



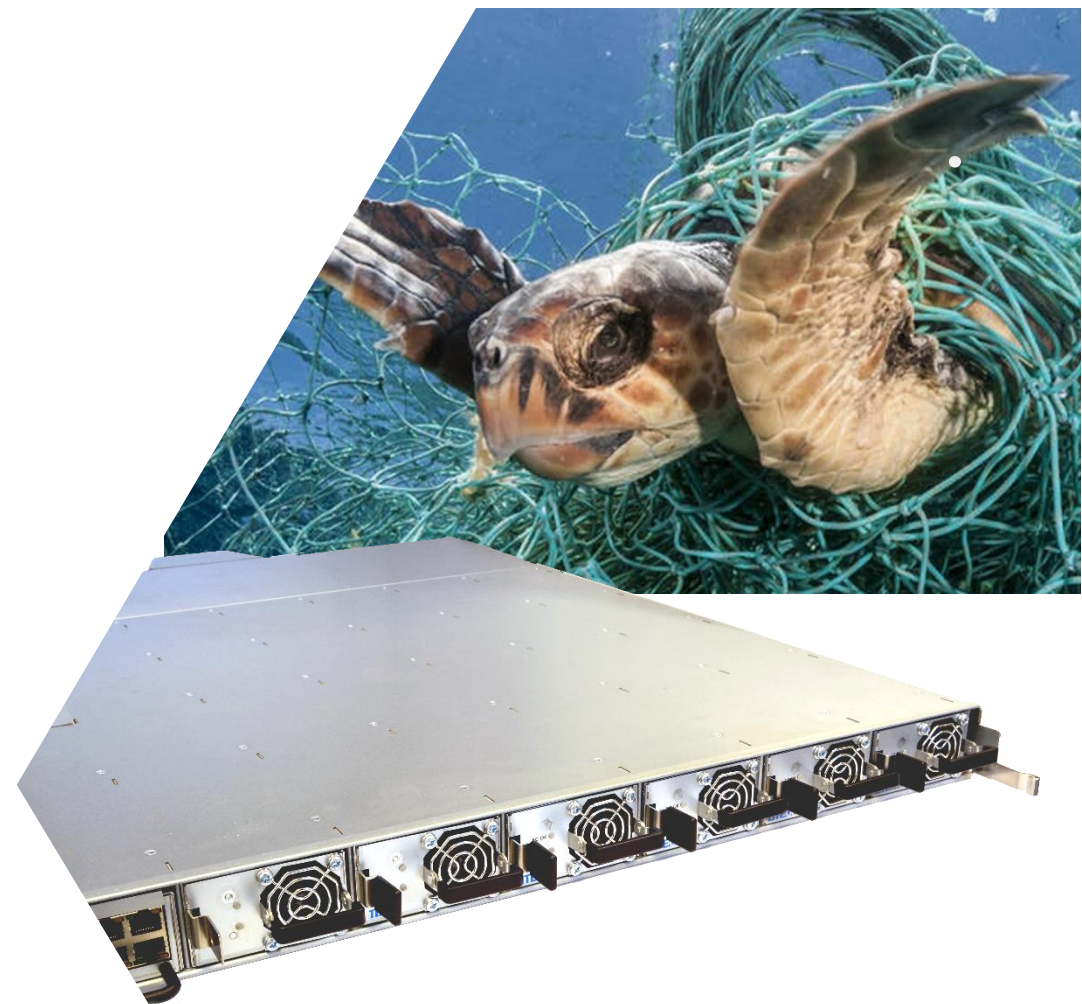
光寶低碳產品之路

LITEON Green Initiative

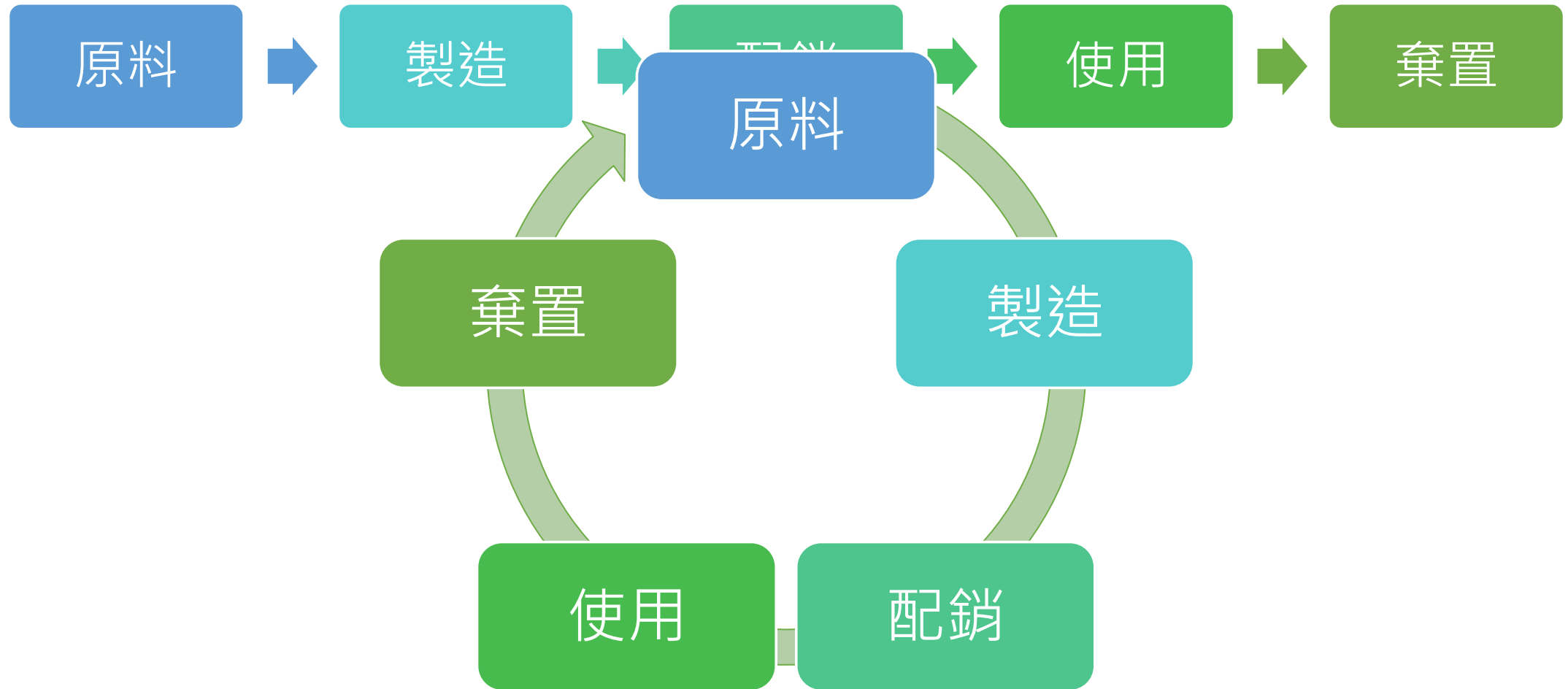


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光寶產品低碳設計

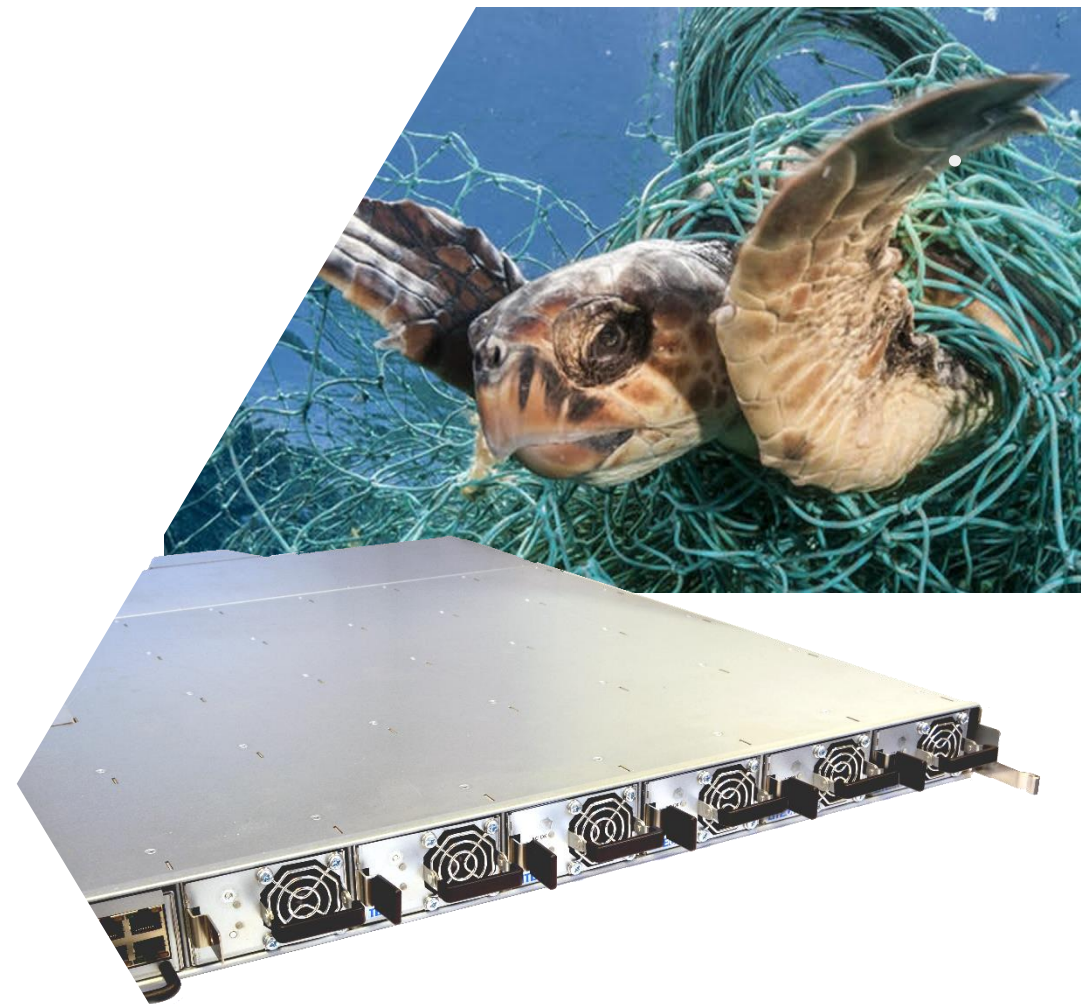


產品綠色設計思維-LCA



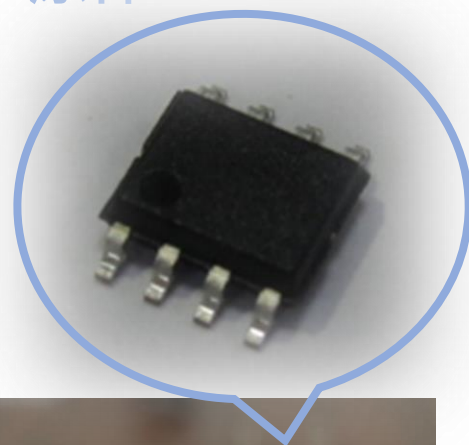
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案例說明



原料階段-電子原件

- 單機減材33%
- 產品減重38.1%



SR circuit parts count totally 12 Pcs.
 Create new IC combined with
 MOSFET can reduce 33% parts count.

