

涂料工业的 绿色供应链及创新

Green Supply Chain Collaborative Innovation in Coating Industry



2020 年，环境危机加剧，PM2.5 空气污染严重影响日常生活。

—— Sarawut Rachanakul
CEO, J.B.P. International Paint Co., Ltd.
& President of Thai Paint Manufacturers Association 泰国涂料制造商协会

JBP 国际涂料有限公司与华泰 (Srithai) 塑料厂大众有限公司合作开发涂料产品，优先考虑使用者的安全，并使用再生塑料制成容器，作为对我们的产品和社会负责的一种方式。

2022 年，我们面临气候变迁、自然灾害和气候波动加剧的问题，无论是世界各地发生的森林火灾、洪水、风暴。这对人类和生态系统中的生物影响越来越大，我们不能否认我们的世界正处于危机状态。

什么是绿色供应链？

基于 3R (减少、重复使用、再循环) 理念，绿色供应链最大限度地减少供应链活动对环境的影响。环保供应商使用可回收材料并减少浪费，并与各利益相关者合作以实现共同的环境目标。他们透过绿色实践和永续发展展现社会责任。绿色供应链的好处不仅有利于人类和环境，也有利于上下游持份者。

为什么涂料工业之间的合作很重要？

同一行业或不同行业品牌之间的合作趋势可促进双方品牌的销售，传播新产品的知名度，并为观众带来对产品的新视角。

In 2020, the intensification of the environmental crisis, the PM2.5 air pollution significantly impacted daily life.

JBP International Paint Company Limited collaborated with Srithai Superware Public Company Limited to develop paint products that prioritise safety for both users, together with utilising containers made from recycled plastic as a way to take responsibility for both our product and society.

In 2022, we were faced with the climate changes, natural disasters and climate fluctuations that become intensified with forest fire, floods, storms happened around the world. That affects both human and living things in the ecosystem more and more and we cannot deny that our world is in a state of crisis.

What is green supply chain?

Based on the 3Rs (reduce, reuse, recycle) philosophy, green supply chain minimise the environmental impact of supply chain activities. Environmentally friendly suppliers use recyclable materials and reducing waste and collaborate among various stakeholders to achieve common environmental goals. They demonstrate social responsibility through green practices and sustainability.

Green supply chain benefits not only for people and the environment but also upstream to downstream stakeholders.

随着公司寻找新的创新方式来接触客户，品牌合作趋势变得越来越流行。

协作可持续发展的挑战

- 全球暖化与气候变迁问题；
- 涂料工业的环保趋势；
- 减少有害物质的使用；
- 减少挥发性有机化合物 (VOC) ；
- 考虑生产线的碳足迹；
- 泰国在 COP 26 (2023 年联合国气候变化大会) 上：2050 年实现碳中和，2065 年实现温室气体净零排放；
- 无法单独实现，必须选择价值链伙伴来发展新的协作前进方式。

协同创新

- 上游到下游的涂料合作伙伴在绿色供应链上进行合作；
- 更多地利用自然资源，以实现碳中和、使用再生能源、尽量减少碳足迹的目标；
- 有机会为油漆及涂料行业的永续发展原则创造统一的商业模式；
- 循环经济的概念模型，其中物质循环是闭合的，以确保资源的利用效率最大化 (图 1)。

当今永续发展的趋势

- 更多发展绿色涂料技术，例如环保、低 VOC 涂料；
- 跨越涂料产业多个领域的水基技术；
- 依照环境、社会和治理 (Environmental, Social, and Governance, ESG) 开展业务，以实现永续发展目标 Sustainable Development Goals, SDG) ；
- 注重使用者、居民和环境各方面的最高安全；
- 碳足迹减少目标；
- 使用再生能源；
- 增强自动化系统，以提高成本效率、减少错误、减少浪费并优化生产流程。



图1：循环经济的概念模型
Figure 1: Conceptual model of a circular economy

Why collaboration in coating industry is important?

