

Case study

Chemical Recycling of Sachet Waste: A Failed Experiment



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Aliansi
Zero Waste
Indonesia



Table of Contents

- Introduction** 1
- How it started: Unilever’s take on the sachet problem** 2
- How it works** 3
 - Facility details 3
 - How collection works 4
 - Flow of the recycling process 5
- Truth behind “the world's first sachet recycling technology”** 6
 - Abrupt and silent suspension 6
 - Overclaimed capacity and technological challenges 7
 - Costly sachet collection 9
 - Low value to local waste pickers 10
 - Lack of transparency 11
 - Unilever’s claims vs reality 12
- Conclusion** 13
- Acknowledgments** 14



Introduction

The scale of global plastic pollution has been brought to light in recent years. Over 300 million tonnes of plastic is produced each year, and more than 90 percent of it ends up in landfills, waste dumps, incinerators, and on lands and waterways. Like many other countries in Southeast Asia, Indonesia is dealing with growth in both domestic consumption of single-use plastic and waste arriving at the ports in the name of trade. Indonesia has been labelled as the second largest contributor to ocean plastic leakage after China.¹ In addition to the amount estimated to leak into waterways and the ocean (9 percent of the 4.8 million tonnes of plastic waste generated in Indonesia every year), the majority of plastic waste in the country is being inadequately managed through open burning (48 percent), dumping on land or dumpsites (13 percent).²

In response to the unprecedented plastic pollution crisis, fast-moving consumer goods companies and the petrochemical industry have supported and promoted countless miraculous-sounding technologies, pushing back on their bad reputations as major plastic polluters. CreaSolv³ is Unilever Indonesia's flagship project on this front, and the media has touted it as an example of a technological innovation that can solve the entire global plastic waste problem by recycling the lowest-value plastic, namely sachet packaging, which is commonly used for shampoo and other body care products, powdered drinks like milk, juice, and coffee, and snacks.

Two years after the highly-celebrated launch of the pilot plant in Indonesia in 2017, however, the fuss around the CreaSolv project quieted down as the company secretly shuttered the operation. Reports from local investors revealed multi-layered fallout of the CreaSolv project, from the logistical difficulties of sachet collection through challenged economics around the end products.

¹ Garcia, Beatriz, Mandy Meng Fang, and Jolene Lin. 2019. "Marine Plastic Pollution In Asia: All Hands On Deck!". *Chinese Journal Of Environmental Law* 3 (1): 11-46. doi:10.1163/24686042-12340034.

² *Radically Reducing Plastic Pollution In Indonesia: A Multistakeholder Action Plan*. 2020. Ebook. National Plastic Action Partnership., 11, <https://globalplasticaction.org/wp-content/uploads/NPAP-Indonesia-Multistakeholder-Action-Plan-April-2020.pdf>.

³ CreaSolv® is a trademarked term.

How it started: Unilever's take on the sachet problem

Sachets are low-value plastics that usually escape conventional recycling and are a major contaminant of the environment. They comprise 16 percent of plastic waste in Indonesia, amounting to 768,000 tonnes per year.⁴ Unilever sells millions of products in single-use sachets, particularly in developing and emerging markets, including Indonesia.

The introduction of CreaSolv was part of Unilever's dual commitment to reduce its product packaging burden by a third by 2020, and increase the use of recycled plastic content in packaging by at least 25 percent by 2025. The consumer giant proudly announced its commitment to “the development of new business models to support the circular economy by reusing old packaging” and shared the excitement for “the innovative CreaSolv technology,” which will make the company “the first in the world to be able to recycle and reuse multilayer plastic packaging waste.”⁵