Diode	Resistance	MLCC	IC	MOSFET	PCB	GLUE
2Pcs	5Pcs	3Pcs	1Pcs	1Pcs	2-layer	
23.3mg	23.95mg	51.6mg	16.3mg	2.028g	10.315g	13g

Totally: 25.458g

Diode	Resistance	MLCC	IC	MOSFET	PCB	GLUE
2Pcs	3Pcs	2Pcs	1Pcs	0Pcs	1-layer	
23.3mg	14.97mg	34.4mg	81.63mg	0mg	7.06g	8.53g

Totally: 15.744g

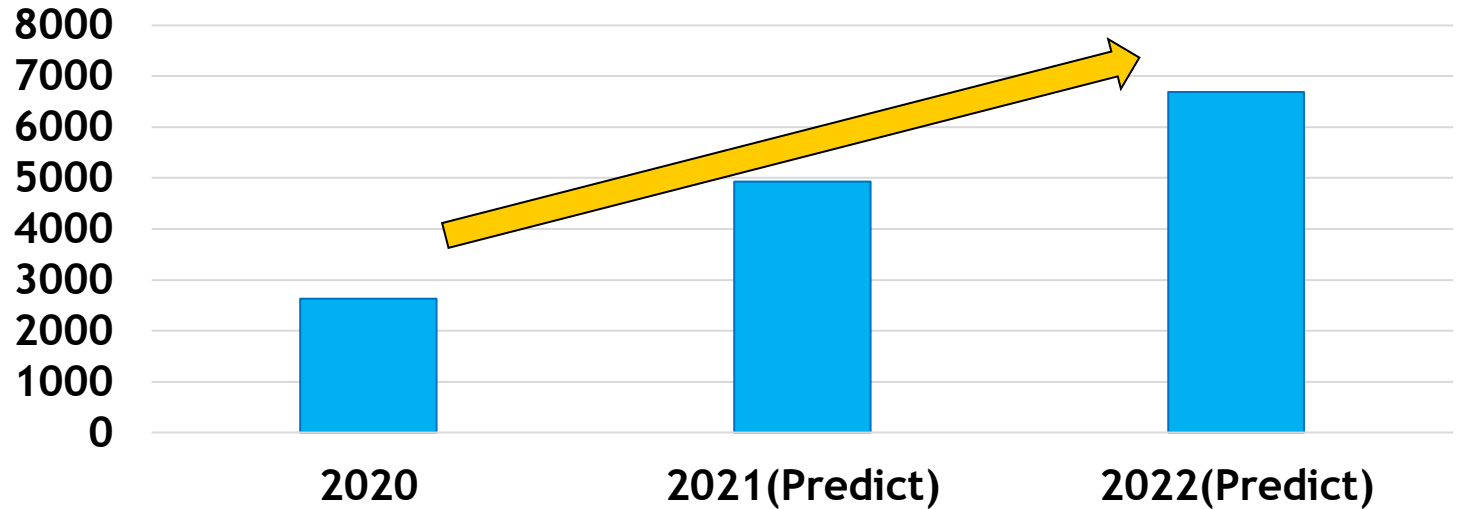
-38.1%

原料階段-塑料



2021年因PCR塑料
減碳量達5000 tonCO₂e

Carbon saving (Ton-CO₂e)



PMS PCR Implement Status			
Year	2020	2021 (Predict)	2022 (Predict)
Action	Increase the PCR Projects 2 projects-->8 projects (A/D/L-customer)	Increase the PCR shipping quantity 28KK pcs-->38KK pcs	Increase the PCR ratio 30%-->50% 50%-->90%
Carbon reduction (Ton-CO ₂ e)	2631 Ton	4928 Ton	6689 Ton

Accumulated 142,420 MWh Electricity Saving in 2011-2020

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2011-2020
Electricity Saving(MWh)	22,261	19,959	12,504	12,398	9,873	12,803	12,854	16,701	10,902	12,165	142,420

In 2021, 60 initiatives were implemented and estimated to reduce **10,030 MWh** annual energy use
 From 2022, more initiatives will be implemented to reach a **11,275 MWh** electricity saving

2020年因廠區節能
 減碳量達9900 tonCO₂e

The main energy efficiency improvement projects in plants including:



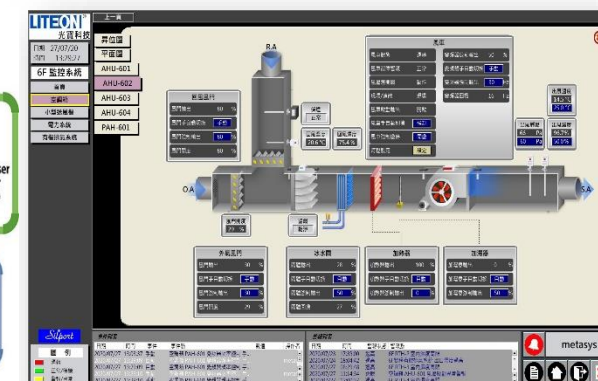
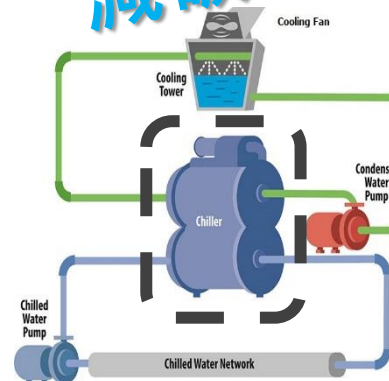
Green Building Design



Rooftop PV System



High Energy Efficiency in Manufacturing Facilities



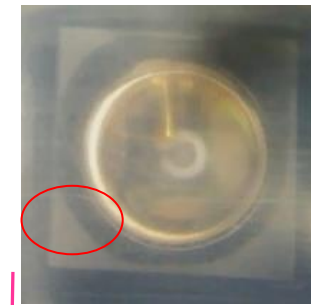
Energy Management System

製造階段-製程節能

自行研發LED封裝材料案

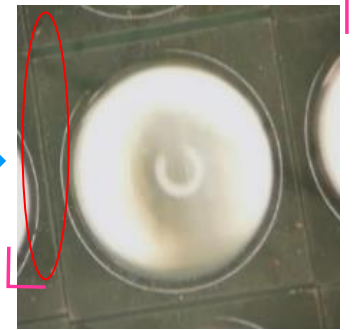
- OAY increasing 10.55% from 87.13% to 97.68%
- Molding time reduce 300s from 700s to 400s
- Electricity saving: 265.2MWh/2020Y

