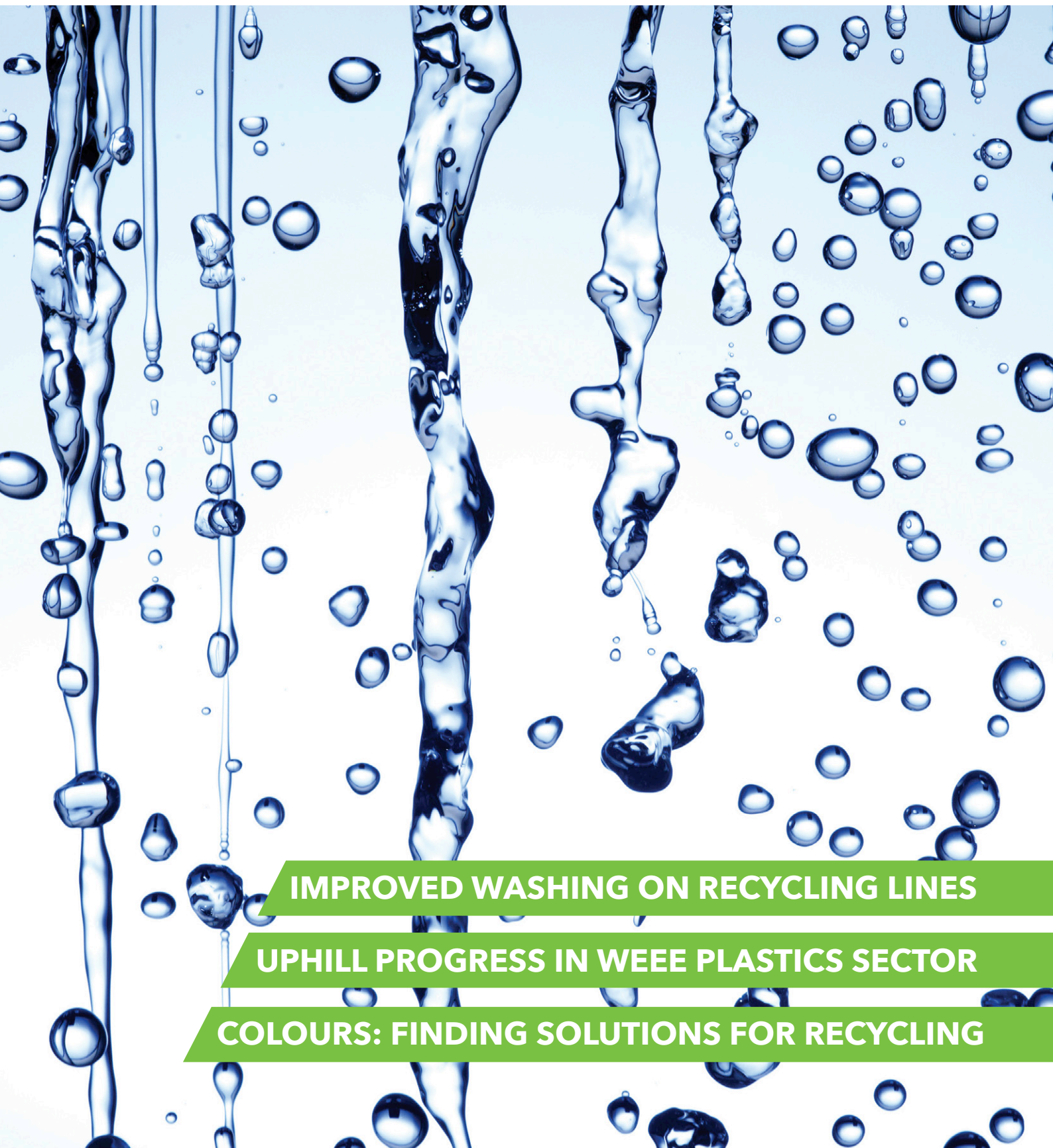


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Plastics Recycling WORLD

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US Plastics Pact unveils recycling strategy

The US Plastics Pact, a consortium launched in August 2020 and led by The Recycling Partnership and WWF as part of the Ellen MacArthur Foundation's global Plastics Pact Network, has published its Roadmap to 2025 strategy, which it says is supported by nearly 100 companies, NGOs and other organisations.

The plastics packaging strategy has four specific nationwide targets:

- Define a list of packaging to be designated as problematic or unnecessary by 2021 and take measures to eliminate them by 2025
- 100% of plastic packaging will be reusable, recyclable, or compostable by 2025
- By 2025, undertake ambitious actions to effectively recycle or compost 50% of plastic packaging
- By 2025, the average recycled content or responsibly sourced bio-based content in plastic packaging will be 30%.



Emily Tipaldo, Executive Director at the US Plastics Pact, said: "The Roadmap is designed to help US industry leaders act on the significant, systemwide change needed to realise a circular economy for plastics by 2025. The time frame is short, and the workload is immense, but if we choose to do nothing, the visions of a circular economy across the US will give way to the status quo. We look forward to working with all our members to drive this critical change."

The consortium said it has "hopes of bringing one unifying voice to plastic packaging guidelines, policy, education, labelling, access, and infrastructure. Unlike any other existing US

initiative, the US Pact provides overarching leadership and accountability by aligning to develop a national strategy, advance shared goals, and measure the strength of progress through annual reporting".

The American Chemistry Council said it supported the goals of the Plastic Pact's Roadmap but commented that it did not contain any recognition of the role that advanced (chemical) recycling will play in recycling waste streams such as multilayer pouches and film, mixed plastics and polystyrene foam food containers. The ACC released its own Roadmap to Reuse last year.

➤ <https://usplasticspact.org>

Cedo to double capacity

Flexible packaging group Cedo has announced it plans to more than double its capacity for recycling plastic films by 2024.

Ton Emans, Group Director Recycling at Cedo, said: "This expansion is the right step towards achieving the full plastics circularity, and I am confident it will contribute significantly towards the achievement of the targets and commitments set on the European market, as well as globally."

Cedo has been active in plastics recycling for more than 40 years. It specialises in recycling household, commercial, agricultural and industrial flexible plastic waste.

Rik De Vos, CEO of Cedo, said the company's second stage of the expansion project was approved by its major shareholder, Straco. It is now in discussions with technology providers and architects, among others.

➤ www.cedo.com

Lego makes prototype brick out of rPET

Lego Group has developed a prototype toy brick made from recycled plastic as part of its R&D work to make Lego products from sustainable materials (including bio-based polymers).

The prototype is made from recycled PET sourced from suppliers in the US that use FDA (and EFSA) approved processes to ensure quality.

The group said on average, a 1-litre plastic PET bottle provides enough raw material for ten 2 x 4 Lego bricks.

A patent-pending formulation uses strengthening additives and bespoke compounding technology to make PET durable enough for the rigours experienced by Lego bricks.

➤ www.lego.com

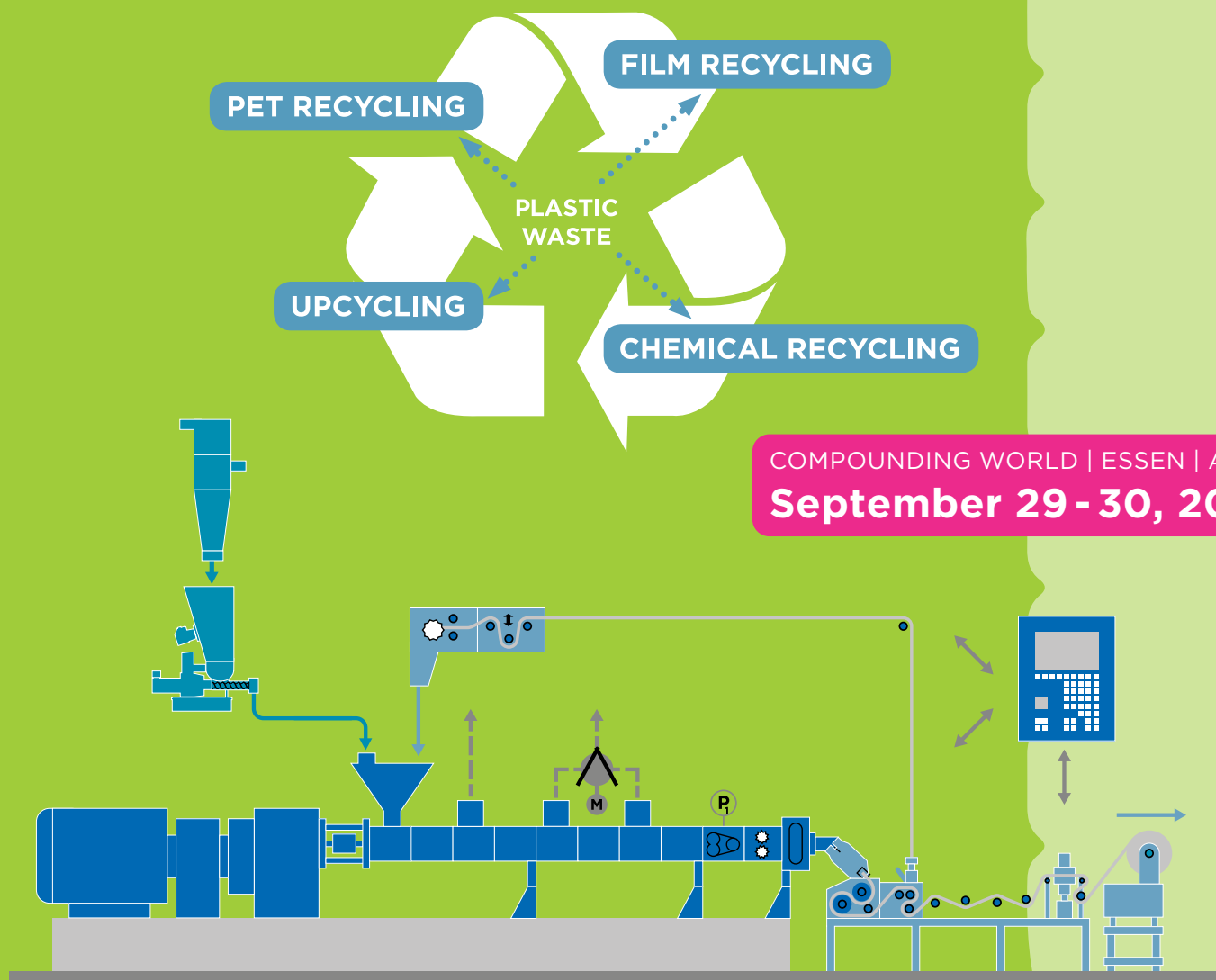


Above: Prototype 2 x 4 Lego bricks

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New Wipag technical centre

German plastics recycler Wipag has opened a technical centre at its site in Gardelegen, allowing it to expand its technical capacities for development of products and processes on behalf of customers.