Brand collaboration between brands of the same or different industries can boost the sales of both brands, spread awareness about new product line, and give the audience a new perspective on the products. Brand collaboration becomes more popular as companies look for new and innovative ways to reach customers.

Challenge in collaborative sustainability

- Global warming and climate change issues,
- Environmental trend in coating industry,
- Reducing the use of hazardous substances,
- Reducing volatile organic compounds (VOCs),
- Considering the carbon footprint of the production line,
- Thailand at COP 26: achieve carbon neutrality by 2050 and net zero GHG emission by 2065,
- Can't achieve alone, have to select the value chain partners to develop a new collaborative way forward.

Collaborative innovation

- Upstream to downstream coating partners to collaborate in the green supply chain,
- More use of natural resources to comply with goals towards realisation of carbon neutrality, use of renewable energy, and minimise carbon footprint,
- Opportunity to create harmonised business model for sustainability principles to paint and coating industry,
- Conceptual model of Circular Economy where material loops are closed in order to ensure the use of resources to maximise efficiency (Figure 1).

Today's trend of sustainability development

- More development of Green paint technology, for example, environmentally friendly and low VOC paint,
- Water based technology across multiple sectors of the coatings industry,
- Conduct business in line with Environmental, Social, and Governance (ESG) to achieve Sustainable Development Goals (SDGs),
- Focus on the greatest safety in all aspects for users, residents and environment,
- Carbon footprint reduction targets,
- Use of renewable energy,
- Enhance automated system to increase cost efficiency, reduce errors, waste reduction and optimise production process.

Paint reusing and recycling in global initiatives allow for a second life for unused paints, for example:

- Dulux, Akzo Nobel (Figure 2),
- Up Paint, USA (Figure 3),
- Loop Paint, USA (Figure 4),
- Product Care, Canada: Free recycling services for post-consumer paint, household hazardous waste (Figure 5),
- Recolor, USA: Collect unused and leftover paint to create recycled paint (Figure 6),
- Paint Care, British Coatings Federation: Create a circular



