of natural resources and solid waste.

Efficiency of Circular Economy & Company Vision

In order to meet the goals of sustainable development, we are committed to:
(1)Maintaining the amount of recovered paper we process.
(2)Cooperating with government policy concerning the classification of recovered paper and corrugated containers.
(3)Gradually increasing the amount of corrugated paperboard containers we receive, thus improving the recovery rate of containers .
(4)Implementing waste classification to reduce other sources of trash.

有機生物資源

正隆股份有限公司

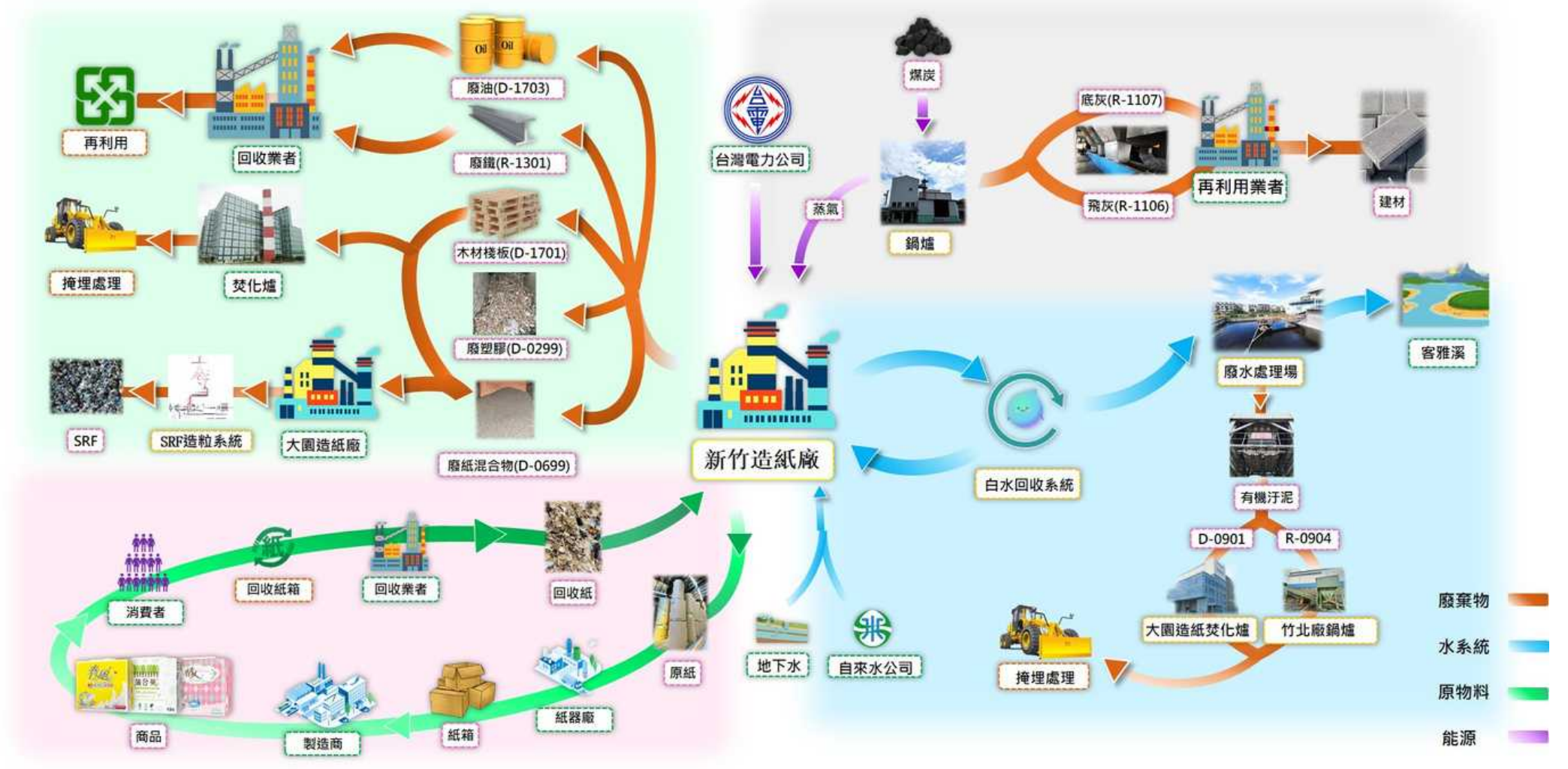
「紙」和生活密不可分，是民生必需品，也是工業和商業包裝不可或缺的一環。「珍惜資源、創造二次森林」，正隆於1959年成立以來，即善用紙材循環特性，透過綠色造紙製程將回收紙材再生成各式紙製品。追求零廢棄願景，正隆致力於製程餘料資源化、拓展替代燃料，並跨產業合作發展綠色能源，積極跨足轉型為二十一世紀低碳綠能新紙業。

秉持產品生命週期思維，實踐產品、能源和水資源三大循環。產品循環以「原料—產品—原料」形成搖籃到搖籃的綠色循環，每年使用近180萬公噸回收紙。能源循環以持續投資汽電共生、發展風力光電、沼氣發電，推動製程餘料資源化，將漿紙污泥、廢紙混合物等再利用為輔助燃料，逐步提高廢棄物資源化達85%。水資源循環以PDCA管理、跨廠交流，落實製程節水與用水分級管理，提升生產用水重複利用效率，每年節水1%為目標，安全合規的放流水提供溪流、濕地等穩定水源，孕育生物多樣性，固碳延緩溫室效應。

正隆以「低碳綠能新紙業」為目標，持續發展更多創新循環經濟提升能資源整合效益，包含於大園廠增設回收漿設備、高雄燕巢建置台灣第一座智能綠色紙器包裝工廠、竹北廠無燃煤生質能熱電系統、發展智慧造紙落實綠色生產，成為亞洲循環經濟典範企業。

正隆 CHENG LOONG

新竹廠　能資循環系統



CLC: A New Low-Carbon, Green Energy Paper Company

Paper, an item essential to our daily lives, is also an indispensable part of industrial and commercial packaging.

“Cherish Resources and Create a Secondary Forest.” Since the establishment of CLC in 1959, we have made good use of paper's suitability for recycling to create various products made out of recovered paper using green paper production. To fulfil the vision of zero waste, CLC is fully committed to recycling leftover unused material, promoting alternative fuels, and developing green energy via cross-industry collaboration, in order to actively transform ourselves into a new low-carbon, green energy paper industry for the 21st century.

The product, energy, and water resource recycling models are based on the principles of the product life cycle. The product recycling model of “material-product-material” is essentially a cradle-to-cradle green cycle, improving both the quality and quantity of the recovered paper and increasing the sources of raw materials. CLC processes almost 1.8 million tonnes of recovered paper every year. With regard to energy recycling, we are continuously investing in cogeneration, developing wind & solar energy and biogas power generation, and promoting the recycling of leftover unused material. Pulp sludge and mixed waste paper are reused as auxiliary fuel, enabling us to achieve a waste-to-resource rate of 85%. In terms of water recycling, we are implementing the following measures to improve the efficiency of reuse of process water: PDCA management; cross-plant communication and exchange of experience; conservation of process water; and management of water consumption at various levels. Our annual target for water conservation is set at 1%. The release of water is safe and compliant with regulatory requirements; this means that clean water can be discharged into rivers and wetlands, nurturing biodiversity, enhancing carbon fixation and mitigating the greenhouse effect.

CLC is applying the principles of a circular economy to achieve the goal of becoming a “New Low-Carbon, Green Energy Paper Manufacturer.” It is the aim of our company to set the benchmark for circular economies in Asia; with this in mind, our recent investments have included installing a cutting-edge recovered pulp facility, establishing Taiwan’s first smart green box plant, and introducing the most efficient bioenergy system in Taiwan; we will also continue to develop smart production to realize our goal of green, low-carbon production.

有機生物資源

永豐餘消費品實業股份有限公司

清水廠

公司簡介

造紙起家之永豐餘，於1946年，秉著專業的造紙技術，踏入家庭用紙市場，並在1987年成立家品事業部，致力於家庭用紙的經營。

積極擴大事業版圖，於2004年2月併購P&G清水廠，增加《柔情》、《得意》品牌，成為台灣最大的家庭用紙廠商，奠定台灣市場領導地位。

為達成生產、銷售垂直整合，更於2007年10月1日合併永豐餘造紙-楊梅廠、清水廠，『永豐餘消費品實業(股)公司』正式獨立，期許成為大中華地區全方位領導性消費品公司。

循環經濟

永豐餘消費品實業貫徹母公司「循環經濟」的理念，致力在產品發展和環境生態間取得最佳利基點。在環境保護上著眼於提高資源的使用率，降低對水資源與能源的倚賴，提升製程效益，推動再生能源的使用，努力降減碳排。

1.原物料回收再利用：將剩餘　(SRF)和漿紙餘泥，減少溫室氣的製程餘料製成替代燃料，達到減少化石燃料使用及廢棄物減量之雙重目的。工廠使用的紙漿、製程品之殘捲、裁邊紙，全數皆能回到製程再利用。

2貫徹零排放精神：推動鍋爐SRF混燒計畫，並可混燒紙漿餘泥及SRF，工廠的漿紙餘泥已經可以完全廠內自行合法處理，無須委外清運。

3廢棄物分類、回收再利用：廠內生產與製造設備維修產生之資源-如廢金屬、廢膠膜、廢紙張紙版等，工廠皆進行分類儲放，委由合法資源廠家回收並出售。

推動資源循環效益及未來展望

溫室氣體排放減量：兩廠生產製程所需能源以用電/蒸汽為主，透過混燒固體回收燃料

溫室氣體排放盤查 CO_2 -e噸/年	楊梅廠	清水廠
2017	50,459.50	77,599.86
2018	48,312.08	71,194.49
2019	42,379.31	66,064.59

體排放量。由溫室氣體年度排放盤查如下，可看出近年整體能源使用趨勢逐年降低。

節能減碳：本公司積極推動節能相關方案，運用ISO 50001能源管理系統搭配YES(永豐餘卓越系統)管理制度，不斷尋找節能的機會點，包括更換LED燈具、高效率馬達等，並透過製程的改善及每年編列預算淘汰老舊泵浦、低效馬達，同時引進先進進口高效泵浦與新式磨漿設備，以降低生產用電與燃料。本公司於2015年開始設定每年減量1%之節能目標，期能達到節能減碳的目標。發展綠能：本公司兩廠屋頂已全面裝置太陽能發電設施，每年可發電生產綠電340.1萬度/年，並可降減碳排放1,710噸/年。

About Us

YFY began operations as a paper mill and entered the consumer paper product market with professional paper-making technology in 1946. We established the Consumer Products Division in 1987 and we are committed to producing consumer paper products.

We actively expanded our business by merging Chung Shui mill of Procter & Gamble Home Products Co., Ltd. in February 2004, and adding two brands —"Tender" and "Delight" . We thus became the largest consumer paper product manufacturing plant in Taiwan and consolidated our leading position in market in Taiwan.

To achieve vertical integration of production and sales, we merged Yang Mei mill and Chung Shui mill of Yuen Foong Yu Paper Manufacturing on October 1, 2007 and created the independent ‘'YFY Consumer Products Co., Ltd.'' with the aim of becoming a comprehensive leader of consumer products in Greater China

Circular Economy

Yuen Foong Yu Consumer Products Company Limited implements group company's concept of "circular economy" and strives to achieve the best niche between product development and environmental ecology. In terms of environmental protection, company focuses on increasing the utilization rate of resources, reducing dependence on water and energy, improving process efficiency, utilizing the renewable energy, and striving to reduce carbon emissions.

1. Recycling the raw materials：The surplus materials of the process are made into alternative fuels for the dual purpose of reducing fossil fuel use and waste reduction. The pulp in used, scrap rolls of process products, and trimmed paper all can be returned to the process for reuse.

2. Implement the spirit of zero emissions：To promote the boiler with SRF mixed burning plan, that can also burn the pulp sludge and SRF together. The pulp sludge from the factory can be legally processed without outsourcing to clean up.

3. Recycling and reuse classified wastes：The resources generated in the factory such as scrap metal, waste film, waste paper and paper plates, etc., are classified storage and are sold to legal resource treatment.

Promoting the Circular Economy and Future Prospects

Reduction of GHG emissions：The energy sources used for the production process of the two plants consist mainly of electricity/steam. They mix solid recovered fuel (SRF) and pulp sludge for incineration to reduce GHG emissions. The annual GHG inventory results shown below demonstrate how the overall energy consumption has declined in recent years. Energy conservation and carbon reduction：

The Company actively promotes energy conservation plans. We use the ISO 50001 Energy Management System and the YFY Excellence System (YES) to continue to explore opportunities for energy conservation including shifting to LED lights and high-efficiency motors, implementing process improvements, and allocating budget to replace old pumps and low-efficiency motors. We also introduce advanced imported high-performance pumps and new milling equipment to reduce electricity and fuel consumption in production. In 2015, the Company set an energy conservation target for reducing energy consumption by 1% each year with the aim of attaining energy conservation and carbon emissions reduction.

Green energy development：The Company has installed solar power generation facilities on the rooftops of both plants. They generate 3.401 million kWh/year and reduce carbon emissions by 1,710 tons/year.

GHG inventory Co_2 -e tons/year	Yang Mei mill	Ching Shui mill
2017	50,459.50	77,599.86
2018	48,312.08	71,194.49
2019	42,379.31	66,064.59

有機生物資源

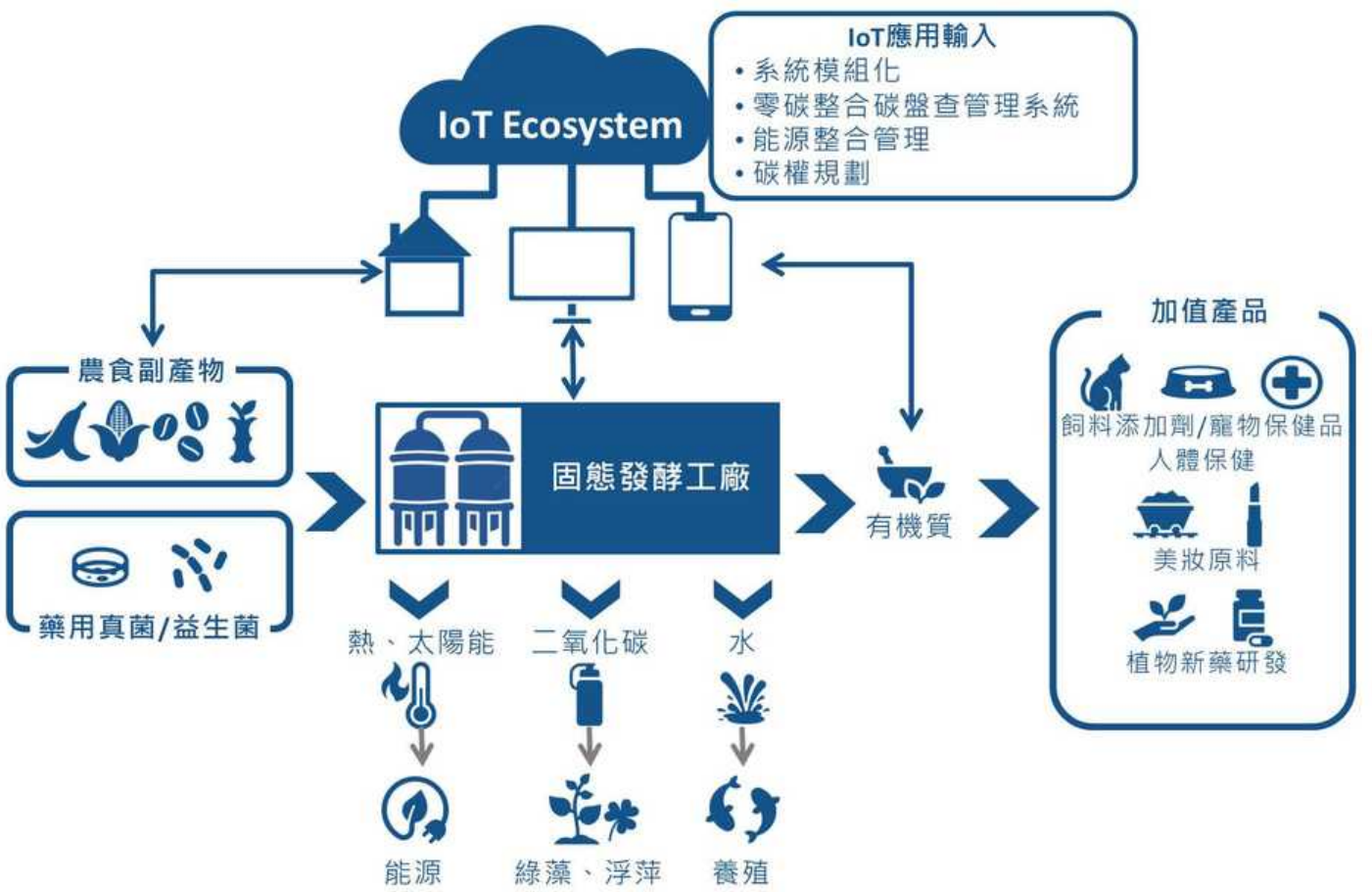
京冠生物科技股份有限公司

IDEA for better life !
KGbiO
King's Ground Biotech Co., Ltd.

21年來，京冠生技投入農餘材料循環高值化、健康產業品牌化，引領台灣智慧農業與再生經濟發展。結合專利微生物逆境發酵技術、生理和營養學的理論，我們善用不同菌種的特性來進行農食副產物固態發酵，藉由產生具生物活性代謝成分的方式，將低營養、低價值的農業餘料加值為具機能性與功能性的特色產品。

京冠生技目前著眼以下農食副產物高值化研發：(1) 綠豆殼 – 將其活性成分運用在預防醫學與取代抗生素上，已經實驗證實能有效促進糖尿病傷口修復、阻斷流感病毒複製和感染，此一創新技術具高度市場應用性；(2) 黃豆渣 – 利用複合式菌種將其再製為富含魚粉風味的小分子蛋白，形成功能性動物飼料蛋白質原料；(3) 咖啡渣 – 台灣每人每年平均喝超過百杯咖啡，但一杯咖啡使用的咖啡豆，高達99.8%都成了咖啡渣，後續分解產生大量溫室氣體、甲烷，加劇地球暖化。京冠生技首創將咖啡渣進行生物激化，產生含天然抑菌功能的特有菌體代謝物質，能與消化酵素協同作用來強化經濟動物腸胃功能、有效抑制大腸桿菌和黴漿菌，更可改善飼料效率，提升離乳仔豬日增重和飼效。京冠生技為國內畜產業導入精準營養與無抗飼養應用，研發具綠經濟特色的環保飼料(Ecofeed)，大幅提升台灣畜牧產業品質與產能，因應全球糧食危機。

京冠生技也努力發展廠中廠連線生產模式，未來期能運用Design house概念將農食副產物高值化技術進行服務授權，以深度整合與串連在地農食上、下游產業，為台灣農業淨零的臨門一腳做出貢獻，並引導整廠輸出模式打入國際舞台，進而打造Taiwan can lead的循環經濟綠色生產品牌。



King's Ground Biotech has led agricultural biotechnology toward re-use and intelligent agriculture in the past 21 years. We provide material recycling with high value and further develop health brands. Our core competency is bio-collision and bio-intensification technologies. Food waste reacts with specialized microorganisms through the fermentation process and produces more active ingredients with supplement function and applied in potential health products. We know how to design optimal solid-state fermentation conditions with multiple specialized microorganisms and suitable substrates. Moreover, we are dedicated to creating high-value health products from byproducts and applied in functional feed additives and health products.

For example, we investigated the active ingredients from mung bean hull with anti-virus and anti-bacterial activity. The experimental data were shown significant efforts in promoting diabetic wound-healing and blocking influenza virus replication and infection. It has technological innovation and market applicability. Moreover, we also provided the active ingredients as small molecule proteins from soybean residue. It is featured with a unique fishmeal flavor and abundant nutrients. In addition to the above products, considering the annual growth and expansion of the global coffee market, drinking coffee every day is a pretty regular habit and life attitude. Therefore, developing the additional values of coffee ground is what we have been doing currently. Make a cup of coffee, only 0.2% of the coffee bean is used, and the remaining 99.8% goes to waste. The coffee waste produces the greenhouse gas methane, one of the primary causes of global warming.

After the solid-state fermentation process, the metabolized by-products with selected strains using used coffee grounds as raw material have natural bacteriostatic compounds with three primary functions: 1. Improve economic animals' gastrointestinal function and synergy effects with digestive enzymes and probiotics. 2. Effectively inhibit pathogenic bacteria, especially E. coli. and mycoplasma 3. Improve feed conversion ratio and increase the daily weight gain of weaned pigs.

KGbio uses the design house concept to authorize technology and develop the in-house connection production model. We hope to deeply integrate and connect with the local agricultural field and food industries. We have successfully investigated active ingredients from various food wastes to high-value functional products with biotechnology processes, such as mung bean hull, tea byproducts, soybean residue, coffee grounds, and other food byproducts. Most application is functional feed additives, and we are focused on circular economy and precision nutrition in economic animals. Our goal is to develop Ecofeed, achieve higher quality products, and significantly improve the feed industry.

有機生物資源

玩艸植造股份有限公司

玩艸植造是以天然植物作為媒材進行社會創新，致力推動餐飲減塑的社會企業。我們利用「蒲草（Lepironia）」栽種、處理、貿易與銷售，串連農民與消費者的新供需結構。將水澤雜草變成民生用途的吸管、廢耕地投入生產、在地閒置勞動力發揮生產力，蒲草吸管使用上與塑膠吸管相近，轉移成本遠低於其他替代品。我們創造的經濟價值以「環保生態」、「在地創生」與「民生利用」的形式永續循環；市場使用越多，就取代越多塑膠吸管。

玩艸植造公司於2020年中設立，但早在2018年我們便已投入研究與測試，經兩年在東南亞與台灣的研發工作，歷經募資、團隊調整與契作關係建立等前置作業，終於在2020年底正式以「玩艸植造」的品牌推出市場。除了小量銷售，我們多數時間皆在推廣與倡議資源循環。至2021年底，已有超過四百家廠商、協會機構與學校採購合作。

我們的主要循環作法，可分為生產端、加工端與消費端的串接，包含高頻率的田間管理；採收後進行清洗、裁切、通管、消毒與乾燥、包裝。無論自動化或人工，都沒有產生額外材料或不可分解的廢料，而目前在台灣，我們已種植兩百甲面積的臺灣蒲草，正欣欣向榮地生長著，總共出貨三百多萬支吸管來測試台灣市場。

此外，也有團隊同仁位於英國倫敦，負責推廣銷售、加拿大市場展開初探，談定代理商合作並已出貨。韓國、香港、中國杭州與廣東分別都有代理商洽談中。從社會風氣與商業實施的效果來看，我們對今年度達到指標型客戶的採購抱有信心。我們花了兩年研究，穩固生產端的基礎，不疾不徐，畢竟社會創新需要穩定的火侯慢熬，累積到指標性廠商採用，才會忽然彰顯巨大價值。這也是我們對未來的預期！



"Wonder Greener" is a socially innovative startup aggressively working on plastic reduction. Additionally, we are the only one social enterprise addressing this issue with thorough natural Lepironia straws in Taiwan. From 2018 on, we have been trying so hard in farms around Taiwan and Southeast Asia, and optimizing the manufacturing process. We are also trying to build up a new provide-demand structure to create the sustainable value cycle by "environmental solutions", "local revitalization" and "dailylife consumption" with botanic straws. We are growing lepironia, and simply turning which into commercial disposable straws, in order to substitute plastic ones. Our main recycling method can be divided into the series connection of production, processing and consumption. Our simple but safe process including cleaning, cutting, penetration, dehydration and sanitization. No additional material or non-decomposable waste is generated.

With the acceptable transfer cost, convenience of usage, and multiple environmental benefits, we are literally initiating a revolution of dismissing plastic straws. Practically, the more disposable straws we use, the more benevolence we contribute to the earth, and the more economical value returned to local farmers.

Our team consists of serial entrepreneurs, experienced business managers, bio and environmental experts. We are all experienced in relative domains; therefore we confidently devote ourselves to these whole green solutions to social problems. In Oct. 2020, we build up this social enterprise in the belief that "little straws trigger a sustainable value cycle."

So far, we already farmed Lepironia over 400 acres in Taiwan, and used over 3 million grass straws for market testing. Although we are so young, we already have several potential clients and partners currently in Taiwan. Besides, we have been coleborating with local agents in London and Canada to provide our straws there. We are convinced to make the value of benevolent green business with social impact globally.

有機生物資源

臺灣菸酒股份有限公司

竹南啤酒廠

臺灣菸酒股份有限公司為國內菸、酒類產銷公司，公司起源可追溯至日據時代 1901年成立之「臺灣總督府專賣局」，營運迄今已邁入第120年，除專注於本業的菸、酒、啤酒經營外，亦充份發揮企業特色實現多角化經營，拓展食品、餅乾、泡麵、化妝品、飲料等多種市場。

在追求獲利與穩健成長的同時，本公司亦高度重視環境保護並善盡社會責任，透過多元面向降低環境的負荷與減少土地資源的損耗，本公司為國內酒類產量最大生產、銷售商，為發展與環境共生的循環經濟，本公司持續辦理玻璃空瓶回收再利用，消費者於酒類產品飲用完畢後，剩餘空瓶由本公司回收，回收之空瓶經徹底清洗及高溫殺菌，作為下次充填原產品之容器，此類直接以「原型利用」方式使用，為最節省成本與兼顧環保效益之再利用方式，2020年本公司回收玻璃空瓶數量達2億5千萬餘支，創造約14.3億元的循環經濟價值。

玻璃空瓶於重複回收再充填過程中，將逐漸磨損並被生產線汰除，為補足酒類產品製造所需空瓶，本公司設置製瓶廠自行生產玻璃瓶，生產線汰除之磨損瓶，經粉碎成為回收瓶屑作為新生產玻璃瓶之原料，有效減少玻璃廢棄物數量，2020年本公司自製玻璃瓶合計達5千1百萬餘支，使用回收瓶屑合計11,491,088公斤，瓶屑占瓶支總原料比例約為60%。

本公司亦充份利用製酒過程中產生之高營養價值副產物：酵母、清酒粕、紅酒酒粕…等，含有維生素、胺基酸、膳食纖維等多種營養素，開發諸如酵母餅乾、高保溼潤膚皂、化妝品…等多元產品，力行多角化經營；麥粕、米酒糟、高粱酒糟則售予農畜產業做為有機肥料及飼料，惜食減廢的同時，亦追求環境永續。

本公司亦致力推動節能減碳實踐ESG目標，以期成為永續發展的綠色企業， 2020年溫室氣體排放約為185,716公噸二氧化碳當量，較2019年減少7,508公噸，約3.89%。同時配合政府政策推動太陽能光電建置計畫，2014年起陸續建置太陽能光電設備，至2020年累積發電量已達2,354萬度以上，太陽能發電售電收入達1.1億元以上。

Taiwan Tobacco and Liquor Corporation is a tobacco and liquor production and sales company in Taiwan. Its origins can be traced back to the Japanese occupation era. Founded as the Monopoly Bureau of the Taiwan Governor's Office in 1901, this year marks the 120th year of its establishment. While the main focus of its operations are tobacco, alcohol and beer, it has also utilized its enterprise characteristics and diversified its business to include a range of products, such as biscuits, instant noodles, other foods, cosmetics and beverages.

Whilst pursuing profits and steady growth, we also place a high value on environmental protection and are fully aware of our social responsibility. We reduce the burden imposed on the environment and minimize the consumption of natural resources using diversified approaches. As the biggest alcohol production and sales company in Taiwan, we have continued our efforts in recycling and upcycling used empty bottles to develop a circular economy system that prioritizes coexistence with the environment. We recycle used bottles after our alcohol products have been consumed. After being thoroughly rinsed and sterilized at a high temperature, these bottles become containers for the next round of alcohol produced. This way of ''utilizing materials in their original forms'' is both cost-effective and environmentally friendly. In 2020, we recycled over 250 million empty glass bottles, generating a total value of 1.43 billion dollars for the circular economy.

During the process of repeated recycling and refilling, empty glass bottles will gradually become worn out and will therefore be eliminated from the production line. To fill the gap in terms of the quantity of empty bottles needed for alcohol products, we have set up our own bottle manufacturing plant which crushes the defective bottles that have been taken from the production lines and converts them into recycled glass chips. These chips become the raw material required to make glass bottles. In doing this, we have significantly reduced the amount of waste glass. In 2020, we produced over 51 million bottles and used 11,491,088 kg of glass chips made from recycled bottles. The glass chips make up around 60% of the total raw material needed to make bottles.

In addition, we fully utilize the various by-products from the alcohol making process, such as yeast, rice wine sediment and red wine sediment, which are rich in nutrients (including vitamins, amino acids and dietary fibers). From these by-products, we have developed a diverse range of new products—yeast biscuits, moisturizing soap and other cosmetics, to name but a few. Brewer's spent grain, rice wine lees and sorghum wine lees are sold to the farming industry for use as organic fertilizers and feed. We seek to practice environmental sustainability while recognizing the value of food and minimizing waste.

We are also committed to achieving our ESG goals of saving energy, reducing carbon emissions and becoming a sustainable green enterprise. In 2020, our greenhouse gas emissions amounted to the equivalent of 185,716 tons of carbon dioxide—a reduction of 7,508 tons (3.89%) from 2019. In the meantime, we have been actively supporting the government's policy to promote photovoltaic systems and have since 2014 been building our own such systems. As of 2020, we had generated over 23.54 GWh of electricity and over 110 million dollars as revenue from sales of photovoltaic electricity.

有機生物資源

那顆炭國際有限公司

Guantian Black Gold 官田烏金

官田區是菱角的主要產地（佔國內總產量75%），然而伴隨而來每年超過上千噸的大量廢棄菱角殼，卻造成了焚化廠的困擾，也成為當地環保的頭痛議題。

為了以友善環境、永續循環的方式賦予廢棄物新生命，我們結合產業、政府、學校及社會的力量投入研究，於2019年成立那顆炭國際有限公司，並推出以循環經濟為核心之品牌—「官田烏金 Guantian Black Gold」。

為解決此問題，我們開發出專利製炭系統，將菱角殼轉變成烏金—菱殼炭。由於它具有增進土壤肥力、淨化水質、吸濕除臭等特性，我們進而研發並推出一系列菱殼炭生活用品，如菱殼炭皂、吸附包及布類產品...等等。而園區內的專利製炭系統除了產出產品外，更因配有完整「熱源再利用系統」及「太陽能電力系統」，成為循環經濟應用的典範。除了商業上的營運，我們也藉由多樣化的園區導覽遊程，推廣友善地球、循環經濟理念。

面臨台灣鄉村常見的人口外移、人口老化及環境議題，我們期望這樣的典範能夠帶來啟發並有效解決問題。目前已達成效益如下：

一、環境：固碳3公噸/年；碳排放減少11公噸/年；農業廢棄物減少585公噸/年

二、經濟：減少廢棄物處理成本$144萬/年；增加品牌收益100萬/年

三、社會：創造就業機會5個/年；社區總體營造受益1,400人次/年；復康巴士搭乘58萬人次/年

未來我們期望建構模組化的廢棄物再生模式，將此應用推展至其他農業廢棄物，為下一代創造一個更好的未來。

As the main farming area of water caltrop, Guantian district holds account for 75 percent of output in Taiwan. But thousands of metric tons of waste shells were burned or buried each year, causing significant environmental concerns. In order to solve this problem in a sustainable way, we started FanC Recycling International Ltd., put resources of industries, government, schools and communities together and launch a new brand focusing on circular economy, “Guantian Black Gold”.

To solve the environmental problem, we developed an incineration system to turn the shells into biochar, a form of charcoal often described as black gold. With multiple uses—enriching soil, purifying water and absorbing moisture, odors and volatile chemicals, black gold were developed into series of daily products such as soap, biochar pouches and clothes. In addition to its output, our manufacturing area also set an example of circular economic with its heat reusing system and solar electric system. Besides our commercial operation, we also provide guided tour to share ideas of circular economy and eco friendly way of living.

Facing significant emigration, aging and environmental problems commonly seen in rural areas of Taiwan, we try to build up a successful model of circular economy and furthermore, solve these problems. Following are our goals in three ways and have been done by now:

(1)Environment: 3 metric tons of carbon fixation per year; 11 metric tons of carbon emission reduced per year; 585 metric tons of agriculture waste reduced per year.
(2)Economic: $1,440,000 cost of waste treatment reduced per year; Create $1,000,000 profits per year
(3)Society: Create 5 employment per year; 1,400 local people benefit from community development; 580,000 passengers benefit from handicap buses.

Hopefully, with more resources and investments, we will achieve more. In the long term, we also plan to create a module recycling system for all kinds of agriculture wastes, hoping to bring a better world for our next generation.

榮成紙業
ECO PAPER & BOXES

循環科技為美好明天
Recycling for a better tomorrow

公司簡介

榮成紙業是專注於低碳造紙、綠色包裝的垂直整合服務型製造業，是長期落實「循環經濟」的示範企業，以高效率利用資源的環保高新技術，製造生活必需的紙製品；主要產品為使用回收的廢紙生產瓦楞紙箱用紙，且可依照客戶訂單需求，生產瓦楞紙板與瓦楞紙箱，為企業客戶提供客製化、具高附加價值的產品、整體包裝解決方案，以高效率、JIT(Just in time) 生產能力達成高效的接單生產模式，建構服務型的製造業。

綠色生產

重視企業與環境的共存共榮，持續投入製程改善、減少物料使用以強化永續績效，將企業核心競爭力建構於高效利用資源的技術之上，廣泛發展運用五項環保高新技術，提供人們生活所需的綠色包裝，兼顧環保永續發展與生活品質的提升。

五項環保高新技術:
1.再生纖維利用
2.節能生產
3.節水生產
4.空污、水污、減廢處理
5.空間利用

減碳計畫

使用回收廢紙製成的再生紙箱每1公斤的排碳量約0.8公斤，而使用原木漿的排碳量則為6.1公斤；以回收廢紙做為原料，比使用原木漿為原料製成的紙箱減少5.3公斤的碳排放量。榮成使用回收廢紙做為原料，提供社會大眾低碳造紙的服務，為回收紙資源、減少樹木砍伐做出貢獻。

2020年度，集團低碳造紙產量為299萬噸，回收334萬噸廢紙，為地球減碳1,550萬噸，相當於少砍4,700萬棵樹；預計2025年產量可達420萬噸，可回收470萬噸廢紙，為地球減碳2,200萬噸，相當於少砍6,600 萬棵樹。

About Us

Longchen P&P Group uses recycled waste paper as its raw material during production and is a service-oriented manufacturer featuring vertical integration of low carbon papermaking and eco-packaging. It provides corporate customers with tailored and high value-added overall product packaging solutions applying the environmentally-friendly advanced technology that makes the efficient utilization of resources possible.

Green Process

Longchen P&P builds its core competitive advantages on the five environmentally-friendly advanced technologies applying resources at high efficiency, namely 1. the advanced reclaimed fiber utilization technology, 2. the advanced energy-saving production technology, 3. the advanced water-conserving production technology, 4. the advanced air pollution, water pollution, and waste reduction treatment technology, and 5. the advanced space utilization technology. Our green production covers each process in the manufacturing of a product that begins with raw materials in order to ensure environment safety, quality, and efficiency. As of 2019, Longchen P&P already had four eco-packaging plants rated through the clean production evaluation system of the Industrial Development Bureau under the Ministry of Economic Affairs., which set the benchmark in the industrial field.