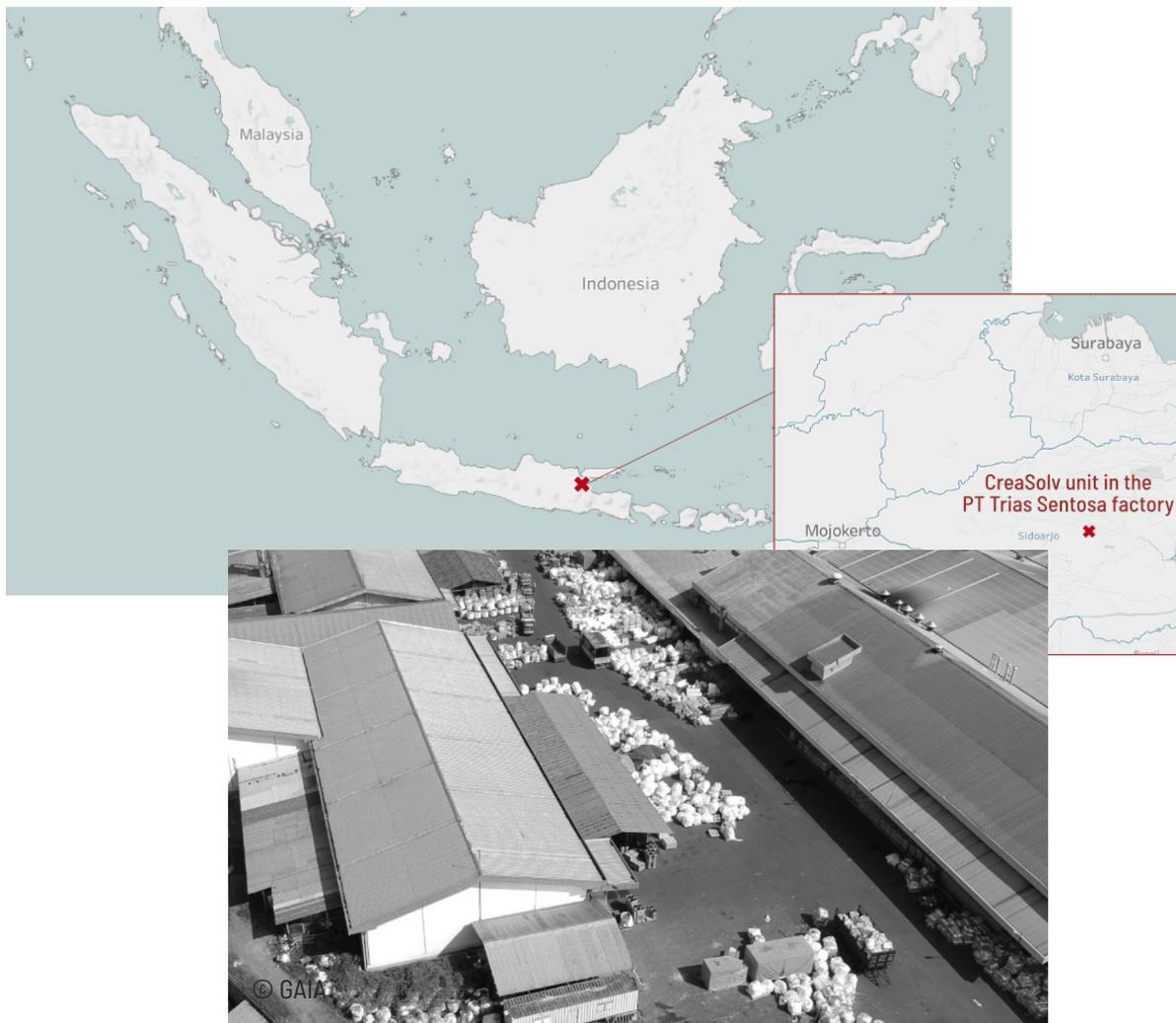
⁴ National Plastic Action Partnership, *Radically Reducing Plastic Pollution*, 21.