图2：阿克苏诺贝尔的多乐士
Figure 2: Dulux, Akzo Nobel

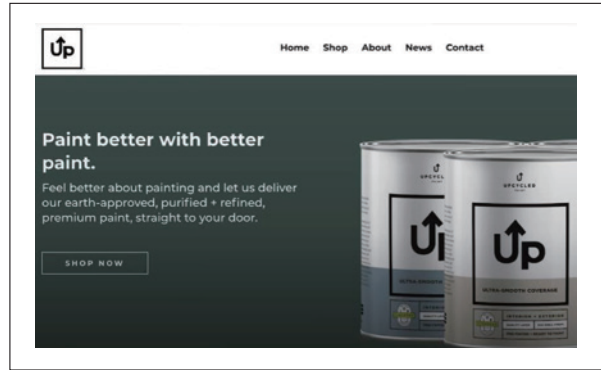


图3：美国Up Paint
Figure 3: Up Paint, USA



图4：美国Loop Paint
Figure 4: Loop Paint, USA

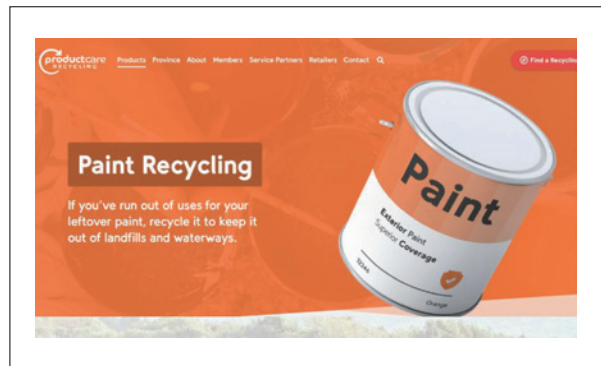


图5：加拿大Product Care
Figure 5: Product Care, Canada

全球倡议中的油漆再利用和回收允许未使用的油漆获得第二次生命，例如：

- 阿克苏诺贝尔的多乐士（图2）；
- 美国Up Paint（图3）；
- 美国Loop Paint（图4）；
- 加拿大Product Care：消费后油漆、家庭危险废物的免费回收服务（图5）；
- 美国Recolor：收集未使用和剩余的油漆以制造回收油漆（图6）；
- 英国涂料联合会——Paint Care：创造循环经济，使剩余油漆回收、再利用或再制造（图7）；
- 爱尔兰社企——再发现中心：从回收中心收集油漆并回收以创造新的颜色（图8）。

下一步的灵感

涂料产业绿色供应链协同创新

2022年「同一个世界：同一个未来」计划由JBP国际涂料有限公司与三个主要合作伙伴合作发起：华泰（Srithai）塑料厂大众有限公司、CRC Thai Watsadu Co., Ltd. 和 UAC Global PCL（图9）。其目标是减缓气候变迁、减少能源消耗、减少温室气体排放，并宣布成为商界的一部分，承担环境问题的责任并维持泰国未来的经济成长。

economy for leftover paint to be recycled, reused or remanufactured (Figure 7),

- Rediscovery Centre, Ireland Social enterprise: Collect paint from recycling centres and recycle to create new colours (Figure 8).

Next step of the inspirations

Green supply chain collaborative innovation in paint industry

In 2022 One World: One Future Together project was initiated by JBP International Paint Co., Ltd. in collaboration with 3 main partners; Srithai Superware PCL, CRC Thai Watsadu Co., Ltd. and UAC Global PCL (Figure 9). With the objective of mitigating climate change, reducing energy consumption, lowering greenhouse gas emissions, and announcing a standpoint to be a part of the business sector in taking responsibility for environmental issues and sustaining the economic growth of Thailand for the future.

UAC Global Public Company Limited

The Business of UAC Global Public Company Limited relates to a circular economy and alternative energy as well as the import and distribution of chemicals by promoting development and supporting the circular economy.

Revitalise the environment and responsibility of society by the use of materials that do not cause pollution, including sustainable and environmentally friendly chemicals which

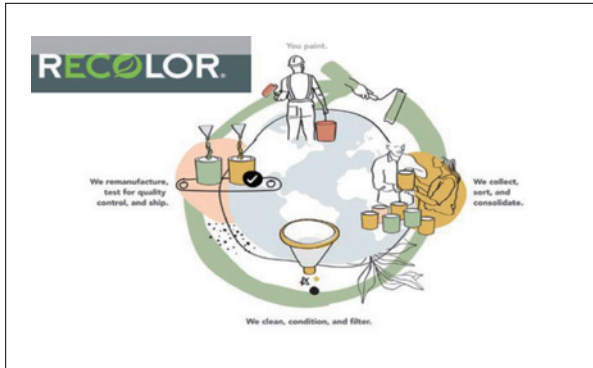


图6：美国Recolor
Figure 6: Recolor, USA

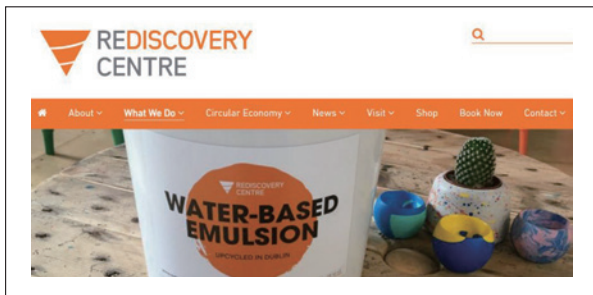


图8：爱尔兰社企——再发现中心
Figure 8: Rediscovery Centre, Ireland Social enterprise

UAC 环球公众有限公司

UAC 环球公众有限公司的业务涉及循环经济和替代能源，以及透过促进发展和支持循环经济来进口和分销化学品。

透过使用不会造成污染的材料，包括现代且易于使用的可持续和环保化学品，重振环境和社会责任。

永续发展、安全、健康、环境与社会责任政策：

- 采购环保的产品与服务（绿色采购）；
- 工厂用水管理；
- 减少废水排放到环境中；
- 重复利用工厂的水或废旧材料；
- 减少电力消耗和能源浪费；
- 依法管理空气质量；
- 管理温室气体排放；
- 组织厂区绿化环境。