Before



NG: peeling

After



OK: no peeling

2020年因LED製程節能
減碳量達 264 tonCO₂e



Cycle Monitor		
	P-1	P-2
Index Time	sec 0.0	0.0
P.M. Total Time	sec 4.0	4.0
FM Pos. WaitSec	sec 5.0	5.0
Disp. Total Time	sec 7.0	7.0
Compression T.	sec 18.1	18.1
Cure timeSec	sec 400	400
Cure time	sec 400	167
Slow Open Time	sec 65.0	65.0
Machine time	sec 0.0	0.0
FM Pressure	Torr 1000	776
CL Pos.	mm -0.001	189.614
CL Spd.	mm/sec 0.0	0.0
CL Force	tonf 0.3	7.0
CL Torque	N 0.30	37.92
Dispense Vol. (Set)	cc 4.6273	4.6273
Dispense Vol. (Act)	g 5.090	5.090
Shot Count 1	43287	29687
Shot Count 2	43287	29687
Shot Count 3	43287	29687
Mold (L) Avg.	degC 120.0	120.1
Mold (R) Avg.	degC 120.0	119.6

使用階段-產品能源使用效率提升

目標：2023年電源供應器產品能源轉換效率較2016年提升2%

Type \ Item	2016	2017	2018	2019	2020
	Max Efficiency	Max Efficiency	Max Efficiency	Max Efficiency	Max Efficiency
Server Power	94%	94.22%	94.09%	94.09%	94.29%
PC Power	85%	89.10%	89.73%	89.73%	89.93%
NB Adapter	87%	87.78%	87.84%	89.08%	89.23%
Phone Charger	75%	77.61%	76.39%	78.16%	82.05%

提前於2020年達成

- 電源產品能源轉換效率2020年較2016年提升4.56%
- UV-LED產品能源使用效率2020年較2018年提升25%
- LED節能路燈取代傳統高壓鈉燈，能源使用效率提升75%

目標：UV-LED能源使用效率於2025年較2018年提升60%

2020 Result	Before (mW)	After (mW)	Efficiency improved rate (%)
C034 series	630	650	3.17%
Base on 2018		650	25.00%
G35 series	10	11	10.00%

2020年提升25%

節能量達28億度電
減碳量達1.425百萬公噸*

*以2019年度電力排放係數0.509公斤CO2e/度進行計算

棄置階段-減少廢棄量

- 減少原物料投入 = 減少廢棄物產出

2020年電源產品自行開發使用高度整合性 ASIC IC，減少33%廢棄元件產出，同時減積減材設計

減碳量達 9523 tonCO₂e



示意圖

- 提升回收再利用 = 減少進入焚化爐
- LED節能路燈產品設計 recycle rate達83% recovery rate 達99.75%

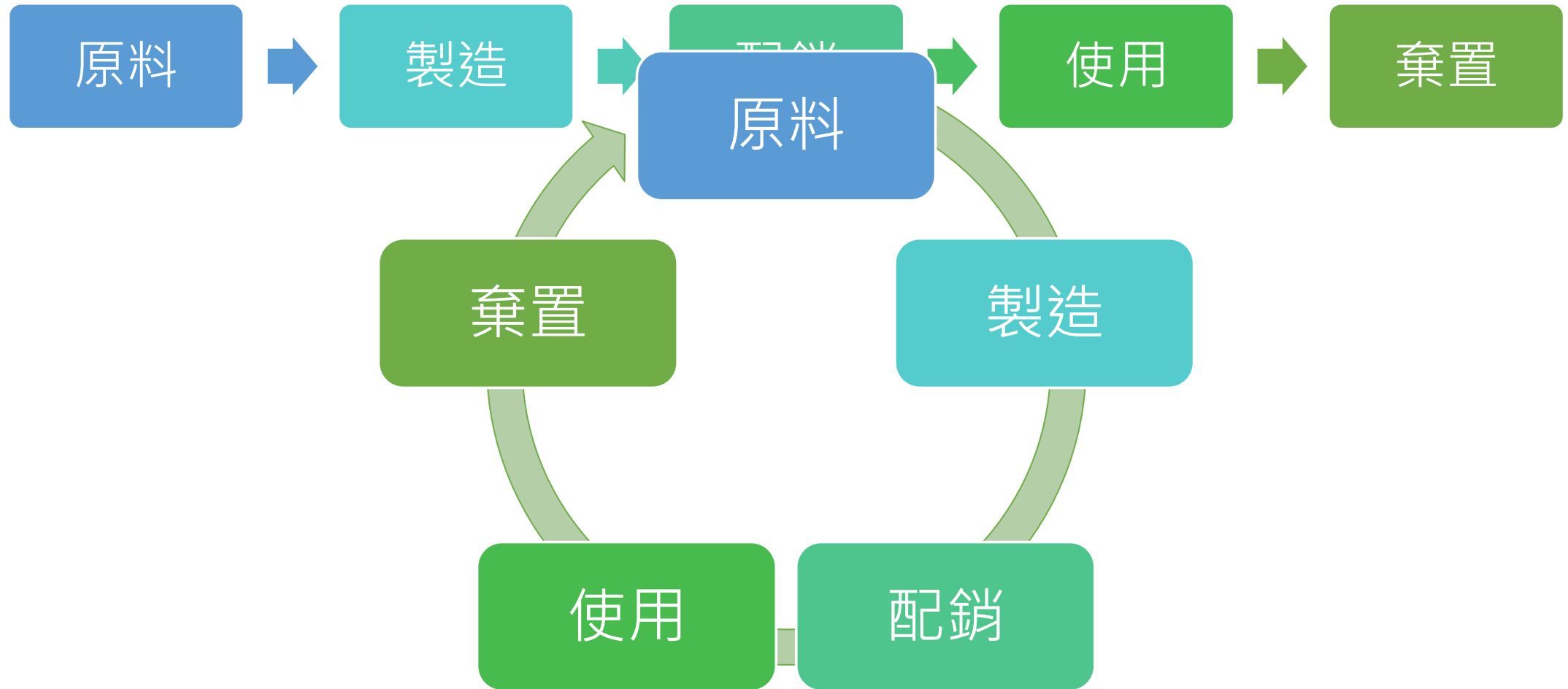
BUREAU VERITAS		TEST REPORT
Technical Report:	(6219)063-0126	March 08, 2019
Date Received:	March 04, 2019	Page 1 of 12
Lite-On Technology Corp. No. 50, Longyuan 7th Rd., Longtan Dist., Taoyuan City 325, Taiwan (R.O.C.)		
Sample Description:	LED Street Light	
Item No(s):	TMv-bbbde "v" denotes the model length, it can be J, 1, 2, 3; "bbb" denotes the number of LED package, it can be 32, 48, 64, 80, 96, 112, 128, 144, 160, 192, 224; "c" denotes the lens type, it can be R,C,A,B,D,E,F,G,H,K,M,P,S,U,W,Y,Z; "d" denotes the correlative color temperature, it can be W:3000K, N:4000K, C:5000K; "e" denotes the NEMA socket function, it can be A:with NEMA socket, B:without NEMA socket.	
Test Period:	March 04, 2019 to March 08, 2019	
ASSESSMENT Specification – WEEE Directive 2012/19/EU		
Product Category	III – Lamps	
Test reuse and recycling rate (%) / Test recovery rate (%)	83.47 / 99.75	
Minimum reuse and recycling rate (%) / Minimum recovery rate (%)	80 / -	
Conclusion: The submitted sample complies with the WEEE directive 2012/19/EU.		
Note: Cleanaway Dienstleistungs GmbH & Co KG is the nominated service provider committed to ensure state-of the art recycling and waste processing		