⁵ “Unilever Perkenalkan CreaSolv® Process untuk Daur Ulang Sampah Kemasan Sachet.” Unilever Indonesia Company Website. January 17, 2022. <https://www.unilever.co.id/news/press-releases/2017/CreaSolv-Process.html>

How it works

Facility details

The CreaSolv plant was located in the PT Trias Sentosa factory complex in the Krian area, Sidoarjo, East Java. Unilever finished building this 700-tonne-per-year facility in 2018, working with the construction company Loemi, and announced that the operation fully began on November 8, 2018.⁶ As claimed in their press release, this system “is designed to recycle polyethylene (PE), as sachets are made up of 60 percent of it” and “the recovered plastic is then used again for the production of sachets.” It also claimed that the technology was “Technology Readiness Level 5” and that “there is solid data on the quality of the polyolefin recyclates made from multilayer packaging.”⁷



⁶“Creacycle - Press/News.” n.d. Accessed January 17, 2022. <https://www.creacycle.de/en/creasolv-plants/circular-packaging-2018.html>, and <https://www.creacycle.de/de/projekte/verpackungen/unilever-beutel-recycling-2015.html>

⁷“Creacycle - Press/News.”

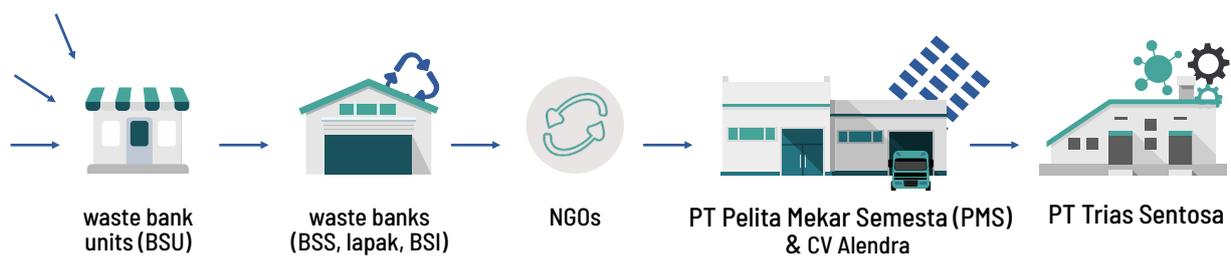
How collection works

For collection of sachet waste, Unilever relied on thousands of waste pickers and communities who collaborated with waste banks, the government, and local retailers. Unilever had noted the need for a “functioning collection infrastructure” with an aim that “the required large plastic waste volumes of several thousand tonnes are also available.”⁸

The community collected sachet waste, which usually comes from households, and deposited it at the Bank Sampah Unit (BSU). For waste generated in *warungs*,⁹ special dropboxes were provided and regularly picked up by the nearest BSU. Instant beverage containers and coffee

sachets are two dominant items in the dropboxes. The collected waste was then sent to a sectoral waste bank or *lapak* that functions as a Bank Sampah Sektoral (BSS). In some cities, including the City of Surabaya, Jombang Regency, Malang Regency, and parts of Mojokerto Regency, Bank Sampah Induk (BSI) also collected waste.

From BSS, *lapak*, or BSI, the collected waste was sent to a third party appointed by Unilever for purchase. In several cities, this role was taken by supporting non-governmental organizations (NGOs) such as Spektra, We Hasta, and Lohjinawi.



The sachet recycling program was best suited for two kinds of multilayer packaging made of polypropylene, namely *Minyak goreng* (pouches for cooking oil and other liquids) and “*metalizer*” (Rinso detergent packaging). Then another kind of packaging ended up in the collection stream, which is *Nutrisari or Jelly* (sachets made with a layer of aluminum foil, used for powdered liquid). The majority of the sachets, which contained aluminum foils, became residue of the recovery process as the technology was not designed to treat aluminum-containing packaging.



⁸ “Creacycle - Press/News.”

⁹ Warungs sell home-made food or various packaged products - usually found in rural areas.