Thomas Marquardt, Managing Director at Wipag, said: "When processing industrial waste, the aim is to reconcile quality, sustainability and cost-effectiveness in order to establish recyclates as an alternative for virgin materials. With the help of mechanical recycling, the technical centre enables us to implement new approaches to solutions and to respond to individual customer requirements."

Wipag produces PP and PE compounds from post-consumer and post-industrial waste. It is owned by Otto Krahn Group, which also owns Mocom and Albis.

➤ www.wipag.com

Norway starts recycling returnable PET bottles

Veolia has inaugurated a new PET bottle recycling facility in Fetsund, Norway, which is the first such plant for returnable PET bottles in the country. The plant was opened by Norwegian Finance Minister Jan Tore Sanner on 9 June.

The facility has a capacity of up to 25,000 tonnes per year, enabling it to recycle about 80% of Norway's total returnable bottles. Until now, around 22,000 tonnes per year of returnable PET bottles have been shipped from Norway to Germany for recycling.

Veolia PET Deutschland, which operates the new facility, has three other European plants that produce food-grade rPET pellets, at Rostock in Germany, Frauenfeld in Switzerland and Norrköping in Sweden.

Matthias Harms, CEO of Veolia Deutschland, said: "Fetsund is our fourth PET recycling plant of this kind in Europe. Veolia has been



IMAGE: BEOLIA

Above: Veolia PET Deutschland owns the new bottle recycling plant in Fetsund

active in this area since 2000, in the plants in Sweden, Germany and Switzerland together with the industry and the responsible authorities to close the plastic cycle."

Infinitem, operator of the Norwegian deposit one-way system, pre-sorts the returned bottles at the Fetsund site, which is around 30km northeast of Oslo. Veolia said: "With the construction of the plant from March 2019 to May 2021 at the same location,

the logistics routes were drastically shortened. This and the increased use of recyclate in the production of new bottles in the future will help reduce climate-damaging carbon dioxide emissions and support the recycling of PET as a plastic."

Covid pandemic restrictions had led to delays in the completion of the facility, which was originally announced for the end of 2020.

➤ www.veolia.de

Starlinger supplies PET system to EcoBlue



IMAGE: STARLINGER

PET bottle recycler EcoBlue is expanding in Thailand, says Starlinger, which is supplying technology for the project.

A Starlinger RecoStar PET 215 iV+ bottle-to-bottle recycling system is being installed at EcoBlue's production site in Rayong Province, Thailand. The line has capacity to recycle 2,500 kg of bottles per hour, equal to about 20,000 tonnes of bottle-grade rPET per year.

EcoBlue produces rPET, rHDPE and rPP made from post-consumer and industrial waste. The company has FDA approval for its 3D Pure rPET to be used in food-contact applications.

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Collect all flexible packaging waste in Europe, says Ceflex

Ceflex, the large-scale European consortium for flexible plastics packaging recycling, has issued a new position statement regarding collection of waste.

This position statement is part of an ongoing alignment on key issues among the Ceflex stakeholders. More than 300 stakeholders took part in a process from September 2020 to February 2021 involving two webinars, interviews and two-day workshop, to agree the statement.

There are four main elements in the Ceflex position statement regarding collection in European countries:

- All flexible packaging must be targeted for collection and sorting, including on-the-go packaging; especially in those few countries where



it is not yet collected, like the UK

- Flexible plastic packaging should be collected as a separate stream or with other light packaging and not mixed with paper, board or glass, to maximise recycling quality

- Additional sorting of flexible packaging from mixed waste is likely

necessary to access all flexible packaging materials and enable circularity

- Ceflex and its stakeholders aim to work with the national authorities and Extended Producer Responsibility schemes to develop effective collection systems that allow for these materials to be sorted and sent for recycling.

The ongoing work of Ceflex includes a study of economic and environmental collection costs in selected countries, in collaboration with Suez and the MARECIE Mapping Recyclability in Europe work, and a study of recycling infrastructure and EPR schemes, in collaboration with Flexible Packaging Europe and Recyda.

➤ <https://cefex.eu>

SK Global invests in Loop

SK Global Chemical (SKGC), a subsidiary of South Korea's SK Group, has taken a 10% stake in Canadian PET depolymerisation technology company Loop Industries. The two companies have also signed an MoU to form a 51-49 joint venture to build four facilities throughout Asia.

SKGC's investment amounts to a total of \$56.5m. The first tranche will be used to help fund construction of Loop's Infinite Loop manufacturing facility Bécancour in Québec.

➤ www.skglobalchemical.com
➤ www.loopindustries.com

Coperion supplies lab line for chemical recycling

Coperion has supplied a ZSK 18 Megalab twin-screw extruder to Ghent University, in Belgium, for research into chemical recycling of mixed plastic waste.

The machine, which offers a throughput of up to 10 kg/h, is equipped with a Coperion K-Tron feeder and

vacuum unit. According to Coperion, its twin screw extruder technology is particularly well suited for chemical recycling of plastics and can typically produce a homogenous and devolatilised melt with a temperature of up to 350°C within 30s.

In the Ghent R&D programme, the prepared polymer is delivered to a reactor, where it is further heated to 500°C. This results in pyrolysis leading to a broad mixture of liquid and gaseous phase hydrocarbons.

➤ www.coperion.com

Rewind Mix removes impurities

Repsol and its partners Axens and IFPEN have developed a new process for chemical recycling of plastics waste that is claimed to remove challenging impurities.

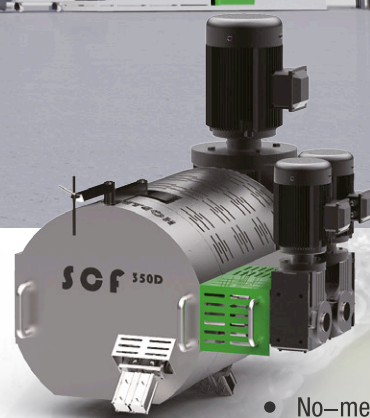
Developed at the Repsol Technology Lab and IFPEN

facilities using Axens' industrial technologies and catalysts, the Rewind Mix process is said to remove impurities such as silicon, chlorine, diolefins and metals from the mixed plastic waste to produce pyrolysis oils that can be fed

direct and undiluted into petrochemical units.

The partners now intend to trial the process, which will be licensed by Axens, on an industrial scale in a Repsol facility.

➤ www.repsol.com
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* Please note places are limited and Starlinger reserves the right to deny participation in the open house.

Indorama plans new PET recycling plant in Indonesia

Indorama Ventures is continuing its global expansion in PET recycling with a new project to build a facility in Indonesia. The facility will be located in Karawang, West Java and will have the capacity to recycle 1.92bn PET bottles per year from across Indonesia.

The recycling facility, which is planned to start up in 2023, will produce washed and shredded rPET flake from post-consumer waste streams which can then be reprocessed for food-contact applications.

Indorama Ventures has six Indonesian sites in four regions: Purwakarta, Cilegon, Tangerang and Karawang. The Thailand-headquartered group announced in 2019 that it aims to recycle a minimum of 750,000 tonnes



IMAGE: INDORAMA

Above: Indorama Ventures will produce rPET flakes at the plant in Karawang

per year of PET globally by 2025, investing up to \$1.5bn to achieve this aim.

Indorama said the new plant in Karawang, along with its other recycling facilities in Southeast Asia, will work with existing PET flake production facilities in Indonesia.

Indonesia says it is aiming reduce plastic debris entering oceans by 70% by the end of 2025, compared with 2017 levels. Indorama said its new PET recycling facility supports the government's National Plan of Action on Marine Plastic Debris.