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光寶循環的實現



產品綠色設計思維-LCA



Scope of SEA HOPE Project



Marine Conservation volunteers
Building up social inclusive corporate culture



Sessions **40** Volunteer service hours **12,413 hr**



Volunteer **4,414**



Clean up marine waste **23,387 kg**



Marine Waste Circular Economy
Green design and make resources sustainable



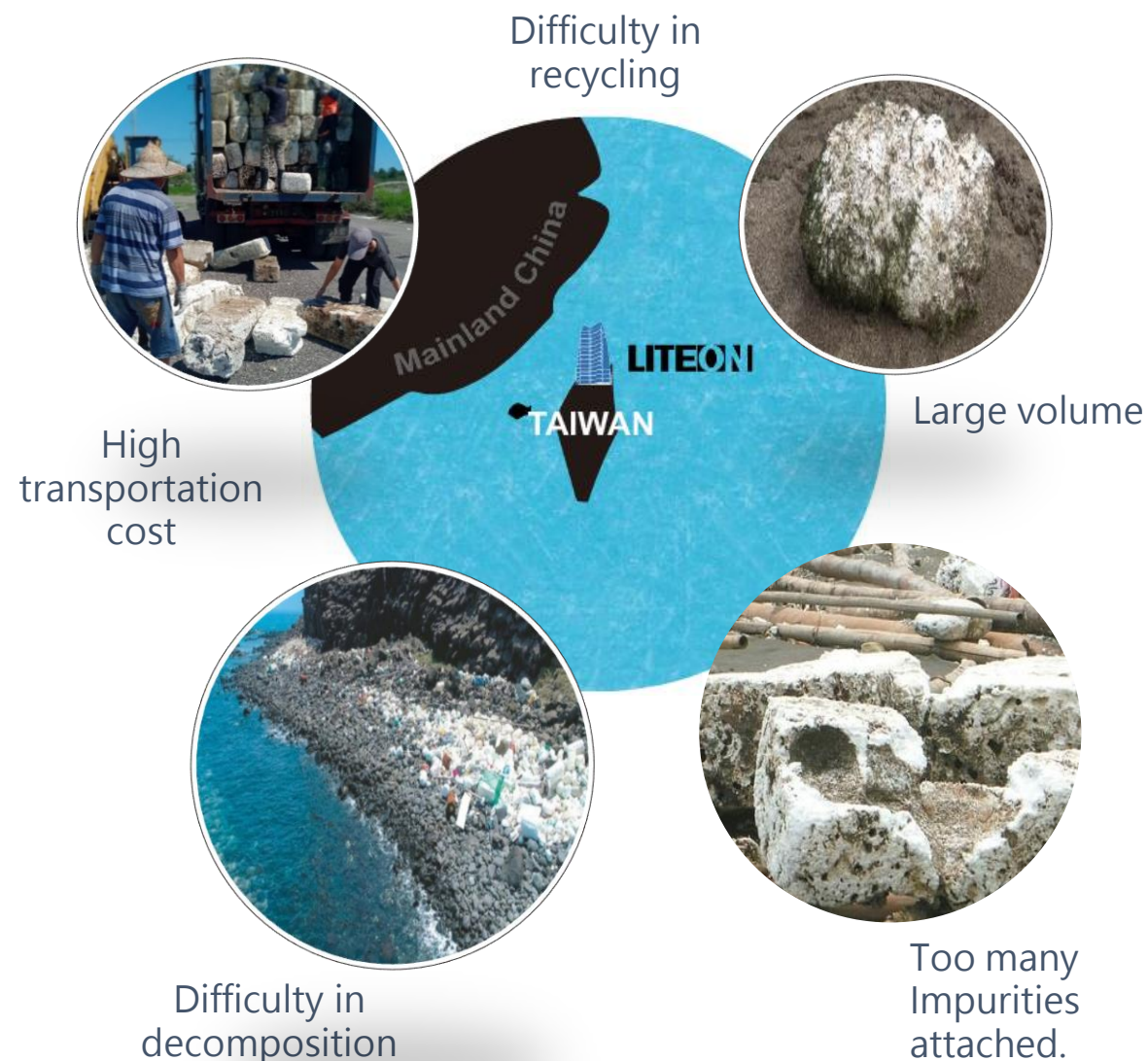
Innovative Conservation Research and Development
Core business combines conservation



Marine Styrofoam Pollution in Taiwan



Existing Issues



Why are there so many Styrofoam?