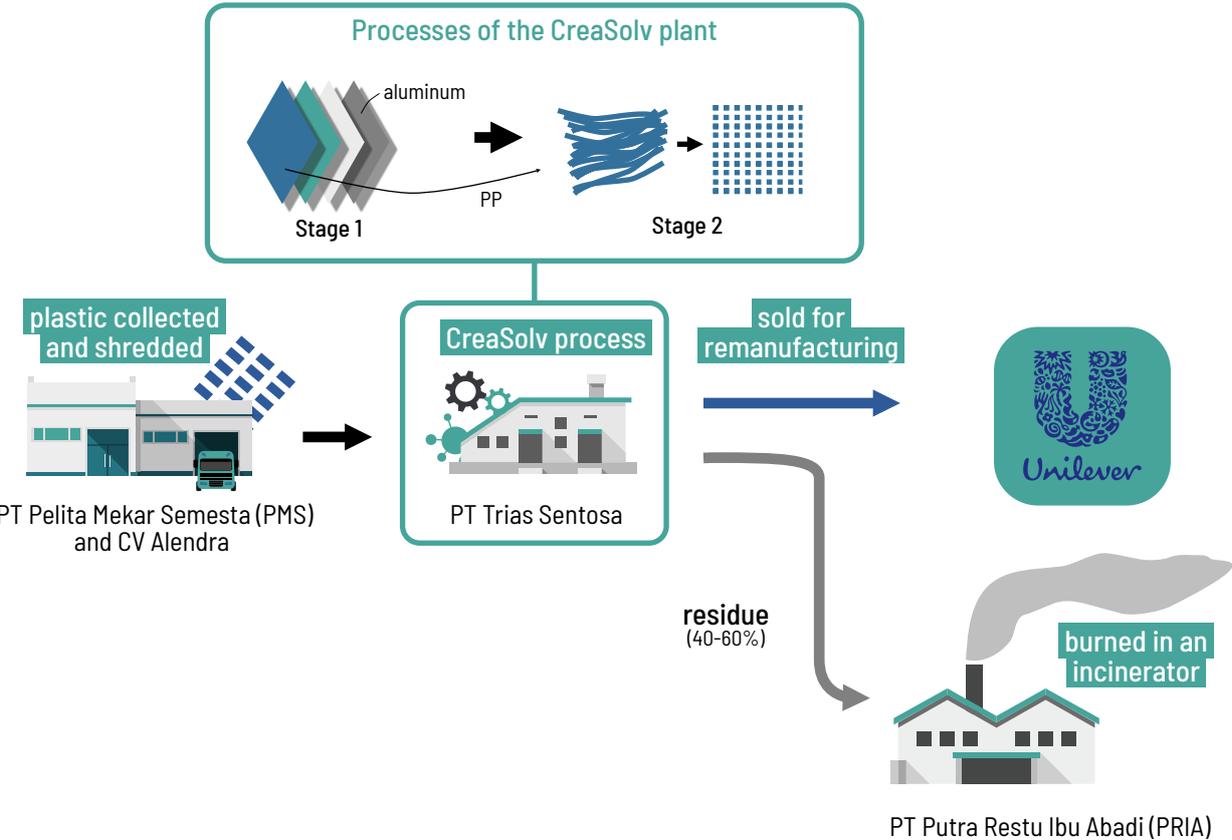
Flow of the recycling process

In order for the technology to work, any packaging waste that enters the factory must be sorted for shredding and processing. PT Pelita Mekar Semesta (PMS) and CV Alendra Kreasindo, in Sidoarjo, shredded waste sachets collected in the industrial areas of Sumput Driyorejo, Gresik.¹⁰

Then PT Trias Sentosa (an industrial complex) in Krian Sidoarjo received the shredded sachets for processing using CreaSolv technology. The machines inside the plant first separated layers from the incoming sachet packaging and pelletized it. The polyethylene film pellets were

the raw material for the new sachet packaging.

Unilever took the processed sachets from PT Trias Sentosa to produce new one-kilogram pouches for a detergent brand Rinso. The residue from the processing at PT Trias Sentosa was sent to PT Putra Restu Ibu Abadi (PRIA) Mojokerto in which it was burned in an incinerator. Unilever said the residue from the process they carried out was around 40 percent, but a local source estimated that the portion of the residue—most of which is aluminum-containing sachets—was around 60 percent.¹¹



¹⁰ After a fire broke out in PT PMS in August 2018, the shredding activity was transferred to a small, unnamed local company that shredded the sachet in Mojokerto.