华泰 (Srithai) 塑料厂大众有限公司

华泰 (Srithai) 塑料厂大众有限公司是泰国较大型塑料容器制造商之一，在 3S 政策下优先创造环保创新，即节省材料、节省能源、拯救世界。

该公司采用循环经济原则开发由 100% 再生塑料制成的包装。

环境、社会与公司治理的商业原则：

- 从供应商回购塑料（闭环供应链）并生产新产品回用；
- 发展对环境友善的绿色产业；

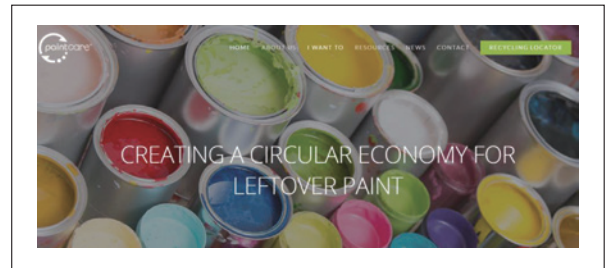


图7：英国涂料联合会——Paint Care
Figure 7: Paint Care, British Coatings Federation



图9：2022年「同一个世界：同一个未来」计划由JBP国际涂料有限公司与3个主要合作伙伴合作发起：华泰 (Srithai) 塑料厂大众有限公司、CRC Thai Watsadu Co., Ltd.和UAC Global PCL。
Figure 9: In 2022 One World: One Future Together project has been initiated by JBP International Paint Co., Ltd. in collaboration with 3 main partners; Srithai Superware PCL, CRC Thai Watsadu Co., Ltd. and UAC Global PCL.

are modern and approachable.

Policy of sustainability, safety, health, environmental and social responsibility:

- Purchasing product and services which are environmentally friendly (Green Purchasing),
- Water management in the factory,
- Reducing the discharge of wasted water into the environment,
- Reusing water or used materials from the factory,
- Reduce electricity consumption and wasted energy,
- Manage air quality according to the law,
- Manage the greenhouse gas emissions,
- Organise by green environment in the factory area.

Srithai Superware Public Company Limited

Srithai Superware Public Company Limited is one of the larger plastic container manufacturers in Thailand, which gives priority to create innovations that are environmentally friendly under the 3S policy, that save materials, save energy and save the world.

The company adopts the Circular Economy principle to develop packaging that is made from 100% recycled plastic.

Business principles of Environmental, Social and Corporate Governance:

- Repurchase plastic from suppliers (Closed loop supply

- 减少进口原料；
- 避免资源开采造成的环境破坏；
- 减少空气污染；
- 以「我们是您的合作伙伴」为口号，升级再造塑料制品是未来塑料的关键生产方式。

JBP 国际涂料有限公司

JBP 国际涂料有限公司是泰国一家涂料制造商和经销商，一直致力于为使用者提供环保及安全的产品，以及不含有害化学物质的原材料。

制造过程减少浪费并将原材料带回过程中再利用的重要性。它还使用再生塑料制成产品容器，包括在工厂使用电动堆高机，而不是使用燃料能源。

JBP 在开展业务时优先考虑永续发展。其环境、社会及治理政策 (ESG) 概念：

- E——环境：依照国家和国际标准一直以环境责任开展业务，以确保消费者及环境的安全；
- S——社会：支持社区和社会，为人们创造机会，改善社区及周边地区的生活质量，获得更好的福祉，与 JBP 共同成长；
- G——良好的治理：透过与合作伙伴和各部门的持续协调，以透明和公平的方式开展业务，对可持续发展的各方都有利。