Low Carbon Papermaking

That 1 kg carton made by recycled waste paper generates approx. 0.8 kg carbon emission while the ones made by primary wood pulp generates 6.1 kg; hence, the use of recycled waste paper as raw materials can reduce 5.3 kg carbon emission than the use of primary wood pulp when making cartons.Longchen P&P uses recycled waste paper as its raw material to provide low carbon papermaking services for the public, contributing to recycling paper resources and reducing tree felling.
In 2019, it had 3.17 million tons of low carbon papermaking output and reduced carbon emissions by 16.5 million tons for the Earth, which is equivalent to 50 million trees saved from deforestation.
In 2023, it is expected that the production volume would reach 4.2 million tons and reduce carbon emissions by 22 million tons for the Earth, which is equivalent to 66 million trees saved from deforestation.

有機生物資源

台灣糖業股份有限公司

公司簡介

台糖公司創立於1946年，為臺灣砂糖產銷之標竿企業。早期以砂糖及糖業產副品產銷為主，近年積極推動多角化及轉型；以循環經濟及永續發展為核心價值，發展新農業並推動資源循環再利用，亦將有助於臺灣早日達成淨零碳排目標。

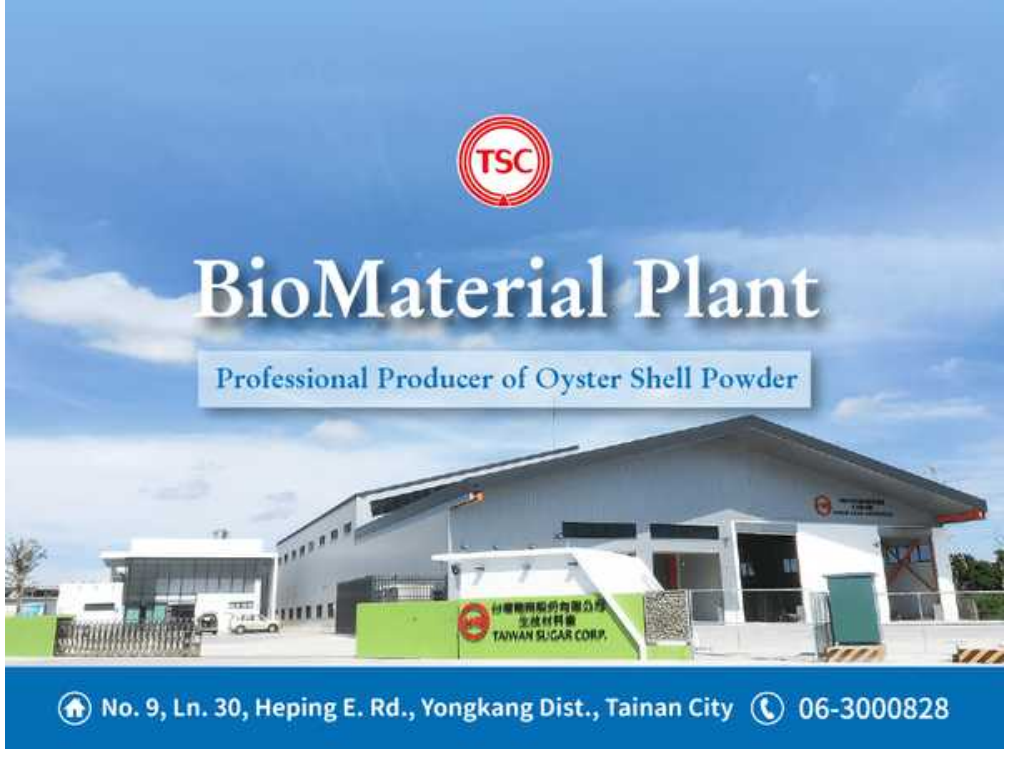
製程說明及推動循環經濟做法

傳統牡蠣加工取出蚵肉後，牡蠣殼往往遭棄置，經高溫日曬、雨淋及醱酵後產生惡臭，占空間且難以處理，不但影響環境衛生、景觀生態，更衍生相關環保問題。台糖公司以資源循環理念投資興建牡蠣殼生技材料廠，全力投入建置循環經濟低碳產業，秉持環境友善採購、節能減碳生產、廢棄物資源化之原則，將廢棄牡蠣殼轉化為碳酸鈣，提高應用價值。

台糖牡蠣殼生技材料廠每年最高可回收處理5萬公噸廢棄牡蠣殼，減輕地方政府牡蠣殼堆置場空間不足的壓力，降低因牡蠣殼隨意棄置造成的景觀影響、環境汙染、疾病傳播、惡臭問題，改善居民生活品質。本廠以廢棄牡蠣殼為原料，經煅燒、細碎後，每年最高生產4萬公噸碳酸鈣，可取代傳統挖山燒石或進口白石燒礦生產碳酸鈣，解決天然資源短缺和浪費問題，減少自然資源挖掘，並降低供應鏈碳排放。

推動循環經濟效益及未來展望

台糖公司將持續研發牡蠣殼碳酸鈣高值化應用，提升生技材料產業競爭力，初期規劃生產肥、飼料及工業用產品，後續朝高附加價值產品發展，俾提升產業技術與資源價值。



Company Introduction

As a leading sugar producer established in 1946, Taiwan Sugar Corporation (TSC) focused on the production and sales of sugar and sugar byproducts during its early days. In recent years, TSC has actively promoted diversification and business transformation. The circular economy and sustainable development concepts have been incorporated to promote new agriculture and facilitate resource recycling and upcycling thus helps Taiwan move closer to the goal of net zero emission.

Product Introduction & Circular Economy Practices

In the past, after oysters are taken out of the shells, oyster shells are often discarded without proper treatment and have caused environmental problems. TSC has established a biomaterial plant for oyster shell reuse and upcycling. Environmental friendly production methods and business models have been adopted to transform discarded oyster shells into Calcium Carbonate ($CaCO_3$) which will be used as material for higher-value products. TSC's oyster shell biomaterial plant can recycle and process 50,000 metric tons of oyster shells per year. After calcination and grinding, a maximum of 40,000 metric tons of Calcium Carbonate will be produced each year. The recycling and reuse of oyster shells solve the environmental and hygiene issues and enhance people's living standard in the seaside villages. Producing Calcium Carbonate from oyster shells is also an effective way to reduce carbon emissions and natural resource depletion when compared with production from imported limestones.

Efficiency of Circular Economy & Company Vision

TSC will continue to develop high-value applications of Calcium Carbonate produced from oyster shells and enhance competitiveness of the biomaterial industry. Fertilizer and animal feed additives and industrial products have been included in the product roadmap in the initial stage; various tests and research efforts are also being conducted to take the products to a higher position in the value chain.

有機生物資源

瑩迪企業股份有限公司

公司簡介

瑩迪企業股份有限公司成立於1990年，自創立以來秉持著「綠色環保、節能減碳」企業核心理念，致力研發有益地球環境的產品，如：生質燃料、環保包裝材料、UV膠等。
2009年，公司跨入再生能源產業，將家具下腳料回收再製成為木顆粒，以供電廠、工業鍋爐使用，盼臺灣工業轉為使用綠電並減少對重油及煤炭的依賴。為拓展臺灣民眾對生質燃料之認知，2018年創立以「友善環境」為目標的戶外用品品牌QUBE，主要販售適合煙燻燒烤的BBQ木顆粒，希望以更貼近生活的方式，讓大家認識生質能源，逐步迎向零碳永續家園之願景。

製程說明及推動循環經濟做法

臺灣每年因農業採收產生之廢棄 果木修枝條不可勝數，成為環境一大負擔、難以消化。層出不窮的露天焚燒、隨地掩埋亂象隨之而來，進而導致病媒蚊蟲孳生、空氣品質惡化等嚴重環境問題。
瑩迪企業將這些廢棄的果樹修剪枝條回收入廠，以專業造粒技術透過粉碎、高溫高壓工序，將廢棄修枝壓製成顆粒狀，產出之木顆粒可做為煙燻、燒烤用途，為其賦予嶄新生命、創造附加價值。
不僅如此，木顆粒燃燒時的二氧化碳被樹木吸收，無額外碳排放，符合碳中和形式。而燃燒後的餘灰為草木灰，能用於施肥、調節土壤結構，完美達成自然資源循環永續利用之效益。

推動循環經濟效益及未來展望

瑩迪企業目標致力於每年有效去化3,000噸以上農業廢棄物，並透過增建農村小型造粒廠，逐年提高10%~20%可去化數量、減少廢棄物處理成本，創造本國勞工就業機會。
此外，期許產出之BBQ木顆粒能取代木炭，大量應用於臺灣民生烤肉活動中， 並拓展外銷版圖藉以減少每年因烤肉產生之碳排放外，同時能提升企業獲利創造環境及經濟效益雙贏邁向永續發展之目標。
高附加價值產品發展，俾提升產業技術與資源價值。

Established in 1990, Ynidyi Enterprise Co., Ltd., adhering to the corporate core of "Green Environment, energy saving carbon", and is committed to developing the environmentally friendly products, such as biomass fuel, packaging materials, UV glue, etc.

In 2009, Ynidyi entered the renewable energy industry. We recycled the wood scraps and made them into wood pellets for power plant or industrial boiler. Hope that Taiwanese Industries can switch to the green power and reduce their reliance on heavy oil and coal.

In order to promote the awareness of biofuels to Taiwanese, in 2018, we created QUBE, an outdoor product brand with the purpose of "eco-friendly", which sells the BBQ pellets for smoking and barbecue. We hope to let everyone knows about bio energy in a way close to life, and then gradually embrace the vision of a low carbon & sustainable living.

A huge number of discarded fruit tree branches are produced by agricultural harvesting every year in Taiwan. It has become a burden on the environment and difficult to deal with. The problems of open burning and burying are emerged one after another, leading to serious environmental problems such as the vector breeding and the air pollution.

Ynidyi recycles the pruned fruit tree branches, and make them into ‘‘wood pellets’’ through the crushing and high--temperature compressing process. The wood pellets can be used for smoking or grilling. Give a new life to the agricultural waste and create its added value.

In addition, the carbon dioxide is absorbed by the tree when the wood pellets are burned. A balance between emitting carbon and absorbing carbon from the atmosphere in carbon sink. No additional carbon is produced. The wood ash can be can be used as fertilizer to adjust soil structure. Achieve the perfect sustainability and recyclability for agricultural waste.

Ynidyi aims to effectively dispose more than 3,000 tons of agricultural waste every year. Then, through the construction of small wood pellet production line, the disposal volume can be increased by 10% to 20% year by year . At same time, we can reduce the cost of waste dispose and create Creating employment opportunities for Taiwanese laborers.

Moreover, we hope that the BBQ pellets can replace the charcoal and wildly be used in barbecue events. Also our export scope can also be expanded as a res ult. Thus, not only can the carbon emissions caused by barbecue events be reduced, but also the company's profit can be improved. Create a win win situation for environment and economic benefits, and move towards the goal of sustainable development.

有機生物資源

環意有限公司

公司簡介

環意致力於環保創意產品設計開發，以 B 型企業 & 社會企業實踐，用具設計質感的產品來提升生活品質，帶動對環境友善的持續行動。

製程說明及推動資源循環作法

專利「RE Green 居家製肥機」＋專利「抑臭酵素」可輕鬆居家使用，讓「生廚餘」無臭DIY成「有機肥」，讓食物零廢棄，並將好菌帶回土壤中，成品有機質含量是市售有機肥的兩倍以上，讓資源回到大地，綠色種植，達環境永續。

推動資源循環效益及未來展望

1.「RE Green環境教育課程」從課程活動，認識產地、到餐桌、到資源循環，推廣友善環境理念，讓更多人從活動體驗理念，到日常生活持續行動。
2.「RE Green善循環平台」種太多蔬果，想與人分享嗎?缺資材，想要資材嗎?想要找尋有著同樣興趣的同好嗎? 善循環平台讓資源循環持續行動。
3.「RE Green 居家製肥組」不但是環保產品，還可以持續創造環保的產品，從使用過程中，去體認生活環境中如何可以達到更友善環境。

Company Introduction

Enviro Idea Co., Ltd. is committed to designing and developing green products using creative concepts. It fulfills its mission as a certified B Corporation and social enterprise, boosts the quality of people's lives with its products which integrate quality and design, and continuously strives to be an environmentally friendly enterprise through its actions and approaches.

Manufacturing Process and Circular Economy Practices

Our patented RE Green Zero Waste Composter with odor-expelling enzymes is simple to use in the home. It can easily turn food waste into odorless organic fertilizer. You can generate zero food waste while returning good bacteria to the environment. The quantity of organic matter in the finished product of the composter is more than twice that of organic fertilizers sold in the market. It brings resources back to the earth, meaning that you can grow more plants and achieve environmental sustainability.

Efficiency of Circular Economy & Company Vision

- RE Green Environmental Education Program: the activities provided in this program allow people to learn about a wide range of aspects, including places of production, the food at our tables, and resource circulation. This program is designed to promote the concept of eco-friendliness, so that people can apply the lessons they have learned from the program activities to their daily lives.
- RE Green Circular Platform: have you grown too much fruit and vegetable produce and want to share it with someone else? Do you need more resources and material? Are you looking for like-minded people who share the same interests as you? With this platform, resources can be utilized as part of a cycle.
- RE Green Zero Waste Composter Kit: it is not only a green product itself but can also continuously create environmentally friendly products. Use it and discover how to have a greener lifestyle and create a better environment.

有機生物資源

同益企業股份有限公司

公司簡介

成立於民國62年，專注於羽毛粉的製作，並在製程上不斷研究創新，不僅將羽毛粉產量升級，也配合自動化進程，降低人力需求且加強防止製程上溢散的異味。

製程說明及推動循環經濟做法

廢棄雞羽毛原本多數都經由焚化廠焚燒，不只浪費燃料，也容易造成焚化廠機器故障。交由堆肥廠則因數量過多且導致空氣品質不佳。

廢棄雞羽毛交予我們時，不僅解決屠宰場最頭痛的廢棄物處理問題，同時還能創造新的蛋白質來源，減少糧食的消耗，達成雙方共生共榮的理想。由於羽毛經高溫水解時，容易受到溫度與壓力影響，若溫度壓力太低，水解不足，消化率不高，牲畜吸收不好，溫度壓力太高則容易燒焦，因此控制適當的溫度與壓力非常重要。

對於品質不佳或存放過久無法當飼料使用的廢棄物，我司再加入菌種發酵，或直接賣給肥料廠使用。透過與酵素的廠商合作，尋找合適菌種，加入羽毛粉水解的製程裡面，提高羽毛粉可消化性蛋白質的含量，使飼料品質提升，增加產品價值。

推動循環經濟效益及未來展望

將廢棄羽毛回收製成羽毛粉，減少屠宰場送至焚化爐燃燒所需的費用，每年節省將近2,000萬元，降低豆粉的採購每年超過2千噸以上。

Company Introduction

Founded in 1973, Tung E focuses on the production of feather meal. Through continuous R&D and innovation, it has not only expanded its production volume of feather meal but also reduced its labor demand and increased its odor prevention capabilities with the introduction of automated processes.

How can Waste be Re-utilized using Circular Economy Practices?

Waste chicken feathers are usually sent to incinerators and burnt. Doing so not only wastes fuel but can also lead to the malfunctioning of machinery at the incinerators. However, if the waste feathers are processed in composting plants, the excessive amount of feathers has a detrimental effect on air quality. In an effort to resolve the waste treatment issue (considered to be one of the biggest problems faced by butchers), Tung E's operations are focused on the production of feather meal from these waste feathers. In addition, new sources of protein can be generated and food consumption lowered, helping symbiosis to thrive. As the feathers are treated using hydrolysis, both temperature and pressure can be significant factors in the effectiveness of the procedure. When either the temperature or pressure is too low, there will not be sufficient hydrolysis. As a result, the feather meal produced cannot be absorbed easily by livestock. On the other hand, when either the temperature or pressure is too high, the feathers will burn easily. Therefore, it is important that the temperature and pressure are set and maintained at a moderate level. For poor-quality waste, or for waste that has been stored for too long and cannot be used as livestock feed, Tung E applies the fermentation process with the addition of bacteria. This product is then sold to fertilizer plants directly. Tung E partners with enzyme manufacturers and looks for suitable strains of bacteria, adding them in to the hydrolysis process. As a result, the content of digestible protein within the feather meal will be higher, the quality of the stockfeed will be enhanced, and the product value increased.

Promoting the Circular Economy and Future Prospects

Tung E recycles waste feathers and turns them into feather meal. It minimizes the expenses required for butchers to send the waste to be burnt in incinerators. Each year, a total amount of nearly 20 million NTD can be saved, and the purchasing of at least 2,000 metric tons of bean powder can be avoided.

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
大愛感恩科技股份有限公司	廢塑膠再利用	110 ★★	
金元福包裝企業股份有限公司(鶯歌廠)	廢塑膠再利用	110 ★★	
耀鼎資源循環股份有限公司	異丙醇廢液回收	110 ★★	
李長榮化學工業股份有限公司	異丙醇廢液回收	109 ★★	
國塑塑膠工業股份有限公司	廢塑膠再利用	109 ★★	
遠東新世紀股份有限公司	二手衣再利用	109 ★★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
宏恩集團	廢塑膠再利用	宏恩 108 ★★ 宏盛 108 ★	
芳泰塑膠有限公司	廢塑膠再利用	108 ★★	
文明鋼筆股份有限公司	廢塑膠再利用	110 ★	
坤璜企業股份有限公司	廢泡棉再利用	110 ★	
隆順綠能科技股份有限公司	舊衣及廢塑膠轉製成再生燃料	110 ★	
雄材大智材料科技股份有限公司	廢塑膠再利用	110 ★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
環佳科技股份有限公司	廢塑膠再利用	110★	
挑品國際股份有限公司	庫存布再利用	109★	
華新麗華股份有限公司台中分公司	廢酸再生	109★	
長春人造樹脂股份有限公司新竹廠	廢塑膠再利用	108★	
巨鑫化學股份有限公司	活性碳再生	107★	
台灣汽電共生股份有限公司官田廠	廢輪胎做爲替代混燒燃料	107★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
育誠興業有限公司分廠	廢塑膠再利用	107★	
佳億化工企業社二廠	廢塑膠再利用	107★	
通利有限公司	廢塑膠再利用	107★	
惠豐化工廠股份有限公司	廢酸再利用	107★	
中國炭素工業股份有限公司	活性碳再生	107★	
環拓科技股份有限公司屏南一廠	廢橡膠回收	107★	

有機化學資源

大愛感恩科技股份有限公司

大愛感恩科技 DA.AI TECHNOLOGY CO.,LTD

公司簡介

「資源變黃金、黃金變愛心、愛心化清流、清流繞全球」，大愛感恩科技作為國內第一家環保社會企業，期許成為國際綠色環保品牌的典範，自成立以來以環保人文、愛心接力、完全回饋為三大核心價值，帶動社會愛與善的循環，並致力開發推廣環保再生材質的產品，於製程中嚴格落實環境保護，減少資源消耗，避免環境污染，展望廿一世紀的綠色潮流願與每一個有心投入環保，善盡社會責任的企業與團體合作，帶動更多人一起用愛和智慧守護我們的大地。

製程說明及推動資源循環作法

秉持著「與地球共生息」的環保理念，大愛感恩環保回收系統分佈全台近 7,000個環保/教育回收站，同時在大愛感恩平台上接引超過200家合作夥伴發揮專業及愛心串成愛心的綠色供應鏈/綠色產業聚落。每年約使用6千萬支的回收寶特瓶，經由物理法製作高品質大愛環保紗、大愛環保布，減少石油開發，讓子孫留下更美好的環境，成品品質與原生無異，再生製程與原生製程相比，再生能節省能源84%、減少碳排放77%。自從2015 年起，每年皆有研發亮點同時產品開發不僅著重在各式回收再生紡織品，現階段更積極研發回收聚酯 (PET、PP) 塑膠產品的開發，並致力開拓資源回收站裡其他跨領域的研發技術。

推動資源循環效益及未來展望

大愛感恩環境永續發展原則與目標以結合綠色回收供應鏈，研發更多回收再製品，同時落實綠色採購方針、產官學研綠色發展合作計畫、關注國際環保議題，並推廣環保理念至各行各業，改變心念，從生活落實對地球的愛護，大愛感恩不只是做環保、說環保，更是環境教育。除了環保產品實體的分享與推廣之外，近年來更持續不斷透過各種平台提供全方位的環保教育，透過時下社群媒體的力量將環保善法精神無國界、無距離的傳遞。

"Resources become gold, gold becomes love, love becomes clear stream, and clear stream flows around the world", DA.AI Technology, as the first environmental protection social enterprise in Taiwan, hopes to become a model of an international green environmental protection brand. Complete feedback is the three core values, driving the cycle of social love and kindness, and is committed to developing and promoting products with environmentally friendly recycled materials, strictly implementing environmental protection in the process, reducing resource consumption, and avoiding environmental pollution. Looking forward to the green trend of the 21st century cooperate with every enterprise and group that is committed to environmental protection and fulfills social responsibilities, and drives more people to protect our earth with love and wisdom.

Adhering to the environmental protection concept of "Coexist with the Earth", the DA.AI environmental recycling system distributes nearly 7,000 environmental protection/education recycling stations across Taiwan, and attracts more than 200 partners on the DA.AI Technology platform to show their professionalism and love. Become a loving green supply chain/green industry settlement. About 60 million recycled PET bottles are used every year to produce high-quality DA.AI ECO yarn and DA.AI ECO fabric through physical methods, reducing oil development and leaving a better environment for future generations. The quality of the recycled products is the same as the virgin materials Compared with the virgin manufacturing process, the regeneration process can save energy by 84% and reduce carbon emissions by 77%. Since 2015, there have been research and development highlights every year. At the same time, product development not only focuses on various recycled textiles, but also actively researches and develops recycled polyester (PET, PP) plastic products at this stage, and is committed to developing other cross-fields in the resource recycling station. research and development technology.

DA.AI Technology environmental sustainability principles and goals are combined with the green recycling supply chain to develop more recycled products, while implementing the green procurement policy, the industry-government-university-research green development cooperation plan, paying attention to international environmental issues, and promoting the concept of environmental protection To all walks of life, change their minds, and implement the love for the earth from life, not only do environmental protection, talk about environmental protection, but also environmental education. In addition to the physical sharing and promotion of environmental protection products, in recent years, it has continued to provide all-round environmental education through various platforms. Through the power of social media, the spirit of environmental protection and good law will be transmitted without borders and distances.

有機化學資源

金元福包裝企業(股)有限公司

鶯歌廠

公司簡介

金元福包裝企業股份有限公司創立於民國67年，總部位於新北市鶯歌，全台設有樹林廠、鶯歌廠及冬山廠等3個廠區，主要產品為真空成型塑膠食品包裝容器，材質以PET、rPET、PP、PLA為主，獲得ISO 9001/ISO 14001/ISO 22000/HACCP/ISO 45001/SCS回收材料等多項國際認證。我們提供完整的一站式整合服務：從產品設計、模具製作、膠皮壓出、成品供貨到售後服務，客戶涵蓋國內外的食品廠、餐廳、超市、大型通路等。

製程說明及推動資源循環作法

身為亞洲真空成型塑膠食品包材領導者，金元福肩負「成為全球產業長期且可靠的永續包裝設計及產能提供者」的使命，我們相信閉鎖循環(closed-loop circular)可讓塑膠更有效地被循環利用且降低對環境之衝擊，因而投入塑膠的循環經濟，將reduce、reuse、recycle等3R原則落實於盒子的產品生命週期，實踐從盒子到盒子(clamshell to clamshell)循環理念。具體作為包含：

- 創立aGain品牌，對市場溝通循環經濟與推廣rPET產品。
- 選用低碳原料，打造低碳產品：rPET (recycled PET)原料較PET新料碳排放降低將近6成，我們的目標是逐年提高rPET使用比率，期望在2025年達到40%。
- 廠內粉碎料回收再利用：膠皮壓出、成品成型的過程中，被裁切下來的邊料，由機器自動回收、打碎成為粉碎料，待下次投產。如此可提高資源利用率、減少事業廢棄物。
- 產品減薄減重：在不影響產品品質與功能的前提下，以科學方式減少產品厚度及重量，以降低石化原料之使用。
- 舉辦內外部環境教育：透過社區學校環境教育、企業參訪、員工講座等互動，讓利害關係人更了解塑膠知識和循環經濟，進而成為責任消費者與生產者。

推動資源循環效益及未來展望

金元福將循環經濟納入公司ESG永續策略之一環，透過各項3R行動方案，1年約減少37,000公噸碳排放量(110年)，相當於95座大安森林公園1年吸附的二氧化碳量。我們的努力也獲得多個獎項肯定，未來金元福將持續以循環經濟、能源管理(含再生能源)為脫碳路徑之核心，成為對世界最好的永續包裝公司。

Company Introduction

KING YUAN FU (KYF) was founded in 1978 with its headquarter in Yingge, New Taipei City. There are three plants in Taiwan: Shulin Plant, Yingge Plant, and Donshan Plant. The main products are thermoforming plastic food containers made from PET, rPET, PP, and PLA. With international certifications such as ISO 9001/ISO 14001/ISO 22000/HACCP/ISO 45001/SCS, we offer one-stop service, from product design, tooling development, sheet extrusion, thermoforming, final products delivery, to aftersales service, to our customers worldwide.

Process Description and Promotion of Circular Economy Practices

Being the leading thermoforming manufacturer in Asia, KYF's mission is ''being a reliable and sustainable packaging designer and capacity provider in global packaging industry''. We believe that closed-loop circular is the key for plastic circular economy, which lead to less environmental impacts. To realize the idea of ''clamshell to clamshell'' circle, we have adopted 3R principles—reduce, reuse, recycle—to the lifecycle of our products. The practices are as followed:

- Create ''aGain'' brand to promote circular economy and rPET products.
- Build low carbon product by using rPET: the carbon emission of rPET pallet is nearly 60% less than that of virgin PET pallet. We aim to increase the proportion of rPET to 40% by 2025.
- In-house trim line recycle: the trim lines are automatically recycled and reuse in production again. This helps increase resource usage and deduct wastes.
- Weight deduction of products: on the premise of quality and functionality, product thickness are deducted to reduce the usage of raw materials.
- Environmental education: we promote circular economy by holding lectures for community schools, plant visits, and internal training to different stakeholders.

Benefits and Future Prospects

Circular economy is part of KYF's ESG strategies. By the 3R actions, we reduced about 37,000 tCO2e a year (2021), equivalent to 95 times of annual CO2 absorbent by Daan Forest Park. Circular Economy and Energy Management (including renewable energy) will be the two pillars to decarbonization in KYF, and we will keep being the sustainable packaging company that treats the world best.

有機化學資源

耀鼎資源循環股份有限公司

ECOVE
A CTCI Company

公司簡介

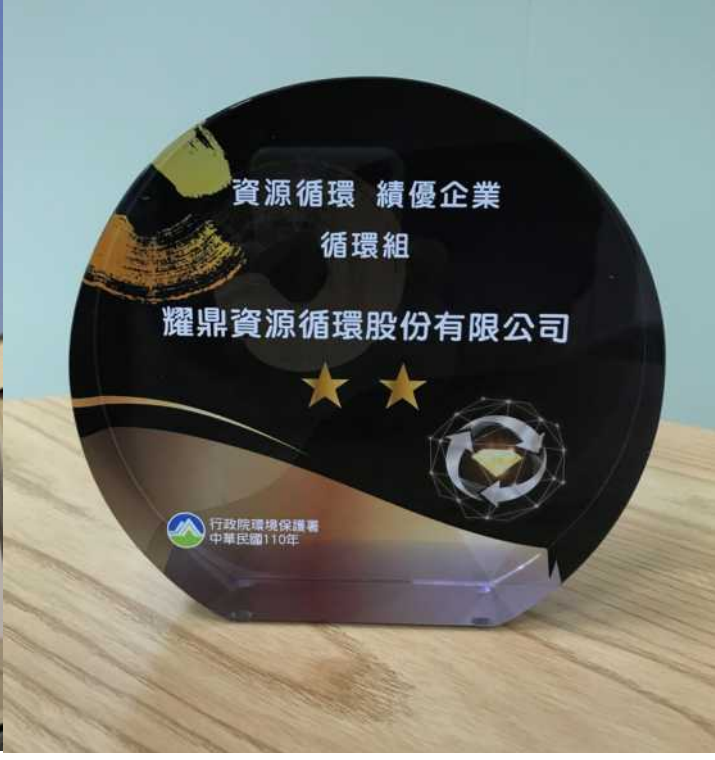
崑鼎投資控股股份有限公司(ECOVE)（以下簡稱「崑鼎公司」）秉持珍惜每一分資源理念，於2018年成立耀鼎資源循環股份有限公司（以下簡稱「耀鼎公司」），依廢溶劑特性選擇環境友善、能耗少及效率高的蒸餾技術，將低濃度廢異丙醇提濃成85%工業級異丙醇產品，回到市場用於清潔去污、調製化學原料及稀釋調勻塗料等，並且透過精進技術整合與創新運用，將85%工業級異丙醇提濃至99.5%產品，重新回到製造生產端，創造更高綠色技術價值。以珍惜每一分資源出發，協助業者降低原料購置成本、削減廢棄物處理費用、延長溶劑生命週期，使資源做最有效的再利用，同時達到減碳效益。

製程說明及推動資源循環作法

耀鼎公司每年處理約1萬噸廢異丙醇，以再利用方式取代傳統焚化方式處理廢異丙醇，以生產工業級異丙醇取代原生異丙醇，預計可減少約8,400公噸/年的二氧化碳排放量。此外，為體現綠色循環經濟目標，耀鼎公司降低廠區及辦公室用電，重油改為潔淨天然氣，提高製程廢熱回收效率，同時購買綠電以折抵製程用電所產生之碳排放量，於2021年05月開始每月使用綠電10,000度，持續購買綠電佔比約全廠用電的20%。依PAS 2060規範，透過盤查、減碳、抵換作為，耀鼎公司於2021年通過英國標準協會BSI查證，達成全廠碳中和；同時亦是崑鼎公司申請BS 8001循環經濟的查核廠，於2021年成為全台首家取得循環經濟及碳中和雙證書之化學原料製造業。

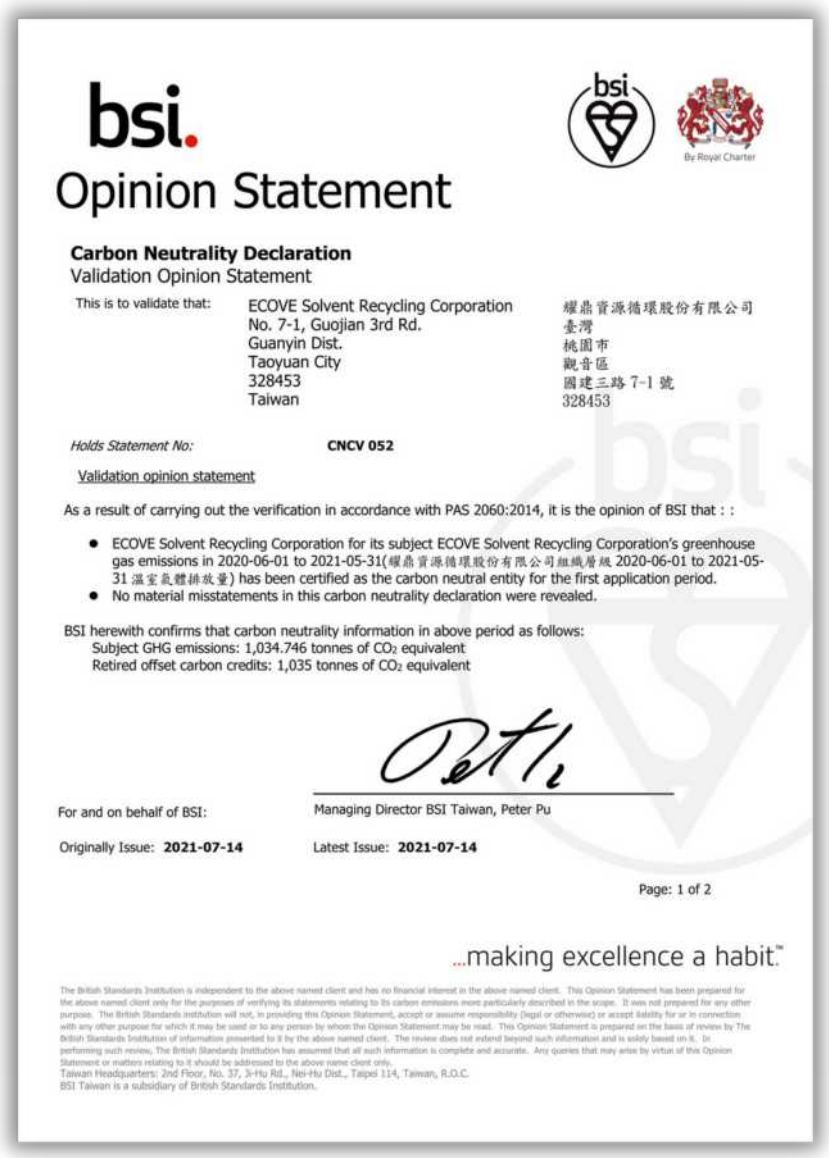
推動資源循環效益及未來展望

為實踐循環經濟與善盡環境責任，耀鼎公司將持續精進技術整合，提供產品高值化服務，將異丙醇產品提高純度至99.7~ 99.9%，增加市場回用度，促成資源零廢棄、物質全循環，朝以搖籃到搖籃為目標努力。此外，長期願景將朝向「低碳永續經營」之藍圖逐步落實，故將每年定期實施溫室氣體盤查作業，藉由盤查過程與結果，確實掌握耀鼎公司溫室氣體排放，由相關減量額度做為碳抵換以達碳中和，邁向資源永續循環再利用及淨零排放之目標。



ECOVE Solvent Recycling Corp. (ECOVE SRC) was established in 2018 by ECOVE Environment Corporation (ECOVE) who regards ‘‘Every Resource Counts.’’ as an inherent spirit. With the environment friendly, low energy consumption and high efficiency, ECOVE SRC treats low-concentration waste IPAs by the distillation technology into 85%, which could be returned to the market for decontamination, chemicals preparation, and painting dilution etc. Besides, through the advanced technology integration and innovative application, 85% IPA is concentrated to 99.5% products, further returning to the manufacturer with higher value. Starting from ‘‘Every Resource Counts.’’, ECOVE SRC assists the industry to reduce the cost of raw material purchase and waste treatment, prolong the life cycle of IPAs, do the most effective reuse of resources and achieve carbon reduction benefits as well.

Instead of the traditional incineration and virgin IPAs production, ECOVE SRC treats around 10,000 tons of waste IPA annually with recycling, which is expected to reduce carbon dioxide emissions by about 8,400 tons per year. In addition, for the purpose of the green and circular economy, ECOVE SRC reduced the electricity consumption of offices and factories, changed heavy oil to clean natural gas, improved the efficiency of waste heat recovery in the process, and began purchasing green electricity to compensate the carbon emissions from the process: use 10,000 kWh/month green electricity (accounts for 20% of plant-wide consumption) from May 2021. Furthermore, through the inventory, carbon reduction and offset, ECOVE SRC has been certified by BSI for achieving carbon neutrality in 2021 in accordance with the PAS 2060 standard; meanwhile, also being ECOVE's audit plant for BS 8001. Therefore, ECOVE SRC is the first chemical material manufacturer in Taiwan to receive the international circular economy and carbon neutrality dual certifications in 2021.



bsi.

