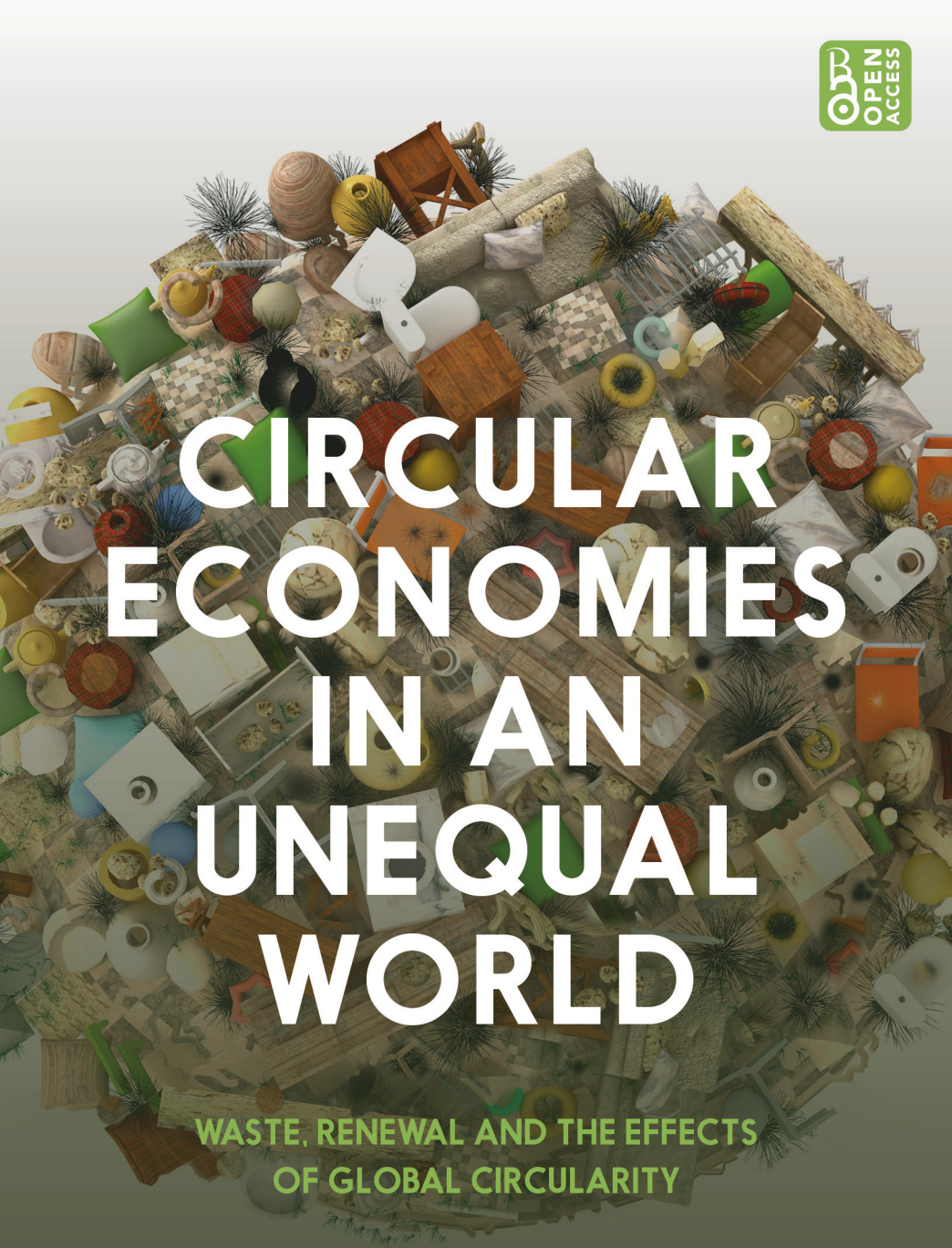

CIRCULAR ECONOMIES IN AN UNEQUAL WORLD

WASTE, RENEWAL AND THE EFFECTS OF GLOBAL CIRCULARITY

Edited by Patrick O'Hare
and Dagna Rams

BLOOMSBURY

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Chapter 3

STIMULATING ECONOMIES

Making plastics circular in Uruguay

Patrick O'Hare

Introduction

Uruguay is considered one of the early pioneers in the adoption of circular economy programmes in Latin America, with Chile often positioned as the continent's leading light. With a centralized CE strategy only recently being drawn up, Uruguay's policies have instead consisted of a dispersed range of prizes, certifications and funding streams that have sought to finance, reward and recognize business endeavours that contribute to a transition towards a more circular economy. These are dispersed in the sense that some of them are organized by state institutions while others represent corporate attempts at self-regulation. Since 2018, for instance, the *Oportunidades Circulares* (Circular Opportunities) scheme, organized by the Uruguayan Ministry of Industry, Energy, and Mining (MIEM), the National Development Agency (ANDE) and various UN bodies, has given out millions of dollars in funding to hundreds of businesses. In 2020 and 2021, meanwhile, the same organizations held rounds of the 'Uruguay Más Circular' prize, through which awards were given to big businesses, SMEs, 'start-ups', cooperatives and associations, communities and educational institutions for their efforts to progress towards circularity.