¹¹ Based on interviews with people who were formally involved in the project.



Truth behind “the world's first sachet recycling technology”

Abrupt and silent suspension

According to Reuters reporting on July 29, 2021, Unilever has revoked the plans for scaling the pilot project due to low commercial viability.¹² The CreaSolv unit in the plant in Sidoarjo had been idling for at least six months by the time of the reporting, with no staff or visitors present at the facility.

When it comes to sachet collection, Unilever had already terminated the collection program in December 2019. The abrupt discontinuation of the sachet recycling program caused disruption among all parties involved in the sachet waste collection and processing. “Knowing that it would stop in December 2019, we sent all sachets that the waste bank had collected to the shredding company. The

amount is up to 20 tonnes,” explained an activist who works for one of the local NGOs.

Some waste banks—including lapaks, BSIs, BSSs—were not aware of the termination of the sachet waste collection program. “(As of December 2020) we still receive sachet waste at the previous rate of IDR300 per kilogram. We can’t stop the collection of sachets. We don’t feel comfortable stopping this when our customers are already willing to separate and collect their waste,” said an employee of the Anggrek Babatan Pilang Waste Bank in Surabaya. BSI Jombang received sachet waste until March 2020. “There are almost two tonnes of sachet collected and now piled up in our warehouse of BSI Jombang. Sometimes we make plastic bricks out of it,” explained the person interviewed at BSI Jombang.

¹² Brock, Joe and Geddie, John, 2021, “Exclusive: From Shell to Unilever, Plastics Polluters Back Recycling-Tech Flops.” Reuters, July 29, 2021, sec. Sustainable Business. <https://www.reuters.com/business/sustainable-business/exclusive-shell-unilever-plastics-polluters-back-recycling-tech-flops-2021-07-29>.

BSI Surabaya also admitted that they could not refuse BSU for depositing sachet waste. BSI Surabaya still accepts sachet waste. "But we also disposed of the sachets to landfill and entrusted them to the Surabaya City officers."¹³ The manager of the BSS did not know anything about the termination of the sachet collection program and ended up burning the collected sachets. "Probably I burnt one tonne," they said. The local investigator points out that it is possible to use such unclaimed waste in factories, such as tofu-making ones, therefore further investigation is needed to find out where and how the waste is being burned.

The majority of the waste bank management admitted that they were disappointed that the sachets collection program was terminated and sachets are no longer accepted by any reclaimers. Now the sachet waste again fills the trash bin and ends up in the landfill. In the cities that have already collected multilayer plastics, including Lombok, Banyuwangi and Samarinda, there are currently tonnes of multilayer plastic piles.

Overclaimed capacity and technological challenges

Unilever Indonesia claimed to have developed a recycling process for "multilayer flexible sachets." What was misleading about the claim is that the technology was only able to process single-layered or non-metallic sachets at best,

which did not reflect the need for an innovation to recycle multilayer metal-containing sachets. Many of Unilever's products themselves come in sachets made of plastic and aluminum, including pouched shampoos and skin care products.

The CreaSolv facility needed to produce three tonnes of plastic pellets per day to stay operational and had plans to expand the capacity to five tonnes per day. However, after the initial stage of the pilot operation, the maximum amount of clean dry pellets that the facility was able to produce was only around five tonnes per month. At this rate, it would take 12,800 years to be able to process the amount of sachet waste annually generated in Indonesia. Even with Unilever's ultimate target for the commercial processing of 27 tonnes of waste per day, it would take more than 77 years to process the sachet waste generated in one year.

Whether the residue rate is 40 percent or 60 percent, the high rate of material loss shows limited effectiveness of the process. According to the local investigator, the 60 percent or 40 percent of the sachet waste that was claimed to be successfully recovered was used to produce detergent packaging ("Rinso") instead of new sachet packaging, because sachet collection tended to mix aluminum-containing sachets and non-aluminum sachets, resulting in low quality of the end product. A local source also shared that the CreaSolv unit was sent

¹³ Dinas Kebersihan dan Ruang Terbuka Hijau (DKRTH) which can be translated into 'Office of Cleanliness and Green Open Space.'

back to Germany in 2017 due to technical issues.