➤ www.indoramaventures.com

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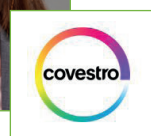
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Enhancing performance to meet recycle quality goals and the need for integrated wastewater treatment are the focus of suppliers of materials and systems for washing, writes Mark Holmes

IMAGE: SHUTTERSTOCK

Improved washing in the recycling operation

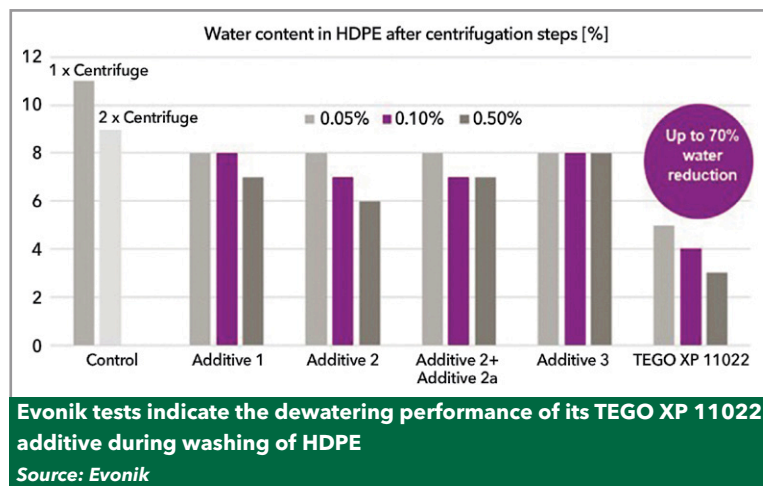
Developments in washing and drying technologies are important for raising the quality of recycled plastics and as a result closing the loop and producing recyclates that can offer similar properties to virgin materials. New additives are being introduced that can improve the washing process and shorten drying times, as well as enhance the performance in de-inking, de-labelling and de-metallising. Improvements in these operations are also at the forefront of the developers of complete washing and drying systems. In addition, these manufacturers are addressing the increasing demand for efficient wastewater treatment to be integrated into washing lines.

Additives can play an important role in washing and drying technologies for plastics recycling, reports **Evonik**. "There is currently high demand for additives in plastics recycling and the market itself is very dynamic," says Ido Offenbach, Americas Segment Manager. "We are observing high capacity of new recyclers all over the world, especially in Europe. As a result, the quantity of the

recycled plastic is consistently increasing. Therefore, it is not surprising there is a need for additives to optimise the washing step and decrease the drying time. To achieve these targets, Evonik has developed additives for the washing and floating steps that can enhance de-labelling, de-inking and de-metallising, as well as reduce the water content in the recycled material which results in lower energy consumption in re-compounding."

Offenbach adds that the washing process is far from perfect and, therefore, optimisation is needed. Currently, most developments are typically focused on improving the efficiency of the cleaning process. Evonik is primarily developing solutions to improve efficiency and minimise upstream problems. For example, re-agglomerated inks can be partly removed with a melt filter/sieve in the production of rLDPE film. However, this slows down production. Furthermore, malodour issues will appear from the thermal degradation of the printing ink resin materials. Evonik has developed a biodegradable de-watering additive that reduces water uptake

Main image:
Efficient washing is a vital step in producing higher quality flakes



during the washing step by up to around 70%, which results in a reduction of the energy consumption during the drying process. This can eliminate the need for centrifuges, the company says.

Evonik says that its focus is the optimisation of the mechanical recycling process, particularly the wet stage and during the process, and in plastics upcycling steps. "For the wet stage, we offer high efficiency additives that optimise the float-sink process with good de-foaming, wetting, de-inking, and de-labelling performance," says Offenbach. "Among these additives we also offer ones that have food contact approval status, which can not only be used in PCR [post-consumer] and PIW [post-industrial] streams but also in the PET bottle-to-bottle process. Tego Antifoam 4-94 is an example of an additive that is suitable for PCR, PIW and B2B processes. Another additive is Tego Surten W 111, which enhances the de-inking and de-metallising process by improving the efficiency resulting in shorter washing steps. We have also developed the de-watering aid Tego XP 11022, which is used before the drying process and reduces the water content, shortens the drying process and lowers energy consumption."

Offenbach adds that future developments will include more efficient additives for PCR users. For example, more efficient de-foaming and wetting

agents that are biodegradable. By doing that it is possible to reduce water contamination during the wet stage, he says. Tego XP 11022 de-watering aid is the first successful additive that provides performance in combination with biodegradability.

Sorema is observing growing global demand for its washing and recycling technologies with customers looking to use PCR materials from flexible and rigid packaging in production. "The aim of new developments is always to obtain better quality flake output, in order to reach a performance level as close as possible to that of virgin material," says Ottavio Previero in Sorema's Sales and Marketing Department. "We can then consider this *upcycling*, when the washed and dried material passes through the extrusion process, closing the recycling loop through the production of films, bottles or trays again. However, problems include the wide variability of incoming materials from country to country, city to city and indeed one bale to another. As a result, tailor-made solutions are often necessary."

Previero continues: "The main fields in which we operate are de-inking for PP pots and flexible PE film packaging, while we have also improved the de-labelling units for PET for high efficiency recycling. After significant development work in the laboratory, we have recently introduced the de-inking module into our systems. In addition, we are increasingly integrating wastewater treatment plants into our lines. This provides customers with good water quality for the cleaning of recycled plastics flakes, combined with a reduction in water consumption."

Sorema has recently supplied a film-to-film recycling plant for **PPHU ANNA Recykling** based at Celestynów, near Warsaw in Poland. The company was founded in 1995 and has always been active in the production of PE granules from industrial waste. However, in recent years growing demand for high quality post-consumer recycled materials prompted PPHU ANNA's management to search for a partner to work with and develop a post-consumer PE film recycling plant.

Right: Sorema has recently supplied a film-to-film recycling plant for PPHU ANNA Recykling in Poland



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Sorema adds that it was selected for this project in 2019 due to its specifically designed flexible washing line. This was able to guarantee compliance with the parameters required for the production of high-quality material coming from stretch and post-industrial films, as well as to ensure production from agricultural and post-consumer films, raffia and jumbo-bags.

The film-to-film recycling line incorporates the most advanced technical solutions of Sorema's modular plant system. These include a low speed and high torque hydraulic shredder, specifically designed by Sorema's holding company Previero, as well as a flexible pre-washing system with a high friction module and pre-washing centrifuge to process a wide range of contaminated materials. At the end of the line, there is fluff storage to feed an extruder with dehumidified material.

With the Sorema line, productivity at PPHU ANNA has reached an output of up to 1,000 kg/h of decontaminated and granulated material at a competitive quality/price ratio. The material obtained is then suitable for extrusion on blown films lines located both in Poland and abroad. Among these processors is Bogucki Folie, which produces B-ECO, an innovative PE film with a three-layer structure and based on 100% recycled material from post-consumer and post-industrial waste.

Holding company Previero has also formed a new wastewater treatment company, Teknodepurazioni Aquae. In October 2020, the company finalised the acquisition of the business branch of Teknodepurazioni srl, based in Rivarolo Canavese, near Turin in Italy. This allows Sorema to offer complete solutions for plastics recycling, providing customers with a turnkey system with integrated, efficient and reliable wastewater treatment.

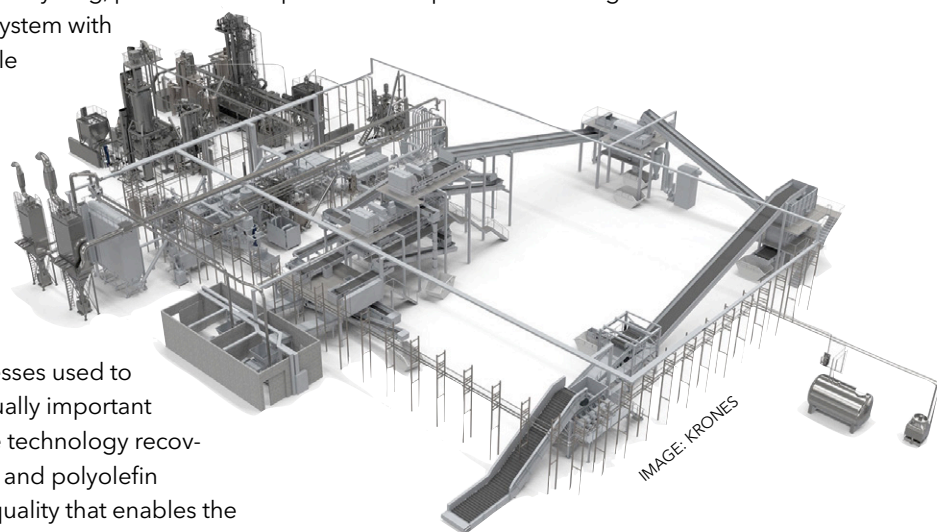
Krones is also introducing wastewater treatment in plastics recycling systems. The company says that recycling technology's sustainability must not be assessed by the quality of its end-product alone. The processes used to make this product play an equally important role. The company's MetaPure technology recovers materials from PET bottles and polyolefin packaging, for example, in a quality that enables the recyclate obtained to be used in equivalent applications. Through continuous system optimisation, Krones has examined the washing module's water consumption.

"In the recycling process, the plastics are ground

into flakes in wet mills and then washed," says Astrid Kadlubski, Product Manager. "This produces wastewater containing various dissolved substances, depending on the input material concerned." In addition to common soiling, these include organic residues of the packaging's contents, for example, or cleaning agents from the washing process and printing ink particles removed from bottles and labels.

"In many recycling lines, the water is recirculated and treated in a by-pass," adds Kadlubski. "With the result that the process water's dirt load keeps on rising and ultimately impairs the end-product's quality." To counter this, Krones has, in conjunction with an associate, developed an intelligent solution for complete treatment of the washing and mill water. This provides several advantages for the recycling line operation. "Firstly, this reduces both freshwater consumption and wastewater incidence," says Kadlubski. "Secondly, the recycling process is kept at a consistently high level of quality. And last but not least, such treatment makes sure that the wastewater discharged into the municipal system complies with the relevant specifications. Needless to say, this also applies for the ultra-stringent regulations in Germany."