The plastics industry was selected as one of the key target industries for transformation by the Circular Opportunities programme and has featured strongly as a recipient of both its funding and recognition in Uruguay. In 2018, for instance, the wine and plastics sectors were those that received the highest levels of funding, with five approved projects per sector, receiving a combined total of 16 per cent of the overall Circular Opportunities budget (Sanz 2020). Beyond such

external pushes, internally, the plastics industry has itself taken measures to assess, certify and improve circular practices. One example of this has been the launch of what effectively amounts to an exercise in public relations: a virtual initiative called '*recircular*' (recirculate) that seeks to publicize how the sector is contributing to a circular economy. A more substantial endeavour is BigCircle, a certification scheme established by PLASTEC, a joint public–private venture that seeks to improve associativity, productivity and formality in the plastics industry and latterly took up themes of environmental responsibility.[1] With BigCircle, lauded as the first CE certification scheme for the plastics industry in Latin America, PLASTEC offers a service to plastics companies which are then graded on their level of circularity.

The priority given to the plastics industry within the CE landscape, not only in Uruguay but also globally, leads us to ask what circularity looks like within an industry that has been castigated for producing colossal amounts of plastic waste. Of the 10 billion metric tonnes of plastic (Geyer, Lambek and Law 2017) that have been manufactured, mostly since the 1950s, it is estimated that only 9 per cent have ever been recycled and 12 per cent incinerated, meaning that 79 per cent of all plastics produced have ended up accumulating in landfills or marine and terrestrial environments (Simon et al. 2021). In 2019, over 368 million metric tonnes of virgin plastics were produced, and these numbers are expected to rise rapidly over the coming decades (Simon et al. 2021). For the Ellen MacArthur Foundation (World Economic Forum et al. 2016), which has been behind a series of plastics pacts between large companies and nation states, a circular economy of plastics involves eliminating unnecessary and problematic plastics, innovative design to make plastics more reusable, recyclable or compostable, and circulating existing plastics to keep them out of landfill.

Plastics are particularly provocative for thinking through the circular economy for other reasons too. On the one hand, through their embodiment of the ideal of plasticity, plastic suggests that its forms can be eternally born and reborn (see Boetzkes and Pendakis 2013). As Heather Davis (2021: 22) notes, what she calls the 'myth of recycling reinforces this notion that plastic is full of plasticity', despite the fact that the material is also 'incredibly recalcitrant and resistant in the face

1. Pseudonyms are used here and for the individuals named in this chapter.

of change'. Plastic also figures as the synthetic material par excellence, resistant to decay and degradation, a justification for the division of the circular economy into two separate cycles, one cultural/technical, the other natural/biological. Yet, as Davis argues, 'the cleavage of the natural from the cultural can only ever be … violent abstraction, doomed to failure' (60). Derived from fossil fuels, plastics return as 'techno-fossils' (Zalasiewicz et al. 2016), joining with rock, clay and wood to become plastiglomerate naturecultures (Haraway 2003) as they 'eventually become part of the cycles of the earth' (Davis 2021: 55). Although this chapter focuses its gaze upon plastics as they are manufactured and recycled in Uruguay, it is worth bearing in mind that the productive cycle of plastics takes us beyond any single nation state: the material that is moulded in Uruguay did not originate there, and much of it will eventually find its way beyond its borders, sparking affects and transforming ecosystems along the way.

In Uruguay, the plastics industry was launched in the decade following the Second World War, with the founding of the Uruguayan Plastics Industry Association (AUIP), in 1956, which succeeded the short-lived 'Association of Plastic Moulders'. The formal plastics sector is currently made up of around 226 businesses, of which 95 per cent are SMEs, which together employ 3,353 people (Larronda 2021). Although these companies often recycle their own industrial 'scrap', the wider recycling of plastic often takes place in informal or quasi-formal milieu, and most operators are not affiliated to the AUIP; their own trade organization has been dormant for several years. The AUIP's motto is 'an industry for industries' and the sector serves both a domestic and an international market. In 2020, for instance, Uruguayan producers exported US$250 million worth of plastics, with the export of expanded polystyrene (EPS), PVC film and PET 'preforms' particularly noteworthy.