CRC Thai Watsadu 有限公司

CRC Thai Watsadu 有限公司是一家建筑材料经销商，是泰国较大的经销商之一，一直以永续发展的方式经营业务并不断发展。

如今，清洁能源「电动卡车」被用来取代柴油，降低运输成本。它还有助于减少可能导致空气污染的二氧化碳。未来，我们的目标是增加电动卡车的数量，涵盖整个业务领域，以实现永续发展的环境。

CRC 再新策略 (ReNEW Strategy)：

- 减少运作过程中的温室气体排放；
- 引导社会福祉；
- 环保包装；
- 废弃物管理：固体废弃物管理包括目前使用电动卡车来运输货物。减少柴油的使用和二氧化碳排放，实现永续发展的环境。

装饰涂料新趋势

「促进永续福祉协作再生涂料」是「同一个世界：同一个未来」所有合作伙伴合作创造的产品，依照循环经济概念的原则设计，旨在提高废弃物管理效率，使原料、过期产品和能源得以循环利用。这是泰国第一个回收建筑涂料品牌，涂料由 35% 或更多的剩余丙烯酸涂料制成，并透过 JBP 的专业技术用于生产新产品 (图 10)。

- chain) and produce new products back to use,
- Develop green industry which is friendly to the environment,
- Reduce imported raw materials,
- Avoid environmental damage which is caused by resource extraction,
- Reduce air pollution,
- Up-cycling plastic products are the key products of future plastics with the slogan "WE ARE YOUR PARTNER".

JBP International Paint Company Limited

JBP International Paint Company Limited is a paint manufacturer and distributor in Thailand. Committed to distributing safety products that are eco-friendly for users since the starting process of raw materials are free from harmful chemicals.

The importance of manufacturing process that reduce waste and bring back raw materials to the process for reuse. Also it uses containers of product from recycled plastic including the use of EV Forklift in the factory instead of using fuel energy.

JBP prioritises sustainability and follows ESG policy:

- E – Environment: Operate the business with environmental responsibility from the beginning to the end according to the national and international standard to be safe for consumers and environment,
- S – Social: Support the community and society by creating opportunities for people to improve the quality of life in the community and surrounding areas, to have better well-being and grow together with JBP,
- G – Good Governance: Operate business with transparency and fair to all parties of sustainability by coordinating with partners and various sectors continuously.

CRC Thai Watsadu Company Limited

CRC Thai Watsadu Company Limited, a dealer of construction



图10：促进永续福祉协作再生涂料
Figure 10: Collaborative recycled paint for sustainable wellbeing

包装新趋势

泰国塑料循环的潜在合作：

华泰 (Srithai) 塑料厂大众有限公司

2020年，JBP与华泰 (Srithai) 塑料厂合作，开始使用由20%再生塑料制成的油漆容器，并于2022年使用100%再生塑料 (图11)，也引入了循环经济概念，将使用过的油漆容器从油漆车间返回给油漆容器供应商 (图12)。

这些容器也获得了亚洲国家和地区的环保包装奖。

- 精选中的精选：ASIA STAR 2020
- 环保包装优胜奖：2020年泰国明星包装奖，工业促进部。

泰国暹罗化工集团 (SCG Chemicals)

SCG Chemicals 或 SCGC 是泰国和东协永续化学创新和制造领域的领导者之一，提供全系列石化产品，包括3种从上游烯烃生产到下游生产的主要塑料树脂：聚乙烯、聚丙烯和聚氯乙烯，包括制品。

SCGC GREEN POLYMER™——消费后回收树脂 (Post Consumer Recycled Resin, PCR) 是我们「回收」解决方案中的产品之一。凭借 SCGC 的独家配方和广泛的生活垃圾收集网络，公司可透过机械回收将废物转化为高质量的 PCR (图13)。