Herbold Meckesheim has supplied a washing line for a UK film recycling company processing around 10,000 tonnes per annum. It is designed for 100% post-industrial stretch film. Herbold says that this is a demanding application for wash lines, because of the high surface area and low bulk density involved. The washing line includes a Herbold EWS 45/200 shredder, which is used as a pre-shredder prior to the wet granulator. The new



Above: Krones' MetaPure technology recovers materials like PET bottles and polyolefin packages - in a quality enabling the recyclate obtained to be used in equivalent applications

arrangement enhances accessibility to the knives and sieves, allowing user-friendly operation. A gearless belt-driven propulsion system in combination with a mechanical clutch, offers additional protection against damage caused by foreign bodies. The rotor can be equipped with variable knife configurations, with easy-to-change armour-plating as an option. In order to obtain high quality of the final product, a hydrocyclone is used instead of a conventional separation tank. This achieves higher separation levels and exerts more friction on the material, which produces purer flakes. These improved outcomes were confirmed prior to the purchase through tests carried out in the Herbold test centre.

Herbold has also installed a new hot washing system in its test centre to meet growing demand for high quality recycled plastics that offer similar properties to virgin materials. For several years,

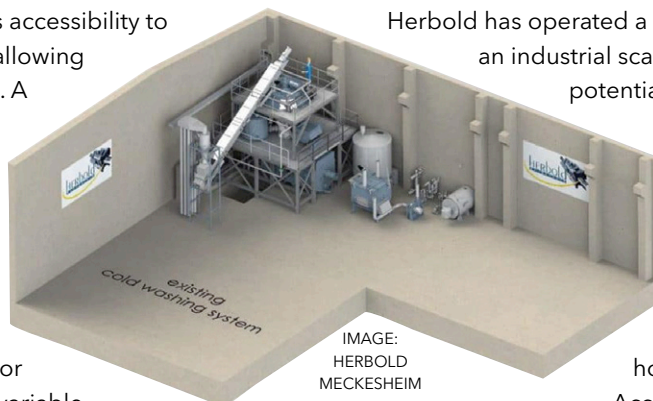


IMAGE:
HERBOLD
MECKESHEIM

Herbold has operated a washing test centre on an industrial scale in which customers, potential buyers, planners and researchers can test and simulate recycling processes beyond laboratory level. This plant is going to be expanded with a suitable hot washing step.

According to Achim Ebel, division manager for washing plants, the new hot washing system replaces the previous pilot plant that has been used for developing hot washing technology for polyolefins. The new system is more than a simple hot washing reactor and represents the latest technology that is also installed in large scale plants.

The plant allows customers to test the treatment of rigid plastics and films with an output of up to 1,000 kg/h in the hot washing system. It has been designed for continuous operation and operates in line with the existing hydrocyclone washing plant. The facility can verify whether and how an improve-

Left: Herbold Meckesheim has installed a new hot washing system in its test centre



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IMAGE: AST



Above: Lindner has been involved with AST to establish a new centre of competence with a complete plastics recycling line to process post-industrial and post-consumer HDPE

ment of the final product can be achieved.

In PET recycling, the hot washing system was traditionally used to remove adhesives with which labels were glued on bottles. The hot washing system is now also becoming a required process step in the recycling of polyolefins and other plastics – any materials where complicated residual material, heavy contamination and persistent odours are to be treated, or just simply where the highest quality level is demanded. With the hot washing system, a considerable reduction of organic contamination is achieved. Herbold Meckesheim adds that it has delivered a number of plants for hot washing of PET, polyolefins and other plastics in recent years and has developed significant expertise in this area. The new plant will now be available to offer this knowledge for other projects.

Lindner Washtech has supplied a shredding and washing line for a major agricultural cooperative in Argentina. The Argentinian economy depends heavily on agriculture – through the rearing of cattle to growing soya, grain and other crops. The industry covers an area of 157m hectares. It also generates around 70,000 tonnes of plastic waste every year, mainly heavily soiled agricultural films, bags and containers.

The Asociación de Cooperativas Argentinas (ACA) in Cañada de Gómez, 70 km west of Rosario, Argentina's third largest city, has taken on the task of recovering this LDPE agricultural film contaminated with soil and organic components. ACA is an agricultural cooperative and also one of the largest farms in the country. The LDPE film waste originates in the company's own facilities and equates to 10% of the plastic waste produced by the agricultural sector in Argentina per year. In a four-stage process, the contaminated, 180-250 µm thick films are recycled using Lindner shredding and washing equipment. The contamination of the material

makes primary shredding a major challenge in the recovery process. For this reason, a Lindner Micromat 2000 shreds the plastics to the optimum particle size of around 60 mm as required for the rest of the process. The shredder ensures continuous throughput with knives that have a long service life. Then, in the pre-washing stage, the flakes are freed from coarse foreign matter and cleaned as well as dried with friction washers. The clean flakes are extruded into pellets, which are yet again used for the production of agricultural film.

Lindner has also been involved with **AST**, the manufacturer of plastic containers, drums and bottles, to establish a new centre of competence with a complete plastics recycling line to process post-industrial and post-consumer HDPE. AST has set a long-term target to increase the amount of recyclates used in its products.

AST produces high-quality packaging with approval for dangerous goods at a facility in Erndtebrück, Germany. Currently, the company is a European market leader when it comes to plastic containers for chemical products or food, and it says it is working hard to increase the sustainability of its products by using recyclables.

The new centre of competence is designed to meet legal requirements in terms of product safety, as well as the principles of the circular economy and EU strategies for avoiding plastic waste. The aim of the new project is to gather experience, pave the way for future strategies and introduce the use of recyclates in the series production of technically demanding HDPE containers and drums. Ultimately, the company wants to produce a sustainable flow of raw materials. The new centre of competence is a pilot project that aims to harness the experience and expertise at the AST locations in southern Germany, Belgium, the Netherlands and the UK.

AST has chosen Lindner as its technology and development partner. The washing and sorting components come from Lindner Washtech, which is also responsible, together with AST, for the facility's entire engineering. The shredders of the parent company Lindner Recyclingtech complete the system solution.

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Specialist recyclers of plastics from waste electronic and electrical equipment are investing in new technology, while R&D projects are tackling the problem of legacy additives, reports David Eldridge



IMAGE: AO

Uphill progress in WEEE plastics sector

Plastics recycling from waste electronic and electrical equipment (WEEE) is a sector that faces some specific challenges. WEEE collection and recycling rates are low relative to other sectors, partly because of issues with producer responsibility schemes. Recycling of electronic waste is technically complicated due to the mixture of metals and variety of polymers (such as ABS, PC, PC-ABS, PA, PMMA) contained in products. Then there is the issue of legacy additives to deal with in some WEEE plastics. Many companies and organisations, though, are continuing to make a great effort to make circular systems work through investments in recycling facilities, collaborative R&D projects and the creation of products using recycled WEEE plastics.

Germany provides a good illustration of the difficulty in making substantial progress in WEEE recycling. The country's Electrical and Electronic

Equipment Act has had mixed success. **BVSE**, the German recyclers' association, said in June: "Germany is still a long way from achieving the prescribed minimum collection rate for waste electrical and electronic equipment of 65%."

The minimum 65% rate has been in effect since January 2019 (based on the average weight of the electrical and electronic devices newly placed on the market in the three previous years). However, BVSE says the amount of WEEE collected has levelled off at an average of around 853,000 tonnes per year, equivalent to a rate of about 45%.

The Act established a responsibility framework for WEEE sector players – manufacturers, retailers, municipal authorities, certified recyclers and others – but the underperformance of the system has led the German government to propose amendments to the Act. The amendments, which are intended to come into force on 1 January 2022, would extend

Main image:
Fridge recycling is contributing to availability of recycled WEEE polymers

IMAGE: CEP



Above: The Circular Electronics Partnership has devised a roadmap with ambitious goals

the take-back concept to commercial products, along with other measures. BVSE says that it has asked that recycling companies that are certified as initial treatment systems should also help with the collection of old devices from private households. The organisation said that in addition to increasing collection rates, the collection system needs to be improved so that the devices arrive undamaged at recycling facilities.

The **WEEE Forum** says very few EU member countries are able to meet collection goals and it called on the EU in September to overhaul its WEEE policy approach. The organisation, which represents Producer Responsibility Organisations (PROs), says it has developed "a new vision" to replace the current system of Extended Producer Responsibility (EPR) which it claims is "not fit for purpose".

In its four-step plan, the WEEE Forum recommends an "All Actors Approach" policy model whereby all private and public entities that have access to WEEE have legal obligations which competent authorities must enforce. "This approach will result in more fairness and inclusivity in the market as well as enhanced monitoring based on sustained co-operation," it says.

Another step is that PROs are required only to collect the WEEE to which they have access via collection facilities and take-back schemes, and should not be responsible for that which is out of their reach, for example treated as metal scrap. In order to improve collections rates, WEEE Forum suggests measures that authorities should implement including setting up a co-ordination body, improving the collection network and the better monitoring of WEEE flows. Its final step is a revision of the calculation method for setting the targets for the quantity of WEEE to be collected in each member state, based either on the amount of equipment placed on the market or on the amount of WEEE generated previously.

Global electronics manufacturers have come

together in the **Circular Electronics Partnership** (CEP) whose aim is to drive a transition to a sustainable and economically viable circular electronics industry. Its Vision document says this will be achieved by leveraging: circular design principles; material, product or component loops; data-driven systems; responsible business models; and advanced partnerships. It has devised a roadmap to show how its goals could be reached by 2030.

The roadmap contains pathways with ambitious aims to increase WEEE collection rates, scale secondary materials markets, create reverse supply chains, and other goals. "By 2030, a global system for takeback will maximise responsible repurposing of purchased electrical and electronic equipment," says CEP. "Transboundary EPR schemes and the convergence of different schemes will have contributed to breaking down silos. Take-back will be valued by producers and trusted by all consumers to deliver environmental, social and economic benefits."