While Uruguay refines imported oil, it does not have the industrial capacity for the 'cracking' process that produces hydrocarbon monomers such as ethylene and propylene and it does not produce virgin plastic pellet, the raw material for the elaboration of many different plastic products. Instead, such virgin plastic is imported from countries such as Brazil, China and the United States. Uruguayan 'plastiqueros' effectively add value to these pellets through extruding, blow-moulding and injecting them into diverse forms, from polystyrene trays to buckets, children's toys to toilet seats. This in itself causes certain problems with regard to creating a circular plastics economy in Uruguay, because there is little that can be done in the country to influence or change the first

stages of plastics production. The focus on circular economy initiatives at an advanced stage of the plastics life cycle, and into its treatment as waste, replicates the global international focus on avoiding plastics pollution, with the same problem that this does little to 'turn off the tap' of virgin plastic production (Liboiron et al. 2020), including those plastics that are regarded as single use, unnecessary and problematic (Barrowclough and Deere Birkbeck 2020).

This chapter focuses on two plastics companies that have been recognized in Uruguay for taking steps towards a circular economy of plastic. The first, Uruplac, is a company that makes plastic board from a diverse array of mostly post-industrial plastic packaging, including polypropylene (PP), polyethylene (PE), polyethylene teraphate (PET) and mixed materials such as Tetra-Pak. It is a small, Uruguayan company with two business partners and a handful of staff. The other company, which I will call Roseta, is part of a large multinational plastics company that produces food-grade expanded polystyrene (EPS) and PVC film, and employs over 200 people at its large plant. While Uruplac works only with recycled material, Roseta only works with virgin polymers, largely because food-grade recycled EPS has not yet been developed. Despite this important difference, both companies have been considered as contributing to a circular economy of plastics in Uruguay. Roseta received the highest circularity rating in PLASTEC's BigCircle audit, while Uruplac has received Circular Opportunities funding and was the 2020 winner of the Circular Uruguay award for the SME category. This chapter will explore the criteria by which such different business models can both be regarded as forming part of the circular plastics economy in Uruguay.

Ethnographic research was conducted at the two companies in question. In the case of Roseta, this was limited to the day before the BigCircle audit was carried out, the day of the audit itself and a subsequent follow-up visit and interviews with senior staff. The fieldwork in Uruplac involved following production in the plant over a period of six months, charting the flows of plastics into the company and the employment of plastic board in a range of uses, from agricultural roofing to carefully designed craft. Mixed methods – interviews, participation observation, analysis of company reports and audits – facilitated an understanding of how the circular economy was perceived at both company and shopfloor levels. It also allowed me to track the term as it moved from theory to practice and back again.

While retaining a critical perspective, this chapter distinguishes itself from a position often found in the literature, where either the circular

economy is critiqued for not entailing systemic change or particular CE schemes are critiqued for not sufficiently adhering to a 'true' version of the circular economy. This chapter takes a different route, focusing instead on how a circular plastics economy is taking shape in Uruguayan economic and social life. Is circular economy recognition allowing plastics companies to carry on with business as usual or is it in fact reshaping business models? Is it shifting relations between the private and public sectors and between national and international organizations? Is it entrenching inequalities or bringing about positive environmental and social change? In its conclusions, the chapter points to two ways that the localized case studies discussed here can contribute to wider tendencies in the circular economy. First, it notes the way that universalizing theoretical principles of the circular economy inevitably become entangled in local priorities that often have little to do with environmental concerns. Second, it argues that the well-intentioned prioritization of design innovation over recycling in circular economy discourse can actually enable the continued mass production of difficult-to-recycle packaging.

URUPLAC

Uruplac was founded in 2012 by an active and a passive business partner. Diego is the active partner, who set up the company after a career in logistics and the plastics industry. Enrique is the sleeping partner, who runs the scrap yard within which the Uruplac plant is located. Though not formally a business partner, a third important figure is Eduardo, who has supported the project since its inception. The company also employs a business manager, an administrative assistant, a foreman and several shopfloor workers.