Opinion Statement

Carbon Neutrality Declaration
Validation Opinion Statement

This is to validate that: ECOVE Solvent Recycling Corporation
No. 7-1, Guojian 3rd Rd.
Guanyin Dist.
Taoyuan City
328453
Taiwan

耀鼎資源循環股份有限公司
臺灣
桃園市
觀音區
國建三路 7-1 號
328453

Holds Statement No: **CNCV 052**

Validation opinion statement

As a result of carrying out the verification in accordance with PAS 2060:2014, it is the opinion of BSI that : :

- ECOVE Solvent Recycling Corporation for its subject ECOVE Solvent Recycling Corporation's greenhouse gas emissions in 2020-06-01 to 2021-05-31(耀鼎資源循環股份有限公司組織層級 2020-06-01 to 2021-05-31 溫室氣體排放量) has been certified as the carbon neutral entity for the first application period.
- No material misstatements in this carbon neutrality declaration were revealed.

BSI herewith confirms that carbon neutrality information in above period as follows:
Subject GHG emissions: 1,034.746 tonnes of CO_2 equivalent
Retired offset carbon credits: 1,035 tonnes of CO_2 equivalent

For and on behalf of BSI: Managing Director BSI Taiwan, Peter Pu

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Taiwan Headquarters: 2nd Floor, No. 37, Ji-Hu Rd., Nei-Hu Dist., Taipei 114, Taiwan, R.O.C.
BSI Taiwan is a subsidiary of British Standards Institution.

To put the circular economy into practice and fulfill the environmental responsibility, ECOVE SRC will keep improving technology to upgrade the purity of IPAs (99.7~99.9%), increasing market reuse and promoting Zero Waste towards the goal of C2C. In addition, the blueprint of "low-carbon sustainable management" will be gradually implemented in the future, hence the GHG inventory will be carried out every year. Through the process and results of it, ECOVE SRC will be able to accurately understand its GHG emissions, and the relevant reduction quota will be used as the Carbon offset to achieve carbon neutrality. It's all for the goal of sustainable resource recycling and Net Zero what ECOVE SRC are moving towards.

有機化學資源

李長榮化學工業股份有限公司

李長榮化學工業股份有限公司成立於1965年，致力成為世界級先進材料公司，深耕永續共榮，營運發展聚焦永續環境、社會關懷和企業治理（ESG）等議題。本著誠信正直、團隊合作、創新及當責領導力的企業價值，於電子級化學品、特用材料、生質化學、能源等領域持續耕耘，滿足半導體、汽車、醫療、消費品等行業的客戶需求，足跡遍及台灣、中國大陸、美國、加拿大及中東。展望未來，李長榮化工期以不斷創新的動能，培育未來化工青年菁英及帶動化工產業的升級轉型。

李長榮化工為台灣電子級異丙醇（EIPA）領導企業，秉持著材料創新精神，研發出電子級異丙醇的回收再利用技術，改良傳統異丙醇廢液回收處理方式。創造出「雙循環」循環經濟模式，協助下游客戶回收異丙醇廢液，蒸餾純化為工業用異丙醇，達成第一個循環；並完全回收廢液中的水，供工廠內部重複利用，達成第二個循環。

相比於傳統異丙醇廢液燃燒處理的方式，「雙循環」循環經濟模式每年可減少二氧化碳（CO_2）排放量約為24.43座大安森林公園的碳吸附量。此循環模式善用每一分地球資源並降低對環境的負擔。

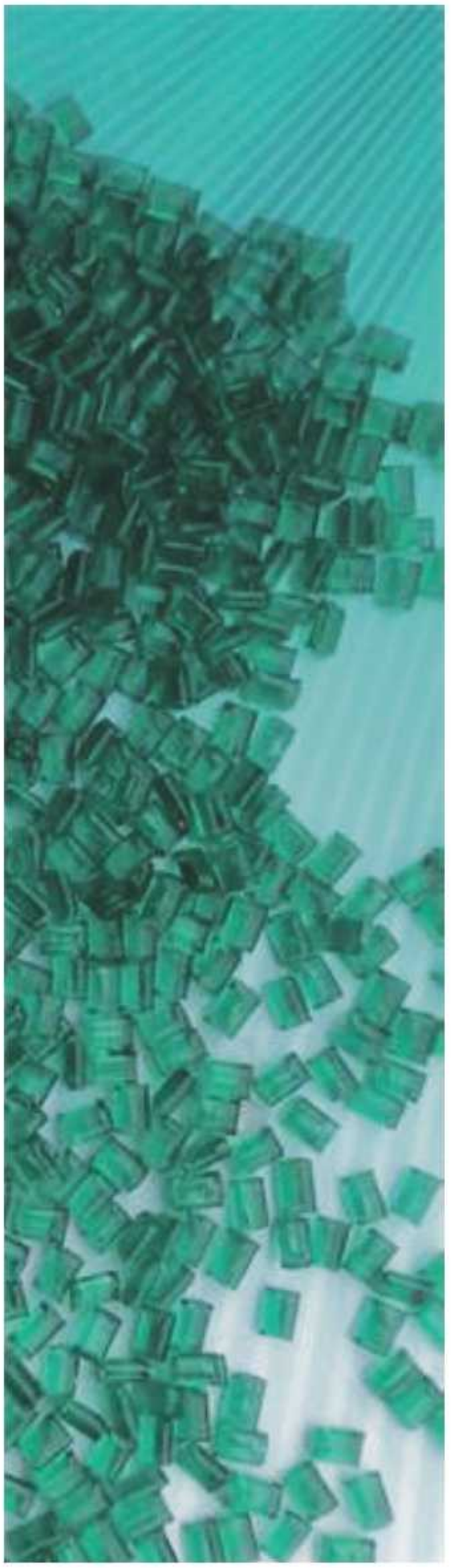
未來我們將持續改良旗下產品及製程，並更進一步把異丙醇廢液蒸餾純化為電子級異丙醇（EIPA），達成「零」廢棄物產生的閉環循環經濟。

Founded in 1965 and headquartered in Taipei, Taiwan, LCY CHEMICAL CORP. has been in material business for more than 55 years with a vision in sustainability and prosperity. LCY integrates its operations of electronic-grade chemicals, functionalized materials, bio-chemistry, and energy with emphasis in semiconductor, automotive, healthcare, and FMCG sectors. LCY has been driving positive changes in sustainable environment, social engagement, and corporate governance, while we firmly believe in continuous enhancement of competitiveness, globalized operations, highly efficient teamwork, and providing strong customer services that ensures customer satisfaction. We also constantly seek innovation and strategic partnership while exploring infinite possibilities to break new grounds at measured pace so as to maintain our competitive edge in a sustainable future.

LCY is the leading producer of electronic-grade isopropyl alcohol (IPA) in Taiwan. LCY upholds the spirit of material innovation and has improved the traditional recycling and treatment methods of isopropyl alcohol waste through its electronic-grade isopropyl alcohol (EIPA) recycling technology. There are two cycles in LCY's Dual Cycle circular economy model. The first cycle assists downstream clients to recycle isopropyl alcohol waste, which is distilled and purified into industrial isopropyl alcohol. As for the second cycle, LCY completely recycles wastewater and reuses within the factory.
Compared to traditional combustion treatment of isopropyl alcohol waste, Dual Cycle circular economy model can reduce 9,504 tons of CO_2 emissions every year. This circular model fully utilizes the resources and reduces the environmental burden. In the future, we will continue to improve our products and processes, and further distill and purify the isopropyl alcohol waste into electronic-grade isopropyl alcohol (EIPA) to achieve a closed-loop circular economy of "zero" waste generation.

有機化學資源

國塑塑膠工業股份有限公司



國塑塑膠工業股份有限公司成立於2005年，專注於聚碳酸酯(PC)的消費後再生料市場，以環保為價值訴求，循環經濟為核心商業模式，目標是成為亞洲區聚碳酸酯再生料的主要供應商。

國塑PC再生製程為自有的核心技術，回收PC的蒸煮、分選純化、造粒與汙水處理等設備皆有設置，現有設置PC蒸煮分選純化自動化產線2條產能40噸/天，2025年以前規劃再增設2條自動清洗產線，自有自動汙水處理廠可處理廢水量200噸/天，現有造粒產線產能500噸/月，2025年以前規劃造粒提升至1,000噸/月，國塑產品皆由100%消費後PC製得，且品質管理體系獲得ISO9001、ISO14001認證，回收再生體系獲得TUV認證，產品符合RoHS2.0與歐盟REACH禁用物質規範，國塑塑膠的宗旨回收再生過程與產品不會產生二次汙染與有害於人類與環境。

國塑產品一直應用3C相關產業鏈，由於環保意識增加3C產品中含有再利用塑膠的比例逐年上升，國塑銷售量由2013年470噸成長至2019年3,000噸增加，未來3~5年預計成長至6,000噸/年；近年來3C產品廢棄塑膠再利用的議題被廣泛討論，因其銷售量大與汰換率高已達必須嚴肅正視的階段，國塑亦積極參與供應鏈回收再製解決方案，將國塑現有設備與技術能量回饋環保相關問題，國塑理念Less is More 減少塑膠 增加再生 環境更美好。




GuoSu Plastics Industry Co., Ltd. was established in 2005, focusing on post-consumer recycled polycarbonate (PC), with environmental protection as its core value and circular economy as its central business model. The company aims to become Asia's leading supplier of post-consumer recycled polycarbonate (PC).

The regeneration of PC is the core technological process of GuoSu Plastics' operations. There is equipment in place for cooking, sorting and purification, granulation and sewage treatment. There are two automatic production lines for PC cooking, sorting and purification, with a processing capacity of 40 tons per day. 2 automatic cleaning production lines are scheduled to be added before 2025. The company-owned automatic sewage treatment plant can handle 200 tons of wastewater per day, and the existing production line for granulation has a capacity of 500 tons per month. The granulation capacity is scheduled to be increased to 1,000 tons per month before 2025. The products of GuoSu Plastics are made from 100% post-consumer PC; the quality management system has obtained ISO9001 and ISO14001 certification, and the recycling system has received TUV certification. The products comply with RoHS2.0 and EU REACH banned substances specifications. Consequently, the recycling process and the products themselves will not produce secondary pollution and cause harm to humans and the environment.

GuoSu Plastics products have always been a part of the 3C product supply chain. Due to increasing environmental awareness, the proportion of recycled plastics in 3C products has increased year by year. The sales volume of GuoSu Plastics has grown from 470 tons in 2013 to 3,000 tons in 2019. The next 3-5 years are expected to see further growth, to 6,000 tons per year. In recent years, the issue of recycling waste plastics from 3C products has been widely discussed. Because of the large sales volume and high replacement rate of these products, it has reached the stage where this issue must be taken seriously. GuoSu Plastics also actively participates in supply chain recycling solutions, making use of the company's existing equipment and technical capabilities to tackle environmental protection-related issues. GuoSu's mission is to reduce plastic, increase the regeneration of plastic and promote a green environment.

有機化學資源

遠東新世紀股份有限公司

公司簡介

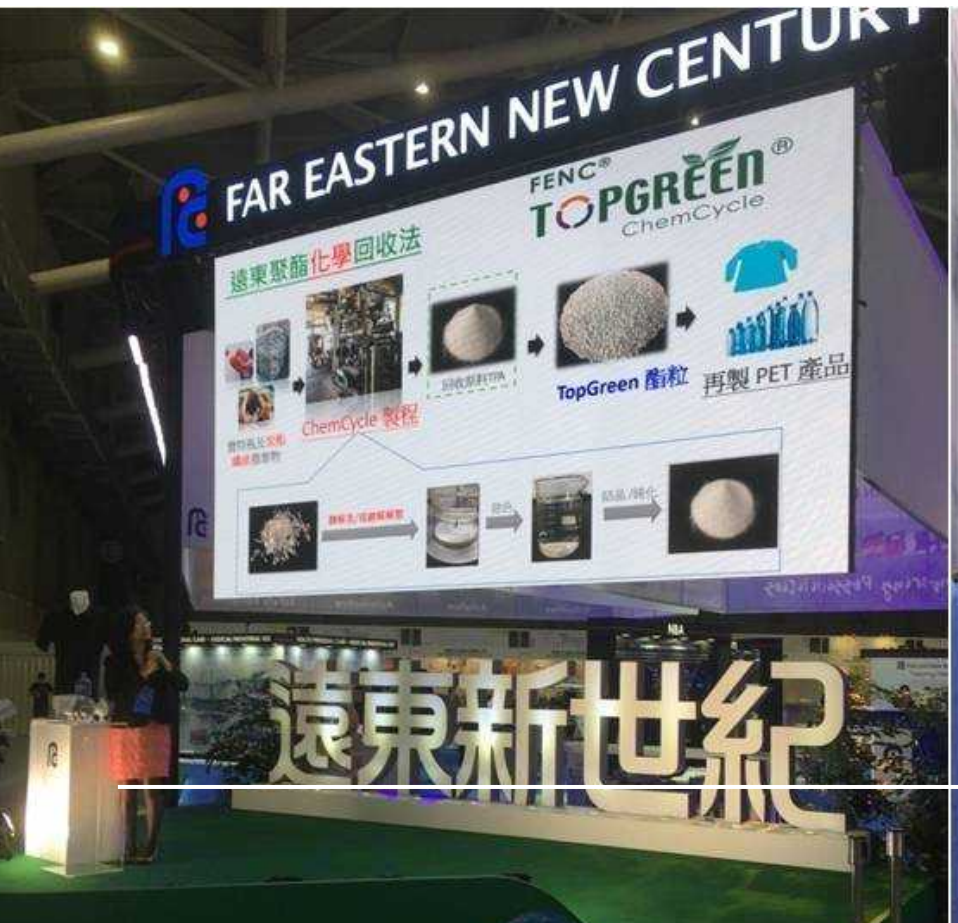
遠東新世紀股份有限公司（原遠東紡織），成立於民國43年1月13日，於民國56年上市，主要營業項目：1.石化纖維原料、半成品及製成品；2.化學聚酯纖維紗（布）、混紡紗（布）、假撚絲、棉紗及布、被單、紡織成衣、針織成衣。3. 寶特瓶酯粒原料、瓶胚、瓶子製造及銷售。

製程說明及推動循環經濟做法

在不改變目前台灣二手衣回收商業模式的前提下，我們提出新的廢織物循環利用方案，將原先要入焚化爐的廢棄織物做分級分類，以利後續的有效資源化處理，將棉含量高的織物做成固態衍生燃料（RDF-5）或纖維素酒精，成為綠色能源燃料，再將PET含量高的織物利用解聚、脫色、反應與純化技術，還原為生產聚酯的原料（rTPA與rEG），最後再加工成高附加價值的機能性聚酯紡織品，回到消費者手中，完成循環經濟的理念。

推動循環經濟效益及未來展望

規劃五年內，優先處理台灣每年數千噸的廢棄織物，並創造近百人以上的就業機會，未來將持續擴大生產規模，並把相關技術推廣至全球，以解決全球數千萬噸/年的廢棄織物處理問題，讓全世界看到台灣的價值。



Company Introduction

Far Eastern New Century Corp. (FENC, formerly Far Eastern Textile Ltd.) was founded on January 13, 1954, and became a public company in 1967. The main products include petrochemical and PET/polyester materials, semi-finished products, finished goods, polyester fiber yarns (cloth), blended yarns (cloth), false twist yarns, cotton yarns and cloth, PET resins/sheets/preforms/bottles, and woven and knitted garments.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

A new process of recovering useful raw materials from textile waste is currently under development. The feedstock for this new process comes from the current recycling system of second-hand clothing in Taiwan. The process involves the decomposition of the PET component of waste textiles and the conversion of PET into its raw monomers (terephthalic acid and ethylene glycol). These monomers are re-polymerized to form PET, which is then processed into fibers and high value-added functional textiles.

The final step is to convert PET fibers to apparel, ready for purchase by customers. In addition to the PET component being utilized, the cotton-rich parts of waste textiles can be converted into refuse-derived fuel (RDF-5) or cellulosic ethanol (for use as a renewable energy source) with this new process.

Economic Effectiveness and Future Plan

The expansion of this process will see the recovery of thousands of tons of waste fabrics annually in Taiwan within five years, leading to the creation of hundreds of job opportunities. In the future, the expansion of mass production and the promotion of this new technology will help to solve the worldwide issue of waste fabrics, and will showcase Taiwan's role in the creation of a better planet.

有機化學資源

宏恩塑膠股份有限公司

宏恩集團
Horng En Group

公司簡介

宏恩集團擁有41年經驗與專業技術，研發多種用途再生料，涵蓋吹瓶級、吹袋級、押出級與射出級等。業務範圍包括 Recycled PP、PE、ABS、PS、PC、PET 片等多樣性的產品，提供客製化配料與染色服務等，在產品方面也取得多種認證，包括ISO9001、ISO14000、ISO28000、ISO50001、GRS（全球回收標準）以及TUV（德國萊茵）再生材料等國內外認證。

目前廠房設有15條生產線，並設置品管實驗室，以數據化的標準，針對原料、製程、成品進行物理性質檢驗及區分，以達客戶需求，賦予廢塑膠再製再循環使用。「資源再利用」是宏恩持續強化的目標，因此在工廠配置完善的汙水處理、廢氣防治設備以及太陽能板的設置，產生綠能源，有效降低廠內溫度，落實綠色經濟及低碳之訴求。

製程說明及推動循環經濟做法

•綠色採購｜將廢棄塑膠回收至再利用工廠的過程中，符合可回收、低污染、省資源等環保理念。汰換設備時亦優先採用綠色產品。
•循環設計 & 廢棄物資源化｜透過宏恩專業技術，廢塑膠經過粉碎、清洗、熔融，經模具押出成型等程序，製成各式加工塑膠品。於再生塑膠粒中，回收材料含量高達75%以上，讓終端產品具有高度循環再利用化。
•製程改善｜致力於改善機具，使其加工技術自動化及穩定生產作業的流程，減少製程中之污染源排放及能源耗損。
•創造價值｜預計每年有效處理5萬公噸廢塑膠，邁向「零廢棄生產」。秉持永續發展之信念，為綠色經濟創造龐大商機。

推動循環經濟效益及未來展望

宏恩致力製造再生率達到95-97%的再生環保塑膠粒；強化回收循環體系，除了能夠減少焚化爐的使用頻率，也可減少資源開發成本；本著「取之於社會，用之於社會」之宗旨，每年固定將公司盈餘的3%回饋給社會，例如：每年提供同仁子女的教育補助金、及定期捐助在地教育單位以及社福單位。

宏恩集團長期關注全球環保議題、洞悉產業脈動以及風險，努力追求創新；積極發展循環再生產業供應鏈，與上下游產業鏈連結，建立產業共生系統，並持續推動循環經濟，實現高度循環利用的經濟效益，以創造公司的價值。

Company Introduction

Horng En Group has 41 years of experience in the recycling industry and has been developing various recycled resins for different applications including blow molding, blown film, extrusion, injection grade. We focus on sales of recycled plastic such as PP, PE, ABS, PS, PC, PET, etc., and also provide customized service for color. Our certificates include ISO9001, ISO14000, ISO28000, ISO5001, GRS, TUV, etc. The factory is equipped with 15 production lines and an internal QC laboratory. "Reuse of resources" is our goal of continuous enhancement. We take good care of communities and facilitate a CSR system to guarantee all resources are fully used without causing any unnecessary waste.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

• Green procurement
The process of recycling plastics waste complies with eco-friendly concepts, includes recyclability, low pollution, and resource-saving. Green products will be the prior choice while replacing equipment.

• Circular design & Waste reclamation
Post-consumer plastic, after crushing, cleaning, melting, and then is extruded as the resin to produce various plastic products. The content of recycled materials that can be reused in the product is as high as 75% or more.

• Process improvement
Improving machinery facilities, automation, and stabilization of the production process can reduce the emission of pollution sources and energy consumption in the manufacturing process.

• Value Creation
It is estimated that 50,000 metric tons of plastic waste can be effectively processed each year and towards zero waste. Keep the faith in sustainable development and create the huge business opportunities for the green economy.

Economic Effectiveness and Future Plan

Our product, recycled plastic pellets, can reach 95-97% of the recycling rate; strengthening the recycling system can not only reduce the frequency of using incinerators but also reduce resource development costs. We donate 3% of the company's surplus earnings to society every year. e.g. annual education grants for the children of colleagues, and regular donations to local education units and social welfare organizations.

Horng En Group has been paying high attention to global environmental issues and has an insight into the recycled industry to strive for innovation. Develop the recycling industry integration from the upstream and downstream, establish an industrial symbiosis system, and keep promoting the circular economy to increase the company's value.

有機化學資源

芳泰塑膠有限公司

芳泰塑膠有限公司
FANG TAI NYLONS CO., LTD.
提供循環經濟達永續經營

公司簡介

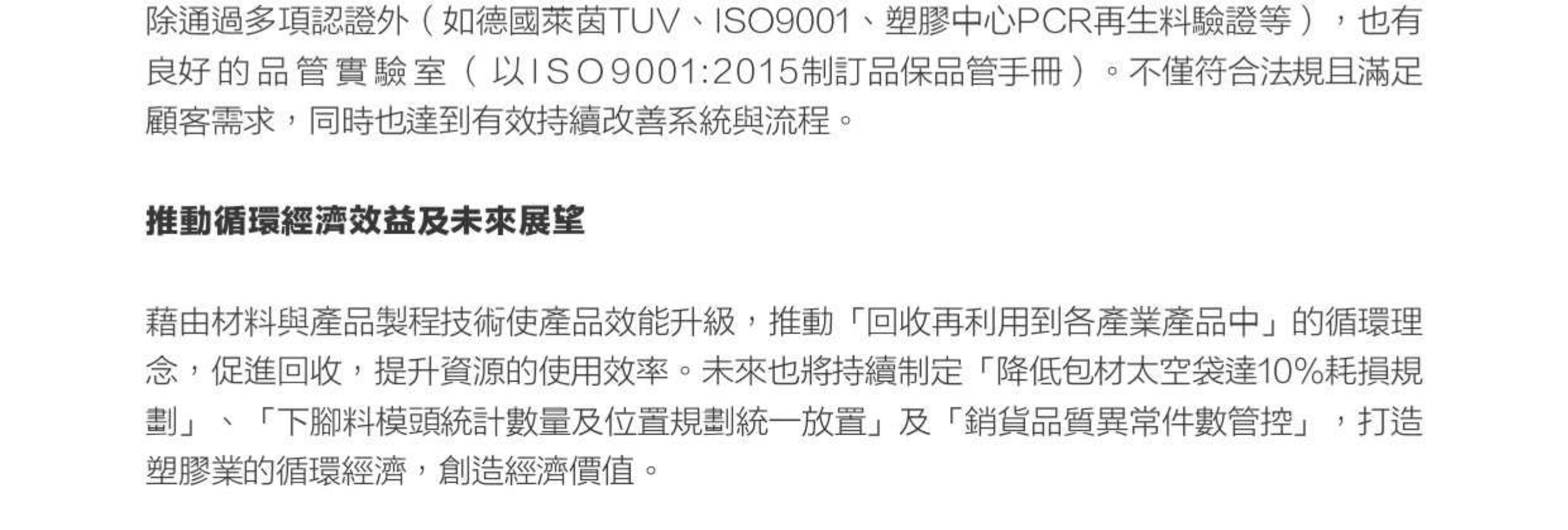
本公司於1978年成立，依照循環經濟指南標準（BS8001）為方向，透過廢棄物循環再生簡稱PCR（Post-Consumer Recycled 消費後回收），將廢棄產品所帶來的環境衝擊扭轉為友善環境，實踐工業循環理念，提升企業綠色能量，透過推動民生消費後PC塑膠回收粉碎再利用與產業共生，達到【提供循環經濟達永續經營】理念。

製程說明及推動循環經濟做法

將廢棄物（如：飲用水大藍桶/遊戲機台/CD片/汽車燈殼），經由粉碎、造粒以及試驗（MI衝擊等）與改良。提供客制化服務，將再生塑料射出成型或將原物料加入百分之二十的PCR再生塑料。透過射出成型的PCR再生路由器、變壓器及再生衣夾出口外銷至日本。除通過多項認證外（如德國萊茵TUV、ISO9001、塑膠中心PCR再生料驗證等），也有良好的品管實驗室（以ISO9001:2015制訂品保品管手冊）。不僅符合法規且滿足顧客需求，同時也達到有效持續改善系統與流程。

推動循環經濟效益及未來展望

藉由材料與產品製程技術使產品效能升級，推動「回收再利用到各產業產品中」的循環理念，促進回收，提升資源的使用效率。未來也將持續制定「降低包材太空袋達10%耗損規劃」、「下腳料模頭統計數量及位置規劃統一放置」及「銷貨品質異常件數管控」，打造塑膠業的循環經濟，創造經濟價值。



Company Introduction

Fang Tai was founded in 1978. The company focuses on Post-Consumer Recycled (PCR) waste, and its operations are guided by circular economy standard BS8001. It turns environmental waste into useful, eco-friendly products, following the principles of industrial recycling and increasing its drive to be a green, sustainable company. Through the recycling, crushing and reuse of polycarbonate (PC) plastics in waste commodities, a system of industrial symbiosis is able to thrive, valuable contributions are made to the circular economy, and operational sustainability is maintained.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

The waste products (such as water containers, arcade game machines, CDs and car headlight covers) are crushed and granulated before undergoing testing (such as MI impact testing) and optimization. Fang Tai offers customized services, including injection molding of the PCR plastic, or adding it into other raw material; the recycled plastic material constitutes 20% of the total raw material. Through the injection molding process, the PCR material is made into routers, transformers and clothes pegs, which are exported to Japan. Fang Tai has acquired several certificates, such as the TUV Rheinland certificate, ISO 9001, and the Plastics Industry Development Center (PIDC) PCR validation. In addition, Fang Tai is equipped with a high-standard QC lab which meets QC and QA guidelines in accordance with ISO 9001:2015. As well as complying with regulations and meeting customers' demands, the company continuously strives to improve its systems and processes.

Economic Effectiveness and Future Plan

By utilizing materials and applying product processing technologies, Fang Tai is continuously enhancing the efficiency of its products while promoting the concept of recycling and reusing materials in the products of various industries. It is committed to facilitating the process of recycling and increasing the use of resources. In the future, it will continue to formulate "plans to reduce the consumption of packaging materials and FIBC bulk bags by 10%", "statistics of the leftover materials and die heads, and plans for a centralized location and placement" and "a control plan for products with quality issues", with the aim of building a circular economy in the plastics industry and generating economic value.

有機化學資源

文明鋼筆股份有限公司

SKB 文明鋼筆

公司簡介

台灣文具品牌「SKB文明鋼筆」前身為「文明書局」。於1951年由盧榮火先生於高雄鹽埕創立，以銷售毛筆、紙張等文具為主。之後成立「文明鋼筆行」，開始鋼筆的組裝銷售，1955正式立名「文明鋼筆股份有限公司」，以台灣製鋼筆聞名，更在七十年代研發秘書原子筆，成為家喻戶曉的品牌。

製程說明及推動資源循環作法

隨著環保意識抬頭，我們思考如果能開發一款從包裝到筆皆以「回收材料」製成、可「重複使用」及「富教育意義」的產品，讓顧客體會到購買時即代表自己也是對環境盡了一份心力。為改變這個現況，黑琵永續鋼筆誕生了。

使用回收辦公廢棄物如印表機、電話機等，經協力廠拆解、粉碎、拌料、製粒等過程後成為rABS塑料，再交由製筆工廠模具射出的過程，於2020年成功量產。包裝盒則選用再生紙漿製成，可作為筆盒收納使用，綁帶、矽膠圈都是可回收的，以「綠色永續」發展出老品牌新價值。

推動資源循環效益及未來展望

黑琵鋼筆上市即受到文創界、環保機關等的親睞，並於2020年獲得文博會金點設計獎，進駐松山文創園區(設計點)、蔦屋、誠品等通路，近期經銷商引進香港誠品販售，讓更多人看見台灣的永續商品，並開啟客製化禮贈品的市場。

Company Introduction

The Taiwanese stationery brand SKB Wen Ming Fountain Pen Mfg. Co., Ltd. was formerly known as ‘‘Wen Ming Bookstore’’. Founded by Mr. Jung-Huo Lu in the Yancheng District of Kaohsiung in 1951, the bookstore mainly focused on the retail sales of calligraphy supplies and paper products. ‘‘Wen Ming Fountain Pen Company’’ was later founded for the manufacture and sale of fountain pens. In 1955, the company was officially renamed as ‘‘Wen Ming Fountain Pen Mfg. Co., Ltd.’’, and has since then been established as a well-known Taiwanese fountain pen brand. In the 1980s, Wen Ming developed the ‘‘SKB – SECRETARY’’ series, making the brand a household name.

Manufacturing Process and Circular Economy Practices

With the growing awareness of environmental protection, we sought to develop a product that was made from recycled material, was reusable and had educational significance, so that customers could feel that they were doing something for the environment when they purchased this product. To meet this goal, the Black-Faced Spoonbill recycled plastic fountain pen was introduced.

We used recycled office waste, such as printers and phones, which were disassembled, crushed, mixed, pelletized and turned into rABS plastic by our partnered vendor, and were then sent to a pen manufacturer that used the injection molding process. In 2020, this product successfully went into mass production. The packaging box of this product is made from recycled pulp and can be used as a pencil case. The string and silicon ring on the box are both recyclable. With the intention of being ‘‘green and sustainable’’, we have revitalized an old, established brand, giving it new value.

Efficiency of Circular Economy & Company Vision

As soon as the Black-Faced Spoonbill recycled plastic fountain pen was launched onto the market, it gained the favor of art and cultural circles and environmental protection institutions. It won the Golden Pen Award at the 2020 Creative Expo Taiwan. It then became available in outlets such as Songshan Cultural and Creative Park (Design Pin), Tsutaya Bookstore and Eslite Bookstore. Recently it was introduced to Eslite Bookstore in Hong Kong by its distributor, further helping to raise the profile of Taiwanese sustainable products. In addition, it has entered the market of customized gifts and giveaways.

有機化學資源

坤璜企業股份有限公司

公司簡介

坤璜企業股份有限公司成立於1962年，成立之初公司產品由初期的PU發泡裁切加工為主，並於1970年轉型為專業PU泡綿發泡工廠，並在1987年研發出吸汗、透氣、除臭特性與防黴抑菌功能之POLIYOU®發泡透氣鞋材，並取得中華民國及多國專利與商標註冊，目前專利POLIYOU®發泡透氣鞋材產品已行銷超過36國，並且長期成為知名品牌採用，為了致力於產品多元化及卓越品質，且滿足消費者舒適健康的最終品質需求，公司不斷在品質、研發、管理上努力，榮獲ISO9001國際品保認證；並於2020年取得全球回收標準認證(Global Recycled Standard 4.0)，回收比例高達85%。

製程說明及推動資源循環作法

最主要是回收PU發泡廠及家俱廠邊角料，回收後經過挑碎、打碎、發泡等程序，再生成為鞋材的料源。

推動資源循環效益及未來展望

a.效益:

a)每年回收廢泡綿約311公噸，減少處理事業廢棄物成本(含運)約NTD 232萬/年。

b)生產POLIYOU®每年營收4,249萬/年。

b. 未來展望:

回收下游廠商事業廢棄物再利用，製造新產品作為其他產業用每年約20噸/年。

Company introduction

Kun Huang Enterprise Co., Ltd was established by Mr. Kun Huang Chang in 1962 and gained the good reputation with its reliable quality. Presently, the company is under the management of Mr. Chris Chang, who handles the company to be a professional insole and PU compound manufacturer with varies products in the field. Kun Huang also built its registered "POLIYOU®" brand name and supplied to consumers more and more products. Kun Huang has won the ISO-9001 certification with their continuous efforts in quality, researching and managing development. Also get certification of GRS 4.0 (Global Recycled Standard 4.0) since 2020, the recycled percentage reach to 85%.

Process description and promotion of circular economy practices

Our main resource is from the waste of PU foaming and furniture factory , we collect the waste , smash to be pieces , combine PU raw material to foaming POLIYOU® block and cut according to different requirement.

Benefits of promoting circular economy and future prospects

*Benefits
a) Recycled scrap of PU sponge about 311 tons a year and reduce the cost NTD 2.32 million a year to deal with the industry waste
b) Annual revenue of NTD 42.49 million / year from POLIYOU® Production.
*Future prospects
Recycling industry waste from downstream manufacturers for reuse, and produce new products for applied in other industries about 20 tons per year.

有機化學資源

隆順綠能科技股份有限公司

公司簡介

隆順綠能科技股份有限公司係由國立高雄科技大學環工博士研究團隊所創立，專業領域為各種固體廢棄物處理、再利用及資源化之環保事業；隆順綠能以自有專利技術設立固體再生燃料(Solid Recovered Fuel, SRF)製造廠，以再利用模式將回收舊衣及廢塑膠轉製成SRF，SRF產品可供給鍋爐應用廠商做為減煤減碳所需之替代燃料，此技術一方面可將目前去化管道窒礙之廢棄物予以能源化，延續其生命週期、創造再利用價值，另一方面具體落實循環經濟理念，符合國家獎勵政策方向，亦響應國際社會對再生能源之倡議。公司目前於台南柳營科技工業區設立SRF生產製造廠，以舊衣、廢紡織纖維及廢混合塑料等為原料製成具能源價值、可替代煤炭之燃料棒，工廠已於2020年8月取得工廠登記證，成為台灣第一家以「SRF製造廠」登記之合法工廠，可合法收取資收物並製成燃料販售，並於2021年2月取得R類廢棄物再利用許可，合法收取相關廢棄物製成燃料棒。

製程說明及推動資源循環作法

貿易商、回收商及成衣廠將舊衣物、混合廢塑膠等物料，送至我司SRF廠(支付入廠費用)，經我司專有製程技術將這些舊衣物及混合廢塑膠來料轉製成燃料棒，再提供給鍋爐應用廠家。

推動資源循環效益及未來展望

台灣每個月丟棄的舊衣量約5000噸，一年累積下來超過6萬噸，近年來國內多數焚化爐面臨老舊、歲修、處理量能萎縮等問題，本廠再利用方法係將事業機構產出廢塑膠混合物與廢紡織品透過破碎、粉碎後，使物料尺寸大小一致、性質更為均勻，再以壓縮成型造棒機將物料壓縮造棒製成固體再生燃料(SRF)，本廠所產製SRF產品可供鍋爐使用者作為取代傳統化石燃料(如煤炭)之替代燃料。本廠今年目標達到SRF年產量5萬噸，對上游產業鏈而言，即每年減少5萬噸之高熱值廢棄物送往焚化爐處理，可大幅減緩焚化爐處理負荷，對下游產業鏈而言，即減少了5萬噸之傳統燃煤之使用，除降低燃料採購成本外，亦有效減少了使用燃煤所產生之碳排，此部分之改善效益係發生於產業鏈上、下游之相關業者中。

未來中期目標為規劃興建SRF二廠，以因應市場上對再生燃料日益提高之需求，長期目標則規劃於計有SRF產能基礎上擴增再生能源發電廠，以SRF製造廠加再生能源發電廠作為可閉環之循環模式，建立完整經濟及市場循環。

Introduction

Long Shun Energy Technology Ltd. was founded by a PhD research team in Environmental Engineering at the National Kaohsiung University of Science and Technology; it specializes in environmental protection-related business, such as the treatment, recycling and resource recovery of solid waste in various forms. With its patented technology, Long Shun has established a manufacturing plant for Solid Recovery Fuel (SRF) that uses its recycling model to convert discarded clothing and plastic waste into SRF. The SRF product can be used by companies that adopt boiler technology as an alternative fuel as a way to reduce coal usage and carbon emissions. On the one hand, this technology can treat waste that is currently difficult to dispose of and turn it into energy, prolonging its life cycle and generating recycling value; on the other hand, it realizes the concept of a circular economy, in accordance with incentivized national policies as well as the international community's advocacy of renewable energy. Based in Liuying Technology Industrial Park in Tainan, Long Shun's SFR manufacturing plant uses old clothing, waste textile fabrics and mixed plastics as the raw materials to produce fuel rods that have energy value and can be a substitute for coal. The plant obtained its registration license in August 2020, becoming the first legal plant in Taiwan to be registered under ''SRF manufacturing plants''. It can legally collect recycled items and convert them into fuel for sale. In February 2021, the plant obtained approval for recycling R-type waste, which means that it can legally collect such waste and turn it into fuel rods.