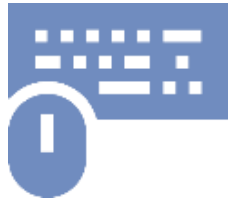
- 10,000 tons of marine waste produced in Taiwan annually, Styrofoam marine waste more than 200 tons (Taiwan 100 tons + overseas 100 tons)
- Source: Mainly from floats used for oyster farming

LITEON SEA HOPE - Styrofoam Marine Waste Recycle Project

Marine waste recycled products

Marine waste recycled plastic can be used to make appearance parts of computer input devices such as keyboards and mice

Products



Recycling Marine Waste Styrofoam

- Cooperation with local environmental protection bureaus

Assist Penghu County & Kinmen County every year to remove 20+ tons of Styrofoam



Styrofoam



0-Waste
LITEON

Processing to PS secondary plastic

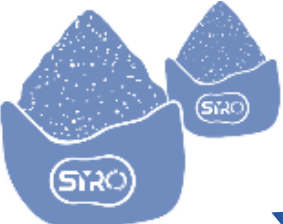
By cooperating with environmental technology social enterprises, through exclusive solvent method, process Styrofoam to polystyrene(PS) secondary plastic



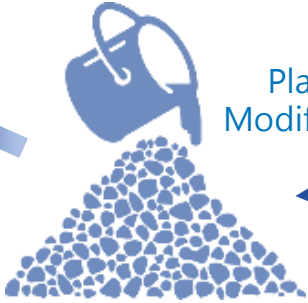
Disposal(Factory)

Plastic modified granulation

Use the modifier developed in cooperation with the Industrial Technology Research Institute to modify recycled material into impact-resistant polystyrene (HIPS) and pelletized



Recycled Material

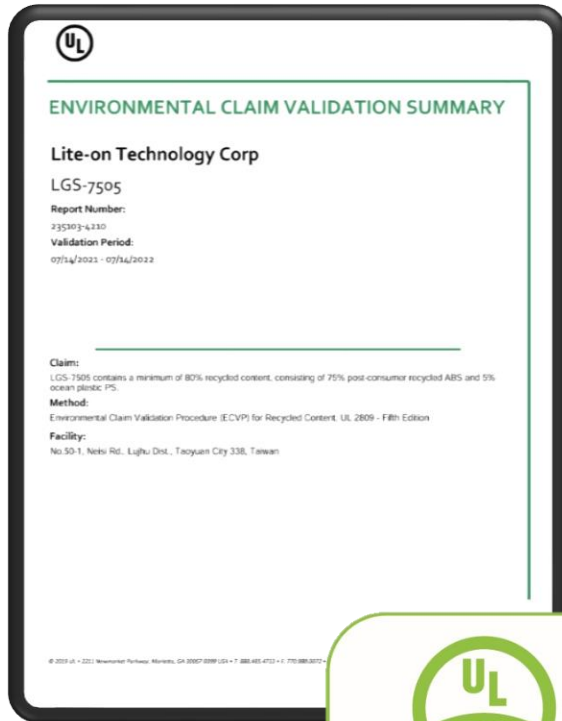


Plastic Modification



The First Ocean Plastic Certificated By UL → LGS-7505

LITEON



LITEON LGS-7505

=

75%



post-consumer recycled ABS

+

5%



OP Styrofoam (PS)

+

20%
Formulation



UL Claim:

LGS-7505 contains a minimum of 80% recycled content, consisting of 75% post-consumer recycled ABS and **5% Ocean Plastic PS**