PT Pelita Mekar Semesta (PMS), the shredding facility faced other forms of operational problems such as fire and mismanagement of toxic liquid. On September 1, 2018, a fire broke out at the factory and the warehouse which held 300 tonnes of sachet waste.¹⁴ Black smoke seemed to rise up and contaminate the surrounding neighborhoods.

Comments from the official at the Ministry of Environment and Forestry

Head of the Sub-Directorate of Products and Packaging at the Waste Management Directorate of the Ministry of Environment and Forestry, Ujang Solihin Sidik, also questioned the sustainability of Unilever's CreaSolv project.

"I try to monitor this technology, it's not proven, it doesn't work. According to the Unilever team, it is not viable," said Ujang when he was a speaker in an online journalist discussion entitled "The Covid-19 Pandemic and the Circular Economy" that took place on January 11, 2021. "One of our homework for Unilever is to demand their promise because their products are mostly single-use packaging. It cannot be recycled, so there is no value for recycling," added Ujang.

"The technology is relatively new, high technology, maybe at that time Unilever had over confidence. To achieve a circular economy we better choose technology as simple as possible, not complicated. Any technology as long as it is not technically and economically viable is difficult to be realized," said Ujang.

¹⁴ "Pabrik Plastik PT Pelita Mekar Semesta Terbakar, Kerugian Capai IDR25 miliar." n.d. Posbelitung.co. Accessed January 17, 2022. <https://belitung.tribunnews.com/2018/09/03/pabrik-plastik-pt-pelita-mekar-semesta-terbakar-kerugian-capai-rp-25-miliar>.

Costly sachet collection

The low recyclability of sachet and economic challenges in the collection process were among the main causes of the plant closure. The way sachets are designed – large in volume and light in weight – are both logistically troublesome and costly.

Since Unilever started collecting multilayer plastic waste in 2017, the locations covered for collection kept expanding as East Java alone did not have enough sachets for processing. Initially, the collection was focused on Surabaya and its surroundings in East Java. It expanded to cities surrounding Surabaya in East Java, such as Sidoarjo, Gresik, Mojokerto City, Mojokerto Regency, Jombang, Pasuruan City, Pasuruan Regency, Malang Regency, and surrounding areas such as Lamongan, Kediri, and Probolinggo. The sachet collection program continued to grow outside of East Java to western part of Java such as in Jakarta and Bandung, and to Yogyakarta. It eventually spread to cities outside of Java island such as Medan, Denpasar, Balikpapan, and Makassar.

As there are multiple actors involved in the collection program, including waste banks (both sectoral and central), NGOs, and shredding companies, the final price of the collected sachet waste was too expensive for Unilever to take and recover to produce new packaging. The quality and the contamination level of the sachets also mattered, which increased the processing costs in between different actions. Unilever focused on collecting sachet waste through the waste banks and drop boxes that they distribute, and provided a stimulant package in order to encourage waste banks to collect more sachet waste. However, the funds were not evenly distributed.

*“Although the sachets could be recycled in small amounts, **it was too expensive to collect, sort and clean enough of these packets to scale up the project without incurring large losses,**” two people involved in the program told Reuters.¹⁵*



¹⁵ Brock and Geddie, “Exclusive: From Shell to Unilever.”

While BSU Mulyo Bareng and the Artha Sampah Sejahtera Garbage Bank received stimulant funds of IDR1 million, BSS level waste bank did not receive any stimulant funds. Amid financial and logistical challenges, the sachet waste collection only lasted for two years, 2017-2019.