Manufacturing Process and Circular Economy Practices

Trading companies, recycling operators and clothing manufacturers send waste clothing and waste plastic mixture to LongShun's SRF plant (a plant entry charge is payable). Long Shun uses its proprietary manufacturing process and technology to transform the waste clothing and plastic mixture into fuel rods, which are then provided to companies that utilize boiler technology.

Efficiency of Circular Economy & Company Vision

Each month, approximately 5,000 tons of clothes are thrown away in Taiwan, which amounts to over 60,000 tons a year. Over recent years, many incinerators have faced a number of challenges, such as wear and tear, the need for regular maintenance and repair, and dwindling processing capacity. Our plant's recycling approach is to crunch and crush waste plastic mixture and textiles generated by businesses—an approach which gives these materials a consistent size and properties—before compressing them with compression molding machines into the SRF rods. Long Shun's SRF products can serve as a substitute for traditional fossil fuels (for example, coal) for companies that use boilers. Our target for this year is to achieve a production volume of 50,000 tons of SRF. For the upstream part of the industrial chain, this means reducing the amount of waste with high calorific value that is sent to and processed by incinerators by 50,000 tons. This will significantly ease the burden placed on the incinerators. Meanwhile, for the downstream part of the industrial chain, the burning of 50,000 tons of coal can be avoided, and significant savings can be made in terms of the purchasing costs of coal. In addition, carbon emissions from the burning of coal can be effectively minimized. The benefits from such improvements can be seen in relevant companies in both the upstream and downstream parts of the industrial chain. Long Shun's mid-term goal is to build a second SRF production plant in response to the growing demand in SRF market, and our long-term goal is to build a renewable energy power plant which generates electricity by using our own SFR, as well as to generate modular output with our SRF plant and renewable power plant, and build a complete sustainable cycle based on a circular economy.

衣纖木主要目的在於解決先前無法將PET/PET及棉混紡之衣服、布料回收再利用的問題。雄材大智以獨創技術將PE及PET混煉，再把PET/PET及棉混紡之衣服/布料破碎成2公分大小的碎片，融合兩者後製成衣纖木粒子，最後擠出成板材。將布料纖維融入衣纖木後，不但提升了結構性、耐重性、和耐候性，也大幅提升使用壽命。因克服了木材與傳統塑木的吸水問題，吸水膨脹/脫水乾裂等變形問題同時得到解決。又因使用材料中不含木粉，亦不會有蟲蛀/發霉等現象。

除了讓環境變安全，衣纖木同時兼顧人體安全。在檢測報告中顯示，衣纖木完全不含甲醛，TVOC，重金屬，或其他有害於人體之物質。另外，阻燃等級達B1，防滑等級達R11。故除了使用於戶外設施，作為室內使用也非常安全。

最後，衣纖木不同於傳統塑木。傳統塑木雖可取代木材的使用，降低樹木消耗。但損壞/替換後的塑木無法回收再利用，只能以廢棄方式焚燒處理，故為一次性的產品。但衣纖木可循環使用，即使經過4次再造，其物性仍高過國家標準。衣纖木是真正做到節能減碳，可循環使用的環保材料。

EF Wood is the solution to pollution caused by wasted clothes made from PET and cotton material. With our patented technology, we successfully combine PE and PET to create a new kind of plastic particles. After we shred the clothes in to 2-cenimeter pieces, we mix the clothes pieces and the particles to produce EF Wood. With the cloth fibre, EF Wood has stronger structure, weight capacity, weather resistance, and longer life time. Since there is no wood powder in EF Wood, it will no deform due to weather conditions. Moreover, it is also moth and mold resistant.

EF Wood is also very safe to human body. From our test reports, neither Formaldehyde, TVOC, heavy metal, nor other hazardous substance are detected. Furthermore, EF Wood is level B fl flame resistant, and level R11 slip resistant. It not only fits for outdoor usage, but also a great option for indoor material.

Last but not least, compare with that WPC is a one-time use product and has to be incinerated after removed, EF Wood is 100% recyclable and the physical properties is still beyond national standard after 4 times of remake, which is a better option for energy saving and carbon reduction than WPC.

有機化學資源

環佳科技股份有限公司

公司簡介

我們習慣在產品設計的開始就納入環保的元素以及大眾化的經濟材料。在深耕緩衝包材多年的2022年，順著循環經濟的潮流，我們持續領先同業在這個產業中引領風騷，並且透過〔熱愛地球 關懷世人〕 的核心理念作為行為準則致力於環保節能，除了提供給使用者最佳的產品效益外，AirSaver產品銷售的部份所得，也不定期捐獻於慈善機構，並用於環境、教育、醫療以及貧困救助。

製程說明及推動資源循環作法

我們的緩衝氣墊產品使用30%的可回收材料，是符合現代環保的概念產品。節省材料，提高空間利用率，是我們區別於傳統包材的地方。單一材質的緩衝氣墊是一款符合現代環保的概念性商品，與傳統的緩衝材料不同的是在材料以及空間的改善使用。可回到生活中的循環系統達到再利用是選用單一材質的主要目地，不僅可促進環境的永續發展，在使用上也更有效的節省原料的使用。

推動資源循環效益及未來展望

我們對於未來持續性的發計劃，逐步將現有客戶進行環保產品的推廣並更換為30%環保再生緩衝氣墊，以目前567.35%的成長動能，2021年第四季已達成國內外客戶8家品牌商，營業額2000萬的目標。

展望2022年，依循【行政院環保署】- [網購包裝減量指引]草案推行成效，預計將國內現有客戶70%使用材質推介使用為30%環保再生料，國外客戶也可大幅增加環保再生緩衝氣墊的使用意願。

將緩衝氣墊的材質修正為30%環保再生緩衝氣墊產品，我司就材質上的修正開發導入環保概念，在推動資源循環措施後的第一個年度，對於社會的貢獻來自於環境友善關懷的推廣與發表層面，參加【新塑膠經濟．永續新趨勢－ 新塑膠經濟全球承諾與再生料發展趨勢研討會】，以專業廠商的角度跟與會的產、官、學同業進行成果發表與分享。而在經濟層面上所發展出來的社會效益目前還在等待發酵出預期的果實。

ECOPLUS was founded in 2010, and is used to incorporate environmentally friendly elements and popular economic materials with our products at the beginning of design.

After cultivating Air Bags for many years, this year (2022), ECOPLUS continues leading the industry to keep up on the trend of circular economy nowadays. Through the core value of "Love the Earth and Care for the People" as our management standard , ECOPLUS continues committing to environmental protection and energy saving. In addition to providing the best product benefits for our users, ECOPLUS donates part of the income from our AirSaver sale to not only charities but also to the four main purpose "environment, education, medical care and poverty relief".

Our Air Bags using 30% of recyclable materials, is a conceptual product that is in line with modern environmental protection. Saving materials and improving the usage of spaces is what we are different from the traditional Air Bags. The main purpose of why we use single materials is to achieve the recycling system cycle, In this way, not only can we continues promoting the sustainability of the environmental development, but also keep up on saving the use of raw materials more effectively and efficiently.

Following by the "Minimization of Online Shopping Packaging" guideline of the Environmental Protection Administration Executive Yuan, we are not only planning to aggressively introduce the 30% Recyclable Filling Inflatable Protective Roll to customers in Taiwan but also introduce it to the overseas customers for the year 2022.
The followings are the actions that we will take and focus
We are planning to launch more category of Air cushioning film which made of 30% recycled plastic material to actively respond to environmental protection.
We are willing to share the experiences and performance for industry government cooperation

有機化學資源

挑品國際股份有限公司

「picupi挑品」挑品國際股份有限公司是台灣第一個致力於面向公眾倡導一種新的永續時尚/設計和綠色生活型態的推廣平台。「picupi挑品」扮演策展、活動規畫及永續顧問的推廣角色，以循環經濟方法整合台灣時尚產業鏈，為企業打造符合永續精神的行銷規劃及置入永續理念之產品製造方法，通過多元的方式，跨足平台合作、接觸不同族群，嘗試著打破只有同溫層的推動，讓更多消費者理解何謂永續並逐步在生活中實踐。

「picupi挑品」這兩三年持續關注台灣紡織廠庫存布料的去化動向。後疫情時代，找到人類與環境之間的共好永續方法是必要的，而啟動了以「零庫存」、「零廢棄」為目標，使用台灣紡織廠庫存布和廢棄布生產製造　　—「穿上改變WEARING CHANGE」商品企劃。

從材料源頭溯起，在設計企畫和製造商品過程中，以商業模式活化紡織品閒置資源，運用了取得bluesign®認證、國際知名內衣品牌指定下單的台灣隱形冠軍紡織廠—達紡企業，之最高等級A級研發，製程打樣或生產過剩造成的庫存機能布料製作女性內褲（00褲），並推出集資計畫，落實有需求才生產的產品零庫存。還回收利用多家紡織廠檢樣測試的廢棄下腳料，製作可重複使用的物流包裝袋，並邀請全家便利商店一起挑戰「零庫存、零廢棄」的具體減塑行動，達到資源再利用之目的。

「picupi挑品」所倡議的循環設計方法須符合聯合國17項可持續發展目標SDGs 的核心原則 ： 負責任的生產、環境保護和應對氣候變遷，同時促進經濟繁榮和滿足社會需求。以創造力、系統思考、可持續方式的原型和社會企業家精神，激發靈感，找到生態系統創新模式，制訂改變時尚/設計產業的原則和一個新的常態標準。

Picupi is the first promotional platform in Taiwan aimed at advocating a new sustainable approach to fashion/design and green living. Picupi has played an important role in efforts to promote circular economy practices in Taiwan's fashion industry, arranging exhibitions and providing sustainability consulting services. In addition to proposing a marketing strategy that conforms to sustainable ideals, the company has devised various manufacturing methods to enable enterprises to integrate sustainable concepts into their operations. Through diverse approaches, cross-platform collaboration, and outreach to various sections of society, Picupi strives to promote the concept of sustainability beyond the echo chamber, making sustainable living more widely understood among consumers and an integral part of their daily lives.

Over the past two to three years, Picupi has been paying close attention to the trends of stock fabric consumption in Taiwanese textile mills. In the post-pandemic era, it's essential to find a way for human beings to live more sustainably. Therefore, with the twin aims of zero stock and zero waste, Picupi started the "Wearing Change" product plan, using stock fabrics and discarded fabrics from Taiwanese textile mills.

Having firstly traced the origin of the material, Picupi activates idle textile resources, adhering to its business model through the processes of proposal, design and production, using stock fabric to manufacture bluesign®-certified women's underwear. It has launched a crowd-funding initiative to promote the concept of "zero inventory", whereby goods are only produced when there is demand for them. Picupi also recycles and transforms discarded fabrics from textile mills into reusable logistics packaging bags, in cooperation with FamilyMart TW.

It is imperative that the circular design methods proposed by Picupi comply with the core principles of the following UN Sustainable Development Goals (SDGs): #12, "Ensure sustainable consumption and production patterns"; #13, "Take urgent action to combat climate change and its impacts"; and #17, "Strengthen the means of imple mentation and revitalize the global partnership for sustainable development" to foster economic prosperity and meet the needs of society. Picupi believes in being inspired to find an innovation ecosystem model through creativity, systems thinking, prototypes of sustainability, and social entrepreneurship to formulate principles that bring about the transformation of the fashion/design industry and set a new normal standard.

有機化學資源

華新麗華股份有限公司

台中分公司

公司簡介

華新麗華股份有限公司創立於1966年，以資本額新臺幣三千萬、生產電線電纜起步，目前華新麗華已是大中華區電線電纜及不銹鋼產業領導廠商，同時成功跨足商貿地產與科技產業投資的國際化企業。

製程說明及推動循環經濟做法

為提升資源循環利用率，降低營運對環境的衝擊，華新麗華臺中廠自2015年引進廢酸再生系統(ARP) 及廢混酸清洗水再生系統(ZEMAP)，至今已有顯著成效。在不銹鋼的加工過程中，有一段酸洗製程，其須將硝酸和氫氟酸做為酸洗混合液使用，而使用過的廢酸中含有與不銹鋼成分相似的金屬，藉由ARP及ZEMAP，可回收氫氟酸、硝酸及產出氧化金屬粉以外，並降低廢水廠處理量及廢污泥的產出。除可降低對環境的影響污染外，同時也正式邁向循環經濟並創造營運效益的新模式。

推動循環經濟效益及未來展望

2019年台中總原物料節省效益為2.71億元，包括氫氟酸採購成本、硝酸採購成本及廢棄物清除處理成本…等；未來應持續執行南酸中運（鹽水廠產出之廢酸送至台中廠做ARP處理），並改善設備瓶頸，提升ARP 處理量。

Company Introduction

Walsin Lihwa Corporation was founded in 1966 with NT$30 million in capital, and started out as a manufacturer of wire and cable. Walsin Lihwa is currently the leader of the wire and cable and stainless steel industry in Greater China, and is an international enterprise that has successfully entered the real estate business and made investments in the technology industry.

Production Process

In order to increase the reuse of resources and decrease its impact on the environment, the Taichung site of Walsin Lihwa established its Acid Regeneration Plant (ARP) and Zero Effluent Mixed Acid Pickling (ZEMAP) facility in 2015. During their processing, stainless steels are subjected to a pickling process whereby mixtures of nitric acid (HNO3) and hydrofluoric acid (HF) are used as pickling agents. The waste acid contains metals with a composition similar to stainless steel. With ARP and ZEMAP, it is possible to recover not only the precious matter from the waste acids, including hydrofluoric acid (HF) and nitric acid (HNO3) in the form of reusable mixed acid, but also the metals in the form of metal oxides. Additionally, these facilities can also reduce the volume of waste water and waste sludge. In this way, Walsin Lihwa Corporation is moving towards a circular economy.

Effectiveness of Circular Economy

The total cost saving from the non-use of raw materials at the Taichung site in 2019 was NT$271 million; this figure even takes into account the purchasing costs of hydrofluoric acid (HF) and nitric acid (HNO3), and the cost of waste management, among other things,. We will continue to increase the processing capacity of ARP in terms of acid recycling and regeneration.
.Customer References: Indonesia.

有機化學資源

長春人造樹脂廠股份有限公司

新竹廠

長春人造樹脂股份有限公司，是國內最大之熱硬化性成型材料之製作廠商。自1949年開創至今已七十年，主生產項目有工程塑膠、環氧樹脂封裝材、環氧樹脂、酚醛樹脂、三聚甲醛、福美林、銅面積層板、光阻劑、磷酸三苯酯、耐燃劑與雙酚A等。

PCB業使用塑料板與再利用產品工程塑料特性相近，由研發調整配方，經粉碎做為填料，以做為再利用產品原料，長春公司亦投入很多資源開發各種產品回收再生製程，協助銅箔積層板下游PCB業，處理製程產生的廢塑料板，並將廢塑料板回收再生利用，除了減少客戶端廢棄物產生，亦使資源再生循環利用。

PCB業使用塑料板粉碎成塑料板粉，可做為再利用產品的原料，2020年塑料板再利用量為120公噸/月，2021年會將塑料板再利用量增加至150公噸/月以上，以解決國內PCB業者日益困難的廢棄物處理問題。

Established in 1949, Chang Chun Plastics Co., Ltd. is the largest thermoset molding compound manufacturer in Asia. Chang Chun's products are being continuously developed, and range from upstream products (formalin, paraformaldehyde and related resins, such as phenolic resin and epoxy resin) to various kinds of molding materials, such as PBT compound, epoxy molding encapsulant, mold cleaner, copper clad laminate, photoresists, triphenyl phosphate flame retardant, brominated epoxy flame retardant, glass fiber insulated copper wire, bisphenol A (BPA), and liquid crystal polymers (LCP), among other things.

The constituent elements of the plastic boards used in the PCB industry are similar to those necessary for the production of molding compounds. Following extensive R&D, it has been shown that these plastic boards can be crushed into a powder and used as a raw material for our recycled molding compounds. Chang Chun has invested a great deal of resources in the development of various product recycling processes, and assists manufacturers of copper clad laminate (for PCBs) in dealing with waste plastic boards. Consequently, the recycling of plastic boards helps to reduce industrial waste and promote resource regeneration and recycling.

The waste plastic boards from the PCB industry are crushed into a powder and used in the production of recycled molding compounds. We aim to increase our recycling capacity from 120 tonnes/month in 2020 to 150 tonnes/month in 2021, thereby helping to solve the problem of waste in the PCB industry.

有機化學資源

巨鑫化學股份有限公司

公司簡介

巨鑫化學股份有限公司，1987年成立於高雄，為因應台灣產業之發展與環境保護，致力於污染防治材料之開發。巨鑫為台灣國內極少數擁有活性碳製造與再生技術及廢碳合法再利用的完整廠商。除了通過ISO9001品質管理系統認證之外，也獲得財政部表揚開立統一發票績優廠商殊榮，可說是非常值得信賴合作夥伴。

因應市場需求，於斗六擴大工業區設立兩廠，有相關活性碳生產及全（半）自動化再生設備；目的為提供客戶即時活性碳供應與再生服務與進行活性碳的品質檢驗，協助客戶選用最適切的活性碳品別，並透過回收廢碳、再生代工與供貨，達到兼顧經濟效能縮短交期等全方位服務。

製程說明及推動循環經濟做法

活性碳廣泛應用於各產業、國民經濟部門和日常生活，如氣體淨化、水處理以及工業製程…等多項用途。活性碳飽和或不再達到處理目標，本公司採用對環境較友善的過熱蒸氣再活化再循環使用，再生碳製程一般相較於新碳生產中減少了近80%的溫室氣體排放量（生產1kg新活性碳約產生4.90kg-CO_2；再生1kg約產生0.82kg-CO_2）。通過熱再活化回收活性碳滿足環境需要，盡量減少浪費，減少二氧化碳排放量。

ACRO活性碳再生製程

STEP 1 廢舊碳	回收已使用過之活性碳
STEP 2 乾燥	此時溫度大約為100° C－150° C，低沸點性有機物質脫落水分蒸發
STEP 3 焙燒	此時溫度大約為400° C－600° C，吸著有機物一部分碳化（重縮合），熱分解生成物脫離低沸點有機物質之脫離
STEP 4 賦活	此時溫度大約為850° C－1200 ° C，細孔之碳化物因水蒸氣之賦活而除去，吸著有機物一部分碳化（重縮合）
STEP 5 冷卻	賦活後之降溫
STEP 6 再生碳	再生製程完成

推動循環經濟效益及未來展望

近年來因為碳材料（煤）的減產與環保意識抬頭，活性碳越來越緊缺上漲，巨鑫化學透過碳資源的回收再利用，使用相對環保的物理熱處理模式，減少化學藥劑等對環境的危害，完善的廢氣濃縮集中處理措施避免二次汙染與能源消耗，避免廢棄物處理的汙染也降低再次使用成本。

活性碳回收再利用推動循環經濟效益有主要有以下幾點：

1、碳資源的回收再利用

2、減少能源的消耗

3、更經濟的價格

4、減少溫室氣體二氧化碳排放

未來展望研究發展更多的碳材料與再利用，及高端應用產品以提高附加價值。

Company Introduction

We are a professional company specializing in the manufacture and reactivation of activated carbon. Acro cares about environmental protection and plays an important role in liquid and gas treatment. For over 30 years, Acro has been dedicated to serving the activated carbon industry; it has developed a series of products catering to the needs of a variety of different industries, including Semiconductors, Electronics, Food and Beverages, and other applications, such as water treatment, waste plants, pharmaceuticals, and air and gas purification. We believe that our company is more competitive than others in the market and the quality of the product we offer is unquestionably superior. In response to increasing sales and strong demand in the activated carbon market, we have invested in two plants at Douliu Industrial Park and designed our own fully- or semi-automated equipment for the reactivation process. With the establishment of the factory, we are capable of efficiently serving those customers faced with the problem of used activated carbon and reactivated activated carbon, while also saving costs.

Process Description and Promotion of Circular Economy Practices

Activated carbon has a wide range of uses in daily life and in various economic sectors, such as in gas purification, water treatment and in many industrial processes. If the activated carbon is saturated or fails to reach the treatment target, our company utilizes an environmentally friendly reactivation method for recycling, namely the superheated steam activation method. Compared with the virgin activated carbon production process, the reactivated carbon production process can reduce greenhouse gas emissions by nearly 80%. (Producing 1 kg of virgin activated carbon will produce about 4.90 kg of CO_2, while reactivating 1 kg of spent activated carbon will only produce about 0.82 kg of CO_2). The recycling of activated carbon can meet environmental needs, reducing both waste of resources and carbon dioxide emissions.

Acro Reactivation Process:

STEP 1 Spent activated carbon	The used activated carbon is collected.
STEP 2 Drying	The temperature is around 100-150 °C. Evaporation of water from adsorbed low-boiling organic matter.
STEP 3 Calcinating (Carbonizing)	The temperature is around 400-600 °C. Part of the adsorbed low-boiling organic matter is desorbed; part of the adsorbed organic matter is thermally decomposed and separated.
STEP 4 Reactivating	The temperature is around 850-1200 °C. Part of the adsorbed organic matter is carbonized (condensed); the carbon residue in the pores is removed by activation of water vapor.
STEP 5 Cooling	The temperature is decreased after reactivation.
STEP 6 Reactivation	The process of reactivating activated carbon is complete.

Benefits and Future Prospects

In recent years, due to the reduction in the production of carbon materials (coal) and the raising of environmental awareness, activated carbon has been in short supply, leading to increasing demand and rising prices. Acro Chemical Company recycles carbon resources using recycling technology, and uses relatively environmentally friendly physical heat treatment methods to reduce environmental hazards, such as chemical reagents. Concentrated exhaust gas treatment reduces energy consumption. Complete exhaust gas treatment measures prevent secondary pollution. In order to avoid the pollution caused by the disposal of spent activated carbon, we have implemented comprehensive waste gas treatment measures to avoid secondary pollution, and also reduce the cost of activated carbon use.

Our process of activated carbon recovery and reuse promotes the benefits of a circular economy in the following ways:

1, Recycling of carbon resources
2, Reduction of energy consumption
3, More economical prices
4, Reduction in greenhouse gas emissions

Looking to the future, we shall be committed to further research and development of carbon material recycling and reuse, and other high-end carbon materials.

有機化學資源

台灣汽電共生股份有限公司
官田廠

公司簡介

台灣汽電共生股份有限公司成立於民國81年5月7日，初期以提供技術興建汽電共生系統為主，87年因應官田工業區蒸汽電力需求，獨資興建官田汽電共生廠，提供區域能源整合服務。89年因國內用電需求逐漸成長，台汽電配合政府能源政策，投入天然氣發電廠興建及營運，目前集團天然氣發電量約佔全國電力總裝置容量的5.2%，扮演能源供應之重要角色。

製程說明及推動循環經濟做法

台汽電官田廠為燃煤汽電共生廠，鍋爐設計為循環式流體化床鍋爐。在考量經濟性以及協助政府處理廢輪胎問題，防止廢輪胎任意棄置而造成登革熱蔓延，利用回收廢輪胎做為替代混燒燃料，約可達到總燃料熱量之三成，減少煤炭等化石燃料使用。台汽電一貫以符合法規、友善環境為理念，台汽電官田廠與協力廠商合作申請煤灰再利用，將燃燒製程所產生之煤灰全部運至混凝土廠，將煤灰與水泥原料以適當比例混合，共同開發製成可控制性低強度材料（ Controlled Low Strength Materials ），由於CLSM 具自平性能，故不須滾壓，適用於狹小或機具無法進入之場所，替代土石回填，如管線開挖後回填工程、狹窄的壕溝內回填、路面或建築物下方孔洞的回填。

推動循環經濟效益及未來展望

配合環保署政策，官田廠已向台南市環保局提出申請將廢輪胎膠片之年燃燒許可量由原先的41,310公噸提升為一年53,703公噸，期望未來能突破燃燒技術，提高廢輪胎膠片燃用比例，協助去化更多的廢輪胎，盡己所能為社會及環境做出貢獻。

Company Introduction

Taiwan Cogeneration Co., Ltd. was established on May 7, 1992. Originally, it focused on providing technology to build cogeneration systems. In 1998, in response to the steam power demand of Guantian Industrial Park, it solely funded the construction of Guantian Cogeneration Plant, which provides regional energy integration services. In 2000, due to an increase in domestic electricity demand, Taiwan Cogeneration Co., Ltd., in line with the government's energy policy, invested in the construction and operation of natural gas power plants. At present, the group's natural gas power generation accounts for about 5.2% of the country's total installed capacity, playing an important role in Taiwan’s energy supply.

Process Description and Promotion of Circular Economy Practices

TCC Guantian Plant is a coal-fired cogeneration plant. The boiler is a circulating fluidized bed boiler. As an alternative fuel for co-firing, recycled waste tires can provide about 30% of the total heat value, reducing the use of fossil fuels such as coal. In addition, they have high economic value, and using them in this way can assist the government in dealing with the waste tire problem—preventing the spread of dengue fever caused by their arbitrary disposal. TCC has always striven to comply fully with laws and regulations and to promote environmentally-friendly practices. TCC Guantian Plant has cooperated with third-party manufacturers to apply for authorization to reuse coal ash. All the coal ash produced by the combustion process is transported to a concrete plant, and the coal ash is mixed with the raw materials of cement in an appropriate ratio to produce controlled low-strength material (CLSM). Because CLSM has self-leveling properties, it does not require rolling. It is suitable for narrow or inaccessible places and replaces soil and rock backfills in such places as large pipeline excavation and backfilling works, backfilling of narrow trenches, and backfilling of holes under roads or buildings.

Benefits of Promoting Circular Economy and Future Prospects

In line with the Environmental Protection Agency’s policy, TCC Guantian Plant has submitted an application to the Tainan Environmental Protection Bureau to increase the annual burning permit for waste tires from 41,310 to 53,703 metric tons/year. It is hoped that, in the future, our company will be able to make significant breakthroughs in combustion technology, increase the proportion of waste tires burnt, assist in the removal of more waste tires from the environment, and do our best to contribute to society and the environment as a whole.

有機化學資源

育誠興業有限公司分廠

公司簡介

育誠興業創立於西元2013年，服務項目為塑膠纖維、塑膠製品等製造產業，於製程中產生之下腳料、廢塑膠，作為主要來源，透過粉碎造粒技術，將廢塑膠粉碎、鹼洗、水洗、脫水等程序再製造塑膠產品，其中以分選步驟最為主要，利用浮選程序將不同材質之廢塑膠分選出後，透過射出成型機製作出髮夾與塑膠盒等產品。

製程說明及推動循環經濟做法

將廢塑膠粒及廠內二次廢塑料再利用，藉由粉碎等資源化技術，將回收之寶特瓶等塑膠廢棄物，分選成不同材質之塑膠粒料，再製成各類塑膠產品販售，將廢棄的資源再轉製成產品重新回歸市場獲取利潤，使達到資源化的目標，由於資源循環有效再利用減少了原料使用，且製成產品（例：再生塑膠盒、再生髮夾）仍可回收再利用，減少廢棄物處理成本。

推動循環經濟效益及未來展望

以資源回收後再利用的觀點出發，不僅節省大量廢塑膠處理費用，還能降低原物料採購成本。另外再製廢塑膠粒、再生或再製塑膠產品均可銷售兼具環境保護與經濟循環效益。

Company Introduction

Founded in 2013, Yu Cheng reproduces plastic products from the plastic waste and residue generated by manufacturing industries during the processes of manufacturing plastic fibers and plastic products; it achieves this by means of crushing and pelletization technology that involves procedures such as alkaline cleaning, water rinsing, dehydration of the waste plastics, and the most important procedure, sorting. It utilizes a flotation process to separate waste plastics made from different materials, which are then made into products such as hair clips and plastic boxes, using injection molding machines.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

Yu Cheng upcycles waste plastic pellets and secondary plastic wastes generated in its plant. Implementing resourcization technologies such as crushing, Yu Cheng sorts the recycled PET materials, classifies them into plastic pellets of different kinds and reuses them in the manufacture of different kinds of plastic products. In this way, waste materials can be transformed into useful products and sold on the market for profit. The objective of resourcization has thus been achieved. Because resources have been effectively utilized again, the end products (e.g. plastic boxes and hair clips) can be recycled and upcycled, the use of raw materials can be minimized, and the total cost of waste processing has been reduced.

Promoting the Circular Economy and Future Prospects

Yu Cheng is committed to the concept of recycling and reusing resources. The company has not only saved a significant amount in waste plastic processing fees but has also lowered the procurement costs of raw materials. In addition, the waste plastic pellets or plastic products that have been reproduced or regenerated can be sold on the market. These products are eco-friendly while also helping to promote the circular economy.

有機化學資源

佳億化工企業社二廠

公司簡介

本公司主要進行R-0201廢塑膠在利用事業，廢棄物來源有鋁塑板、PC板和醫療等廢棄物，如洗腎液空桶、點滴注射瓶（袋）、塑膠配件等。

製程說明及推動循環經濟做法

有別於其他的民生廢塑膠再利用，本廠主要為醫療廢塑膠再利用，將廢點滴袋依不同材質依材質單一拆解，透過粉碎、清洗、消毒滅菌後再產製塑膠片，供後端塑膠造粒廠及塑膠製品製造廠製成土地界標、墊塊、質草磚草格等。

推動循環經濟效益及未來展望

傳統粉碎製程除塑膠可再利用外，餘下的鋁、橡膠、紙只能以D-0299廢塑膠混合物送焚化處理，本廠先將鋁及橡膠做第一道拆解工序處理；瓶身(含紙)進粉碎製程進行塑膠及紙分離，以60噸/月點滴瓶計算可減少110噸/年的廢棄物生成。

Company Introduction

Jia E specializes in the upcycling of R-0201 waste plastics. Its sources of waste material are aluminium-plastic panels, PC boards, and waste medical devices such as empty kidney dialysis fluid bottles, IV drip container bags, and various plastic accessories.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

Jia E differientiates itself from other private waste plastic upcycling companies in that it mainly handles medical waste plastics. It separates and disassembles waste IV drip bags according to type of material. These materials are then crushed, cleansed, sterilized and made into plastic sheets, which are provided to plastic pelletization companies and plastic product manufacturers and turned into land boundary markers, spacer blocks, grass-planting bricks, etc.

Economic Effectiveness and Future Plan

With the conventional crushing process, waste plastics are reused, but the leftover aluminium, rubber and paper can only be treated as D-0299 waste plastic compounds and processed by incinerators. The Jia E process begins with disassembling the aluminium and rubber; the bottles (including the paper material) will be included in the crushing process that separates plastics from paper. In one month, 60 metric tons of IV drip bottles can be processed, resulting in a waste reduction of 110 metric tons each year.

有機化學資源

通利有限公司

公司簡介

創立於西元2012年，可將塑膠表面上的標籤雜質、塗層等澈底清除（清除率可達99%），成功將難以處理的廢塑膠產品轉變為可回收利用的塑膠再生料，除了本身生產再生PP、PC、ABS再生塑膠粒之外，也可代工塑膠粉碎、清洗、造粒，幫助客戶降低成本及地球環境減輕負擔，我們的目標是將全台灣的塑膠垃圾轉變為可再利用的塑膠再生料，在真正意義上實現零污染的願景！

製程說明及推動循環經濟做法

藉由高溫熱熔的技術，將塑膠下腳料轉廢製成「再生塑膠粒」，廢棄的資源經轉製成產品（合成樹脂、塑膠及橡膠、再生塑膠粒）可再製成各種塑膠產品販售。其中加熱壓出製程中模具旁所溢出的塑膠料，經粉碎後可再作為原料使用，減少廢棄物產出，降低資源浪費，提升整體效能，使廢棄物資源化達到最佳。

推動循環經濟效益及未來展望

廢塑料再製成產品，有利於資源循環再利用，有助於降低能源消耗，減少原料成本。再製廢塑膠粒、再生或再製塑膠產品均可銷售，獲得經濟效益。

Company Introduction

Tong Li was founded in 2012 and specializes in thoroughly removing impurities such as labels and coatings from the surface of plastic products, achieving a removal rate of as much as 99%. It can turn waste plastic items that are difficult to process into recyclable and reusable plastic materials. In addition to the manufacturing of recycled PP, PC and ABS plastic pellets, Tong Li offers contract manufacturing services of plastics crushing, cleansing and pelletization, helping its customers to lower costs and alleviate the burden on the environment. Our goal is to turn the plastic waste across Taiwan into reusable plastic materials and truly realize the vision of zero pollution!

How can Waste be Re-utilized using Circular Economy Practices?

Tong Li uses heat-melting technology to turn leftover plastic materials into upcycled plastic pellets. The products created from waste material, such as synthetic resin, plastics, rubber and upcycled plastic pellets, can be further made into all kinds for plastic products available for purchase. The plastic material overflow from the molds (resulting from the heat press process) can be crushed and made into raw materials for other products. By doing so, Tong Li minimizes the amount of waste generated, increases the overall efficiency of the operation, and optimizes the resourcization of waste.

Promoting the Circular Economy and Future Prospects

Turning waste plastics into products is a prime example of effective recycling of resources, helping to lower energy consumption and material costs. In addition, the upcycled plastic pellets or products can be sold, thereby generating economic value.