It continues: "By 2030, the electronics recycling industry will take full advantage of materials through high-quality processing, full traceability and replacement of virgin materials, ensuring adequate socioeconomic conditions of all participants in the value chain."

The improvements needed in the WEEE recycling sector may be sizeable, but established WEEE recyclers are not daunted and continue to invest in new and expanded facilities. **Remondis** is building a new facility at its Lippe plant in Lünen, Germany that is dedicated to dismantling fridges and freezers. The existing dismantling centre in Lünen began operations in 2006, and Remondis reports in its company magazine the centre's technology "is no longer up-to-date and is being stretched to its limits". The facility is expected to be commissioned during the third quarter of 2021.

A WEEE plastics processing plant was built next to the existing dismantling centre in Lünen in 2019 to reduce transportation and enable Remondis to make the most of the plastic recovered from cooling appliances. The company says: "With a capacity of ca. 20,000 tonnes a year, the new fridge/freezer recycling plant in Lünen will be the most modern of its kind in Europe and will achieve excellent recovery and recycling rates."

The new dismantling facility will feature a special matrix to degas the appliances using mixing units. This technology has already been installed at Remondis' dismantling centre in Troyes, France, helping achieve high volumes of recovered materials.

Coolrec has made investments in separation

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technology at its plants in Belgium and Netherlands to improve separation of metals, ABS and PS. In June, it held a small ceremony at its Waalwijk site, Netherlands, following a €0.5m investment in an electrostatic separator. This will process about 6,000 tpa of mixed discarded electrical appliances which will be converted into ABS and HIPS plastic flakes with a purity of at least 98%.

"With this new investment Coolrec positions itself as one of the most sustainable WEEE recyclers in Europe," says Dieter Avonds, Managing Director of Coolrec. "We continue to improve our secondary raw materials production process and make material that can scarcely be distinguished from new. Our ability to produce secondary raw materials with a purity of 98% shows the plastics industry that the conditions are there for making plastic products still more circular."

Coolrec, a subsidiary of Renewi, says it constructed the machine in two phases. The first consists of a large impurity separator to remove mixed waste streams such as paper, wood fibres or pieces of rubber from the plastic streams to be purified. The second process sorts plastic by type on the basis of the electromagnetic load, to enable production of 98% purity ABS and HIPS flakes. The company says this "makes the secondary granules almost as good as primary raw materials, and puts Coolrec in a position to improve the sorting, processing and creation of high-value recycled materials still further".

US WEEE recycler **Universal Recycling Technologies** (URT) has also invested in a new plastics separation system at its headquarters in Janesville, Wisconsin. The system has the capacity to process



IMAGE: COOLREC

6,000 lbs of WEEE plastics per hour, while recovering 100% of all metal contaminants from the plastic stream. It is designed to separate targeted plastics in multiple sink-float tanks by processing the material in a fluid of intermediate density. The plastics recovered in the process include PS, ABS, PP and PE.

URT says it began researching and investigating the potential of adding a plastics separation system to its metal recycling business three years ago. In 2019, URT built a prototype system that tested the design process and product valuation. "We saw an opportunity in the market and wanted to provide a stable and domestic e-waste plastic solution for our customers," says Jim Cornwell, URT's President.

The company says recovery of plastics has become important for WEEE recyclers due to changes in plastic export requirements following amendments to the Basel Treaty. Jeff Gloyd, URT's Vice President of Sales, says the system "allows URT to own our destiny related to plastics recycling. This

Above: Coolrec has made investments in separation technology at its plants in Belgium and Netherlands

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Above: Alba established collections points and developed the Step Up app for post-consumer electronic waste in Singapore

helps us stabilise value, which, in turn, helps us better service our diverse base of customers.”

Alba Group reports it won a global tender from Singapore’s National Environment Agency for the construction and operation of a new collection system for electronic waste. A new law has established the principle of producer responsibility for waste collection and recycling for the first time in Singapore. The electronic waste programme is funded by an EPR scheme. Alba is setting up a collection system consisting of bins, temporary collection points on weekends, a return system from retailers and a chargeable collection service throughout the city of Singapore.

In order for WEEE plastics to meet their full potential and be used to make high-value end products, solutions must be found for the problem of legacy additives remaining in the materials from their first use. EU collaborative R&D projects tackling the problem include the **Nontox** project, which is being run by research groups including VTT, Aimplas and Fraunhofer IVV, plus WEEE recyclers Coolrec, Stena Recycling, Galea Polymers and Treee.

Aimplas says Nontox is focused on the recovery of plastics from WEEE, end-of-life vehicles and construction and demolition waste which contain additives such as brominated flame retardants (BFRs), stabilisers and filling materials. It says two different technologies are being used – Extruclean and CreaSolv – to eliminate these hazardous substances from waste plastics such as ABS, EPS, PS, HIPS, PE and PP.

The Nontox project was presented at a webinar in July jointly organised with other EU projects focused on plastics recycling in electronics and other sectors. It is estimated the Nontox process could recycle 2.18m tpa of suitable materials in Europe, increase recycling capacity by 74% and avoid 2.1m tpa of GHG emissions.

The project is investigating sorting of materials using Active Hyperspectral (AHS) sensing technology which identifies plastics containing BFRs. CreaSolv is a solvent-based process that extracts additives and contaminants, while Extruclean is a mechanical recycling process based on extrusion with simultaneous additive extraction using supercritical fluid CO₂.

“The challenge in the Nontox project is how we can use these technologies to basically serve the purpose of removing the hazardous substances,” said project co-ordinator Muhammad Saad Qureshi, Senior Scientist at VTT-Technical Research Centre, at the webinar. “I believe the technologies are quite ready for commercialisation in a few years.”

He answered a question about the AHS technology: “At half-way through the project we have been able to achieve efficiency up to 80% in classifying BFR plastics. And we are still progressing with the technology and making it even better.”

The **Plast2bCleaned** collaborative project is also aiming to separate BFRs plus antimony trioxide fire retardant additives from WEEE plastics. Presenting the project at the webinar was its co-ordinator Esther Zondervan-van den Beuken, Senior Consultant Plastics at **TNO**, who said: “The project is already doing quite well. In bromine reduction, we have almost reached the target [reduction to 0.4%], and for antimony the target has been reached.”

The process being developed in the Plast2b-

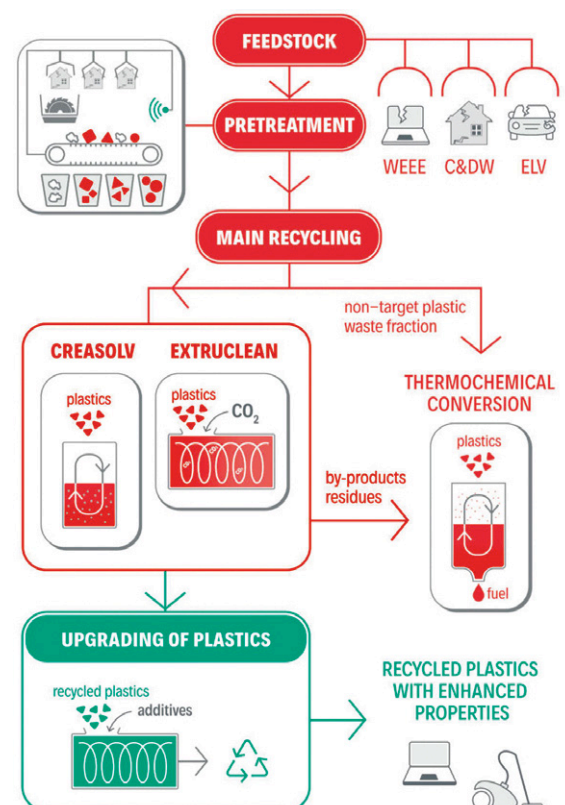


IMAGE: NONTOX

Right: In the Nontox project, Extruclean and CreaSolv technologies are being used to eliminate hazardous substances from waste plastics

Cleaned project involves mechanical pre-sorting of the WEEE plastics followed by separation of three streams – polymer, bromine and antimony trioxide – in a dissolution plant. The project, which is two years into its four-year duration, has so far established the sorting technology at small-scale and created a data library for the Raman spectroscopy being used. It has also established the dissolution process at lab-scale at TNO which is preparation for a scaled-up demonstration at Fraunhofer ICT using 1 kg samples.

Partners in the Plast2bCleaned project also include Elix Polymers, Electrolux, Gaiker and Coolrec. The latter two companies are partnering with Fraunhofer ICT, Erema, Otto Schouter and others in the **Creator** project which was also presented at the webinar. The process being developed in the Creator project uses dissolution for separation of BFRs from WEEE plastics, while Laser Induced Breakdown Spectroscopy (LIBS) is used for identifying BFRs.

In addition to improving collection rates and removing legacy additives, applications for recycled WEEE plastics also need to be developed in order for the sector to achieve circular sustainability. A lot of activity is focusing on this need, as shown in recent developments by consumer electronics brands, manufacturers and WEEE recycling companies.

As part of its Circular Initiative 2021 programme, white goods manufacturer **Electrolux** unveiled the 2-Infinity prototype vacuum cleaner in July which it developed with its partner **Stena Recycling** in Sweden. The 2-Infinity is 90% recyclable, as compared with up to 75% for current products in the market. The next stage of the project involves manufacturing a pre-series of up to 300 appliances to be evaluated for production.