表1：碳排放数据

Table 1: Carbon emission data

高密度聚乙烯 HDPE	K _g CO ₂ /K _g 产品 K _g CO ₂ /K _g Product
SCGC 高密度聚乙烯原生 SCGC HDPE virgin	1.29
高密度聚乙烯原生 (欧盟、美国) HDPE virgin (EU, US)	1.80 - 1.89
SCGC 高密度聚乙烯消费后回收树脂 SCGC HDPE PCR	0.311

表2：2024年我们的主要成就与共同前进的方向

Table 2: Our key achievement and way forward together in 2024

消费后回收树脂业务 PCR Business	2024年 Y2024
回收 Recycling	30公吨/年 消费后回收树脂量 (20% 剂量) 30 metric tons/year PCR consumption (20% dosage)
二氧化碳减排 CO ₂ emission reduction	30,000* k _g CO ₂ e
减少堆填塑料垃圾 Plastic waste reduction to landfill	36* 公吨/年 36* metric tons/year
树木偏移量 Trees offset	5,084 棵树 / 年 (5.9 k _g CO ₂ / 树) 5,084 Trees/year (5.9 k _g CO ₂ /tree)

* 备注：废原料中消费后回收树脂的产率为80%，与原始塑料相比，1k_g消费后回收树脂排放量减少1k_gCO₂e
Remark: 80% yield of PCR resin from waste feedstock, 1 k_gCO₂e emission reduction of 1 k_g PCR comparing to Virgin plastic



图11：2020年，JBP与华泰 (Srithai) 塑料厂合作，开始使用由20%再生塑料制成的油漆容器，并于2022年使用100%再生塑料。

Figure 11: In 2020, JBP in collaboration with Srithai Superware started using paint containers made from 20% recycled plastic and 100% in 2022.

materials, is one of the larger potential dealers in Thailand which has been operating business for sustainability and continuously grow.

Nowadays, the clean energy "EV trucks" are used to replace diesel fuel and reduce transportation costs. It also helps reduce carbon dioxide which can cause air pollution. In the future, it is aimed to increase the number of EV trucks to cover all the business area for the sustainable environment as well.

CRS ReNEW strategy:

- Reduce Greenhouse Gases emission from operation,
- Navigate Society Wellbeing,
- Eco-friendly Packaging,
- Waste Management: solid waste management including at present, EV TRUCK are used, electric trucks to transport goods. to reduce the use of diesel, carbon dioxide emissions for a sustainable environment).

New trend of decorative paint

Collaborative Recycled Paint for Sustainable Wellbeing, Products created by collaboration from all partners in One World: One Future Together, designed based on the principles of the Circular Economy concept, to enhance the efficiency of waste management, raw materials, expired products, and energy to be recycled for further use. The first recycled building paint brand in Thailand where the paint is produced from 35% or more of the reclaimed acrylic paint brought into the process and used to produce new products by using JBP's specialised technology (Figure 10).

New trend of packaging

Potential collaboration for plastic circularity in Thailand:

Srithai Superware

In 2020, JBP in collaboration with Srithai Superware started using paint containers made from 20% recycled plastic and