有機化學資源

惠豐化工廠股份有限公司

公司簡介

惠豐化工廠股份有限公司，成立於民國60年，主要的營業項目有：1.無機鹽類的製造及銷售，例如正矽酸鈉、醋酸鈉、硝酸鈉、氟矽酸鈉等；2.廢棄物（如廢氫氟酸、廢磷酸等）再利用處理；3.磷酸、硝酸、氫氟酸硝酸混合液等無機酸的生產製造。

製程說明及推動循環經濟做法

為實現產業的在地化及順應綠色循環經濟的世界潮流，本公司發明一項從含氫氟酸(HF)廢液中回收氟的專利，並於民國99年取得政府HF廢液通案再利用許可。簡單來說，我們在含HF廢液中加入含矽化合物與含鈉或鉀之化合物，使該廢液中的HF反應生成氟矽酸鈉或氟矽酸鉀的氟矽酸鹽沉澱物，再進一步將此氟矽酸鹽沉澱物自廢液溶液中分離出來，達到回收氟之目的。另外，我們也依廢液成分調整製程，生產HF與其他酸的混合液。本公司亦有從事廢磷酸的再利用處理，充分落實循環經濟的精神。

推動循環經濟效益及未來展望

高科技產業帶動了台灣的經濟發展，創造了數以萬計的就業機會。然而，伴隨而來的污染物質將會對環境造成嚴重的衝擊。

本公司自民國99年首次取得HF廢液通案再利用許可以來，歷經數次展延，目前仍在進行HF通案再利用。為因應各事業機構製程調整部份HF廢液的成份，於民國106年申請增加再利用產品HF+HNO_3混合液，之後更於民國109年申請增加再利用產品HNO_3及$Ca(NO_3)_2$。展望未來，本公司將繼續研發新的再利用製程，回收廢液中其他的有害物質，創造經濟發展及環境維護雙贏的局面。

Company Introduction

Hiforce Chemicals Co., Ltd. is engaged in the provision of industrial raw materials, such as sodium orthosilicate, sodium nitrate, sodium acetate and sodium silicofluoride. It also develops technologies for recovering phosphoric acid, fluoride, hydrofluoric acid and nitric acid from various types of industrial wastewater. The company was founded in 1971 and is headquartered in Hsinchu, Taiwan.

Process Description and Prmotion of Circular Economy Practices

In order to comply with the global trend towards green circular economies, our company's main focus is the recovery of fluoride from waste hydrofluoric acid (HF). We developed a method patented in 2010 to produce fluorosilicate using industrial wastewater containing HF. The method involves converting HF to fluorosilicate by adding silicon sources and potassium or sodium salts into the wastewater. The production process can also be modified according to the content of the wastewater to generate mixed acids containing HF and other acids frequently used in etchants. To give a further example of a circular economy model, our company is also involved in the recovery of phosphoric acid, acetate and nitrate from industrial wastewater.

Achievements and Future Prospects

A circular economy is one of the solutions to environmental problems caused by human activity. We have successfully incorporated the principles of a circular economy into our businesses for years by turning hazardous substances in industrial wastewater into products with high added value. We are currently developing methods for recovering many other harmful substances, including nitrate and ammonium, from wastewater so that it can be discharged into the natural environment. Hiforce Chemicals will continue to be committed to supporting green economics and contributing to both economic growth and sustainability.

有機化學資源

中國炭素工業股份有限公司

中國炭素工業股份有限公司

公司簡介

成立於1964年，為國內首屈一指之活性炭製造公司，專司空氣污染防治、廢水處理、純水處理、製程脫色等產品製造，並提供活性炭專業更換施工、廢活性炭再生加工、活性炭相關諮詢等多面向服務，創造除活性炭販售外之附加價值。

製程說明及推動循環經濟做法

將廢活性炭運用獨特的再生技術，使之重新賦予活性，藉由可不斷重複利用特性，達到環保與節能減碳。

以變廢為寶、貢獻社會、美化環境為服務宗旨，創業至今一直致力於廢炭的回收服務，如何使廢炭減量化、資源化是我們一直努力的方向。除廢活性碳可再利用外，為促進循環經濟，亦整合一條龍代工服務，從產品選購、更換、施工、裝填、清運與再利用、品檢皆包辦，依客戶需求量身訂做，讓客戶對於活性碳使用、清除與處理更有保障。

推動循環經濟效益及未來展望

一噸飽和活性碳廢棄物被焚燒掉，則相當於對大氣釋放0.128噸二氧化碳，製成一噸的優質活性碳，需要消耗8噸木材或者8噸原煤，活性碳的再生可以大量減少對資源的消耗，減少大氣污染，降低能源浪費。活性炭套用範圍日趨廣泛，但是因活性碳在使用過程中容易飽和而失去吸附能力，故必須經常替換以達到最佳使用效果。

G-306-4070

G-840-4x8MESH

G-840-8x30MESH

G-840AC-12x30MESH

Company Introduction

Founded in 1964, China Activated Carbon Industries Ltd. is Taiwan's leading manufacturer of activated carbon, specializing in products for air pollution prevention, waste water treatment and decolorization in the manufacturing process. It also offers additional professional services, namely the installation and replacement of activated carbon, the upcycling and processing of waste activated carbon, and activated carbon consultation services; thus, additional value is created on top of sales of activated carbon.

How can Waste be Re-utilized using Circular Economy Practices?

China Activated Carbon adopts unique regeneration technologies to reactivate waste activated carbon. Because the activated carbon can be reused again and again, China Activated Carbon is able to protect the environment, save energy and reduce carbon emissions. Its purposes are to turn waste into valuable products, make contributions to society and improve the environment. Since its establishment, the company has committed itself wholeheartedly to recycling and reducing waste carbon and converting it into useful resources. In addition to reusing waste activated carbon, in a drive to promote the circular economy it also integrates various one-stop OEM services, encompassing product selection, replacement, installation, filling, removal, upcycling and quality inspection. It tailors its services to its customers' requirements to ensure that its customers can effectively use, remove and process activated carbon.

Promoting the Circular Economy and Future Prospects

Burning 1 metric ton of saturated activated carbon waste emits 0.128 metric tons of carbon dioxide. To produce 1 metric ton of premium quality activated carbon requires the consumption of 8 metric tons of timber or raw coal. Regenerating activated carbon will significantly reduce the consumption of resources, avoid atmospheric pollution and minimize the wasting of energy. The scope of activated carbon applications is becoming more and more extensive. However, as the activated carbon becomes easily saturated during use and thus loses its adsorption capacity, it is necessary to replace activated carbon regularly for optimal effectiveness.

有機化學資源

環拓科技股份有限公司

屏南一廠

公司簡介

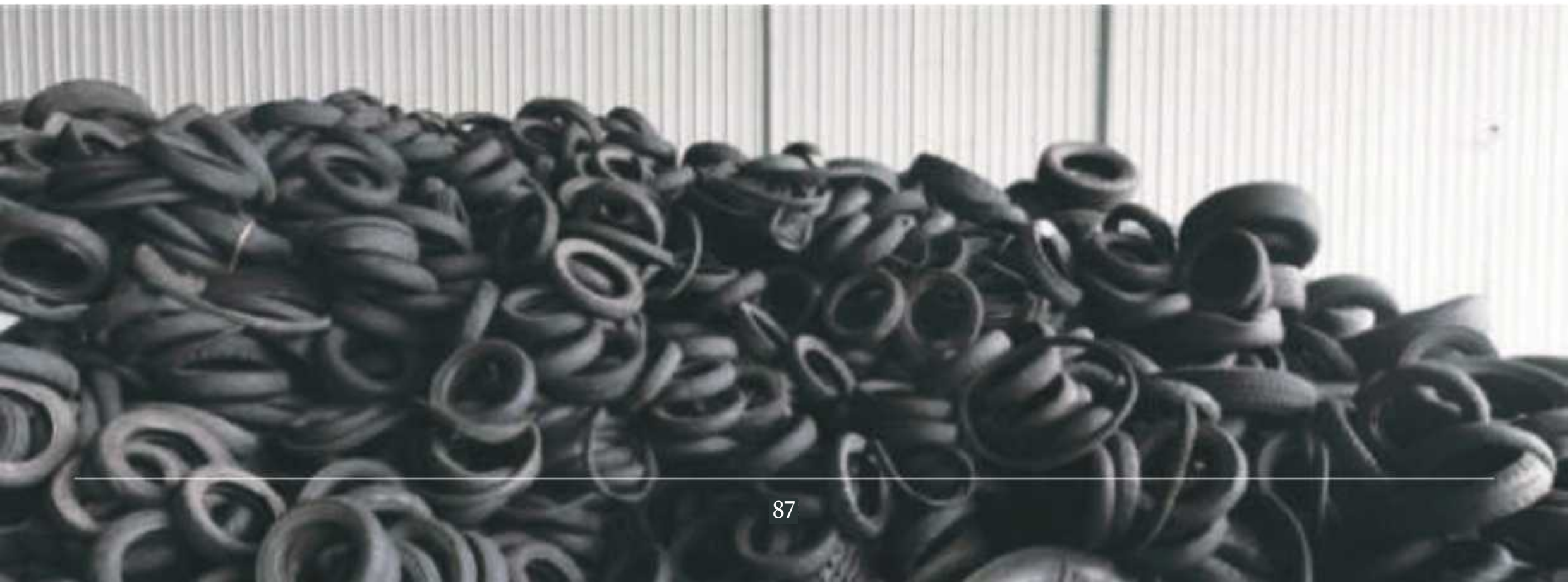
擁有全世界獨家創新的熱裂解技術專利，致力於廢塑膠、橡膠、有機廢棄物熱裂解資源回收處理，及土壤熱脫附處理技術開發與應用。提供有機廢棄物熱裂解及熱處理系統專業設計、設備建造施工、製程操作與品管技術。

製程說明及推動循環經濟做法

以廢棄輪胎裂解技術結合輪胎製造廠之商業模式，將廢輪胎裂解技術導入綠色循環經濟概念，透過產品與商業模式的創新，並與市面上高效率、低成本，線性製造的商品競爭。以台灣獨創的熱裂解技術，將廢棄資源有效再生成產業所需之原料，同時整合台灣橡膠產業鏈，依循環經濟生產模式充分使用低碳再生原料，達到低碳生產的目標，降低台灣能資源的需求量，建構廢橡膠及廢輪胎資源再生中心，結合台灣現有產業鏈的優勢，讓橡膠資源生生不息。

推動循環經濟效益及未來展望

•熱能/蒸氣：燃燒裂解所產出之熱能轉換為蒸氣，供給周邊輪胎廠或化工廠。
•環保碳黑：可做為色母粒之原料，或回售給輪胎製造商作為碳黑原料使用，減少輪胎廠使用石化燃料所產出之碳黑，並從而降低二氧化碳的排放。
•再生油品：以低於市面上低硫燃料油之價格，提供客戶符合低碳經濟之綠色能源。



Company Introduction

Enrestec owns the exclusive patent for its innovative pyrolysis technology. It is committed to the recycling and processing of waste plastics, rubber and organic waste using thermal decomposition, as well as the development and application of thermal desorption technology for soil. Professional services offered by Enrestec include the designing of pyrolysis and heat processing systems for organic waste, the building and installation of facilities, and the implementation of various processing operations and quality control technologies.

How can Waste be Re-utilized using Circular Economy Practices?

Enrestec has introduced scrap tire pyrolysis technology into the business models of tire manufacturers, integrating this technology with the concept of a green and circular economy. With its innovative products and business model, it is able to compete with other market players who offer products based on highly efficient, low-cost and linear manufacturing processes. Enrestec's pyrolysis technology—the only example of its kind in Taiwan—upcycles waste into the raw materials required for various industries. At the same time, it integrates with the rubber industry chain in Taiwan. The operation follows a circular economy production model and fully utilizes low-carbon, renewable raw materials, enabling the company to realize its goal of low-carbon manufacturing. Hence, in establishing a center for upcycling waste rubber and tires, Enrestec can play its part in lowering the consumption demand of resources and energy in Taiwan; furthermore, it can make use of the advantages of Taiwan's existing industry chains to ensure that rubber resources will continue to be plentiful.

Promoting the Circular Economy and Future Prospects

- Heat/Steam: the heat generated during the pyrolysis process is converted into steam which can be supplied to tire or chemical plants.
- Eco-friendly Carbon Black: this can be used as a raw material for color masterbatch, or sold back to tire manufacturers for use as raw material in the manufacturing process. This will minimize the amount of carbon black that is generated by the burning of fossil fuels in tire factories, and will further reduce carbon dioxide emissions.
- Recycled oil: Enrestec offers its clients recycled oil (at a market price lower than that of low-sulphur fuel oil) as an alternative and green energy source that meets the requirements of a low-carbon economy.

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
台灣鋼聯股份有限公司	煉鋼業廢棄物再利用	110 ★★	
綠電再生股份有限公司	廢電子電器回收	110 ★★	
金益鼎企業股份有限公司	電子廢棄物回收	109 ★★	
惠嘉電實業股份有限公司	廢電子電器回收 廢塑膠再利用	本廠 109 ★★ 六廠 107 ★	
中鋼公司	製程副產物收集再加工	107 ★★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
中國砂輪企業股份有限公司鶯歌廠	廢樹脂砂輪回收	107 ★★	
中鋼鋁業股份有限公司臨海廠	廢鋁及廢鋅回收	107 ★★	
美琪瑪國際股份有限公司觀音廠	廢鈷錳觸媒回收	107 ★★	
翰金科技股份有限公司	重金屬廢水回收	109 ★	
優勝奈米科技股份有限公司	貴金屬回收	109 ★	

非金屬殘渣資源

台灣鋼聯股份有限公司

台灣鋼聯股份有限公司配合政府環保政策，將電弧爐煉鋼業所產生之有害事業廢棄物集塵灰予以再利用，除可有效解決國內電弧爐煉鋼業集塵灰之處置問題，再以旋轉窯高溫冶煉技術將集塵灰中之鋅 (Zn約25%) 、鉛等有價資源物回收製成「粗氧化鋅Crude Zinc Oxide (Zn約58%)」產品，銷售給國外冶煉廠或化工廠製成純金屬鋅錠產品（Zn 99.995%）或高純度氧化鋅產品（ZnO 98%），再轉售給國內鍍鋅、輪胎、橡膠業者重新製作成鍍鋅建築材料或相關民生消費品，完成台灣廢鐵循環經濟社會中另一項重要之「金屬鋅生命週期循環」。

本公司製程之最終產物旋轉窯爐碴係屬性質安定且可100%再利用之一般事業廢棄物，為「經濟部事業廢棄物再利用管理辦法」所列之35號公告可再利用旋轉窯爐碴，故本公司爐碴係委由100%持股子公司「台鋼資源股份有限公司」或合法再利用業者做為水泥原料、水泥製品混凝土粒料、瀝青混凝土粒料、瀝青混凝土粒料原料、非結構性混凝土粒料原料或鋪面工程之基層、底層級配粒料原料，達成「零廢棄物」經營理念目標。

Taiwan Steel Union Co., Ltd. follows government environmental policy and recycles the hazardous industrial waste of dusts generated from Electronic Arc Furnace actively. Not only It may effectively solve the problem of Electronic Arc Furnace Dust (EAFD) treatment, but also can recycle zinc, lead and other valuable materials from EAFD (Zinc content about 25%) and make Crude Zinc Oxide (Zinc content about 58%) product by the Walze Kiln Smelting Process. Those Crude Zinc Oxide Products will be sold to foreign zinc smelters and chemical factories, and further process to make them into Zinc Ingots (Zinc content 99.995%) or high purity Zinc Oxide product(ZnO 98%). And those products will be resold to domestic compaies such as steel galvanizing plant, tire, and rubber companies to produce galvanized construction materials or consumer goods. By doing this, one of the important step of Taiwan scarp circular economy society-'' Zinc metal life circle''- is completed.

The final by-product from TSU production process is waelz kiln slag, which is stable and 100% reusable industrial waste. The slag is registrated as No. 35 declarated reusable kiln slag from Regulations Governing Administration of Reuse of Enterprise Waste. And the recycling of the slag will hand over to 100% shareholding subsidiary Taiwan Steel Resource Co., Ltd. or legal recycle company to use as cement raw material, cement product concrete mix grade material, asphalt concrete mix grade material, asphalt concrete mix grade raw material, non-stractrul concrete mix grade material or the raw material of the foundation of pavement grades construction, in order to achieve the goal of TSU business concept- ''Zero Waste''.

金屬資源

綠電再生股份有限公司

綠電再生為妥善處理電子廢棄物，解決日趨嚴重的電子廢棄物污染問題，於民國87年由12大家電製造業者投資成立，成為亞洲第一家專業運作的廢電子電器物品資源化環保處理工廠，協助家電業者落實製造者責任延伸(Extended Producer Responsibility, EPR)，並引領我國邁向「資源循環」及「城市採礦」的新里程碑。

廢棄的家電及資訊物品從市場上回收後送到綠電再生楊梅廠，經過拆解、破碎、分類，即可再處理或再加工製成可循環利用的資源，其中，回收到的鐵、鋁、銅、塑膠粒等再生原料，還可以重新回用到原製造端。在處理廢電子電器及資訊物品的過程中，綠電再生將「環保、安全、效率、保固、永續發展」的公司政策，貫徹到公司管理制度與員工的日常工作和行為模式，持續提升資源化再利用比率及再生原料價值，也確保工作安全健康與避免對環境造成二次污染。針對廢棄物之去化問題則導入「再利用」、「再製造」與「再使用」等思維，促進公司在兼顧環境、經濟與社會效益的前提下穩健成長。

綠電再生多年來循規蹈矩、兢兢業業地處理每一項廢物品，不僅能確實避免環境污染產生，也為我國企業提供高品質的再生原料，成為我國接軌國際綠色市場的後盾。循環經濟是世界趨勢，綠電再生將不會在本業的回收處理上停下腳步，而是將透過橫向發展相關資源循環新事業，再為公司注入新的成長動能，持續為實踐資源永續循環貢獻心力。

E&E Recycling was established in 1998 by 12 major home appliance manufacturers to handle E-waste and solve the pollution problems. E&E Recycling is Asia's first professionally-operated E-waste treatment and resource-recycling plant. By assisting home appliance manufacturers to fulfill extended producer responsibility (EPR), E&E Recycling also paved the way to new milestones towards ''resource recycling'' and ''urban mining'' in Taiwan.

Discarded home appliances and IT equipment are recycled from the market and sent to the E&E Recycling Yangmei Plant. After dismantling, crushing, and sorting, waste items can be reprocessed and recovered as valuable resources. For example, iron, aluminum, copper, plastic pellets and other recycled raw materials can be used in the manufacturing process of new products. E&E Recycling has taken the lead to solve the environmental issues associated with E-waste pollution, and implemented environmental protection, safety, efficiency, warranty and sustainable development as corporate policy. Over the years, this has been embedded in the company's daily operation to foster continuous improvement in efficiency and resource value, ensure safety and health of employees, as well as to avoid secondary environmental pollution. E&E Recycling is especially looking at solutions that will enable recycle, reuse and remanufacture. This facilitates the company to grow steadily while taking into account the environmental, economic and social benefits.

Over the years, E&E Recycling handles E-waste with care and conscience to prevent environmental pollution, as well as to provide high-quality recycled raw materials for Taiwanese enterprises to support their business in the international green market. While circular economy has become a global trend, E&E Recycling will not stop at E-waste recycling and treatment. Instead, E&E Recycling will continue to work with the various partners to develop new business models, thus bringing new growth momentum to the company and contributing to sustainable resource circulation.

金屬資源

金益鼎企業股份有限公司

公司簡介

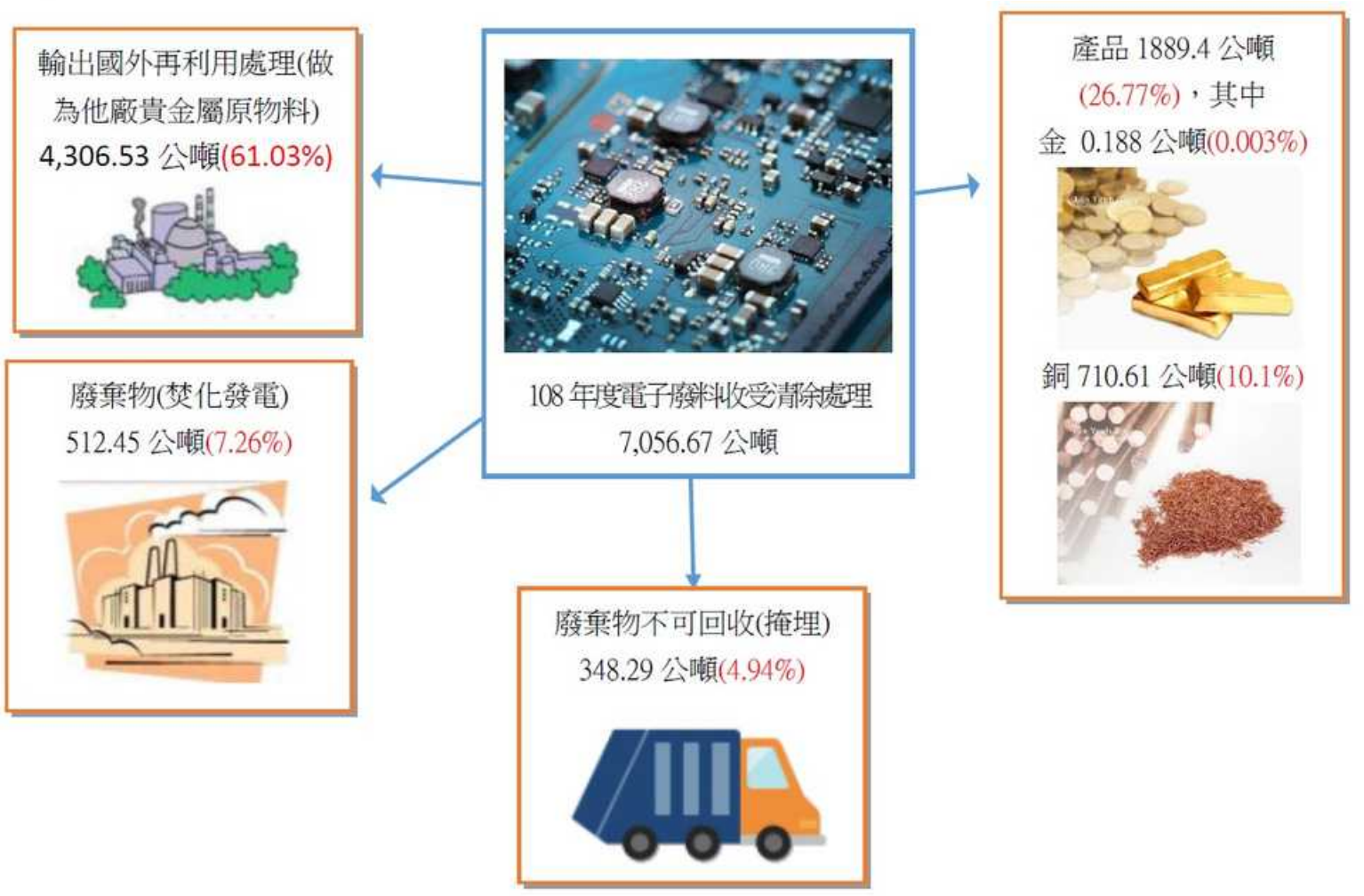
金益鼎於民國八十六年成立，本著減緩資源枯竭與環境共生的永續發展理念，就近服務科學園區的科技廠，協助客戶處理電子廢棄物。金益鼎以新竹為基地，業務遍及全台，並於民國九十七年五月在中華民國證券櫃檯買賣中心掛牌後，業務範圍擴展至中國，歐美及東南亞。

製程說明及推動循環經濟做法

金益鼎持續提升集團整體營運競爭力，擴大經濟規模發揮支援效應，透過資源回收再利用之一貫化作業，大幅降低處理電子廢棄物的汙染，為循環經濟的最末端及最前端，從廢棄物回收到原物料生產，搭起循環經濟產業鏈的連結，達到環境與產業共生的目標。

推動循環經濟效益及未來展望

環境效益：



經濟效益：

金益鼎於109年度，增加企業獲利：2.48億元/年，創造EPS:2.48。

社會效益：

本公司在回收處理技術累積超過23年以上的經驗，除了在本業精益求精，發揮專業的熱忱外，並積極推動社會公益及產學合作、研發資源循環、保護環境技術及製程中減少廢棄物的解決方案，協助客戶強化減廢工作，降低製造成本、解決高科技產業所產生的電子廢棄物問題，讓廢棄物從被錯置的資源，成為新生產週期的原材料，進而創造出公司的價值。

Company Introduction

In 1997, Jiin Yeeh Ding Enterprise Corp. (JYD) was established. Based on the sustainable development concepts of slowing down resource depletion and symbiosis with the environment, JYD provides an e-waste disposal service for the technology companies in the nearby Science Park.

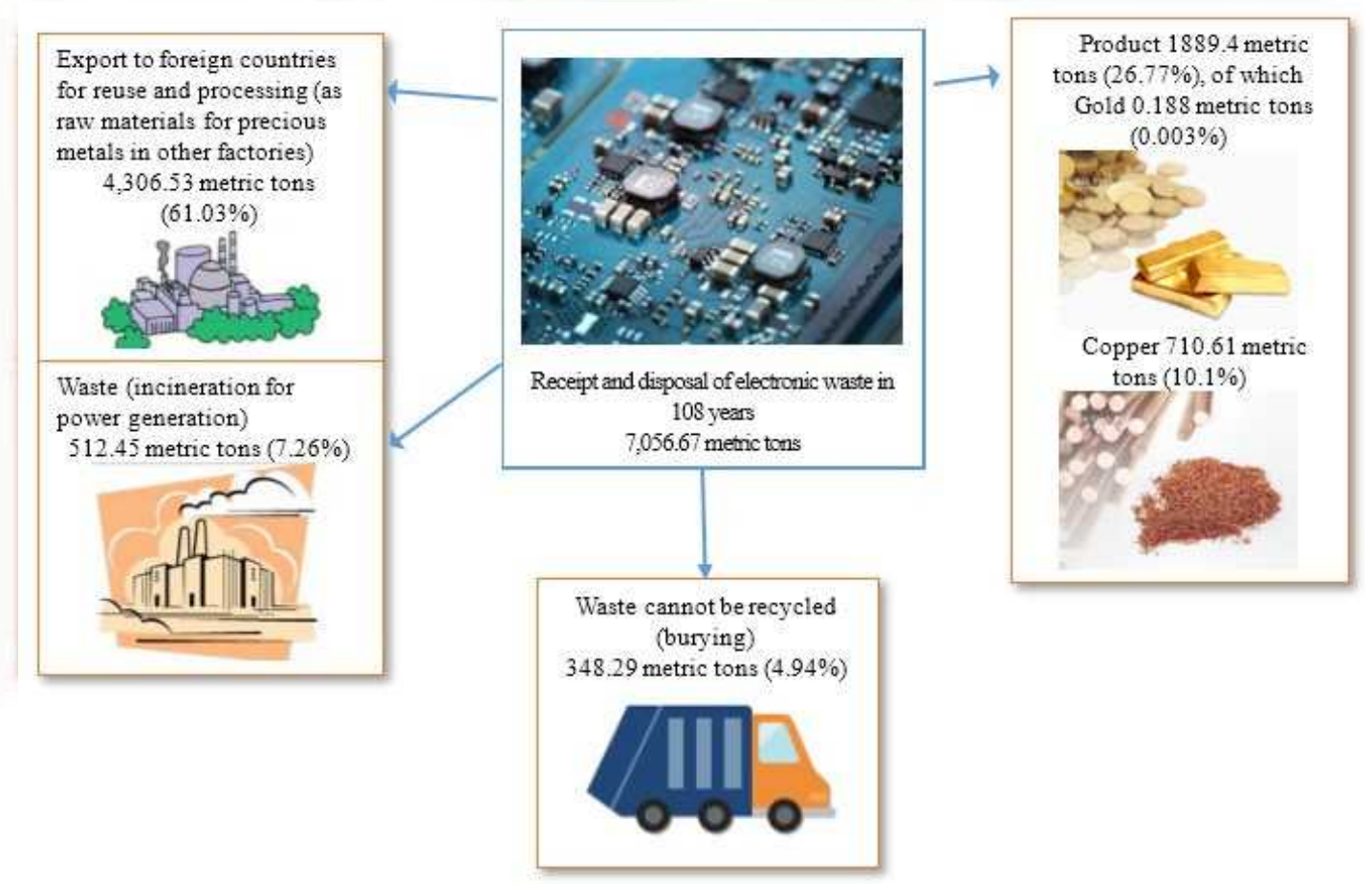
JYD is based in Hsinchu and has operations throughout Taiwan. After being listed in the Taipei Exchange in May 1997, the business was expanded to China, Europe, America and Southeast Asia.

Green Technology Industry Circular Economy

Jiin Yeeh Ding Enterprise Corp. continues to improve its operating competitiveness, expanding its economies of scale to play a vital role in significantly reducing pollution caused by electronic waste processing. The recovery of raw materials for production provides a strong link in the circular economy chain, thus achieving the goal of symbiosis between industry and the environment.

Benefits of Promoting Circular Economy and Future Prospects

Environmental benefits:



Economic benefits:

In 2020, Jiin Yeeh Ding increased its corporate profits by 248,372,000 NT$ on the previous year, creating EPS of 2.48. Social benefits:

JYD has more than 23 years of experience in recycling and treatment technology. In addition to its pursuit of excellence and enthusiastic approach to professionalism, JYD earnestly promotes social welfare and industry-university cooperation, actively researches and develops resource recycling, protects environmental technology, and reduces waste in the manufacturing process. This approach assists customers in intensifying their waste reduction efforts, thus reducing manufacturing costs and solving the problem of electronic waste generated by high-tech industries. Consequently, waste is transformed from misplaced resources to raw materials for the new production cycle, thereby creating company value.

金屬資源

惠嘉電實業股份有限公司

台灣沒有豐富的礦山資源，卻是電子產品生產大國，更應該重視「城市礦山」概念，做好資源回收再利用，穩定供給資源使之不餘匱乏。惠嘉電致力於各類物品回收及再利用，減少自然資源消耗，減輕環境負擔，積極建立循環型的社會體系，以達到「零廢棄」目標。綠色能源以及再生原料已經是全球趨勢，惠嘉電於1997年以務實的做法與環保核心的長期策略跨入環保產業，貫徹「回收資源」、「資源再生」精神，戮力於廢電子電器物品及廢資訊物品回收、清除、處理及資源化並投入相關環保領域發展。

惠嘉電為台灣甲級廢棄物處理業領導廠商，中部地區第一大廠，連續多年獲得環保署評鑑第一名，於台灣、香港、深圳及上海均設有服務據點，包含知名上市櫃企業、科學園區廠商及各級學校，累計的客戶逾千家，完整四大事業單位專業處理報廢項目，滿足客戶各種不同的需求並用心解決所有問題，是值得託付的專業夥伴。

四大事業體系

環保事業：廢電子電器、資訊物品回收處理

基於製造者責任之延伸，惠嘉電成為台灣第一批獲得「四機一腦」補貼之專業回收處理機構，積極配合環保署政策，投入環保回收、清除、處理之領域，主要透過拆解、破碎、粉碎、分選等各項步驟，將有害物質做妥善處理，並回收有價資源再生利用。除謹遵相關法令要求、務求分類回收確實外，亦經由流程管控，有效防治輸入、貯存、處理、輸出作業之污染產生。

甲處精煉事業：廢電子零件、下腳料回收精煉、甲級清除&處理

惠嘉電公司以合法經營與堅持環保的理念持續於業界耕耘，是取得環保署核可的合法甲級清理機構，除了廣收各類事業廢棄物進廠處理外，亦可配合廠商至指定地點進行國稅局或海關報廢品報廢清除作業及聯單申報，提供安全、合法的廢棄物清理服務。

貴金屬精煉再生

惠嘉電於2000年取得第一類甲級廢棄物處理許可證，為台灣最早取得此證照廠商之一，除透過拆解、減容、破碎、分選等物理處理外，更具有貴金屬回收及精煉技術設備之合格回收處理廠，以高溫熔煉及化學提煉方式將可再利用之貴金屬還原，以達資源再生的目標。

再生事業：廢塑料回收分選

惠嘉電於2005年取得塑膠再利用檢核資格，設有專業塑膠廠，占地3,000坪，並透過專利分選技術，將回收塑料透過粉碎、清洗、分選、脫水等流程，分選出可再利用之PE、PP、PS、Hi-PS、ABS等塑料，每月產能達1800噸。

機械研發事業：環保設備整廠整案輸出

體認全球資源回收利用的迫切需求，在不斷力求本身機械設備創新之餘，也為不同需求之客戶提供專業系統設計、規劃及整合服務，協助國內外處理業者更效率的進行廢棄物處理，惠嘉電擁有優異專業人才及處理技術，不僅在國內廢棄物處理市場佔有一席之地亦以創新的好口碑廣銷海內外。

循環經濟

循環經濟 回收再利用

環保不僅僅是降低污染，而是將可利用之資源再生利用，透過專業回收處理，將回收的混合塑料再度製成商品，形成一種「循環經濟」。

智慧發光 厚植競爭力

惠嘉電除現有環保補貼項目之回收處理外，亦投入大量心力，致力於多項環保相關事業之研發創新工作，陸續取得多項發明專利，努力於看似無價之廢棄物中再創價值，以達到「零廢棄」的目標。

Taiwan is not rich in mineral resources; however, it is one of the world's leading manufacturers of electronic products. Therefore, in order to improve our resource recycling and reuse, we should pay more attention to the concept of "urban mines".

Our company was established in 1997, with a focus on the recycling, removal, and disposal of waste electric and electronic equipment (WEEE) and waste IT products, in addition to investment in the development of related environmental conservation fields. Along the way, we surmounted many obstacles and overcame difficulties. In order to promote the recycling and renewal of resources, whether in the item input, handling, or output phase of our operations, we are committed to continued improvement and pollution prevention. The use of green and renewable energy has become a global trend. Our company entered the environmental conservation industry with a pragmatic approach, and the development of "environmental conservation" as a core element of our long-term strategy remains unchanged. In the future, the creation of the FGD Electronic Environmental Conservation Business Group will allow a spirit of consistency and active expansion to continue to thrive.

FGD plays a leading role in the recycling industry and has the highest recycling capacity in central Taiwan. It has won first place in the EPA evaluation for many consecutive years. In order to serve our clients more strategically, FGD has set up offices in Taiwan, Hong Kong, Shenzhen and Shanghai to meet customer demands and solve all types of issues. FGD has a diverse range of clients, including major science parks, schools and listed companies. We've served over 1000 customers in various fields, with our operations being spread across 4 major BUs. FGD is undoubtedly your reliable partner when it comes to the recycling business.

Four major BUs

Environmental BU: Waste Electronic and IT Product Recycling.

Since 1998, FGD Industrial has actively aligned with Environmental Protection Administration policy and dedicated itself to the environmental conservation
fields of recycling, removal, and treatment. The recycling and renewal of resources are the key business principles that FGD Industrial has consistently abided by. Items recycled include, among others, WEEE, waste IT products, and waste fluorescent lamps. Hazardous materials, such as refrigerant and phosphor, are properly disposed of through the various processes of disassembly, fragmentation, crushing, sorting, etc., and valuable resources are recycled.

Qualified Metal Refinery & Recycling BU: Waste Electronic Component & Downgrade Product Refining and Recycling.

FGD Industrial continues its hard work in the industry, with lawful operations and a philosophy that emphasizes environmental conservation. It is a legal Class A cleanup institution endorsed by the Environmental Protection Administration. In addition to widely accepting all categories of industrial waste for treatment at our plant, we can also coordinate with companies to implement National Tax Administration or Customs scrap material cleanup and manifest declaration at designated locations to provide safe and legal waste cleanup services.

In addition, various types of processing systems are used for the disassembly, fragmentation, crushing and sorting of recycled goods. In order to achieve the goal of resource regeneration, FGD Industrial deals with usable resources, and the finished products can be used in the production of other commodities. Now, FGD Industrial are able to process mixed plastics and precious metals through their own plastic plants and refineries.

Reproduction BU: Waste Plastic Material Sorting

FGD Industrial has the patented technology to enable the preliminary filtering of lightweight material, such as dust and foam, and the sorting of reusable plastics, such as PP, PE,PS and ABS, with a monthly capacity of up to 1800 tons.