This is the second prototype developed by the partners: the first prototype, made from 100% recycled materials and reused components, was



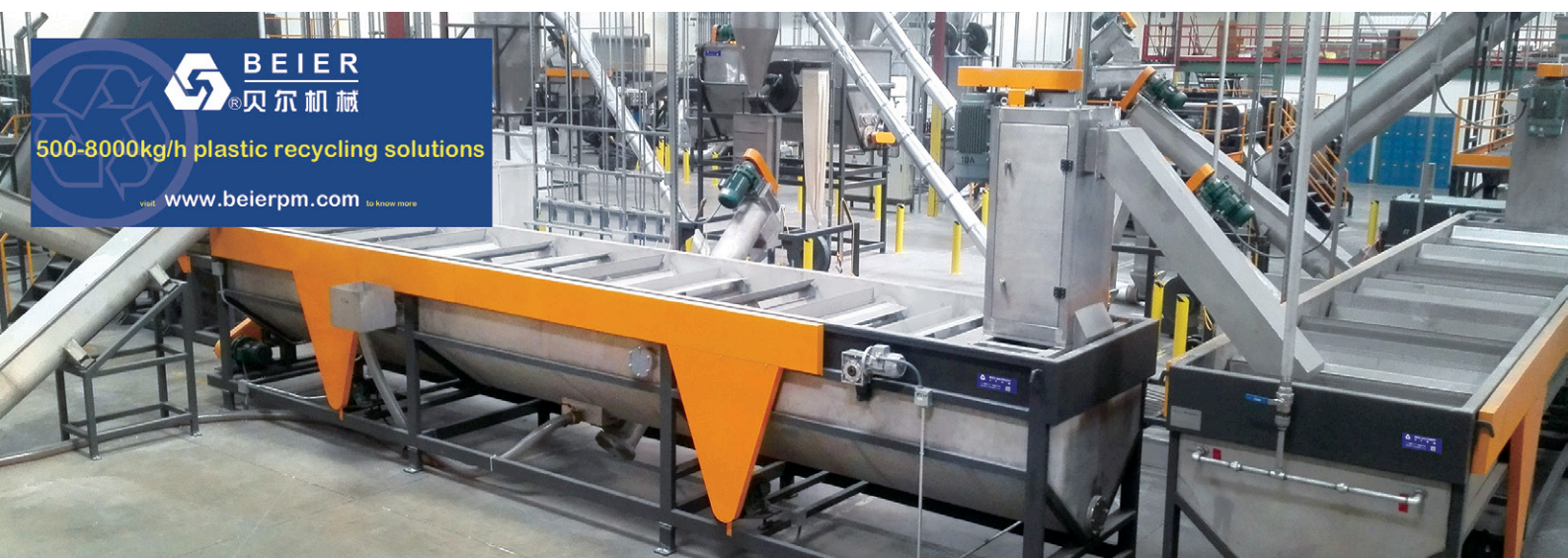
IMAGE: ELECTROLUX

shown in October 2020. Stena said at the time: “The goal is to learn more about how to make the market for recycled plastics function as well as for virgin materials. The first concrete result is a visionary vacuum cleaner made of 100% recycled plastic and reused components from electronic consumer products. The prototype is developed to explore circularity in household appliances.”

The material in the first prototype originated from used consumer products such as hair dryers, vacuum cleaners and computers. The focus on consumer products has enabled the project to study the lifespan of the recycled products and components to gain insights about consumer recycling behaviour and attitudes.

Henrik Sundström, Head of Sustainability at Electrolux, says: “This project has highlighted many of the considerations we take into account as we seek to become more circular. From product design and material use to new business models, there are regulatory requirements as well as quality and safety questions that need to be addressed. We have to strike a good balance in increasing the amount of reused and recycled materials when making products that are optimised for further recycling at the end of life.”

Above: The 2-Infinity prototype vacuum cleaner was developed by Electrolux with its partner Stena Recycling



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Right: The Eco-SIM Card developed by Thales in partnership with Veolia

Electrolux has a target that by 2030 all its product ranges will contain at least 50% recycled materials. The prototype vacuum cleaners will provide important knowledge for future innovation, it says.

Used fridges are the source of materials for two new WEEE plastics applications. **Thales**, the French multinational aerospace electronics group, joined forces with waste management and recycling group **Veolia** to create the first eco-designed SIM card made from recycled plastics. They say the use of recycled materials in the Eco-SIM Card will eliminate the need for about 5,000 tonnes of virgin plastics per year. Thales engineers worked with Veolia's experts to develop a special process that uses this recycled material to manufacture SIM cards that meet the mobile industry's requirements (details of this process have not been revealed).

In the UK, online electricals retailer **AO** says that plastics extracted from old fridges will be used to create new ventilation products for the first time. AO Recycling operates take-back and recycling facilities for WEEE materials. The company will produce recycled high impact PS from approximately 63,000 fridges each year, collected at its recycling facility in Telford. The HIPS will be used to manufacture ducting components in energy saving systems produced by UK-based manufacturer of domestic ventilation fans, Volution Group. The ventilation systems are installed to recover heat from extracted air and use it to reduce heat loss and save energy in the properties in the most economical and eco-friendly way.

Rob Sant, MD of AO Recycling, says: "We're so pleased that Volution will be using the plastic from our fridges to create fantastic eco products. As a retailer, AO wants to take responsibility for the entire recycling process, from start to finish, and we're proud to be producing high quality plastic that can be easily used in new products. The circular economy is really at the forefront of our

Below: White goods recycling at AO Recycling in the UK



IMAGE: THALES

business ambitions and our investment in plastic is key to fulfilling our long-term goals."

AO has also opened a new "rework" facility in Crewe, where appliances returned by customers will be thoroughly tested with the aim of reselling them. The facility handles approximately 900 appliances a week, including washing machines, fridges and TVs.

Styrenic materials producer **Elix Polymers** has grouped all of its circular economy activities under the new brand name, E-Loop, including ABS and PC-ABS with mechanically and chemically recycled content. The first products made commercially available are E-Loop H801 MR black and M220 CR25, which Elix says have been validated by customers in the automotive and toy industries.

E-Loop H801 MR is a material that contains mechanically recycled material, and E-LOOP M220 CR25 is made with sustainable feedstocks certified under ISCC Plus by International Sustainability & Carbon Certification.

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IMAGE: AO

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Detective work: finding colour solutions for recycling

Materials groups are adapting colour products to help the plastics recycling sector deal with issues around sustainable masterbatches, detection in sorting and the grey tone of recycle, writes Peter Mapleston

As demand for plastic products based on recyclates rises, so do requests for sustainable plastic colourant systems. Companies producing pigments and colour masterbatches are responding to the call. Additive suppliers are also using new colours to assist with post-consumer recycle (PCR) sorting systems. And there is a growing movement to persuade brands and consumers to accept the colour imperfections in PCR, rather than cover them up.

Finke, a leading producer of plastics colourants, has developed the Fibarec masterbatch series. All masterbatches in the new range are based on either PCR or post-industrial recycle, PIR. "This enables the production of attractive colourful plastic products made from 100 % recycle," says the company. Grades available so far are based on rPET. Fibarec grades with rPE and rPP carriers will follow shortly. Fibarec masterbatches can be processed just like masterbatches based on virgin materials and can be used in products based on recycle or virgin polymers.

"The challenge of colouring post-consumer plastics recycle lies in the inherent greyish colouring of most PCR materials, which needs to be taken into account in the matching and adjusting of the colourant," says Finke. It says its customers can rely on the experienced colourists, who develop more than 8,000 new colour shades in accordance with customer specification each year.

Plastics manufacturers can choose from three service concepts for the colour matching process for their individual ready-to-use Finke colourant: colour matching and sampling according to specification, custom colour matching at Finke's laboratory, or on-site colourist service.

In March, **Avient** announced the launch of Rejoin PCR Masterbatch for polyolefin packaging applications. Made with polyolefin PCR as a carrier resin, Rejoin PCR Masterbatch can enable a bottle or part to be manufactured from 100% PCR.

Avient says that until now, with masterbatch generally being made using virgin material as a carrier resin, at typical let-down ratios the finished product would contain 3 to 5% non-recycled plastic. "We understand that many consider the use of colourants and additives that rely on virgin resin carriers to nullify the claim of 100% PCR, so we worked to develop a solution that could help our customers deliver fully on their sustainability commitments," says Bob Lee, Marketing Director, Color & Additives Asia. "This leading-edge product answers a growing industry need and demand."

Rejoin PCR Masterbatch combines pigments and functional additives into a single solution without negatively affecting colour or mechanical properties. It can be added during production using standard equipment with little to no impact



Main image:
How are suppliers solving the puzzles of colours in plastics recycling?



Above: With its Fibarec masterbatch series, Finke has developed a new masterbatch line to satisfy the growing demand for sustainable plastic colourant systems

on processing and allows for full recyclability of the end product.

With its PCR masterbatch, **Gabriel-Chemie** says it “enables its customers to recreate new functional and above all colourful plastic items from consumer plastic waste.” It offers masterbatch with carriers in rPET, rPE and rPP, which are suitable for injection moulding and films with higher thickness. Depending on customer demands, lighter and effect colours as well as laser additives can be incorporated.

When it comes to sorting mixed PCR streams, the issue of how to deal with black materials continues to raise its head. Many automated sorting systems use NIR (Near Infrared) detection to separate different polymers. But if coloured plastic parts contain carbon black, the NIR rays are absorbed and therefore cannot be properly detected or distinguished from one another.

At least one carbon black company says the issue is not as thorny as some may say, and that sorting technologies can be made capable of “seeing” carbon black in plastics. But there are also numerous colour companies coming up with alternatives. Not exactly black, but very close to it.