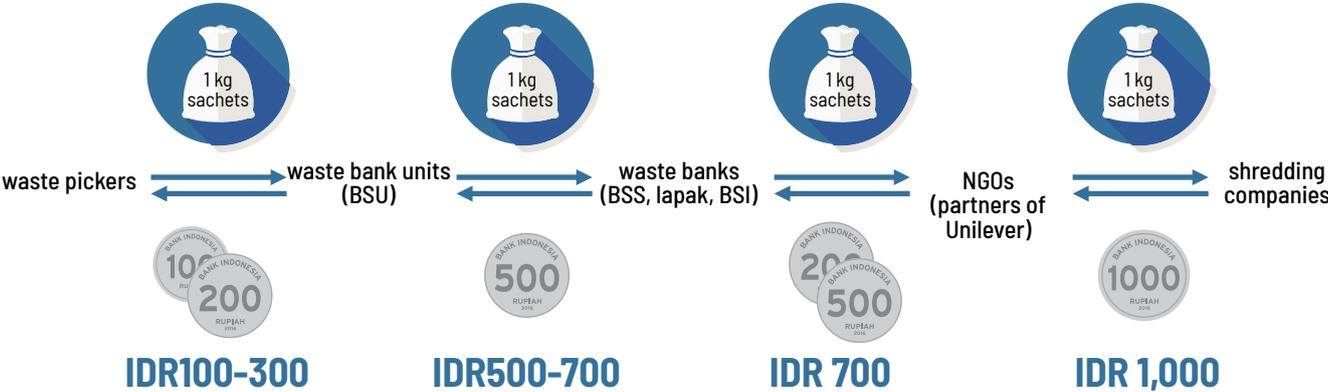
An employee of TPS3R (a material recovery facility) said that the collaboration with Unilever did not reach an adequate implementation. With the fallout of the sachet collection, the facility offered Unilever discarded diapers as there are 5,000 pieces or around 300 kilograms of diapers collectable in Mulyo Agung Village, Malang. Unilever did not respond to this offer.

Low value to local waste pickers

In the beginning of the collection program, local waste pickers had expectations for additional income. To their disappointment, however, the price that Unilever offered was not competitive compared to other recyclables such as polypropylene. When a waste picker sold a kilogram of sachet waste, the BSUs paid IDR300. Central waste banks (BSSs, Lapaks,

BSIs) then pay the sectoral banks IDR500 per kilogram and sell it for IDR700 to local NGOs handling it to shredding companies. By the time the NGOs sell the sachet waste to shredding companies, the price is at about IDR1,000, while the waste picker was only paid IDR300 in the beginning.

Normally, regular polypropylene cups are priced by plastic recycling companies as much as IDR4,000 per kilogram. If polypropylene is shredded and clean, the price can go up to IDR8,000-10,000 per kilogram. Because the purpose of recycling sachet waste is to recover polypropylene, sachet waste is also priced significantly lower than polypropylene cups, which generates income seven times higher than sachet waste (eight times if the collected waste is clean). "We only take a little. We have to separate the collected waste again because sometimes there are plastic bags or paper. The transport cost is covered because we also collect other waste such as bottles, glass or metal," said a person who works with BSS in Bulaksumur, West Surabaya.



Lack of transparency

Besides the reporting by Reuters, which was based on testimonies of two local sources, it is extremely rare to find any information about the current state of the sachet recycling program and the details of the facility operation. Unilever has not made an official announcement about the closure, whereas it admitted that another CreaSolv plant in Italy failed in one of its position papers.¹⁶

The company slipped under the radar of governmental regulatory systems, as it was merely a pilot project and the CreaSolv unit was part of a broader industrial complex that is already registered under the regulatory system. No changes were made to the facility's environmental impact assessment report since the installment of the CreaSolv unit, and therefore, no environmental assessment records can be found publicly, even if the operation induces concerns on environmental health impacts. This is especially alarming, considering that a documentary film crew spotted dumping of bright blue effluent in October 2019.



During filming for the Story of Plastic we visited one of the only existing chemical recycling plants in Indonesia and saw a bright blue effluent coming out of the facility flowing out into the adjacent river. – Stiv Wilson, Peak Plastic Foundation

¹⁶ "Creacycle - 2021.04.15 CreaSolv® Process – Position Paper." n.d. Accessed January 17, 2022. <https://www.creacycle.de/en/press-news/positionpaper.html>.