Mechanical BU: Recycling Equipment Total Solution

FGD Industrial possesses outstanding professional talent and treatment techniques, providing professional system design, planning, and integration services to customers with different needs; not only has this earned us a place at the head of the domestic waste treatment market, it has also broadened our reputation for innovation through sales overseas to countries such as Japan and China (Shanghai).

Circular Economy

The FGD circular economy is created through professional recovery treatment. Environmental protection means not only reducing pollution, but also recycling and reusing available resources. A prime example of this is the manufacture of plastic from petrochemicals; through professional recovery treatment, more products can eventually be made from these plastics to create a circular economy.

New understanding has enhanced our competitiveness in the recycling business. In addition to government-subsidized projects, FGD has devoted substantial efforts to R&D and obtained recognition in IP accomplishments. We consistently strive to create value from waste in order to achieve our ultimate goal of "zero waste".

金屬資源

中鋼公司

中鋼公司

公司簡介

中鋼公司位於高雄市，成立於民國60年12月，粗鋼年產量約一千萬公噸，主要產品為鋼板、條鋼、線材、熱軋、冷軋、電鍍鋅鋼捲、電磁鋼捲及熱浸鍍鋅鋼捲等鋼品。產品約70%內銷，30%外銷，國內市占率逾50%，為目前臺灣最大鋼鐵公司；外銷主要對象為中國大陸（含香港）、日本、東南亞。

製程說明及推動循環經濟做法

中鋼公司將各類製程副產物收集再加工，同時接收廠外廢棄物，透過廠內高爐、轉爐、酸液再生等不同製程之物料需求及處理技術，可使絕大部分廢棄物在中鋼公司廠內獲得充分應用。而製程產出的副產品(包括煤焦油、輕油、高爐石、轉爐石、氧化鐵粉、脫硫石及脫硫石著磁料等)，主要供應至化學、營建、土木、電機及民生等產業使用，使資源得以有效再利用。

另外，為提高用水穩定度，逐步朝多元水源之目標邁進，以期降低停／限水導致減產甚至設備損壞之風險，中鋼公司率先配合國家開發新興水資源政策，成為全臺第一個大量使用都污再生水的企業。

推動循環經濟效益及未來展望

未來中鋼公司將持續努力，提升副產物資源化再利用率，穩定生產用水，實踐循環經濟，善盡社會企業責任，創造和諧共贏的局面。

Company Introduction

China Steel Corporation (CSC), located in Kaohsiung, Taiwan, was founded in December 1971. With an annual production capacity (in terms of crude steel) of around 10 million tonnes, CSC produces a range of products, including plates, bars, wire rods, hot and cold rolled coils, electrogalvanized coils, electrical steel coils, hot-dip galvanized coils, and Ti-Ni-based alloys. Roughly 70% of CSC's production is for the domestic market, with exports accounting for the remaining 30%. CSC is the largest steel company in Taiwan, enjoying a market share of around 50%. Major export destinations are mainland China (including Hong Kong), Japan and Southeast Asia.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

CSC recycles and reprocesses various by-products and waste products from in-plant processes and external plants. Most of the waste can be fully re-used as raw materials at various stages in the steelmaking process, such as the blast furnace, the converter, and in the acid regeneration plant. By-products of CSC include coal tar, light oil, blast furnace (BF) slag, Basic Oxygen Furnace (BOF) slag, iron oxide powder and desulfurization slag. The residual iron present in desulfurization slag can be supplied to industries such as chemicals, construction, civil engineering, secondary steelmaking and electrical machinery, as well as to people in their everyday lives, ensuring that resources can be used effectively.

In addition, through water-saving measures and the development of reclaimed water applications, CSC is striving to improve the stability of its water supply. By gradually diversifying the sources of water required for its operations, CSC is greatly reducing the risk of reduced production capacity or equipment damage caused by the cutting off or limiting of the water supply. CSC is a leader in developing innovative solutions to create new water resources, and has become the first company in Taiwan to use reclaimed water from municipal sewage on a large scale.

Economic Effectiveness and Future Plan

CSC will continue to improve the recycling rate of its by-products, stabilize the water supply used for production, practice circular economy, fulfill corporate social responsibility and create a harmonious community.

金屬資源

中國砂輪企業股份有限公司

鶯歌廠

公司簡介

中國砂輪 KINIK COMPANY座落於台灣著名的陶瓷之鄉—鶯歌，為經營超過六十年以上的砂輪專業製造廠，可供應低階基礎至高階精密「研磨」、「切削」加工使用的砂輪或刀具等，產品規格超過十萬種。主要產品項目：1.傳統砂輪、鑽石砂輪、2.鑽石碟、3.再生晶圓、4.各類真空吸盤。

製程說明及推動循環經濟做法

1. 本廠回收廢樹脂砂輪（每月最大再利用核可量：12.4噸）經再生爐高溫裂解並篩選後取得「再生磨料」，將其添加於砂輪的非使用面（基層）。透過再生磨料使用能有效減少原物料使用及降低廢棄物產生，並創造搖籃到搖籃的循環經濟模式。

2. 積極推動廠內廢棄物以資源化方式（再利用或做為其它廠家的原物料）處理，資源化比例已由103年20.7%逐步提升至109年86.8%。

推動循環經濟效益及未來展望

1. 最近五年廢樹脂砂輪再利用量為60噸，以再生磨料回收率50%及平均每噸磨料購買費用約40萬元計算，已節省1,200萬元原物料購買費用，並協助客戶減少約130萬廢棄物處理費用。

2. 本公司已與專家、學者共同開發廢棄物再利用或資源化之技術，將擴增相關應用產線，預計於111年使6成廢棄物廠內再利用，114年可收受其他事業廢棄物，以提升循環經濟的成效。

Company Introduction

Kinik Company is a professional grinding wheel manufacturer located in Yingge, a town famous for being the ceramics capital of Taiwan. The company has been operating for over 60 years.

We produce more than 100,000 types of products to meet any of our customers' needs for grinding and cutting solutions, ranging from basic to high-end applications. Our main products are: conventional grinding wheels and diamond/CBN grinding wheels; CMP diamond disks; reclaimed wafers; and porous ceramic vacuum chucks of various types.

Process Description and Circular Economy Approach

1. Our recycled resin grinding wheels (maximum reusable amount per month: 12.4 tons) are pyrolyzed in the regenerative furnace, and after screening, "recycled abrasives" can be obtained, which will be added to the non-used surface (the base) of grinding wheels. By using recycled abrasives, raw material consumption and waste generation can be effectively reduced, creating a cradle-to-cradle circular economy model.

2. We actively recycle the waste in our factory by reusing it or converting it into raw materials for other manufacturers. The recycling rate has seen a gradual increase, from 20.7% in 2014 to 86.8% in 2020.

Benefits of Circular Economy and Future Prospects

1. Over the last five years, we have reused 60 tons of recycled resin grinding wheels, saving NT$12 million in raw material costs, and helping our customers save around NT$1.3 million in waste disposal costs (calculated based on the 50% recycling rate of the recycled abrasives and an average purchase price of about NT$400,000 per ton of abrasives).

2. We have also been working with experts and scholars on the development of new waste recycling technology and the expansion of related production lines. 60% of the factory waste is projected to be reused by 2022, and by 2025 we plan to start taking waste from other companies to further enhance the effectiveness of our circular economy.

金屬資源

中鋼鋁業股份有限公司

公司簡介

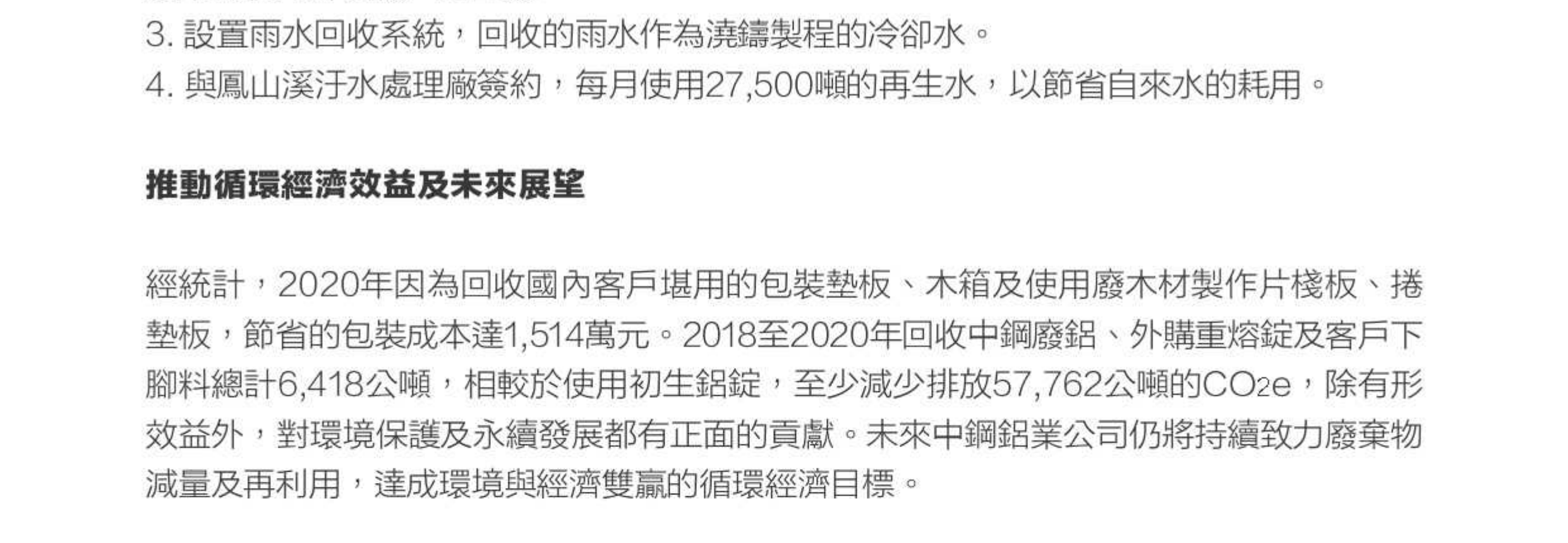
中鋼鋁業股份有限公司成立於1996年，為台灣最大的鋁軋延製造商，主要生產鋁板、鋁片、鋁捲、鋁箔、鋁合金錠、鋅合金錠、鋅陽極板、熱浸鍍鋅錠等高品級鋁材和鋅鑄品，供應國內外之食品包裝、交通運輸、3C電子等環保綠能產業發展所需要的鋁合金材料。

製程說明及推動循環經濟做法

1. 回收中鋼公司廠內廢鋁及廢鋅陽極板作為生產鋁胚及鋅合金錠的原料，中鋼鋁業也向外採購使用廢鋁為原料所生產的重熔錠及客戶的下腳料。
2. 回收國內客戶堪用的包裝墊板、木箱，整理後重新使用。設置木工廠，以廠內回收堪用廢木材製作片棧板、捲墊板。
3. 設置雨水回收系統，回收的雨水作為澆鑄製程的冷卻水。
4. 與鳳山溪汙水處理廠簽約，每月使用27,500噸的再生水，以節省自來水的耗用。

推動循環經濟效益及未來展望

經統計，2020年因為回收國內客戶堪用的包裝墊板、木箱及使用廢木材製作片棧板、捲墊板，節省的包裝成本達1,514萬元。2018至2020年回收中鋼廢鋁、外購重熔錠及客戶下腳料總計6,418公噸，相較於使用初生鋁錠，至少減少排放57,762公噸的CO_2e，除有形效益外，對環境保護及永續發展都有正面的貢獻。未來中鋼鋁業公司仍將持續致力廢棄物減量及再利用，達成環境與經濟雙贏的循環經濟目標。



Company Introduction

C.S. Aluminium Corporation (CSAC) was established in 1996 and is the largest manufacturer of rolled aluminium products in Taiwan. It mainly produces the following high-quality cast aluminium and zinc products: aluminium plates, rolls, sheets and foil; zinc alloy ingots and zinc anodes for electroplating; and hot-dip zinc ingots to produce the aluminium alloy materials needed for food packaging manufacturers, transportation providers and 3C electronic products manufacturers, both domestically and internationally, to enable the development of these industries' environmental protection and green energy practices.

Process Description and Promotion of Circular Economy Practices

1. C.S. Aluminium Corporation recycles scrap aluminium and scrap zinc anodes (used for electroplating) from China Steel Corporation, using them as raw materials for the production of aluminum slabs and zinc alloy ingots. The company also purchases remelted ingots (produced using scrap aluminum and customers' scraps as raw materials).
2. Packaging padding and wooden boxes from domestic customers are recycled and re-used after being repaired. A wood factory has been set up to make pallets and padding for aluminium roll from useable waste wood.
3. A rainwater recovery system has been set up; the recovered rainwater is used as cooling water for the casting process.
4. CSAC have signed a contract with Fengshan Creek Reclaimed Water Plant to use 27,500 tons of recycled water per month in an effort to save tap water consumption.

Benefits of Promoting Circular Economy and Future Prospects

According to statistics, in 2020, due to the recycling of packaging padding and wooden boxes from domestic customers, and the use of pallets and padding made from waste wood, up to NT$15.14 million were saved in packaging costs. In the period 2018-2020, a total quantity of 6,418 metric tons of aluminum scrap, purchased remelted ingots and customer scraps were recycled, reducing CO_2e emissions by at least 57,762 metric tons. In addition to reaping tangible benefits, the company is also contributing positively to environmental protection and sustainable development.
In the future, C.S. Aluminium Corporation will continue to strive to reduce waste and reuse resources, in order to achieve the goal of creating a win-win circular economy, benefiting both the environment and the economy.

金屬資源

美琪瑪國際股份有限公司

觀音廠

公司簡介

於民國81年設立於桃園觀音，為配合環保及減少原料成本，引進英國生產技術和設備，將原本僅能做污泥處理的廢鈷錳觸媒改為液態觸媒，取代現有固態觸媒，有效達到再次利用廢觸媒並降低處理費用成本。

製程說明及推動循環經濟做法

- 美琪瑪率先研發液態觸媒，同時提升觸媒的活性
- 發展低腐性液態觸媒CMB，有效解決高腐蝕性問題，提升觸媒穩定性
- 提供CTA及PTA回收系統，擁有業界最高的鈷金屬回收率
- 研發PTA M.L 母液水回收系統，創造更高價值
- 協助客戶回收包括「焚化爐黑」、「CRU鈷漿」、「廢PTA」、「CTA殘渣」，有效解決環保問題

推動循環經濟效益及未來展望

研發出新世代的CTA廢觸媒回收系統及PTA母液系統，實績如下：

· CTA觸媒回收系統（Part I）

1. 效能：

– 鈷回收率 > 90%

– 去除CTA殘留物中的COD，鈷和其他腐蝕金屬

– 比其他CRU和焚化爐效率高

2. 客戶實績：

包含南韓、印尼、廈門、泰國及臺灣

· PTA 母液回收系統(Part II):

1. 效能：

– 鈷回收率: > 90%

– 廢水肥收率: 80%

– 去除PTA M.L流中的TA，鈷和其他金屬

– W.W.T.節省了很多手續費

2. 客戶實績：印尼

Company Introduction

Founded in 1992 in Guanyin, Taoyuan, Mechema Chemicals has introduced production technology and equipment from the UK for the purposes of protecting the environment and lowering the cost of raw materials. The company converts waste cobalt-manganese catalysts (considered only to be useful for sludge treatment) into liquid catalysts, which replace solid catalysts. As a result, waste catalysts can be reused and processing costs can be lowered.

How can Waste be Re-utilized using Circular Economy Practices?

tained the highest cobalt metal recycling rate in the industry.
• Mechema has developed a PTA ML (mother liquor) water recycling system to generate more value.
• Mechema recycles incinerator bottom ash, CRU cobalt slurry, waste PTA, and CTA residue for its customers, effectively resolving environmental issues.

Effectiveness of Circular Economy

Mechema has developed a new generation of CTA waste catalyst recovery system and PTA mother liquor system. The actual results are as follows:

• CTA Pretreatment Unit (Part I):
1.Performance:
-Cobalt recovery rate: > 90%.
-COD, Cobalt and other corrosive metals removed from CTA residues.
-Higher efficiency than other CRU and incinerators.
2.Customer References: Korea, Indonesia, China (Xiamen), Thailand and Taiwan.

• PTA ML Recovery Unit (Part II):
1.Performance:
-Cobalt recovery rate: > 90%.
-Water recovery rate: 80%.
-TA, Cobalt and other metals removed in PTA ML stream.
-Substantial savings made in WWT handling costs.
2.Customer References: Indonesia.

金屬資源

翰金科技股份有限公司

公司簡介

翰金科技經過多年的研發、測試，自主開發了一套全世界首創「金屬濕式提鍊技術」（Hydro-metallurgical process）一方面將此獨特的（可以選擇性吸附重金屬）專利技術，以全新的商業模式，設置離子交換樹脂系統模組（Equalys System設備）提供給排放重金屬廢水的產業一個完整、簡單、效率高又成本低的服務模式，有別於傳統的重金屬廢水處理及傳統的重金屬回收或固化掩埋的作法。將對環保服務業及資源化工業產生革命性影響，希望可為經濟、環保及企業利益共創三贏的局面。

製程說明及推動循環經濟做法

翰金公司之「金屬濕式提鍊技術」，將前段客戶端吸附收集的重金屬溶液（現階段為鎳回收廢液及鎳廢水）加以分離、純化、濃縮、結晶等創新的製程，將原屬廢棄物的重金屬，經資源化生產，製成可市售、循環使用的重金屬化工原料（硫酸鎳），也可作為電動車電池之正極材料使用之原料，使重金屬原料得以循環再利用。

推動循環經濟效益及未來展望

翰金公司營運模式，對於產生重金屬廢棄物之客戶，除可降低處理費用成本，亦可使廢棄物減量、減少對環境污染之影響及衝擊，並可將廢棄物資源再回收。亦可推動企業社會責任（CSR），環境、社會及公司治理（ESG），可達成循環經濟及資源再利用之成效，提升綠色產業形象。

翰金公司目前積極推展業務，營運量將會持續提升，亦需要增加20-30%人力之投入，已持續招募新進人員，提供更多工作機會。

Company Introduction

Having invested years into research, development and testing, Hydroionic EnviroTec has successfully commercialized the world's first hydrometallurgical heavy metal purification and reclamation process. Hydroionic integrates specialized ion exchange resins with a series of patented and proprietary processes to provide low-cost, automated, modular and highly efficient heavy metal wastewater treatment and water recycling services to industrial clients (Equalys Systems). While traditional heavy metal treatment requires chemical precipitation and hazardous sludge burial, Hydroionic's recycling process will revolutionize the environmental services and resource recovery industries by lowering costs, boosting economic growth, and strengthening corporate environmental compliance.

The Hydroionic Process: Enabling a Circular Economy

Heavy metals from the client's hazardous wastes are recovered by Equalys Ion Exchange Systems. The Hydroionic Process then separates, purifies, concentrates and crystalizes the recovered metals (currently with a focus on nickel-bearing wastes) into high-purity chemicals, such as nickel sulfate (a critical component of lithium-ion battery cathodes). These chemicals are then sold back to industry, creating a sustainable, closed-loop supply chain (as referenced in the diagram below).

Promoting the Circular Economy and Future Objectives

Hydroionic's services allow industrial clients with heavy metal-bearing hazardous wastes to drastically reduce their environmental compliance, treatment and disposal costs; moreover, the recovery and recycling of metals significantly decreases the volume of waste and the corresponding impact on the environment. These are key factors in enhancing corporate social responsibility (CSR) as well as environmental, social, and corporate governance. The recycling and reuse of increasingly scarce resources also promotes the circular economy while reinforcing the client's green, environmentally-conscious image.

As Hydroionic accelerates the expansion of its service, the volume of metals recycled (as well as hazardous waste eliminated) will increase significantly. As it expands, the company anticipates a need for a 20-30% increase in manpower and is actively recruiting additional staff.

金屬資源

優勝奈米科技股份有限公司

公司簡介

優勝奈米科技股份有限公司成立於2009年，致力於「環境-安全-資源」的全球議題，專精於綠色化學製程研發與系統整合，主要營業項目有奈米材料、電鍍技術和貴金屬回收再生。針對全球大量的電子廢棄物，優勝奈米提供安全環保的解決方案(Total Solution)，顯著提升處理電子廢棄物之經濟價值，並提倡「責任黃金」的永續理念，增進企業綠色形象和實踐循環經濟。

製程說明及推動循環經濟做法

顛覆傳統採用高腐蝕性、高毒性及高碳排焚燒的處理方式，改以逆向工程及綠色化學之原則與概念，開發出多種安全無毒的金屬剝除劑，搭配自行研發之環保行回收設備，以對環境友善、操作安全及低碳排放的綠色製程，能快速將電子廢棄物之主機板元件妥善分類，如IC晶片、CPU、連接器、鋰電池、電容、銅線圈等，分別回收金、銀、鈀、錫、銅、鉭及三元鋰電池等貴重金屬資源，將資源再生循環利用，做到「永續的生產與消費(Sustainable Consumption and Production, SCP)」，達成聯合國永續發展目標。

未來展望

優勝奈米獨家的專利技術應用領域廣泛，包含半導體、電子製造、封裝測試、電子廢棄物回收、採礦及珠寶首飾等，深受公部門肯定，被列為展現台灣實力及拓展綠色經濟的示範亮點，產品和技術已輸出至全球五大洲超過30個國家，目前正與國際品牌大廠洽談合作，解決全球大量的電子廢棄物問題，減緩全球暖化、氣候變遷帶來的衝擊，讓地球得以永續生存下去。

Company Introduction

Established in 2009, UWin Nanotech. Co., Ltd. has dedicated itself to studying the global issues around environmental stability and resources, and specializes in the research and development of green chemical processes and system integration. Its main areas of business are nanomaterials, electroplating technology and precious metal recycling. The total solution of e-waste treatment provided by UWin can significantly increase the economic value of e-waste, and enhances the company's green image by promoting the concepts of "Responsible Gold" and the circular economy.

E-waste Treatment Using Eco-friendly Processes

Abandoning traditional highly corrosive, highly toxic and high carbon-emitting treatment methods, UWin adopts the concepts of reverse engineering and green chemistry to develop various eco-friendly and non-toxic metal stripping agents and recycling equipment. This innovative green technology can easily separate components (such as IC chips, CPUs, connectors, Lithium-ion batteries, capacitors and copper coils) from the printed circuit board and then recover the precious metals from these components using eco-friendly and low-carbon hydrometallurgical technology. The recycling and reuse of these precious metal resources can enable the company to work towards achieving "Sustainable Consumption and Production (SCP)" and meeting the United Nations' "Sustainable Development Goals (SDGs)".

Benefits and Future Prospects

UWin's patented technology can be applied to multiple industries, such as semiconductors, electronics manufacturing, packing and testing of semiconductors, e-waste recycling, mining and jewelry design. This technology has been strongly endorsed by the government; it has been showcased as a demonstration of the strength of Taiwanese green technology and has been promoted to more than 30 countries across 5 continents worldwide. Currently, UWin cooperates with world-famous brands by providing the total solution of urban mining, which can not only help to solve the problem of e-waste but also lessen the impacts of global warming and climate change.

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
力優勢環保股份有限公司	底渣再利用	110 ★★ 109 ★	
台灣水泥股份有限公司蘇澳廠	產業廢棄物再利用	110 ★★	
亞洲水泥股份有限公司	污泥及燃煤底灰再利用	110 ★★	
台灣水泥股份有限公司和平分公司和平廠	廢棄物互補利用	107 ★★	
全興資源再生股份有限公司	飛灰或底渣再利用	107 ★★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
皓勝工業股份有限公司	弧爐氧化碴再利用	110★ 107★	
寰冠科技股份有限公司	底渣再利用	109★	
大陸營建廢棄物共同清除處理股份有限公司	砂石混合物再利用	107★	
信一預拌混凝土股份有限公司南崁廠	飛灰或底渣再利用	107★	

非金屬殘渣資源

力優勢環保股份有限公司

力優勢公司底渣核准處理量為每月41,200公噸，處理對象為公有垃圾焚化廠之焚化底渣（廢棄物代碼D-1103）。隸屬力麗集團旗下環工事業群的山林水環境工程股份有限公司之子公司後，更秉持「創新」、「專業」、「品質」、「服務」的理念，持續朝「環境資源」及「循環再利用」領域發展。

雖已是底渣處理業全國規模最大的公司，但力優勢並不以此為滿足，仍一直不斷思考如何發揮從業之最佳效益與價值，並盡最大努力來維護我們的生活環境。力優勢全亞洲率先採用全段濕式處理技術的廠商，進入製程的每一顆粒底渣都經過水洗，成本雖遠高於同業，但能產出品質最好的焚化再生粒料。力優勢也採用多段式精細分選設備，不僅能有效回收底渣中對環境影響較大的金屬雜質，更以「都市採礦」的方式創造營利，並以此營利持續投資精進及回饋社會，營造正向的永續循環。因有感於國內底渣再利用之瓶頸點在於焚化再生粒料去化，力優勢將產品實際應用於道路、人行道、公園廣場…等相關工程實例製作宣導文件，配合機關於各縣市推廣宣導焚化再生粒料「好用且經久耐用」之使用實績，以促進再生粒料循環利用。

依據環保署統計108年全國底渣產出約有91萬公噸；製成焚化再生粒料再利用量約75萬公噸，同年力優勢處理底渣數量及再生粒料之再利用數量（部分配合機關領料）分別為19.4萬及19.6萬公噸，占比分別為21%及26%，兩者均為全國之冠，對國內垃圾資源化循環貢獻卓著。未來力優勢仍將持續抱持協助改善臺灣環境的使命感，不斷精進。

Re-use Environmental Co., Ltd. (RECL) has acquired bottom ash permits to process 41,200 tons of bottom ash per month. Most of this bottom ash is produced by government-owned incinerators (Waste Configure Code: D-1103). RECL is affiliated with Forest Water Environmental Engineering Co., Ltd; Forest Water is also one of many subsidiary companies of Lealea Group. It is RECL's mission to uphold a spirit of innovation, professionalism, quality and service, whilst striving for development in the key areas of environmental resources and recycling.

Though RECL has already become the largest bottom ash disposal company in Taiwan, it is still not satisfied; on the contrary, it has been making great efforts to optimize benefit and value, always willing to push the boundaries so that we sustain and protect our living environment. For instance, we are the first supplier in Asia to adopt wet processing technology. Every single particle of bottom ash is washed before undergoing the procedure, and even though this raises the costs far above those of our competitors, it nevertheless enables us to produce the best quality of recycled bottom ash aggregate. Moreover, by using multiple precision sorting equipment, we can not only efficiently recycle those larger metal impurities with the greatest impact on the environment, but also apply "urban mining" technology to generate profit; with these profits, we can continue to invest in progress and give back to society, creating a positive and sustainable cycle. It is widely understood that the removal of used bottom ash is a challenge facing Taiwan. With this in mind, RECL is committed to the use of its product for roads, sidewalks, parks, public spaces and many other related projects and buildings, generating publicity documents and cooperating with various cities' public agencies in order to make its high-quality, durable product more widely known, and to promote the usage of regenerated, recycled aggregate.

According to Environmental Protection Administration statistics, in 2019 the annual nationwide production of bottom ash was approximately 910,000 tons, about 750,000 tons of which were used in the manufacture of recycled aggregate. In the same year, RECL managed to process 194,000 tons of bottom ash, and produce 196,000 tons of recycled aggregate. That is about 21% and 26% respectively of the total nationwide figures, the highest proportion in each category. It is RECL's mission to make significant contributions to domestic waste resource recycling, and to foster a spirit of enthusiasm in helping to improve the environment in Taiwan.

非金屬殘渣資源

台灣水泥股份有限公司

蘇澳廠

公司簡介

台灣光復，政府成立水泥工業監理委員會，於民國35年4月接管台灣化成工業株式會社(本公司蘇澳水泥廠)，於民國43年11月11日將本公司由公營移轉為民營，民國51年2月9日，率先響應政府「資本證券化」政策，成為證券市場第一家股票公開發行上市之公司。

製程說明及推動循環經濟做法

台泥珍惜自然資源，積極減少天然原物料之耗用、開採與購買。透過水泥窯製程可達1,300度高溫之特性，引用國際級協同處理技術(Co-processing)，與晶圓廠、鋼鐵廠、淨水廠及公共工程等業者形成循環經濟圈，協助處理產業廢棄物，將廢棄物資源化、無害化再利用。減少水泥製程中所需煤炭的使用量，開發碳含量比例較低或具有熱值的替代料，如煤灰、木屑、廢木材、固體再生燃料(Solid Recovered Fuel, SRF)及稻殼等農業廢棄物，降低煤炭使用量。

推動循環經濟效益及未來展望

面對全球氣候變遷等新興風險，台泥以台灣企業的先驅自許，透過制定能源使用、再生能源、原燃料替代、水資源使用之管理指標與目標，打造「零廢棄、零污染、零排放」之循環經濟與企業永續價值。

Company profile

After the retrocession of Taiwan to the Republic of China, the government established in April 1946 the Cement Industry Supervisory Committee, which took over Taiwan Chemicals Co. (the Company's Suao plant), Taiwan Cement Corporation (TCC) transformed from a state-owned enterprise to become a private company on November 11, 1954. On February 9, 1962, TCC became the first company to publicly list on the Taiwan stock exchange in support of the government's policy to develop the capital market.

How can Waste be Re-utilized Using Circular Economy Practiced?

Tcc treasures natural resources, actively reducing the consumption, mining, and procurement of natural raw materials. With the high temperature of 1,300°C in the cement kilns, Tcc engages in co-processing to from a circular economy ecosystem with foundries, steel plants, water treatment facilities, and construction companies. Turning waste into harmless reusable resources enables the utilization of alternative raw materials while resolving industrial wastes. Tcc proactively reduces coal use in the cement production process and develops lower-carbon or alternative materials with caloric value like coal ash, sawdust, discarded wood, solid recovered fuel (SRF), and agricultural wastes such as rice hulls.

Economic Effectiveness and Future Plan

In the face of emerging risks such as global climate change, Tcc prides itself as a pioneer of Taiwanese enterprises, stipulation of management indicators and targets for energy use, renewable energy, alternative material/fuels, water resource uses, it endeavors to create a circular economy of ''zero waste, zero pollution, and zero emission'' and the Company's sustainable values.

非金屬殘渣資源

亞洲水泥股份有限公司

公司簡介

亞洲水泥公司為滿足國內建設水泥需求並活絡東部地方經濟、增加就業機會，於1973年設立花蓮製造廠，生產各型別卜特蘭水泥及熟料。
在設廠之初迄今，持續秉持取之於社會、用之於社會之經營理念，採用先進環保設備，降低製程污染排放，並綠美化廠礦區及鄰近社區，期望能為社會、為地球付出企業正向力量。

水泥製程及推動循環經濟做法

水泥生產一般有四個工序，分別是礦石開採、生料研磨、熟料煅燒和水泥研磨。1)石灰石是水泥製造最主要原料，故石灰石係自行採礦供應；2)將包括石灰石、粘土、矽砂和鐵渣等天然原料研磨成細粉，稱為生料；3)在水泥窯中使用煤炭將生料加熱至燒結溫度，在此過程，原料的化學鍵被分解，重新組合成新的礦物，稱為熟料；4)將熟料與適量石膏在水泥磨中研磨成細粉，即為水泥。
本廠積極推動循環經濟，使用各種廢棄物或資源化產品取代天然原料或煤炭，確保資源可持續回復、循環再生，並能降低環境壓力，使生產過程減少資源投入、增加廢棄物利用以創造循環型社會，達到環境與經濟共榮的目標。

推動循環經濟效益及未來展望

- 亞泥花蓮廠2020年推動循環經濟效益如下：
- 降低天然原料使用：使用替代原料22.6萬公噸，相當可以減少天然礦石原料開採約22.6萬公噸。
- 降低煤炭使用：使用已高溫燒結之替代原料，例如：燃煤底灰、轉爐石及礦物細料（脫硫碴）；使用替代燃料，例如：漿紙污泥、固態燃料及塑膠片，減少煤炭耗用約1.2萬公噸。
- 降低溫室氣體排放：溫室氣體減量達5.8萬公噸。
- 推動資源循環後，創造上游廠商之作業人員、運輸司機、本廠現場作業人員及管理人員，合計42個就業機會。
- 亞泥花蓮廠推動循環經濟未來展望2030年之目標如下：
  提高原料替代比例達400公斤/噸-水泥膠結材料，相當於每年替代原料130萬公噸。提高燃料替代比例達15%，相當於每年替代燃料9.6萬公噸。降低單位水泥之溫室氣體排放量達10%，相當於年減溫室氣體30萬公噸。

Company Introduction

In order to meet the demand of cement for domestic construction, activate the local economy in the east, and increase employment opportunities, Asia Cement established the Hualien Plant in 1973 to produce various types of Portland cement and clinker.
Since the establishment of Hualien plant, we have continued to adhere to the business philosophy of taking from the society and using it for the society, adopting advanced environmental protection equipment, reducing pollution emissions from the process, and beautifying the factory, mining area and neighboring communities, hoping to contribute a positive power to the society and the earth.

Manufacturing Process and Circular Economy Practices

There are generally four processes in cement production, namely limestone quarrying, raw meal grinding, clinker calcination and cement grinding. 1) Limestone is the major raw material for cement manufacturing, so limestone is supplied by self-mining; 2) Natural raw materials including limestone, clay, silica sand and iron cinder are ground into fine powder, called raw meal; 3) Using coal as fuel, raw meal is heated to a sintering temperature in a cement kiln. During this process, the chemical bonds of the raw materials are broken down and then they are recombined into new compounds, called clinker; 4) The clinker and an appropriate amount of gypsum are ground into fine powder in a cement mill, which is cement.
Our plant actively promotes the circular economy, using various wastes or recycled materials to replace natural raw materials and coal, to ensure the sustainable recovery and recycling of resources, and can reduce environmental pressure, so that the production process can reduce resource input and increase waste utilization to create a recycling society and achieve the goal of the environment co-prosperity with the economy.

Efficiency of Circular Economy & Company Vision

The benefits of promoting circular economy in Hualien plant in 2020 are as follows:
Reduce the using amount of natural raw materials: about 226,000 metric tons of alternative raw materials were used, which can reduce the mining of natural ore raw material by about 226,000 metric tons.
Reduce the consumption of coal: Use alternative raw materials that have been sintered at high temperature, such as coal ash, basic-oxygen-furnace (BOF) slag and mineral fines (desulfurized slag) and alternative fuels, such as pulp and paper sludge, SRF and plastic flakes, reducing coal consumption by about 12,000 metric tons.
Reduction of greenhouse gas emissions: The reduction of greenhouse gas emissions is about 58,000 metric tons.
Increased various employment opportunities: After promoting circular economy, it increased 42 employment opportunities for operators of upstream manufacturers, transport drivers, on-site operators and management personnel of the plant.
Future Prospects of promoting circular economy in Hualien plant in 2030 are as follows:

1. Increase the substitution ratio in cement raw material to 400 kg/T- cement cementitious material, which is equivalent to 1.3 million metric tons of raw materials replaced per year.
2. Increase substitution ratio of fuel to 15%, which is equivalent to replace 96,000 metric tons of coal per year.
3. Reduce the greenhouse gas emissions per metric tons of cement to 10%, which is equivalent to reduce 300,000 metric tons of greenhouse gases per year.