Al-Farben has developed R-Black, which it says offers “the best compromise between colour tonality, opacity, polymer compatibility, non-toxicity, and perfect NIR detection due to a specific adjustment of its reflectivity. The key is to not absorb in the near-infrared wavelength and allow sorting systems, which are based on reflective or transmitting sensors, to properly identify different polymers. With our latest solution R-Black, black plastic becomes sustainable as it allows it to enter in the recycling cycle.”

The performance of R-Black has been tested at the main recycling manufacturer facilities in Europe using NIR spectroscopic techniques, says Al-Farben. The recognition rate obtained shows that R-Black allows the black material to be readily sorted at the highest demanding rate into polymer

streams, whereas carbon black coloured items could not be sorted.

Besides the spectral properties in the visible and NIR, the packing application involves regulatory issues regarding food contact requirements, the company notes. R-Black has food packaging approvals based on its stability and non-migratory nature. Most recently R-Black received FDA approval in the US, adding to approvals which include German and French Regulations, AP (89)1 (Council of Europe Resolution on use of colourants in plastics).

Holland Colours says that it has been positioning itself as a co-designer of colour and functional solutions with a focus on sustainability, goals that are reflected in some of its newest plastic additives. SORT is its answer to the problem of how to filter out and recycle black plastics. The black pigment can be read by NIR sorting machines. “It eliminates recycling headaches, while offering the same beauty and depth of colour,” says the company.

At Gabriel-Chemie, Corporate Brand Manager Diego Karpeles says that “in an aim to increase the NIR detection rate and recycling sorting rate of black packaging products, our group has got one more product certified by the French entity COTREP; our customer and global brands can rely on a further Gabriel-Chemie black shaded, NIR-detectable and also officially certified product.” (COTREP is the Comité Technique pour le Recy-



Every PCR recyclate has its own colour. When colouring, the starting material has a strong influence on the final colour. Using the examples of caps and closures, Gabriel-Chemie illustrates how the base material affects the final colour of the product when using virgin material compared to PCR material as the carrier. Polypropylene caps with different levels of PCR: the left-most cap in each row is 100% virgin polymer, the last one is 100% PCR, and caps in between contain 50% of each (rows with three caps) or 75/25 and then 50/50

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Right: Gabriel-Chemie has received COTREP certification for black masterbatches that are NIR-detectable

clage des Emballages Plastiques - Technical Committee for the Recycling of Plastic Packaging).

Kafrit's CC 90778 LL

Black masterbatch is another non NIR-absorbing alternative, developed and optimised to enable sorting and recycling of black plastic products. The producer says it has high tinting strength and opacity, NIR-reflectivity at any concentration, and is extremely heat resistant, making it suitable for use with all plastics, even after multiple processing steps.

Kafrit launched its NIR-detectable black pigment in 2019, and it now has FDA food contact approval in the USA as well as in Europe and Japan.

Feddersen Group company **AF-Color** says it can now offer carbon-black-free versions of almost all its colour masterbatches. It says that during product development, the main focus was on achieving the greatest possible colour depth in the black range and enhancing competitiveness. However, carbon black is not only an issue in blackening. Many masterbatches contain carbon black in certain colorations and therefore fall through the sorting grid. "In view of the resulting requirements, we have already reformulated and successfully recreated some products from our portfolio both in preparation and at the request of our customers," says AF-Color.

Gabriel-Chemie's newest product line is TagTec - short for Taggant Technology. The company says the product series will facilitate the identification and sorting of colours more easily in future. Additional to the colour recycling application, it lifts the application possibilities of product authentication to the next level focusing on safety, traceability and automation of product processes. In addition to predefined options, Gabriel-Chemie offers its customers tailor-made solutions.



IMAGE: GABRIEL-CHEMIE

The ground-breaking technology works with small particles, which are incorporated into plastic parts and detected by either Star or Tau sensors from Gabriel-Chemie's co-operation partner Sensor Instruments.

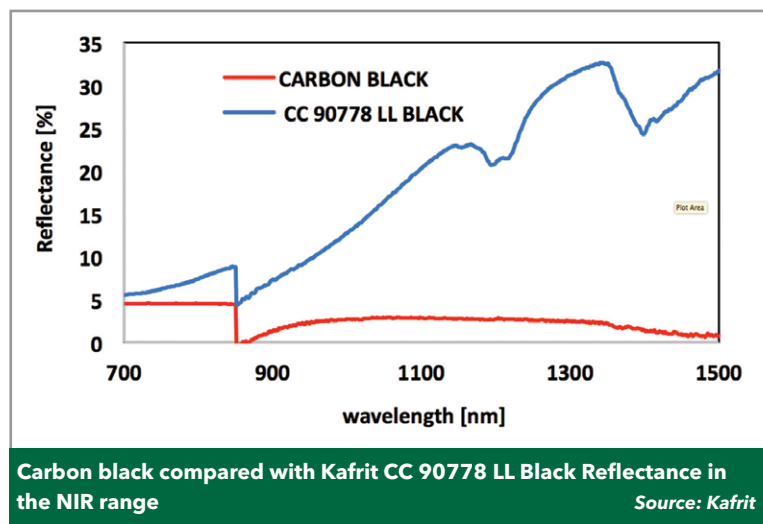
"In other words, plastic parts receive an individual DNA - an identity signature like a fingerprint, which enables the documentation of an entire product," says the company. "Therefore, all stages of a product life cycle - from manufacturing, quality management, supply chain or circular economy of raw materials - are traceable."

Holland Colours too has a solution for food brands and PET bottle converters who are looking for a better way to prevent counterfeiting and also ensure product safety through laser marking. MarkIT is a library of encapsulated colour pigments that support melt-free and burn-free laser marking, in many cases without using laser-marking additives. The technology works with both PET and rPET and can also be used on PVC products for the building and construction industry.

As more PET bottles get recycled, it is inevitable that the material will have an increasing number of useful lives. Even with solid stating during mechanical recycling, there is a risk of property degradation, including discolouration. Tests carried out by Avient, whose portfolio includes various additives for PET, show that after five melt histories, equivalent to material being recycled twice, discoloration can be notable.

Today, with 30% rPET already used in numerous bottles, 9% of material has already seen two or more loops. In the future, with 50% rPET in a bottle, 25% of material will have been through two or more loops. This means that recycle performance will have a greater impact on bottle quality, there will be increased yellowing (measured as b^*), and there will be more colour variability, unless corrective action is taken.

Andrea Smith is Global Product Manager for PET resin functional additives at Avient. She says the company is involved in a new project involving what is likely be a liquid additive that is applied to PCR flake prior to extrusion into rPET pellets. "We are currently evaluating different types of chemistries





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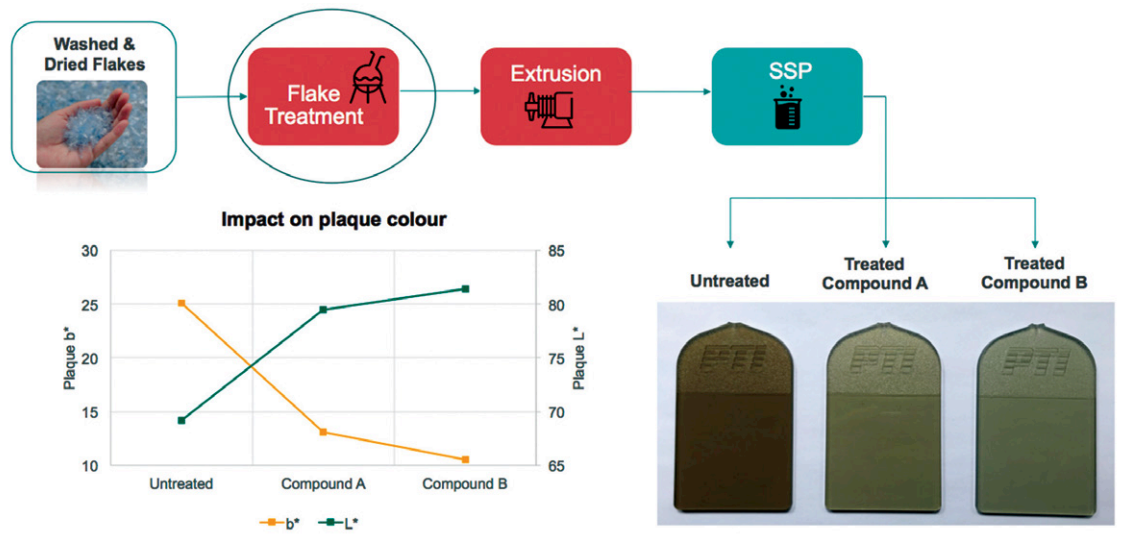


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Developmental rPET flake treatments from Avient may significantly reduce yellowing (b*) and discoloration (L*)

Source: Avient



for this product," she says. Tests have shown how flake treatments can have a significant effect on cutting colouration in rPET. "There is a huge impact on stabilising colour formation," says Smith. Treatment of compounds can reduce b* values by 15 units (10 vs 25) - b* indicates the level of yellowing. L*, which is a measure of darkness on a scale from 0 (black) to 100 (white), rises from 69 to around 82.

Holland Colours offers TintMask for this technology space. The additive also counteracts the colour deviation associated with recycled PET and turns even lower grade rPET into a viable choice for brands. It is offered in two formats, a liquid and a solid microbead, ensuring it can be applied in any production environment.

With PCR tending to come out of the extruder looking grey, recycling companies, processors and users have two alternatives: they can disguise the grey by adding pigment, or they can embrace it and make grey a positive rather than a negative feature.