Unilever's claims vs reality

	Unilever's claims	Reality
Collection	Unilever aimed to collect 1,500 tonnes of sachet waste for recovery in 2019 and 5,000 tonnes in 2020. ¹⁷	Collection program wasn't successful and abruptly stopped after two years.
Expected outcome	Unilever's aim was "to develop a closed-loop system for sachets." ¹⁸	The technology was only suitable for mono-type sachets free of aluminum foils.
Product quality	The recovered plastic was supposed to be used again to produce new sachets.	The end product was used to produce detergent packaging instead due to the complexity of processing aluminum-containing feedstock with non-aluminum materials.
Residue rate	Unilever said the residue from the process they carried out was around 40 percent.	A former employee of one of the facilities related to the Creasolv project estimated the residue was around 60 percent.
Material circularity	Unilever claimed that the technology produces plastic which can be used multiple times, offering the potential for a circular economy model.	Forty to sixty percent of waste feedstock was lost as residue during the process, and the recyclability of the detergent packaging is unproven.
Costs	In the press release announcement in 2017, Unilever's Chief R&D officer David Blanchard put forward economics as one of the main benefits of the recycling program, stating: "by finding the right solution, there is a great opportunity to save on expenses which means more value for the business." ¹⁹	The facility, which was developed in collaboration with Fraunhofer Institute IVV from Germany, has cost Unilever more than EUR 10 million (or equivalent to IDR 156 billion) for construction since 2011. ²⁰

¹⁷ "Our Solution for Recycling Plastic Sachets Steps Forward." Unilever Global Company Website. Accessed January 17, 2022. <https://www.unilever.com/news/news-and-features/Feature-article/2018/our-solution-for-recycling-plastic-sachets-takes-another-step-forward.html>.

¹⁸ "Our Solution for Recycling Plastic Sachets Steps Forward."

¹⁹ "Unilever Perkenalkan CreaSolv® Process untuk Daur Ulang Sampah Kemasan Sachet."

²⁰ "Creacycle - Press/News."

Conclusion



We have solvolysis and pyrolysis technologies that can just about process current multilayer materials but they're really not very economical and so the short answer [is that] we've got to rid of them (sachets)²¹ – Alan Jope, CEO of Unilever

The quiet closure of the CreaSolv facility, which Unilever strategically neglects to report, is a reminder that chemical recycling technologies that major plastic polluters tout as the solution cannot solve the plastic pollution crisis. Those technologies routinely fail and cause vast financial and environmental damages, and are distracting us from pursuing genuinely sustainable solutions.

The case of Unilever Indonesia's failed sachet recycling program also sheds light on the presumable fate of mobilizing waste pickers for low-value plastic collection. The waste pickers were not paid enough because of multiple middlemen in the collection flow, and all parties involved – waste pickers, waste banks, and NGOs – took a hit when Unilever abruptly stopped the collection program. Because of the low value of sachet waste, the business model that was built around collecting and recovering sachet waste was not viable to begin with.

Phasing out sachet packaging and replacing it with reuse/refill systems is by far the most effective, affordable, fair, and environmentally sound solution to the sachet waste problem, and governments and corporations must devote resources to building a circular zero waste economy.²² As one of the multinational consumer goods companies that have profited off polluting our oceans and lands, climate, and the communities across the globe with packaging waste, Unilever should assume the responsibility by paying off the externalized costs and phasing out single-use packaging.

* IDR 1 = USD 0.000070 (as of January 17, 2022)

²¹ Pew. "Breaking the Plastic Wave | Launch Event." YouTube video. 1:30:27. July 24, 2020. <https://youtu.be/tNtkgRkenlk>.

²² Catherine Liamzon et al. 2020. "Sachet Economy: Big Problems in Small Packets." Global Alliance for Incinerator Alternatives. <https://doi.org/10.46556/EJQZ7769>.

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This case study is based on interviews conducted with local investigators A.M. and H.S, and individuals who were formally involved in the project, from August to December 2020.

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1958 University Avenue, Berkeley, CA 94704

www.no-burn.org