非金屬殘渣資源

台灣水泥股份有限公司

和平公司和平廠

THE FUTURE IS WORTH IT
台泥企業團

公司簡介

台灣水泥股份有限公司，於1954年公營轉民營，又於1962年以股票編號1101成為台灣第一家股票上市公司；配合產業東移政策，和平廠成立於2000年，主要營業項目為水泥製造生產，主要產品為卜特蘭水泥第I型。

製程說明及推動循環經濟做法

花蓮和平水泥專用區，導入循環經濟理念，將工業港、和平電廠以及水泥廠透過密閉管線相連，港、電、廠三種不同產業原料、燃料以及廢棄物互補利用，形成產業內封閉迴圈，所生產之水泥產品，不經陸運以更低碳之海運輸出。跨產業「循環經濟」運作模式，最佳化資源使用效益，此為台泥獨創跨產業的資源利用，零廢棄物、低碳排與生態之循環經濟示範基地，並創下紀錄，打造全世界唯一無灰塘環保電廠、歐盟認證工業生態港以及每到夏夜螢火蟲飛舞的水泥廠。

推動循環經濟效益及未來展望

台泥是台灣的國家代表品牌之一。過去，台泥的生產均配合需求。未來，台泥將主動友善環境，主動解決環境問題，運用創新科技、創新思維，開發新能源，朝打造「零廢棄、零污染、零排放」之循環經濟，創造永續企業的新價值進行。

Company Introduction

In 1962, Taiwan Cement Corp. (TCC) became the first public company in Taiwan, with the stock code 1101. In response to government policy that aimed to shift more industries to the East, Heping Plant was established in 2000 and mainly produces Portland Cement Type I.

How can Waste be Re-utilized Using Circular Economy Practices?

Adopting circular economy principles, a sealed pipeline network connects the zone's industrial port, power plant, and cement plant, enabling the flow of raw materials, fuel and waste between the different facilities in a closed system. Cement products are directly shipped by sea, eliminating the higher green-house gas (GHG) emissions associated with ground transport. This cross-industrial, circular operational model optimizes resource usage. It is part of an ecological, circular economy demonstration zone that uses resources in an innovative way to eliminate waste generation and reduce GHG emissions. It is also the only thermal power-producing cement plant in the world that does not dispose of fly ash in landfill and which obtained a Certificate of Verification from the European EcoPorts Port Environmental Review System. The benefits of these initiatives are readily apparent on summer nights when fireflies light up the dark skies around the cement plant.

Economic Effectiveness and Future Plan

TCC is one of Taiwan's representative brands. Having focused on merely producing cement in the past, TCC is now committed to becoming an eco-friendly enterprise, shifting its focus to actively solving environmental issues. Through the application of innovative technologies and ideas, TCC continues to develop new energy sources, and move towards a circular economy model with "zero waste, zero pollution, and zero emissions" as its core values, establishing new standards as a sustainable enterprise.

非金屬殘渣資源

全興資源再生股份有限公司

公司簡介

為國內第一家審核後核可之CLSM再利用機構，採用最新型拌合計量系統取代傳統式現場拌合運作模式，導入進出料管理及財會管理系統，並通過ISO9001品質管理系統與ISO14001環境管理系統，大幅提高資源循環之價值。

製程說明及推動循環經濟做法

將事業機構鍋爐發電、鍋爐汽電共生所產出之廢棄物（飛灰或底渣）及廢水處理產出之廢棄物（無機性污泥）再利用加工處理，生產「可控制性低強度回填材（CLSM）」。經由專業組織團隊帶領下，採選優質級原料、配料、落實品檢及嚴格品質控制作業系統配合，領先業界取得產品製程之專利（M522837、M528858），更為國內經濟部工業局第一家審查後核可之CLSM再利用機構。大幅提升可控制性低強度回填材之產品品質，讓在提供業界優良產品的同時亦為環境保護、資源永續貢獻一份心力。

推動循環經濟效益及未來展望

事業機構產出之廢棄物（飛灰或底渣）再利用加工處理，將其製成產品可控制性回填材料（CLSM）所創造價值，產生效益如下：

(1)使用於道路回填或大樓回填等工程以取代天然級配開採，減少開採後衍生的環境污染及資源耗費。

(2)使用於管溝電線管路埋設工程等，縮短施工工期以降低交通阻圔衝擊亦提升工程施工品質減少資源耗損。

Company Introduction

Chan Sing is the first organization in Taiwan to be given approval for the recycling of controlled low strength material (CLSM). The company has adopted the latest mixing and measuring systems in place of the traditional onsite mixing operation model. It has also introduced inbound and outbound material management and F&A management systems, and has received ISO 9001 (quality management system) and ISO 14001 (environmental management system) certification. It has significantly increased the value of resource recycling.

How can Waste be Re-utilized Using Circular Economy Practices?

Chan Sing reuses and processes waste generated by utility companies, including fly ash or bottom ash (produced during the power generation process of boilers and in power cogeneration systems), and inorganic sludge (produced during wastewater processing), from which CLSM is then produced. Under the leadership of a professional and organized team, Chan Sing selects premium raw materials and other ingredients, conducts thorough product inspections and adopts a strict quality control system. It became the first operation of its kind to obtain patents for its product manufacturing process (M522837 & M528858) and is the first CLSM recycling organization in Taiwan to be approved by the Industrial Development Bureau, Ministry of Economic Affairs. It has significantly enhanced the quality of CLSM. As well as providing premium products to customers in various sectors, the company makes significant contributions to protecting the environment and maintaining the sustainability of resources.

Promoting the Circular Economy and Future Prospects

Chan Sing reuses the waste generated by utility companies, such as fly ash and bottom ash, and reprocesses it into the production of CLSM, creating a high-value product with the following benefits:
(1) CLSM can be used in engineering projects such as road or building backfilling to replace natural materials in excavation and grading works, preventing environmental pollution and resource consumption.
(2) CLSM can be used in engineering projects such as embedding pipelines and cables in ditches; the use of CLSM leads to a shorter duration of construction works, reduced disruption to traffic, enhanced construction quality and a reduction in resource consumption.

非金屬殘渣資源

皓勝工業股份有限公司

公司簡介

皓勝工業股份有限公司，成立於2009年，並於2013年取得再利用登記檢核。主要再利用項目為電弧爐煉鋼爐氧化碴（石）、煤灰、無機性污泥（氟化鈣污泥）…等，屬於國內少數專業電弧爐氧化碴以及氟化鈣汙泥之再利用機構。建材類再利用產品包括CLSM、再生粒料，廣泛用於回填工程；資材類再利用產品為人造螢石，可取代煉鋼用天然螢石，深獲市場肯定。

製程說明及推動循環經濟做法

1. 全國第一家通過氟化鈣污泥再利用為人造螢石再利用許可並實際生產之再利用機構。人造螢石品質較天然螢石更為穩定，廣受煉鋼業應用於取代天然螢石。

2. 運用電弧爐氧化碴、焚化再生粒料、燃煤灰渣，設計成為全再生粒料之CLSM。每月平均15,000m^3以上之CLSM產量，使用近30,000噸之再生粒料。

3. 將電弧爐氧化碴再利用成為瀝青混凝土用細粒料，2016年成為全國第一家配合政府輔導供料予公共工程瀝青鋪面之電弧爐氧化碴再利用機構。

推動循環經濟效益及未來展望

1. 品質優先：
廢棄物再利用所產出之產品，其品質不必然劣於原生物料產品。當再利用產品品質表現優異，其廢棄物再利用的身分將不再是客戶的顧慮。

2. 量出為入：
廢棄物再利用流程中，收受、處理、銷售三個主要流程應以銷售為拉力導向，而非以收受為推力導向。品質優異的產品可帶來順暢的銷售，進而刺激再利用機構提升處理能力以及收受數量。

3. 聚焦研發：
隨著廢棄物產源變化，廢棄物基質亦隨之改變，再利用機構應具有充足研發及檢驗能量，隨時監控廢棄物穩定性，並開發符合市場需求之產品。

Company Introduction

Hao Sheng Industrial Co., Ltd. (HSI) was established in 2009. In 2013, HSI was registered as a waste recycling plant. The main types of waste accepted for recycling are EAF slag, coal ash and fluoride sludge. HSI produces recycled products used in construction, including controlled low strength material (CLSM) and sustainable aggregates. HSI reuses fluoride sludge to produce artificial fluorite, which can be used to replace natural fluorite in the steelmaking process. HSI's products are popular in the market.

How can Waste be Re-utilized using Circular Economy Practices?

1. HSI's plant is the first in Taiwan to be given approval to reuse fluoride sludge to produce artificial fluorite. Artificial fluorite is more stable than natural fluorite, and it is widely used by the steel industry in place of natural fluorite.
2. HSI uses sustainable aggregates (EAF slag, incinerator bottom ash and coal ash) to replace natural aggregates in the production of CLSM. The average monthly CLSM production capacity is greater than 15,000 m^3, which means that nearly 30,000 tons of sustainable aggregates are used.
3. HSI reuses EAF slag as fine aggregate to produce asphalt concrete. In 2016, HSI became the first EAF slag recycling plant to cooperate with the Taiwanese government in supplying slag aggregates for the construction of asphalt public pavements.

Economic Effectiveness and Future Plan

1. Quality first: The quality of products created from recycled waste is not necessarily inferior to the quality of those produced from non-recycled materials. When the quality of recycled products is excellent, the waste used in their production ceases to be a concern for customers.
2. Input based on output: In the waste recycling process, the three main stages of receiving, processing and selling should be guided by sales, rather than by quantity of waste received. High-quality products can lead to a smooth sales process, which in turn drives the recycling plant to increase its processing capacity and rate of acceptance.
3. Focus on R&D: As the source of waste changes, the composition of the waste changes accordingly. The recycling plant should have sufficient R&D and inspection capabilities to monitor the stability of waste and develop products that meet market demand.

非金屬殘渣資源

寰冠科技股份有限公司

公司簡介

以更加環保更加節能（常溫常壓）方式，將廢料（事業廢棄物）變成原料，取代部份天然砂石做成CLSM（控制性低強度回填材料）等鋪路材料，稍微解除日益短缺的砂石困境。

製程說明及推動循環經濟做法

將飛灰、底渣、爐渣等等製成CLMS（低強度混凝土材料）、水泥原料、工程材料用料。盡力於各類無機廢棄物再利用，研發最佳用途，足為其他廠之典範。

具6項R類利用於CLSM產品及3項D類利用於回填材或粒料原料，CLSM產品自我管控並研發。客戶端搭配捷運輕軌，自來水管路工程，污水管路工程等及他營造工程公司。

推動循環經濟效益及未來展望

寰冠是將廢棄物百分百取代天然砂石，每年處理6,900公噸廢棄物，取代6,900公噸的天然砂石。將原本要去掩埋、焚燒或耗去土地空間燃料，變成可在常溫常壓下百分百利用，並衍生成零廢棄物。本公司除具再利用身份，亦能產製非結構性混凝土之廠商，目前產品僅做CLSM，用於道路回填，每年產生產品總共可以幫忙鋪路 23,484立方米。

Company Introduction

Huanguan Technologies Ltd. uses green and energy-saving methods (i.e., normal temperature and pressures) to convert industrial waste into raw material, which can be substituted for natural sand and gravel in the production of paving material and controlled low strength material (CLSM), and can slightly alleviate the severe problem of the decline of sandstone.

How can Waste be Re-utilized Using Circular Economy Practices?

Huanguan turns fly ash, bottom ash and cinder ash into CLSM, cement and other engineering materials. It endeavors to reuse various types of inorganic waste and to ascertain the best ways to use them; in doing so, Huanguan aims to become a role model for other industry players. Huanguan uses six kinds of recyclable or reusable waste for producing CLSM, and three types of industrial waste for refilling material or aggregates. The company has the capability of researching and developing, as well as controlling, the CLSM products. It provides services to a wide range of customers for various applications, including the light rail transit system, tap water pipeline engineering, sewer pipeline engineering and other construction projects.

Promoting the Circular Economy and Future Prospects

Huanguan reuses waste and converts it into products that can fully replace natural sandstone. Each year it processes 6,900 tonnes of waste to replace 6,900 tonnes of natural sandstone. In this way, the fuel that would otherwise be incinerated, end up in landfills or take up land space can be fully re-used under normal temperatures and pressures, with zero waste production. In addition to reusing waste, Huanguan also provides non-structural concrete. Currently, the company only produces CLSM, which is used as backfill in the construction of pavements. The amount of CLSM produced each year is sufficient to provide material for 23,484 square meters of pavement.

非金屬殘渣資源

大陸營建廢棄物共同清除處理股份有限公司

公司簡介

於民國95年3月成立。主要營運項目為替新建及拆除營建所產生的廢棄物進行清除處理，同時也秉持「只有對地球友善的事業才能永續生存，我們的努力永遠沒有句點」的經營理念將廢棄物進行清除並合法處理。不僅保障顧客權益同時也獲得顧客的信賴與支持。

製程說明及推動循環經濟做法

將營建混合物分類篩選後，產生的「砂石混合物」材料回歸到源頭。例如：營建工程材料、磚瓦原料、混凝土添加材料、骨材及建材原料、工程填地料及道路工程級配料等。其餘分篩後所產生之廢金屬、廢塑膠、廢紙等則回歸資源回收廠。廢塑膠部分經由資源回收廠破碎造粒後銷售於紡織廠，製成再生環保紗。廢棄木材運至合作廠商作為鍋爐燃料，廢塑膠混合物則送至焚化廠焚化，燃燒時所產生蒸氣可做為汽電共生動力，達資源再利用最大效益。

推動循環經濟效益及未來展望

廢棄物再利用率達90%以上。經增加分類後，篩選出混凝土塊，可送至砂石廠破碎、磨成砂，減少處理成本167萬/年。

Company Introduction

Founded in March 2006, Da Lu's operations focus on the removal and processing of waste generated during building construction and demolition. It abides by the following principle: "The only sustainable business is the one that is environmentally friendly; our efforts will never end". The waste is removed and treated legally. Da Lu has not only protected its customers' benefits and rights but has also won their trust and support.

How can Waste be Re-utilized using Circular Economy Practices?

Du Lu sorts and filters the mixed construction waste, creating a sand and gravel mixture which is made into raw materials for use in such areas as construction, tiles, additional material for concrete, aggregates, buildings, ground fill engineering, and graded material for road works. After being sorted and filtered, the remaining waste metal, plastics and paper go to waste recycling plants. The waste plastics are then crushed and pelletized by the waste recycling plants and sold to textile factories,
where they are converted into recycled yarn. The waste timber is shipped to Da Lu's partner companies to be used as fuel for boilers. The waste plastic mixture is transported to incinerators and burned; the steam produced during the burning process can be used as power for the power cogeneration system. As this clearly demonstrates, all resources can be fully reused.

Economic Effectiveness and Future Plan

More than 90% of the waste can be reused. Following the additional sorting and filtering process, the concrete blocks can be transported to quarries, where they are crushed and ground into sand. This results in a saving of around NT$1.67 million per year in processing costs.

非金屬殘渣資源

信一預伴混凝土股份有限公司

南崁廠

公司簡介

於民國77年成立，為信大水泥股份有限公司所屬子公司。主要產品為一般混凝土、纖維混凝土、抗灣混凝土及自充填高流動混凝土。目前南崁廠採用日本日工新式雙軸強制式自動攪拌設備（密閉式骨材庫等），每日可生產2500立方公尺之優質混凝土供應各類工程。

製程說明及推動循環經濟做法

將燃煤發電廠或事業燃煤鍋爐產生之燃煤飛灰R-1106（飛灰或底灰），做為原料或攙和物資源再利用，其主要用途為水泥原料、水泥製品原料、混凝土攙和物，產品接符合CNS3090預拌混凝土要求，另外，原料貯倉是為非開放設計，輸送採半密閉設計以減少揚塵。

推動循環經濟效益及未來展望

將每年約400公噸廢棄物回混凝土拌合以降低廢棄物處理成本（約200萬頓）。

Company Introduction

Founded in 1988, Hsin I is a subsidiary company of Hsing Ta Cement Co., Ltd. Its main products are conventional concrete, fibrous concrete, bend-resistant concrete, and self-compacting, high-flow concrete. Currently, its plant in Nankan, Taoyuan uses the latest twin-shaft compulsory automated concrete mixers from Japan (with enclosed aggregate storage facilities), and has a daily output capacity of 2,500 cubic meters of high-quality concrete that can be used in all kinds of engineering projects.

How can Waste be Re-utilized using Circular Economy Practices?

Hsin I repurposes the fly ash and bottom ash (R-1106) residue from coal-fired power stations and industrial coal-fired boilers by using them as a raw material or a material for mixture, more specifically as raw material for cement and cement products, and as a component of concrete mixture. Hsin I's products are compliant with CNS3090—the standard for ready-mixed concrete. In addition, the storage silo for raw materials is partly enclosed, along with the conveyor system, in order to minimize dust.

Promoting the Circular Economy and Future Prospects

Each year, Hsin I uses 400 tonnes of waste material in concrete mixture, thereby saving approximately NT$ 2 million per year in waste disposal costs.

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
綠色冀泉股份有限公司	種植原生樹種結合社會公益	110 ★★	
配客嘉股份有限公司	包裝循環	109 ★★	
中勤實業股份公司	晶圓盒清洗再利用	108 ★★	
GC贈物網（吉星共享股份有限公司）	建置贈物網平台分享多餘物資	110 ★	
七逃藝術有限公司	循環設計創作	110 ★	

公司名稱	資源循環特色	獲得績優企業遴選之年分與等第	廠商資訊
皓揚環境科技有限公司	智慧垃圾、廚餘資源回收系統	110★	
綠點能創股份有限公司	綠能共享及公益	110★	
凡立橙股份有限公司	智慧瓶子回收機	109★	
青瓢有限公司	以租代買	109★	
芒菓丹(貿塑企業子品牌)	以租代買	109★	

循環租賃模式

綠色冀泉股份有限公司

Green Hope Spring

公司簡介

綠色冀泉社會企業創辦人陳宇華多年來在偏鄉資助足球隊已超過12年，2015年成立復育台灣原生種的綠色冀泉社會企業後，持續思考如何將種樹與單純的足球公益結合，在2017年提出以樹養球計畫，在有足球的學校種高經濟原生樹種，每場勝利都幫球員署名種樹，樹苗由社會大眾及企業認養(一人一千一樹計畫)並送給學校，讓教練帶著球員負責養護小樹。原生樹種不需要施肥，注意水份即可，樹的落枝落葉變成公司的創收，以落枝做成的”獎牌”成為全台灣各類型賽事採購優選，所有從樹衍伸出來的營收30%回到足球學校，30%繼續種樹，30%維持公司營運，落實ESG精神，為了記錄這一切，2020年研發加樹APP，運用區塊鏈技術，讓每棵樹都有自己的故事，量化人類所看不見樹的價值，校園種滿了，就往閒置或是廢校繼續種樹成林，將來一座座森林足球場誕生了，而森林能做的事情就是孕育萬物與延續人類文明，人類要付出的行動就是跟我們馬上去種樹。

製程及推動循環經濟做法

跨領域的結合,從一棵樹苗到一片森林,與苗農合作(育苗),在都市陽台育苗增加都市綠色面積(類綠建築),陽台共享,18個月後再到偏鄉學校校區或是閒置農地落土(土地活化),落土的數量取決於每支足球隊的勝場(社會設計),導入科技(AIOT,區塊鏈),數據就是力量(大數據),量化看不見的生態價值(點數經濟),向願意支付費用的企業或是大眾收取費用(公眾參與),3年後,樹成林,能自給自足(樹循環經濟),並開始資助球隊發展費用(足球發展)。移動的過程連結不同參與者,不同產業,並創造不同效益。

推動循環經濟效益及未來展望

現在地球上每一分鐘有50個足球場大的森林在消失，沒有森林就沒有人類文明及萬物，所以當地球生命源頭因為人類經濟活動而快速損耗，氣候危機已經來臨，那加速促進這一切的人類應該更積極有所作為。既然科學證據都已經證明樹是對抗氣候變遷全球暖化最簡單有效又便宜的方法，種樹就得種出真正的經濟發展與生態循環價值。

未來展望:

1.SDGS目標
1,2,3,4,5,6,7,8,11,12,13,15,16,17。

2.ESG：涵蓋環境保護,物種保育,社會影響力,翻轉偏鄉弱勢與貧窮,公司自給自足並有能力擴展複製商業模式。

3.CSR：加強企業的社會責任強度與維度，提升到永續環境，綠能轉型，支持運動。

4.USR：與大學社會責任計畫合作，從教育著手，師生實作，學生實習，專題與競賽，協助大學深耕在地與共同參與氣候行動。

5.公眾參與：一個人一輩子若只幫地球種下一棵原生樹種，代價是台幣1,000元，看似微小，但是若因此可以影響周邊的人共同參與，則可以匯聚龐大的力量，除了種回森林，循環經濟發展，地球就有機會延緩惡化的速度，可以從本計畫開始，自發性,危機感與創造力的結合。

6.生物多樣性：一棵樹就是一個微生態系、微氣候，森林就是一個完整生態性，無論在都市的生態跳島、或是偏鄉森林，樹都是維持人類文明的關鍵，別讓子孫只能看圖想故事。

Company profile

Founder Chen Yu-Hua of GHS Social Business has funded football teams in rural areas for 12 years. Following GHS Social Enterprise's establishment in the restoration of indigenous trees in Taiwan in 2015, the GHS has continued to contemplate on how to simply combine tree planting and football public welfare. In 2017, the ‘‘Planting trees to protect kids football’’ plan was proposed. Indigenous trees species of high economic value were planted in schools with football as a sport. Trees were planted with football players’ signatures after each victory. The seedlings were put up for adoption by the general public and enterprises (One Thousand Per person Per Tree Plan) and were given to schools for coaches to lead their players to take care of the young trees. Indigenous tree species require no fertilization; just make sure it is watered. Fallen twigs and leaves are the company's revenues. The ‘‘medal’’ made of fallen twigs becomes the top choice of various types of game procurements. 30% of revenues derived from the tree go back to the football school, where 30% are used to continue planting trees and 30% are used to maintain company operations. Adhering to the spirit of ESG, in order to make complete records, the Tree-adding APP was developed in 2020. Through blockchain technology, every tree has its own story. The value of a tree invisible to humans is quantified. Once trees fill the campus, they continue to be planted in idle or abandoned schools. Trees make up a forest and give birth to a forest football field in the future. A forest is capable of nurturing all things on earth and prolongs human civilization. Come plant trees with us at once. It is the price humans must pay! Planting trees to protect kids football. It’s not just for football but also for the earth

Introduction to the process and approaches of driving resources circulation

Diversified Industries: Through Interdisciplinary Integration, from seedlings to forests, cooperate with seedling growers (growing seedings). Grow additional seedlings on balconies to increase the city's green area (categorical green buildings) and balcony sharing. Plant them in the soil in rural school areas or idle farmlands after 18 months. The quantity of soil planting depends on the number of wins of each football team (social design), importing technology (AIOT, blockchain), data is strength (big data), quantifying invisible value (points economy), and collecting fees from willing enterprises or the general public (public participation). When trees become a forest three years later, it is self-sufficient (circular tree economy). It starts funding finding football team development fees (football development) during the migration process, different participants, industries are linked, thereby generating different benefits.

Economic Effectiveness and Future Plan

The world’s forests, the size of 50 football fields, vanish every minute. Without forests, there will be no human civilization and all things on earth. Therefore, the rapid depletion of the origin of life on earth due to human economic activities marks the advent of climate crises. Humans that have contributed to this acceleration should take more active measures. Since scientific evidence has proven that trees are the simplest, the most effective, and the most affordable approach against climate change and global warming, trees planted should bring out the true value of economic development and the ecological cycle.

1. SDGS：Goal1,2,3,4,5,6,7,8,11,12,13,15,16,17。
2. ESG：Cover environmental protection, species conservation, social influence, transforming the vulnerable and poverty around in rural areas, company self-sufficiency, and the ability to expand and duplicate the business model.
3. CSR：Strengthen the intensity and dimension of corporate social responsibility, upgrade to a sustainable environment and green energy transformation, and support sports.
4. USR：Collaborate with plans of USR(university social responsibility). With education as the starting point and through teacher-student implementations, student internships, keynote speeches and competitions, assist universities in putting down roots locally and jointly participate in climate actions.
5. Public participation: If a person plants only one indigenous tree species in a person’s lifetime, the price to pay is NT$1,000. It may not be much, but if it can influence people around and get them to take part, it can draw enormous strength. In addition to replanting trees back to the forest and promoting the development of a circular economy, earth will have a chance to delay the rate of deterioration. Start with this plan, thereby combining spontaneity, crises, and creativity.
6. Biodiversity: A tree is a micro-ecosystem, a microenvironment. A forest is a complete ecology. Whether it is an ecological island hopping in the city or forests in rural areas, trees are the key to retaining human civilization. Do not let ‘‘descendants imagining history through pictures’’ become a reality.

循環租賃模式

配客嘉股份有限公司

配客嘉 PackAge+

公司簡介

提供消費者更加環保的網購選擇，期望未來透過包裝循環模式，能夠讓包裝以共享租賃的方式在電商、消費者與歸還通路之間重複循環使用，減少紙箱破壞袋等包裝垃圾的浪費。

製程說明及推動循環經濟做法

網購循環包裝袋使用回收寶特瓶與廢棄玻璃製成，結構設計上堅韌耐用，可重複使用超過50次，袋面部分則經過防水、抗污等特殊處理，不易變髒或毀損；此外，為確保商品不被他人拆封偷竊，包裝袋上附有專利防盜貼紙，並內建條碼，串接包裝與消費者購物資訊。將可重複使用的網購包裝租賃給電商業者，讓電商業者使用循環包裝出貨；當消費者收到循環包裝的貨物時，可將包裝歸還合作店家，並領取線上及線下店家提供的優惠；回收包裝經過消毒、清潔及保養後，再提供給下一個電商使用，形成網購包裝循環系統。

推動循環經濟效益及未來展望

本公司為目前國內唯一提供循環包裝服務業者。對實體店家來說，除店家資訊會在Package+ APP上曝光外，同時可藉由消費者到店家歸還包裝增加來客數，進而帶動買氣。預計在2022年完成減少3,000萬次的一次性包裝，使用循環包裝袋（箱）。減少每個紙箱/膠帶/氣泡緩衝材等一次性包裝浪費，碳排放約1.2公斤。

Company Introduction

PackAge+ provides consumers with a green online shopping experience, in the hope that packaging material can be reused and recycled in the future by online shopping companies, consumers and packaging material recycling points , so that we can avoid generating packaging waste, such as cardboard boxes or plastic bags.

How can Waste be Re-utilized Using Circular Economy Practices?

For items purchased online, we offer recycled packaging bags that are made from used plastic bottles and waste glass. These bags are strong, durable and can be used more than 50 times. The surface of the bag is processed to be water-resistant and smudge-resistant, as well as wear-resistant to some degree. In addition, to ensure that the bag and its contents are not stolen, each bag comes with a patented anti-theft sticker which has an embedded barcode linking the bag with details of the buyer and of the goods purchased. After shoppers receive their items in the recycled packaging, they can return the packaging material to the partnered stores and benefit from various offers provided by online and physical stores. These returned packaging materials will then be sterilized, cleaned and maintained before being supplied to the next online shop. This constitutes a recycling system for online shopping packaging.

Promoting the Circular Economy and Future Prospects

PackAge+ is the only provider of recycled packaging material in Taiwan. As for brick-and-mortar stores that collect material returned by consumers, they can gain more exposure on our PackAge+ app, where their store details are published. In addition, they can benefit from more consumers visiting the store—and potentially more in-store purchases made—when they come to return the packaging material. PackAge+ estimates that, due to the use of recycled packaging bags and boxes, 30 million fewer single-use packages will have been used by 2022. Every item of single-use packaging, such as cardboard boxes, adhesive tape, and bubble wrap, produces an average carbon emission of 1.2 kilos.

循環租賃模式

中勤實業股份公司

公司簡介

整合各高科技產業推出晶圓智慧出貨盒、智慧棧板箱及智慧料架，透過高設頻技術遠端監控貨架及出貨物流情形，提升產品運送狀況，改善儲存與報廢數量。同時整合系統，搭配機械手臂及AGV自動無人搬運車，幫助現有廠房導入高效、準確、靈活的自動化載具搬運傳輸，節省人力成本，提升理貨速度，達到設備互聯、資料共用、大數據分析，提供管理者最佳決策。為顧客解決相關產品使用之損耗、靜電、化學之清洗及維護問題，打造及定位半導體所要求之高潔淨度。

製程說明及推動循環經濟做法

以特有的專業清洗技術，將原來僅能一次性使用的載具，回收清洗再次重複利用3~4次，延長晶圓載具的使用期限，並大幅減少工程塑膠廢料的處理成本及對環境的損害。

推動循環經濟效益及未來展望

為國內首家晶圓載具回收清洗業者，以清洗的服務來延長載具壽命，至少可有晶圓載具34億個/年進行再利用，減少1,462萬噸的塑膠廢棄物，每年減少廢棄物處理成本至少1億元以上、而增加企業獲利2億元以上。無塵室清洗達到半導體要求，晶圓載具等潔淨清洗包裝及實驗室驗證，遵循高科技客戶品管要求。

Company Introduction

Chung King combines various high-end technologies to produce smart shipping boxes, pallet collars and shelving for silicon wafer products. Using high-frequency technology, the status of shelving, shipment and logistics can be monitored remotely. As a result, product shipment and storage conditions can be enhanced, and the amount of waste minimized. Chung King integrates multiple systems, such as robotic arms and Automatic Guided Vehicles (AGVs), and has introduced highly efficient, precise and agile automated carrier/conveyor systems on the shop floor, leading to a reduction in labor costs and an increase in product sorting speed. As a result, machines are connected with each other, data is shared, and big data analysis can be conducted, all of which enables management teams to optimize their decision-making. Chung King solves its customers' issues related to product usage, including wear and tear, static electricity, chemical cleansing and maintenance. It both meets and sets the standard of cleanliness required in the semiconductor industry.

How can Waste be Re-utilized Using Circular Economy Practices?

Chung King utilizes its unique and professional cleaning methods so that wafer carriers (that would otherwise be used once) can be returned, cleaned, and reused 3 or 4 times over, thus extending their life span. Consequently, the costs of processing engineering plastic waste can be reduced to a great extent, and the impact to the environment can be minimized.

Promoting the Circular Economy and Future Prospects

Chung King is Taiwan's first provider of a wafer carrier recycling and cleaning service. With this service, the duration of use of the carriers can be extended. At least 3.4 billion wafer carriers can be reused every year, and plastic waste can be reduced by 14.62 million tons. Each year, the cost of processing waste can be reduced by at least 100 million NTD; companies will be able to make additional profits of at least 200 million NTD. Chung King's service of cleanroom cleaning meets the standards required in the semiconductor industry. The washing, cleaning, and packing of the wafer carriers, and the laboratory verification, all comply with the QA requirements of Chung King's customers in the high-tech industry.

循環租賃模式

GC贈物網（吉星共享股份有限公司）

公司簡介

GC 贈物網是主題式社群，打造讓閒置物資便利流通共享的平台。除開發供民眾免費使用的APP，更推出讓企業全員參與的分享減碳行動。贈物網的使命，是透過資訊流通和精準媒合，營救本不該遭廢棄的物品，送給更合用的對象，透過循環經濟中「再分配—再使用」的迴圈，重啟物品的生命週期，延續物命，達成環保減廢減碳效益。

製程及推動循環經濟做法

GC 贈物網的解決方案是以共享促循環、以循環促永續，提倡無條件共享，去除資源循環流動的門檻，讓每個人都用最便捷的方式，分享出多餘的物資，「以分享代替丟棄」，同時也免費索取自己需要的物品，「以延用代替購買」。讓共享和物資循環成為一種生活方式，自然達成公益、環保、循環、永續的生活及發展目標。

GC 贈物網投入開發便利高效的贈物平台，供用戶免費贈送和索取物資。在服務內容方面，除了針對個人之間的C2C 及個人與公益單位之間的C2N(NPO)贈物模式外，亦協助企業規劃並執行以物資循環為主題的各類ESG 專案，包含：

1. GC 共享圈APP：協助打造企業或組織內部物資循環系統
2. 分享減碳行動：包含斷捨離講座及代客贈送的完整物資循環服務
3. 企業商品及庫存品公益媒合

推動循環經濟效益及未來展望

創立13 年來，GC 贈物網啟動物資分享循環439.3 萬件，減少因掩埋和焚燒導致的二氧化碳排放達到9,413 噸。在資源循環再利用的推動下，目前總受益人次已達1,907 萬人，其中公益組織受益人次達879 萬人。以經濟效益來看，GC平台每日分享物資總價值58.8 萬新臺幣，13 年總成交物資價值達到27.8 億新臺幣，為社會節省大量的資源。

企業方面，目前已有50 間不同領域的標竿企業，包含SOGO 百貨、新光金控、研華科技、中強光電、中石化、聚陽實業等與贈物網合作，成功媒合35,580 件物品，共為環境減負32.4 公噸碳排。GC 未來3 年目標，即是透過創新SaaS 軟體服務，結合產官學，一同推動組織及企業打造在地的物資循環共享圈，加速氣候行動影響力範圍並落實低碳生活。

Company profile

Give Circle (GC) is an online platform which offers users a way to share their idling items easily and conveniently. In addition to its free App, GC also launches ‘‘Sharing Cuts Carbon’’ initiative, allowing companies and their employees to participate in climate action effortlessly. Our mission is to‘‘rescue’’the already produced and still usable items and ‘‘matchmake’’ them to the next owners, by providing a platform for information exchange and precise matchmaking. We aim to facilitate the‘‘redistribute and reuse’’process in the circular economy, to restart and extend the life cycle of items, to reduce waste, to cut carbon emissions and protect the environment.

Introduction to the process and approaches of driving resources circulation

Our solution is to promote sustainability through circulation, and to increase items circulation by sharing. GC advocates unconditional sharing and removes barriers and thresholds that prevent things from circulating freely. On one hand, it allows everyone to give away items in the most convenient and efficient way, and encourages people to give before they trash anything; on the other hand, it allows people to take or request items for free and constantly reminds them to try first to use items from others before they shop. GC makes sharing a new lifestyle, and it's the lifestyle for a more sustainable future. Join GC, those seemingly distant goals such as social care, environmental protection, and sustainability become part of your daily life.

GC develops a efficient and convenient items sharing platform for people to GIVE and TAKE items unconditionally. In addition to its C2C and C2N(NPO) service models, GC also provides services for corporations, designing and implementing various items circulation themed ESG projects, which include:

1. GC App for Enterprise/Organization: it helps companies or organizations to create internal items circulation systems
2. Sharing Cuts Carbon Initiative: this includes a complete package of services from「 Low Carbon Life 」educational workshop to surrogate giving service
3. Charitable Matchmaking Service for Commercial Goods and Inventories

Economic Effectiveness and Future Plan

Results for driving resources circulation and future prospect During 13 years since its foundation, GC has facilitated redistribution of more than 4.39 million items. By preventing them from ending up in landfill and incinerator, we cut down 9,413 tons of carbon emissions. The items being redistributed and reused not only benefit the environment, but also benefit 19.07 million people, including 8.79 million of financially challenged ones. From social & economic perspective, the value of items transacted per day on GC platform is about 588,000 NTD, and the total value of items transacted in the past 13 years mounts to 2.78 billion NTD. By redistributing items, GC also helps to balance resources in the society and create a better life for everyone.