German rigid packaging producer **Jokey** has been running a campaign called "Grey is the new green," for some time, making a virtue out of recycle's greyness. Jens Stadter, CEO of Jokey, says that everything being grey was a problem for a long time, but things have changed. "30 years ago, grey packaging still had a boring eco-image attached to it. Today, it is the

other way around: grey packaging stands for the circular economy."

He says: "When recycle packaging solutions can be found throughout store shelves, it is a clear statement: this is what recyclable packaging looks like! Of course, this must be accompanied by communication: grey is not a deficit, but a clear commitment. Those who value sustainability can easily identify the appropriate packaging at the point of sale thanks to the grey colour and thus consciously make an ecologically motivated purchase decision."

The grey colour alone is not enough for a green image of course. The PCR content of sustainable packaging must also be verifiable. Quality marks such as the RAL quality mark "% recycled plastic" show how much recycle the packaging contains and where it comes from, Stadter says.

Der Grüne Punkt (The Green Dot), a leading provider of packaging take-back systems based in Germany, takes a similar view. In March, it reported that producers of plastic packaging in Germany were complaining about their raw material being expensive and in short supply. "Plastics manufacturers increasingly deliver their goods to China where the economy is on the rebound and raw materials are in demand, so higher prices are paid," it said. "That leaves German companies out in the cold - they can scarcely obtain enough supplies and have to put up with much higher costs. Recycles may constitute an alternative here - but these have so far hardly been used for packaging."

Der Grüne Punkt says this is where a product innovation it developed with W Müller, a German producer of blow moulding equipment, fits in. Together, they developed a bottle made of Systalen LDPE, produced from PCR film waste using technology

Right: Swiss building materials retailer Haga relies on the grey recycle bucket from Jokey. The buckets used for selling clay plaster contain at least 50% PCR



specifically developed for top-quality LDPE applications.

"As confirmed in initial tests, the bottles score highly not only in terms of an attractive surface and a minimum of unpleasant odours but above all in terms of high mechanical strength, which is the result of a recipe developed specifically for this bottle," says Der Grüne Punkt.

Jörg Deppmeyer, Managing Director of Der Grüne Punkt, says the bottles can be used for packaging cleaning agents or other liquid products, such as fertilizer. The source material means they are normally grey, but co-extrusion can be used to produce a skin layer of virgin material in any colour.

Broadway Colours makes masterbatch and rotational moulding powders in the UK. It recently commissioned a new lab and appointed Chandres Surti as Technical Manager. He will lead a growing technical team in the development of bespoke masterbatches. Sales Director Nick Barber believes that it's time to start driving change in consumer perception when it comes to using PCR in coloured plastic packaging. He feels that materials manufacturers and brand owners have an important role to play in supporting the changing landscape.

Der Grüne Punkt and W Müller developed a bottle made of Systalen LDPE sourced from PCR film



IMAGE: DER GRÜNE PUNKT

"We know that colour is widely used for brand recognition, and we know consumers favour colourful packaging with no imperfections. However, we believe perceptions may soon change. You only need to look at sentiment towards the use of plastic generally to know how this can impact corporate decision making. We've seen instances of supermarkets reducing their use of plastic, even if evidence suggests that the alternative solutions aren't actually greener."

Broadway Colours has been asking if recycling



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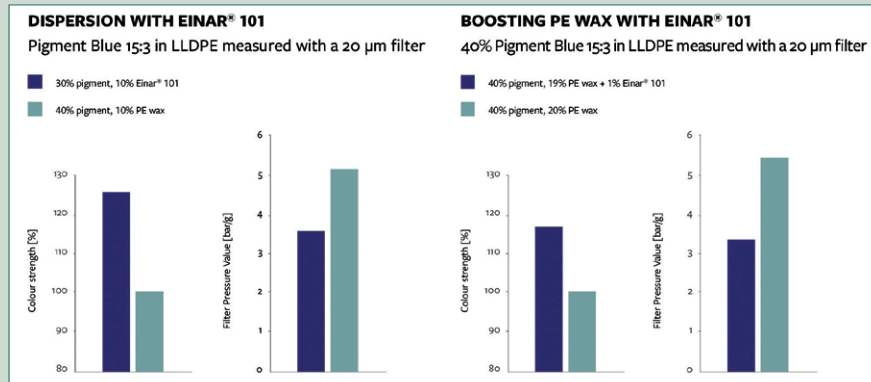
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Food ingredient from Palsgaard also acts as colour dispersing aid

Polymer additives specialist – and food ingredient manufacturer – Palsgaard says the search for sustainable solutions applies to colour dispersing aids too. “The good news is that the solution is already available thanks to the technology behind a much used food ingredient.”

The company’s Einar 101, which is a plant-based liquid, “has been proven to be more efficient than the powdered waxes currently on the market,” it says. Einar 100 is based on the chemistry behind polyglycerol polyricinoleate (PGPR), originally designed to control viscosity in chocolate and to prevent oil separation in low-fat margarine spreads.

Traditionally, powdered, petrochemical-based waxes have been used to coat pigments and help distribute them in the polymer product. This can create airborne dust, which may have a negative effect on the distribution. Palsgaard says Einar 101 has “outstanding” performance compared to industry standards. “In colour masterbatches, it has been proven to be more efficient



than waxes currently on the market at much lower concentrations,” the company says. “This in turn means that pigment loadings can be reduced to achieve the targeted colour strength, which saves cost, helps achieve faster colour changes and enhances sustainability profiles.”

Einar 101 can also be combined with renewable waxes to boost colour strength. “As an added benefit, colour masterbatch producers will also be able to improve production processes, since the equipment becomes much easier to clean when switching to other colours,” Palsgaard adds.

The company says that by substitut-

ing PE wax with Einar 101, the pigment concentration can be reduced by 25% while achieving a better colour strength and lowered FPV. “By replacing just 1% PE wax with Einar 101, a significant increase in colour strength and decrease in filter pressure can be observed.”

Einar 101 coats the pigment and enables a uniform and homogeneous dispersion of individual pigment particles in the polymer. Palsgaard says Einar 101’s chemical composition as a non-ionic surface active component means it is free from low-molecular-weight oils that can adversely affect colour applications.

compatibility should take precedence over brand consistency – particularly for products with a short lifecycle. Barber says: “We know that highly loaded colours can impede the recycling process. Sometimes the greenest thing to do is make compromises on colour in order to support sustainability. So when it comes to colour, will there come a time when consumers see this as a barrier to recycling?”

In his view, “As more PCR is used, consumers will gain greater awareness of recycled content in packaging. Less pigment and higher amounts of PCR won’t lend themselves to perfect-looking packaging. However brands that are happy to feature imperfections have a great opportunity to communicate this positively. They’ll rightly be seen by consumers as leading the sustainability movement in plastic packaging. The environmentally conscious consumer will increasingly turn to these brands over those that clearly prioritise appearance

over sustainability. Our colour matching suite will be enhanced during our ongoing site upgrades. It’s perfect for allowing us to educate customers as we can demonstrate our process to them. It works really well when colouring materials with high levels of PCR.”

CLICK ON THE LINKS FOR MORE INFORMATION:

- > <https://finke-colors.eu/en>
- > www.avient.com
- > <https://gabriel-chemie.com>
- > www.alfarben.com
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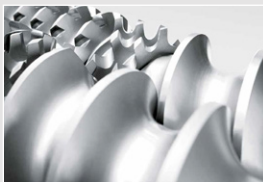
A deep-dive analysis of the European mechanical rigid polyolefin recycling industry (PP and PE). It quantifies recycling capacities, waste streams (municipal and commercial, production scrap, other), and actual recyclate volumes of pellets, compounds, regrind and flakes. It provides context on sustainability drivers and how they shape innovations in the value chain including structural and format changes.

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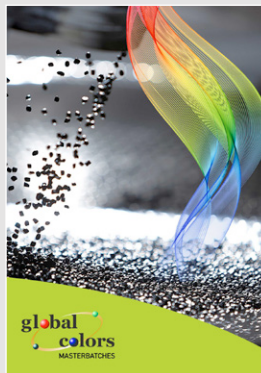
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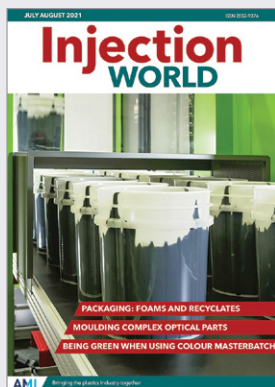
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Plastics Recycling World March/April 2021

The March/April edition of Plastics Recycling World magazine takes a look at the latest innovations in melt filtration. It also explores the use of additives to enhance recycle quality and reviews some of the newest developments from the PET recycling sector.

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Injection World July-August 2021

The cover story in the July-August issue of Injection World looks at how foams and recycle are increasingly being used to mould sustainable packaging. Other features are about meeting the demands of complex optical parts and the latest in colour masterbatch.

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Compounding World July 2021

The July edition of Compounding World explores how antimicrobial additives are being used to control bacterial growth on plastics surfaces. It also looks at the latest developments in digital colour measurement, laser marking and welding technology, and melt filters.

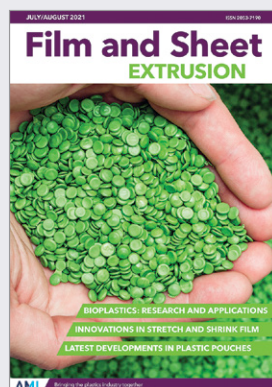
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Pipe and Profile July/August 2021

The July-August edition of Pipe and Profile Extrusion dives into PVC with a report on new recycling targets in Europe, plus the latest developments in PVC additives. Other features are on extruder investments and developments, and materials patents.

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