The Definition of OP & OBP from UL 2809

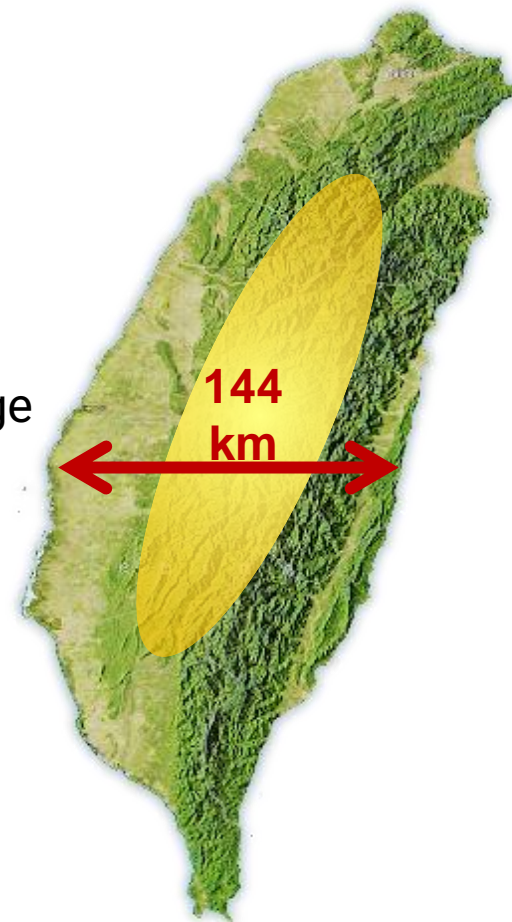
- OP / Ocean Plastic

Plastic waste has entered in the ocean







- OBP / Ocean Bound Plastic

located within the range of 50km from shore in communities or areas



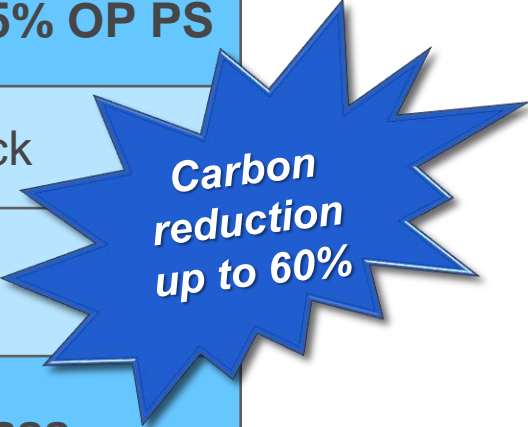
Plastics commonly used comparative table

Brand	LITEON	SABIC	LOTTE	Poly Visions
Model	LG-7505	T2BX2500UV	Starex GC-0720S	Dura PET™ 0624 NLP OC
Resin Type	ABS/PS 	PC/PET 	ABS/PET 	PET 
Description	PCR 75% ABS + 5% OP PS	PC+ 20% OBP PET	ABS + OBP PET	90% OBP PET
Color	Grey/Dark/Black	Natural Speckle		
PCR Certification	UL2809	No Data	No Data	No Data
REMARK	<ul style="list-style-type: none"> 1. Easy to molding 2. Can use existing molds 3. Performance is close to Virgin Resin 4. Circular Economy & Marine conservation 	Difficult to molding	Difficult to molding	Lack of rigidity

The first OP in the world

Comparison of materials

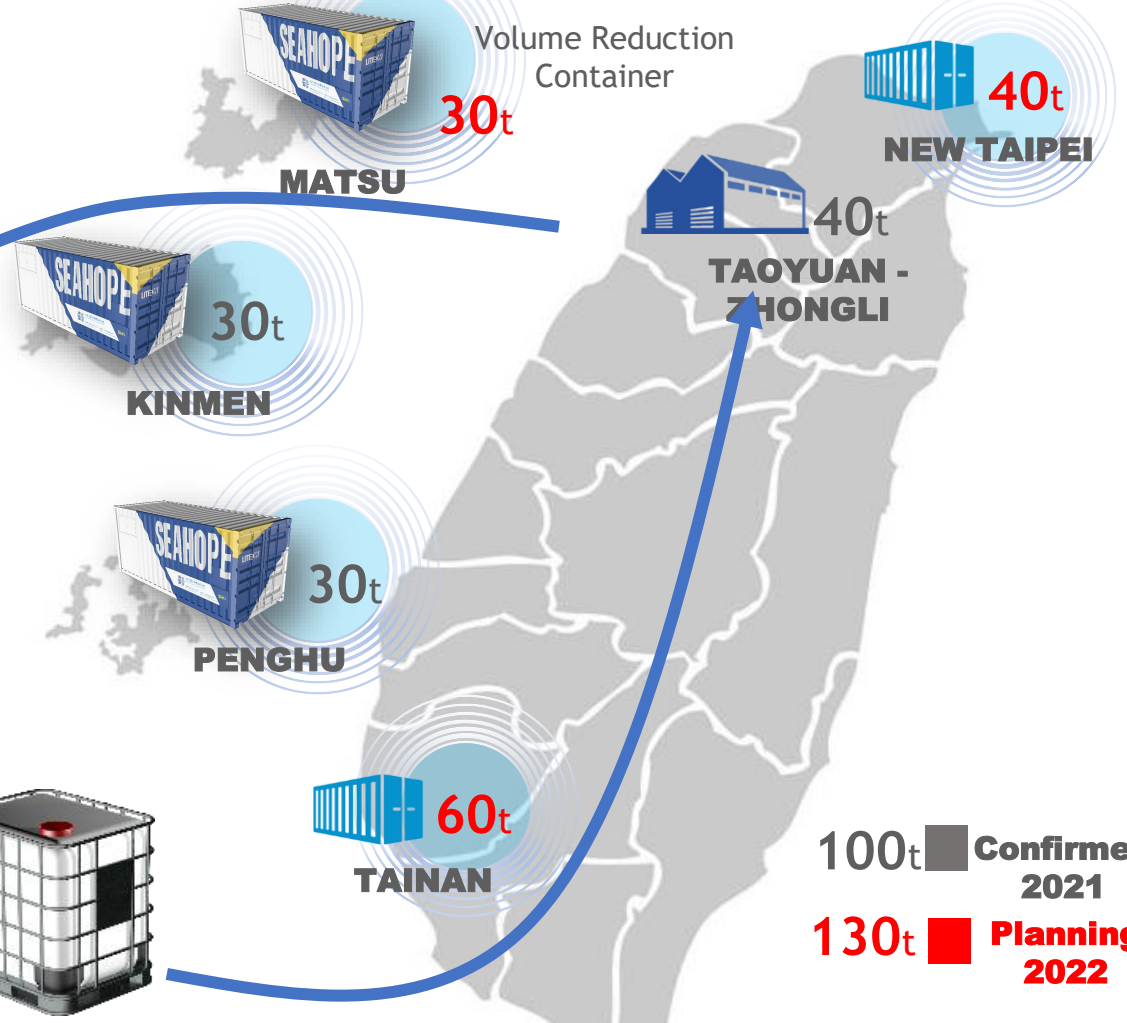
Brand	CHIMEI	LITEON [®]
Model	PA-757	LGS-7505
Resin Type	ABS	ABS/PS
Description	Virgin ABS	PCR 75% ABS +5% OP PS
Color	Milk White	Dark/Black
Carbon Footprint (kgCO ₂ e/kg plastic)	3.57	1.14
PCR certification		UL 2809 Pass