GC also partners with 50 leading companies in different fields to further expand its items circulation ecosystem, including SOGO department store, Shin Kong Financial Holdings, Advantech, CoreTronic, China Petrochemical and Makalot Industrial, etc. These companies altogether give away and share 35,580 pieces of idling items with the public, reducing approximately 32.4 tons of CO_2 emissions.

GC's goal for the next 3 years is to create multiple ‘‘local’’ items circulation ecosystems across Taiwan.

With its innovative SaaS ‘‘GC App for Enterprise/Organization’’, companies, government institutions, and even schools can establish their local and internal sharing platforms for items circulation. This essential step will speed up our movement on climate action.

循環租賃模式

七逃藝術有限公司

公司簡介

七逃藝術位於台南孔廟文化園區，從2016/03/25美術節開幕以來，展出油畫、水彩、工藝等三十多檔次展覽。致力於推廣美術、生活工藝創作與欣賞，如同台南小吃般親切。2017年建立「循環設計」的品牌，關注社會及環境議題並持續開發減塑環保的紡織品，如棉布環保食物袋、蔬果袋、購物袋、蜂蠟袋、有機棉植物染等。2021年於台南市下營區投資植物染及循環工藝設計空間，決心以「循環經濟、地方創生、工藝文創」核心價值，落實執行台南循環工藝文創發展。

製程及推動循環經濟做法

近年推廣友善環境蔬食餐飲與循環設計創作，經常舉辦舊衣改造、植物染織、木作、蜂蠟等循環工藝體驗課程，開發蜂蠟袋、食物袋等環保減塑產品，以NG水泥袋、旗幟、咖啡麻布袋等循環設計文創產品，循環再利用生活周遭可資源利用材料，具體實踐「經濟、社會、環境永續發展」循環工藝生活理想。

整合各社創平台的努力，開創循環經濟的設計思維，改造很多舊思維的產品，恰到好處，發揮更強大的民間力量在循環經濟的面向上。

推動循環經濟效益及未來展望

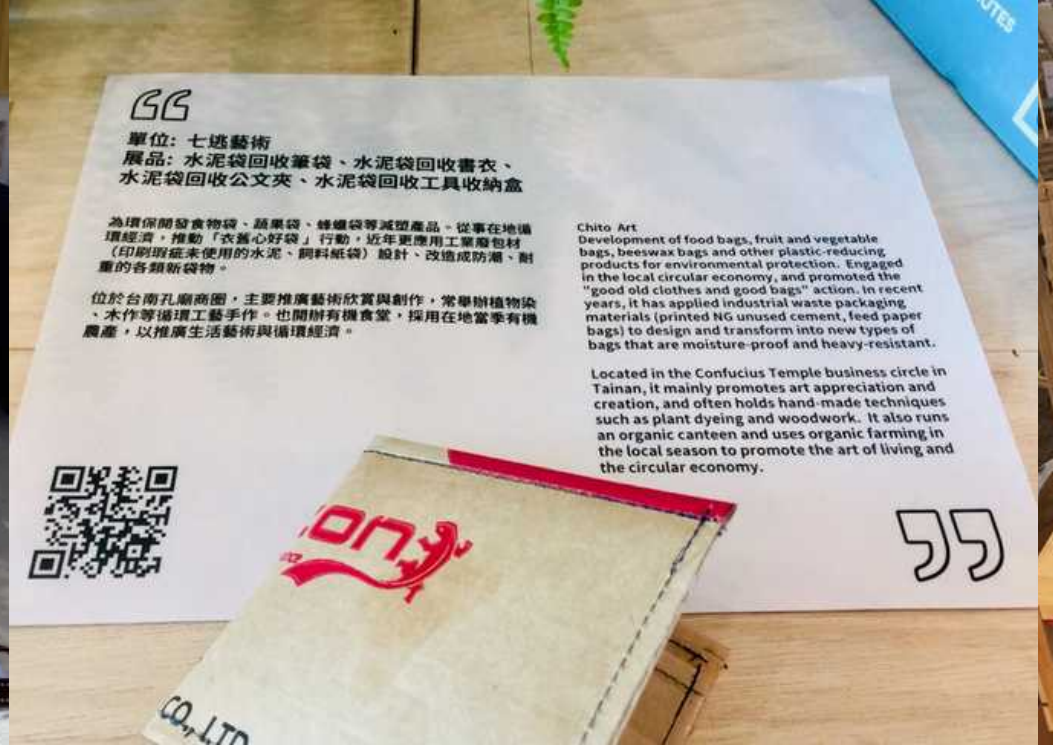
推動資源循環效益，年減少環境廢棄物生成大約4公噸：

1.減少舊衣剩布廢棄物生成約400公斤/年 2.減少瑕疵NG未使用的水泥、飼料袋廢棄物生成約1,500公斤/年 3.減少選舉布旗、活動旗幟廢棄物生成約500公斤/年 4.減少樹木、植物枯枝落葉廢棄物生成約600公斤/年 5.減少咖啡麻布袋廢棄物生成約500公斤/年 6.生物循環蜂蠟全利用500公斤/年(發揮養蜂產業所有價值邁向零廢棄)，未來將擴大社區循環工藝創意研發，以台南自然生態、歷史文化融入循環設計情境，以地方社區的OCOC（One Community, One Craft）工藝社群概念，繼續運用循環設計（Cyclic Design）導入文化、旅遊與市場等跨領域整合，啟動循環工藝三大策略：

1. 高價值循環：結合「Tainan ReDesign 好南人永續城市行動專案計畫」發展染織循環工藝設計創新，透過循環文創產品創新設計，致力「創新設計、循環設計」核心價值，建立循環工藝創作設計平台。

2. 產品服務化：開發獨特循環工藝商品與服務，開發獨特循環工藝文創商品，創新循環旅行遊程，串連循環工藝文創合作店家，建構台南循環經濟工藝聚落，以達永續經營的目的。

3. 系統性合作：創新數位轉型綠色消費，推動台南循環工藝消費生活模式，透過教育推廣資訊平台。創新線上報名線上課程，發展循環工藝商品與服務，鼓勵企業單位進行綠色採購，開創多元行銷管道，以循環工藝核心活動落實各類型環保教育活動。



Company profile

Since its launch during the art festival on 25th March, 2016 in the Confucius Temple Cultural Park in Tainan, Chito Art has showcased its oil paintings, watercolor paintings and crafts in more than 30 exhibitions. It has devoted itself to the creation and appreciation of fine arts and handicrafts and the idea that these things can be as enjoyable as the street foods in Tainan. In 2017, Chito Art launched the brand ‘‘Circular Design’’, with a focus on social and environmental issues and on the development of eco-friendly textile products that use less plastics, including reusable cotton food wraps, carrier bags for fruits and vegetables, shopping bags, beeswax bags, and naturally colored organic cotton fiber. In 2021, Chito Art invested in natural dyes and a space for designing crafts from recycled materials in the Xiaying District of Tainan City. With its core values based on circular economy, regional revitalization and culture-themed arts and crafts, it is committed to promoting the cultural and creative development of recycled crafts in Taiwan.

Manufacturing Process and Circular Economy Practices

In recent years, Chito Art has been promoting vegetarian foods and beverages and creative designs that are friendly to the environment. It regularly organizes hands-on activities for people to experience and enjoy circular handicrafts, such as the renovation of old clothes, crafts involving natural dyes and beeswax, and woodworking. It has developed green products that help reduce the amount of plastics used, including beeswax wraps and food bags. It uses defective cement bags, banners, flags and linen coffee bags in the design and creation of recycled art and craft products. The company recycles and upcycles all available resources in the surrounding environment and realizes the ideal of ‘‘sustainable development of the economy, society and the environment’’ with its recycled handicrafts.

Chito Art integrates the efforts of various social innovation platforms and creates designs based on the concept of a circular economy. It has remade many products that were once considered as products with old concepts. It utilizes the power of the private sector in the circular economy model.

Efficiency of Circular Economy & Company Vision

Chito Art promotes the benefits of circulation of resources, reducing the generation of waste by approximately 4 tons a year in the following ways:

1. 400 kg of clothes and fabrics are reused;
2. 1500 kg of defective or unused cement bags and feed bags are reused;
3. 500 kg of banners and flags used during election campaigns or events are reused;
4. 600 kg of dead branches or dry leaves are upcycled;
5. 500 kg of linen coffee bags are reused;
6. 500 kg of beeswax is fully utilized through biochemical recycling (with the aims of extracting full value from the beekeeping industry and generating zero waste).

In the future, Chito Art will expand its creative development of recycled crafts by incorporating Tainan's nature, history and culture into its designs, utilizing the concept of ‘‘One Community, One Craft’’, adopting cyclic designs and integrating culture, tourism and marketing. Chito adopts the following three strategies in its designs:

1. High-Value Circulation: Chito Art works with the Tainan ReDesign program to drive innovation in the design of natural dyeing crafts. With its new designs of recycled cultural artworks, Chito Art is committed to the core value of ‘‘innovative design and circular design’’ and to developing a creative platform for recycled crafts.
2. Products as Services: Chito Arts develops unique recycled crafts and services, offers innovative travel itineraries, connects with sellers of creative recycled artworks, and has constructed a circular economy craft village in Tainan to achieve the objective of sustainable management.
3. Systematic Collaboration: Chito Art implements the ideals of innovative digital transformation and green consumption. It encourages a lifestyle of consumption of recycled crafts in Tainan and promotes information platforms with an educational approach. Chito Art offers online training courses, develops circular crafts and services and encourages business to adopt the principles of green consumption.
   It launches a diverse range of marketing channels and conducts a wide variety of educational activities relating to environmental protection, as well as offering core activities such as recycled crafts training programs.

循環租賃模式

皓揚環境科技有限公司

iTrash
智慧無人收集服務
Smart Waste Collection Service

皓揚環境科技創新的iTrash智慧垃圾回收整合服務收集系統，乃是將母公司鴻海環境科技20年以上專業垃圾冷藏壓縮設備與廚餘、資源回收設備技術模組化，再搭配多項專利，推出iTrash智慧垃圾收集系統，包含智慧垃圾收集機、智慧廚餘收集機及智慧瓶罐回收機。提供24小時無人自動化垃圾收集服務系統，使用者僅需以悠遊卡操作，即可支付垃圾處理費及加值資收回饋金。旨在改善傳統垃圾收集造成環境髒臭的問題，其次促進民眾自動自發進行垃圾減量與資源回收，並且減少使用塑膠袋。

iTrash所收集之生活垃圾及廚餘可交由生質能源廠商進行分類後，一方面脫水、堆肥成為可再利用之肥料，另一方面透過機械化生物處理(MBT)技術，製成替代燃料。廢棄寶特瓶收集後運至回收場，處理成乾淨的PET碎片。PET碎片經由加工成為回收聚酯（Recycled PET）。利用這些回收聚酯再製成的環保再生纖維，可以製成服飾用紗；每7到8支寶特瓶，就可製成一件運動T-shirt，整個製程可以減少40~85%的能源損耗、54.6%的碳排放。此外，鐵鋁罐的回收對環境永續亦相當重要。用回收的鋁罐來製鋁，比用鋁礬土能減少82%的能源消耗。用回收的鐵罐來煉鐵比用鐵礦能減少52%的能源。

結合18項設計專利，iTrash針對垃圾收運問題建構多元創新的公共服務模式，兼顧人與環境的和諧，落實垃圾減量及增進節能減碳績效。未來將持續增強產品功能，擴增設備回收處理品項，為環境永續不斷精進與努力。

Hao-Yang Environmental Technology has inherited more than 20 years of profession in manufacturing of waste refrigeration, compression and recycling equipment from its parent company Hon-Hai Environmental Technology. Equipped with a number of patents, Hao-Yang launched the innovative iTrash Smart Waste Collection Service System, including smart garbage collectors, smart food waste collectors, and smart bottle and can recycling machine. It provides a 24-hour self-service automated waste collection service. Users only need an Easy Card to pay for garbage disposal and to receive value-added by recycling bottles and cans. ITrash aims to improve the problem of environmental dirt and odor caused by traditional garbage collection and impels the public to reduce waste and make a better recycling spontaneously.

The domestic waste and food waste collected by iTrash can be handed over to biomass energy manufacturers for sorting. On the one hand, it can be dehydrated and composted into reusable fertilizers, and on the other hand, it can be made into alternative fuels through mechanized biological treatment (MBT) technology. PET bottles are recycled into clean PET fragments and then processed into recycled polyester (Recycled PET). The polyester fibers made from recycled polyester can be used to make yarns for clothing. For every 7 to 8 PET bottles, a sports T-shirt can be made. The entire process can reduce energy consumption by 40 to 85% and decrease carbon emissions by 54.6%. In addition, the recycling of cans is also very important for environmental sustainability. Instead of mineral mining, recycle and reuse aluminum cans reduces energy consumption by 82%, while recycle and reuse tin cans lessen energy consumption by 52%.

With 18 design patents, iTrash constructs a diversified and innovative public service model for garbage collection, taking into account the harmony between people and the environment, implementing garbage reduction; improving energy conservation and reducing carbon emissions. In the future, we will continue to enhance product functions, expand equipment recycling items, and continue to improve and commit ourselves for environmental sustainability.

循環租賃模式

綠點能創股份有限公司

陽光伏特家

陽光伏特家（Sunnyfounder）為台灣第一家、規模最大的全民電廠平台，同時也是國內第一家綠能售電業，希望透過全民參與行動為台灣社會及能源發展帶來正向改變。在陽光伏特家平台，民眾可以選擇「出租屋頂」、「小額出資」及「愛心捐款」等多元參與方式，共同支持綠電生產。

1. 綠益共享模式：民眾可輕鬆選擇電廠出資專案，並購買一片或是數片太陽能板，與其他參與者一起共享綠能獲益。

2. 綠能公益模式：結合企業CSR資源與民眾愛心捐款，為國內社福機構募資建置太陽光電系統，並將售電收益回饋給弱勢社福團體，使其獲得長期穩定的幫助。

3. 提供屋頂模式：民眾可將屋頂閒置空間出租給陽光伏特家，屋頂建置陽光電廠，除了可以隔熱、降溫外，屋主還可免出資即獲得5%以上的售電收益。

4. 綠電交易：透過陽光伏特家售電業身份，促成國內發電業者及綠電需求買家，促進台灣綠電自由交易市場，更協助企業維持國際競爭力。

截至2021年3月，陽光伏特家已完成超過300座太陽能電廠專案、累計超過10百萬瓦設置容量，並帶動超過2萬人次共同參與。其中，陽光伏特家平台更集結地方政府、企業與民眾的愛心力量，共同募資打造14座綠能公益電廠，把綠能的好處帶到弱勢角落，用陽光點亮數千名兒童、老人及身心障礙患者的未來，並讓台灣綠能發展更有價值與溫度。2019年，陽光伏特家更取得國內第一張「綠能售電業執照」，提供多元化的綠電服務，向全民發綠電、用綠電的目標前進。

陽光伏特家致力於成為永續能源轉型中的創新解決方案提供者，讓全民都能夠參與生產永續的再生能源、使用再生能源、以及使電網更穩定的服務模式。

生產再生能源：我們創造了民眾能夠簡單參與全民電廠的共享經濟平台，解決過去過高的資金門檻障礙，讓大眾能依自身的能力「有錢出錢」、「有屋頂出屋頂」，以多元的方式參與生產再生能源。

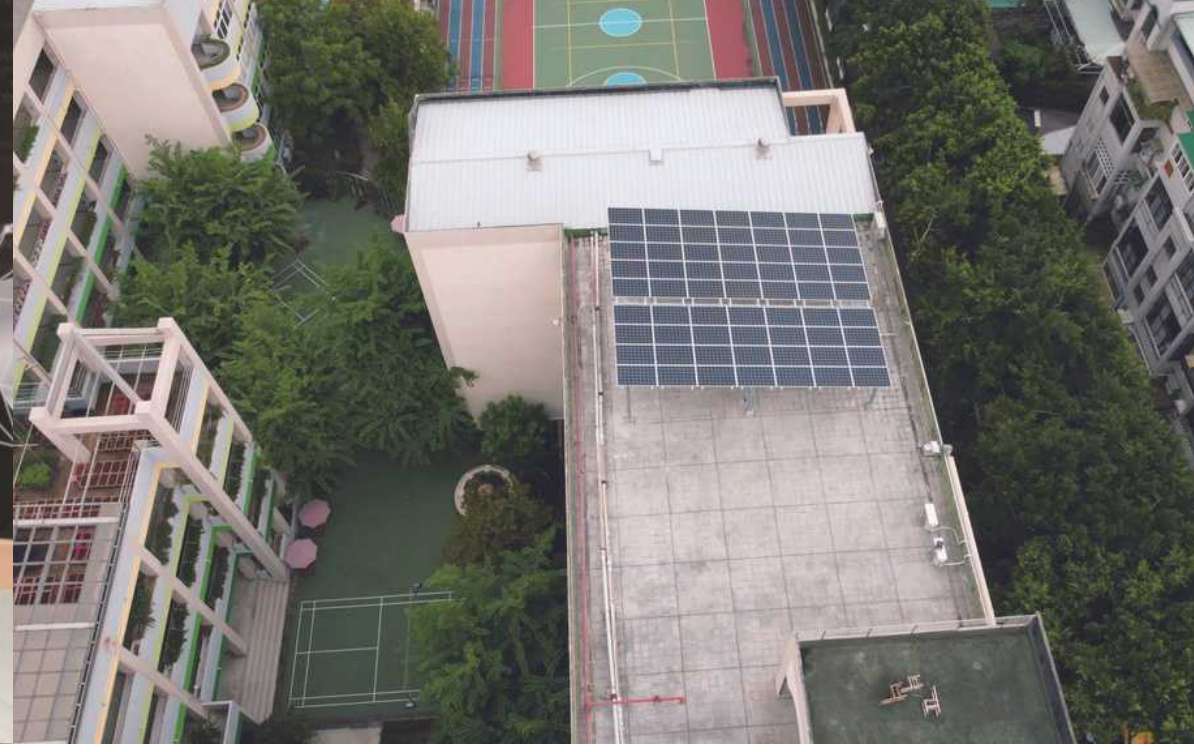
使用再生能源：2019年，陽光伏特家取得台灣第一張綠能售電業執照，且致力於推動優化法規政策，作為民間業者也積極參與政策意見會議。我們相信越多的綠電生產者與使用者匹配，能讓大眾與企業更直接的滿足不同程度的再生能源需求。

穩定的電網：為了因應再生能源在台灣能源結構的比例日漸增加，電力調度必然會是新挑戰。因此我們也正在為電力自由交易市場布局，打造能讓大眾一同參與協助電力調度與維持電網穩定的新服務。

用綠能改變世界：陽光伏特家相信面對全球緊急氣候狀態以及推動能源轉型時，以企業角度出發的創新解方是參與行動不可或缺的角色。

因此我們打造的服務，都包含公民電廠平台與多元綠電服務，集結民眾與企業的力量來推動台灣再生能源發展，期望透過參與式、共享經濟型態的服務模式推動永續能源，以此來面對氣候變遷難題中，再生能源佈建及應用的需求。

我們的創新服務也獲得了亞太創新合作獎與B型企業協會的認證，我們也持續為成為對地球更好的企業努力，創造環境、經濟、社會三方共好共榮的願景。



Sunnyfounder is the first green energy crowdfunding platform in Taiwan. Our mission is to allow everyone to participate in the action of green energy and share the benefits.
With an innovative crowdfunding business model, Sunnyfounder invite different stakeholders, including the general public, the disadvantaged groups, the enterprises, as well as local governments and non-profit organizations to find their active roles through our platform, and together, we can steer towards the green future we want.

Green Profit Sharing model
First, Sunnyfounder provides people with a very simple way to become a citizen power plant partner. In the past, investing in a solar power plant would cost around millions to hundred millions (NTD). But through Sunnyfounder, you only need to buy one solar panel, around 15 thousand (NTD)(equal to roughly US$600), and you can share the benefits with other participants.

The Green Energy Charity model
In addition to helping more people participate in the sharing of green energy, in particular, it has further improved the situation of the socially disadvantaged groups through the green energy charity model.
The Green Energy Charity model combines the donation efforts of enterprises and the public to build solar power system for the disadvantaged.

Provide Rooftops model
Based on the Green Profit Sharing model, people with spare rooftops could join our provide rooftops model, by simply filling the form to apply.
Besides working together with EPC, we also open to the crowd to make sure all the proper rooftops could be part of the green energy.

Energy Trading
Sunnyfounder as Electricity Retailing Utility Enterprise bring about independent power producer and buyer in need of green energy, accelerate the energy trading market in Taiwan. Further more, assist corporation in Taiwan keep the firm competitiveness in global market.

Based on the Green Profit Sharing model, people with spare rooftops could join our provide rooftops model, by simply filling the form to apply.
Besides working together with EPC, we also open to the crowd to make sure all the proper rooftops could be part of the green energy.

Since 2021 March, more than 300 solar panel system 10 Mega Watts had been built around Taiwan, with 20 thousand people participating in the construction. Also, there have been 7 enterprises & more than 7 thousand people participating in 14 solar charity projects through SunnyFounder. We have helped more than 1,000 children, the elderly, and the physically and mentally handicapped.

Sunnyfounder is committed to becoming the provider of innovative solutions for a sustainable energy transition, allowing everyone to participate in the production and application of renewable energy, as well as adding a service model which would more stabilize the power grid systems.

Producing Renewable Energy
Sunnyfounder has created a platform with easy access for everyone to participate in the implementation of citizen power plants and share the economic benefits together. It helps resolve the past issue of high financial threshold for building a solar power system and encourages all to join forces to produce renewable energy; it's a diverse model of participation according to everyone's own interest and ability.

Applying Renewable Energy
In 2019, Sunnyfounder received the first Renewable-Energy-Based Electricity Retailing Enterprise Certificate of Taiwan, aiming to push the optimization of regulation policies, and had since actively participated in policy review meetings as a private industry. We believe that with more matching between green energy suppliers and consumers, the general public and the enterprises will have direct satisfaction in their needs of renewable energy.

A Stable Grid System
To cope with the increased proportion of renewable energy in Taiwan's energy structures, the dispatch of energy has become a new challenge. Sunnyfounder is laying out an electricity liberalization market, and creating a new service with which the general public may participate in the dispatch of energy and the maintenance of stable grid systems.

Change the World with Green Energy
When facing global extreme climate situations and the promotion of energy transition is imperative, Sunnyfounder believes that innovative solutions from the perspective of industries should be an indispensable role for action.

Thus, Sunnyfounder's service, including the platform of citizen power plants and diverse green energy applications, has combined all possible forces to push
forward the development of renewable energy in Taiwan. We hope that promoting sustainable energy through the service model of participatory and sharing
economy would cope with the needs of renewable energy when facing the challenge of climate change.

Sunnyfounder's innovative service models have won the Asia Pacific Social Innovation Partnership Award. We are committed to be an enterprise that will help
to shape a better earth and achieve the prosperous vision of harmoniously coexisting society, economy, and environment.

循環租賃模式

凡立橙股份有限公司

ecoco
宜可可循環經濟

因為想為這片土地做點事，盼望孩子成長的城市更美好，宜可可從台南出發，以輕鬆、有趣方式推動民眾的環保行動。2018年開始，推出整合環保、點數折抵消費或愛心捐款、資收物再生技術與設計等多面向平台——ECOCO循環經濟，結合ECO與COin之概念，實踐資源再生、永續發展理念，將您手中的空瓶罐杯、廢乾電池轉變成ECOCO積分，以獲得合作夥伴的豐厚回報。

【環保更簡單】高科技智慧回收機，結合點數折抵消費的模式，讓回收變成日常生活的樂趣之一。【回收有意義】與專業的設計研發團隊合作，將回收物處理、再製成環保再生商品，延續資源生命、降低資源浪費，建立循環式商業生態。

自2018年營運以來，ECOCO服務次數已逾45萬次，回收數量超過1,900萬隻，所得到的ECOCO點數已有57%被兌換使用。台南是ECOCO的第一站，我們正前往更多城市，與更多人一起為地球動起來！讓回收的行為變成日常生活的樂趣之一。

Since it is our desire to create a better world for the next generation, we started a fun and engaging initiative in our hometown of Tainan, in the hope that more and more people would be inspired to join us. Launched in 2018, ECOCO integrates the ideas of recycling, coupons and recycled products into a recycling platform, using a circular economy model as its basis. The name ECOCO combines “ECO” and “COin”, representing the concepts of resource regeneration and sustainable development. Using our scheme, you can turn your spare bottles, cans, cups and batteries into ECOCO points, in exchange for awesome rewards from our partners.

An Easy Way to Protect the Environment

ECOCO specializes in high-tech smart recycling machines with gamification elements. Users join the system and get coupons as rewards for their eco-friendly behavior.

Making Recycling Meaningful

ECOCO cooperates with professional design teams in transforming recycled materials into creative products, reducing the waste of energy and natural resources.

Since its inception in 2018, the ECOCO service has been used over 450,000 times, more than 19 million cans/cups/bottles have been recycled, and 57% of ECOCO points earned have been successfully redeemed. Tainan is just the first stage of the journey for ECOCO. We will move forward and play our part in making recycling an enjoyable activity in every city.

循環租賃模式

青瓢有限公司

公司簡介

青瓢團隊成立於2016年4月，以社會企業的方式提供「循環容器導入」及「零廢棄顧問規劃」，服務配合專業清洗及物流，提供一次性食品容器解決方案，為使用者走向環境永續的目標。

製程說明及推動循環經濟做法

針對減少一次性容器的使用問題，青瓢目前主要提供「特定時間」、「特定地點」的活動提供租借服務，除了提供環保餐具的租賃服務外，也協助客戶做前期規劃，並將餐具配送至活動使用，使用後做回收、清洗及倉儲，服務理念及具體做法如下:

●第三方集中管理，提升使用效率

●挑選適合餐具，結合專業清洗，降低服務成本

●導入服務規劃，提升使用體驗

推動循環經濟效益及未來展望

目標致力於3年內，拓展活動服務，以及每年500場以上活動，每年減少40萬件一次性容器使用。從服務拓展至日常生活，拓展循環容器使用情境。

Company Introduction

Founded in April 2016, Chingpiao is a social enterprise that provides reusable container services & "zero waste" consulting services. We cooperate with professional cleaning and logistics companies to provide a solution for disposable food containers.

Future Prospects

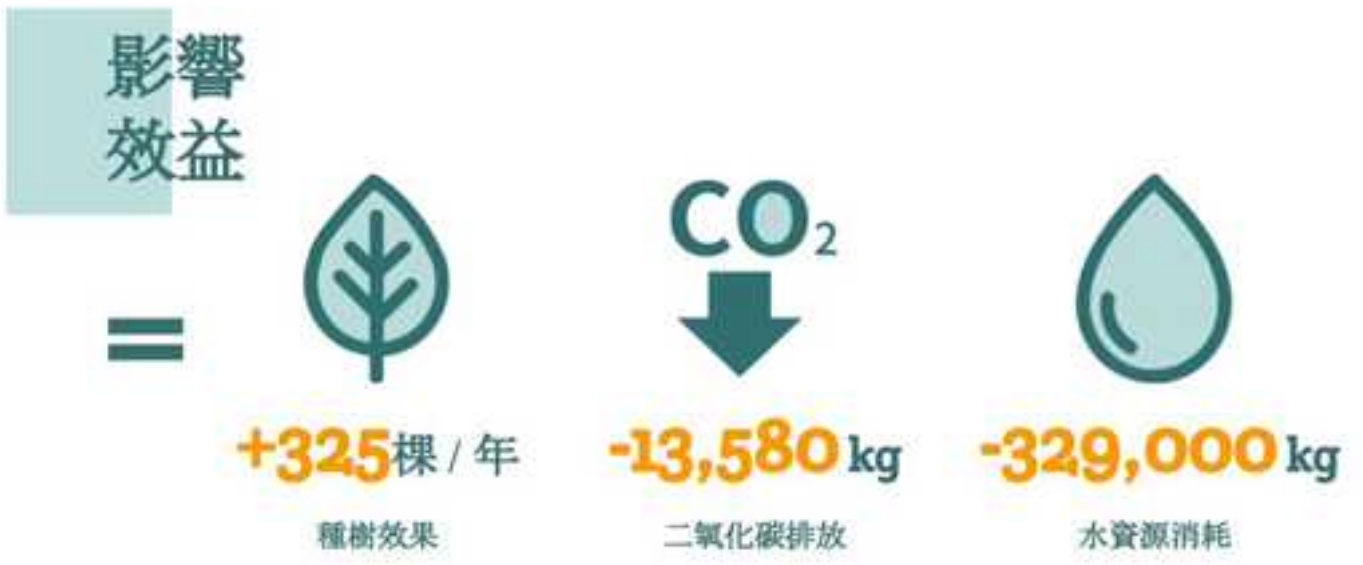
In three years, we expect to expand the capacity of the operation to 500 events and 400,000 disposable containers reduced per year. We also hope to expand the business to provide services for people's daily lives.

Circular Economy Approach

To address the problem of single-use, disposable containers, Chingpiao's services focus on events and gatherings, which take place at a specified time and location. We provide a reusable food container rental service, as well as assisting customers with pre-planning and logistics. After the event, we collect, clean and store the containers, so that they can be reused for the next event. Our service has three features:

- Services centrally-managed by a third party to increase the turnover of containers
- Selection of suitable containers, combined with professional cleaning, to reduce service costs
- Provision of tailor-made services to enhance the user experience.

Our Value



循環租賃模式

芒果丹(貿塑企業子品牌)

公司簡介

貿塑企業本業為塑膠資源再生利用工廠，主要回收各大半導體廠承裝晶圓之包裝盒（晶圓盒）進行再生循環利用，製成各類再生塑膠原料進行銷售之業務。為落實資源能夠不斷重複循環再利用，成立品牌「Mangodan芒果丹」，將再生原料製成各類產品，透過以租代買的商業模式，希望去改變人們「丟」的習慣和動作，以落實資源真正的全循環，同時也確保了資源不再有流入到自然界中的機會。

製程說明及推動循環經濟做法

為確保芒果丹所生產的產品，最終都能100%再回到芒果丹的資源全循環系統中，不斷的重覆循環再利用，我們堅持以「租」代買的商業模式，來提供產品的「使用權」給需要的人，過程中人們將不會再有「丟」的動作出現，所有的資源最終都將會被主動收回並重覆循環利用，確保資源不再有流入到自然界中的機會。

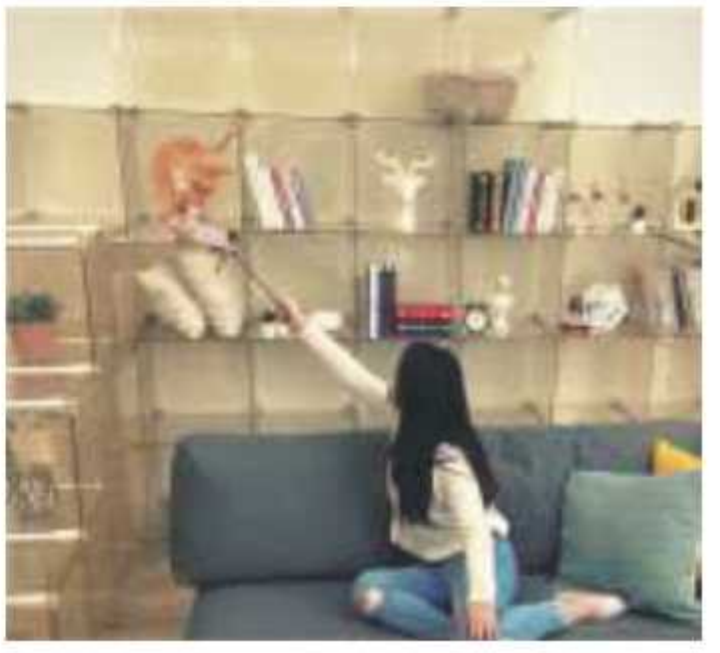
芒果丹資源全循環服務系統，是目前唯一完整符合環保3R的產品服務：（Reduce減量）我們回收半導體產業會產出的廢棄晶圓盒進行再製，充份利用這些再生資源生產產品，以取代並減少原生資源的開採，同時也減去了開採及提煉時的碳排放。

透過「以租代買」及「主動收回」的資源全循環系統服務流程，除了讓產品能夠不斷的循環使用（Reuse再使用）外，更能夠在產品壽命終結後可以回收再製（Recycle再生），以取代因廢棄焚化造成的大量碳排放！「主動收回」後的產品經過檢查，堪用的消毒續用，不堪用的再回到資源全循環系統中成為再生原料，重新製成產品，再次提供給需要的人使用。每一次的租用，就讓這項資源得以不斷地重複循環，推升了資源再利用率的最大化！

推動循環經濟效益及未來展望

從2019年12月推廣租用服務至今，服務範圍囊括：展覽、品牌百貨臨時櫃、市集、店面及居家使用。2020整年度，人們與芒果丹的共同努力，成功減少了3,972格展示櫃與6,155組防疫隔板，讓這些資源能夠不用再丟！不因活動或空間需求導致後續大量的資源廢棄。

未來，貿塑企業與子品牌芒果丹，計畫集合相同理念的生產者、品牌商，一同複製資源全循環系統的成功經驗！期許封閉的資源全循環系統，可以在台灣遍地開花；從源頭就減少廢棄物產出的機會！最後，不只是製造與品牌商，芒果丹亦想集合擁有產品設計能力的設計師，透過自己的設計開始決定資源的後續命運。並協助設計師們了解再生資源的相關知識以及製程須知。



Company Introduction

Mausu Enterprise Co., Ltd. is a plastic recycling plant that recycles waste wafer boxes from semiconductor factories to manufacture various recycled plastic materials. In order to implement resource recycling, Mausu built a new brand named Mangodan with a special business model that we rent products instead of selling to achieve the goal, no more littering, make sure all resources can be reused without waste. We are looking forward the future that no trash exists in nature.

How to Re-utilize Waste Textile on the Basis of Circular Economy?

All products of Mangodan are designed to be 100% recycled to make sure all resources can be reused after products reach the end of their product life cycle. We are dedicated to build a new business model that we rent products instead of selling to provide them to who really needs. In the process of renting, people don't have to litter anymore so that it can minimize the amount of waste and reduce environmental impacts effectively. Mangodan had built the 100% recycling system with practicing the 3Rs' concept. Nowadays, Mangodan is the only brand that can provide services of 3R in Taiwan. What follows is a description of the 3Rs of Mangodan. (1) How to reduce: Mangodan recycles waste wafer boxes from semiconductor industries, and use the recycled materials to substitute the original one to produce products. Thereby carbon emissions of mining and extraction can be decreased. (2) How to reuse and recycle: through the mechanism of renting, products of Mangodan would be taken back on our own initiative until customers have no need. If the products are still available, they can be rent to other people who needs after being sterilized. If not, they will be reproduced to a brand new one. All resources can be recycled over and over again to maximum their usage rate.

Economic Effectiveness and Future Plan

Since 2019.12, the scope of Mangodan service covers exhibitions, pop up shops, creative marketplaces, stores and household. In 2020, Mangodan had provided services with 3972 grids of cabinets and 6155 sets of epidemic-preventing partitions already. It means these resources have preserved from littering. In the future, Mausu and Mangodan will dedicate to gather the producers, brand owners and product designers, and share our experience of 100% recycling mechanism. We are looking forward to their change that they can adjust the direction of product design, and always take resource recycling into consideration.

最美好的人生途徑就是創造價值。——池田大作