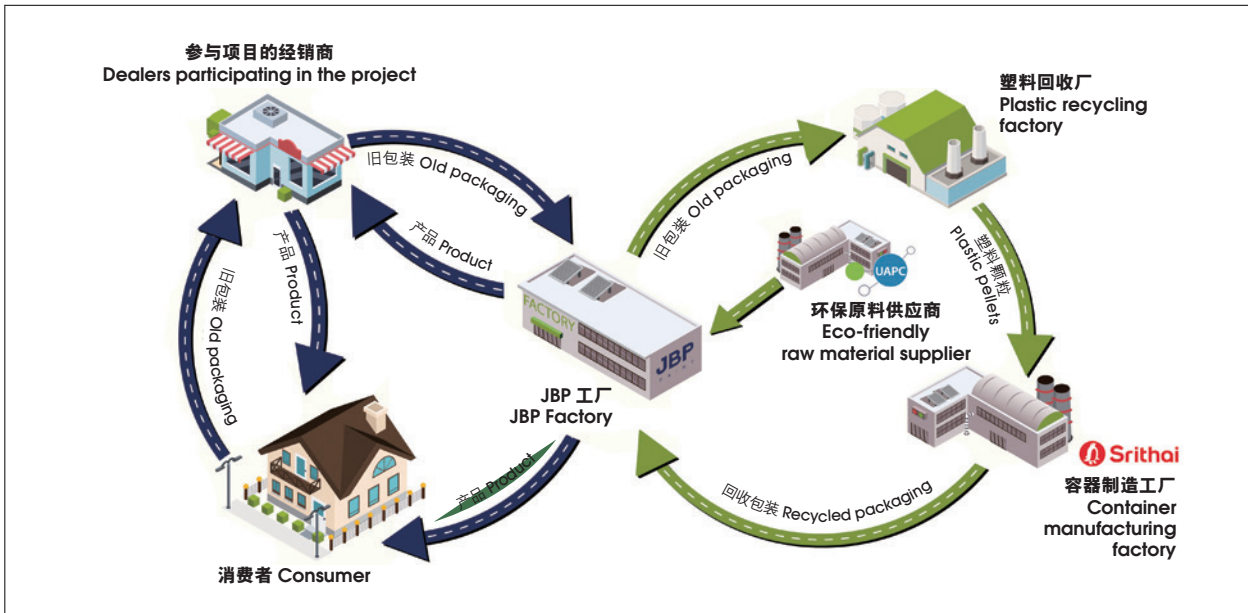


图12: 引入循环经济概念, 使用过的油漆容器从油漆车间返回给油漆容器供应商。
Figure 12: Circular economy is introduced which is the concept in returning used paint containers from paint shop back to paint containers suppliers.

结语

此次合作的目的是为我的世界做出贡献。JBP、Srithai、UAC Global 和 CRC Thai Wadsadu 运用其业务经验和现有能力来创造可持续发展的创新、产品和服务, 并致力于未来持续的共同成长。共同目标是应对气候变迁、减少温室气体排放, 并成为商业部门的一部分, 以维持国家持续的经济成长。

100% in 2022 (Figure 11). Also introduced circular economy concept in returning used paint containers from paint shop back to paint containers suppliers (Figure 12).

The containers have also received awards for environmentally friendly packaging both nationally and regionally in Asia.

- The Best of The Best: ASIA STAR 2020
- Winner Award for Environmentally Friendly Packaging: Thai Star Packaging Awards 2020, Department of Industrial Promotion."

SCG Chemicals

SCG Chemicals or SCGC is one of the leaders in sustainable chemical innovations and manufacturing in Thailand and ASEAN that offers a full range of petrochemical products ranging from upstream production of olefins to downstream production of 3 main plastics resins: polyethylene, polypropylene, and polyvinyl chloride including finished products.

SCGC GREEN POLYMER™ – Post Consumer Recycled Resin (PCR) is one of the products in our "Recycle" solution. With SCGC's exclusive formulations and wide ranging network of household waste collection, we can turn waste into high quality PCR by Mechanical Recycling (Figure 13).

Conclusions

The purpose of this collaboration has a mutual intention to contribute to our world. JBP, Srithai, UAC Global and CRC Thai Wadsadu conduct their business experiences and existing capabilities to create innovations, products, and services for sustainability, and aiming for sustained mutual growth in the future. The common goal is to address climate change, reduce greenhouse gas emissions, and be a part of the business sectors to sustain the ongoing economic growth of the country. ☐



图13: 绿色油漆容器由100% PCR塑料制成
Figure 13: Green paint container made from 100% PCR plastic