Note: LGS-7505 carbon emissions are estimated by quoting the following reference materials
<https://recyclinginternational.com/plastics/axions-recycled-polymers-bring-large-carbon-footprint-savings/2461/>

Innovation On-site Volume Reduction System - Call for Collaboration

LITEON

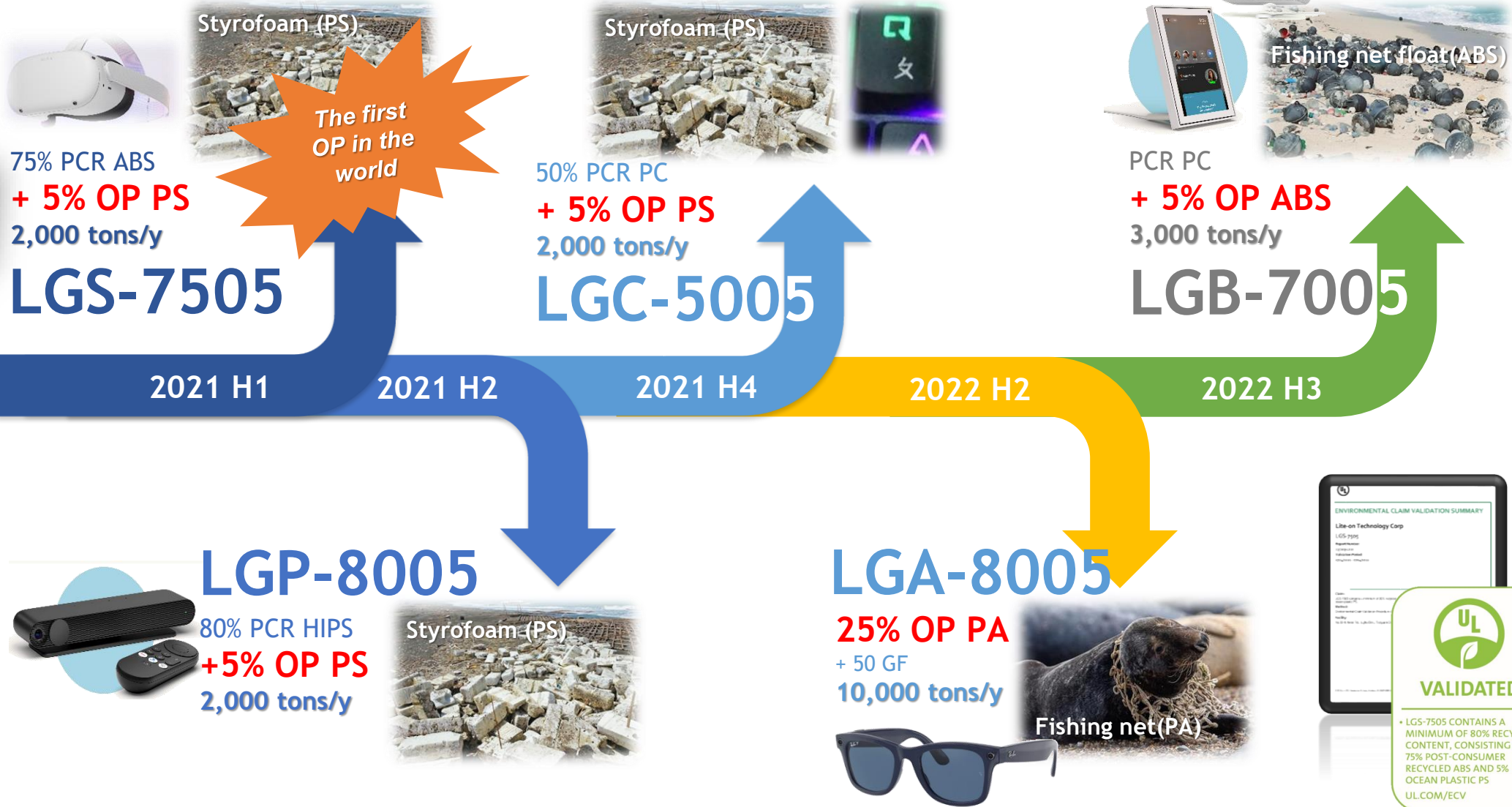


100t ■ Confirmed 2021
130t ■ Planning 2022

on-site VRS plan

光寶海廢永續材料開發

LITEON



ENVIRONMENTAL CLAIM VALIDATION SUMMARY
Lite-on Technology Corp
LGS-7505

UL VALIDATED

- LGS-7505 CONTAINS A MINIMUM OF 80% RECYCLED CONTENT, CONSISTING OF 75% POST-CONSUMER RECYCLED ABS AND 5% OCEAN PLASTIC PS

UL.COM/ECV

講師簡介

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現職：光寶科技 主任專員

學歷：交通大學 永續環境科技

專業認證：

- ISO 14064 溫室氣體主任確/查證員
- PAS 2050 產品碳足跡主任確/查證員
- 行政院環境保護署-溫室氣體盤查暨先期專案查驗人員
- 行政院環境保護署-溫室氣體抵換專案查驗人員
- 經濟部中小企業處-綠色供應鏈管理師
- 行政院環境保護署-甲級廢棄物處理技術員

減碳議題實績：

- 光寶 SEA HOPE 海廢永續材料專案
- LCA盤查：筆電、電源供應器產品等13項產品
- ISO14025(EPD)查證：台車、明基等共11家企業11項產品
- 碳足跡(CFP)查證：裕隆汽車等共15家企業15項產品
- ISO14064-1(組織溫室氣體)：明安國際大業一廠、三陽工業湖口總廠、大潤發滄雅店等14個組織

Jeffery.tseng@liteon.com





0-Waste

LITEON[®]

- Ocean Conservation
- Low-Carbon
- Circular Economy