Diego and Eduardo met working for what was at the time one of the largest companies in all of South America, a plastics firm that I will here call Remar. According to Eduardo, this was a company that 'marked a before and after in the [Uruguayan] plastics industry' in the sense of a step-change in production and technical capacity, as it operated out of six plants and manufactured 'anything you could imagine out of plastic'. While Eduardo was in charge of a sixty-plus maintenance team, Diego was brought in to revolutionize internal recycling and improve efficiency, instituting a system that minimized waste while maximizing the reincorporation of industrial scrap into productive processes. Nevertheless, the company still worked with

virgin polymers and produced large amounts of flexible, multi-layered packaging that was difficult to recycle once it had been released onto the consumer market. According to Diego, it was on visits to Uruguay's precarious informal plastics recycling industry that working in Remar began to bother him: 'I stopped seeing maximizing profits of a company that was producing 100% disposable waste [plastics] as virtuous. There was too much waste and a social reality [of post-consumer recycling] that had to be stopped.' With this comment, Diego was most likely alluding to the informal labour, poor health and safety practices, and environmental contamination that could often be found in the recycling sector.

At first, Eduardo, Diego and another Remar engineer started their first, now defunct, firm that recycled conventional 'mono-material' plastics such as polyethylene (used in much packaging) and polypropylene (used for packaging and household objects and toys, such as Lego), even managing to sell high-quality post-consumer plastics back to companies like Remar to be fashioned into new products. However, both Remar and this first recycling firm were shuttered – partly as a result of the 2001 Argentine and Uruguayan financial crash – and it would be a decade before Diego launched another recycling endeavour, this time focused on mixed materials that could not otherwise be recycled in Uruguay. A key partner in this regard was Tetra-Pak Argentina, which was seeking a way to recover and recycle the Tetra-Brik (e.g. litre drinks containers) products that were both increasingly successful on the Uruguayan market and largely ending up in landfill and the environment. This led Tetra to finance the purchase of Uruplac's most important piece of machinery, a hot press that melts chipped plastic into a standardized board.

Although this press has been improved with small upgrades in recent years, Uruplac's basic machinery and industrial processes have mostly remained the same since its founding. The company receives, largely for free from industries, post-industrial mixed plastics packaging and materials, such as Tetra-Brik, aluminized plastic foil, pharmaceutical PET blisters and multi-layered polypropylene wrappers. It shreds these plastics using a mill, breaking them down into small pieces. Each of the three 'ingredients' of the formula was stored in different silos, meaning that when composing the mix, workers took and weighed a fraction from each silo, before mixing them together and pouring them onto a conveyer belt. These were then spread out evenly before a sheet of heat-resistant plastic film was placed across the top and the belt was moved under the press, which applied heat and pressure discontinuously,

allowing humidity to be released as the pressure was lifted while also preventing the boards from suffering scorch marks.

Immediately after having been pressed, the board were reduced to what one worker referred to as a 'gelatinous, jelly-like consistency'. They were then placed under a manually operated cold press, and after having cooled, they were cut according to specification using a three-piece circular saw that trimmed the rough edges of the board across their depth and breadth. Each plastic board weighed around 25kg, measured 2.44m × 1.22m, and was manufactured at an average rate of forty boards per day. These could be sold as they were for roofing and insulation, or to companies that cut the board down to manufacture new products such as Wendy houses, waste receptacles, compost bins and smaller design items.

In the small Uruplac office, heated only by a wood-burning stove, Diego picked up a sample of what is known as 'plastic wood or lumber', a product made solely from recycled high-density polyethylene (HDPE), which had been dropped off the previous day by a construction company that wanted to know if he could manufacture a product to the same technical and material specifications. Diego replied, dismissing the offer:

> I could make a very good board like this, but I'd need to pay for my raw materials, because there is already market demand for this raw material [recycled or virgin HDPE] from those who use it to make buckets, pipes, and so on. So I'm not solving a problem and Uruplac turns into a purely and exclusively commercial enterprise and ethically, we don't want to go there. Our technical objective is to continue down the path of being the only ones who can do something with the waste for which there is no demand in the market.

Diego thus relies on a stream of what has been called 'problem plastics' (WRAP 2022) – laminates that have different layers of different plastics, a combination of plastics and non-plastics, troublesome additives and/or an excess of printed ink. Mechanical plastics recycling essentially relies on shredding recycled plastic and then melting it down at a certain temperature so as to produce either plastic pellets or new products. The problem is that different plastics melt at different temperatures (they have different 'melt indexes') and they also react differently depending on the process (blowing, extrusion or injection) that they have previously undergone in their first incarnation. Injecting or extruding mixed plastics or plastics combined with other materials

such as aluminium and cardboard, which either do not melt or melt at vastly different temperatures, can result in below-par products and/or damage to machinery. With Uruplac's method, on the other hand, the formula used means that enough plastics melt under the hot press to act as a glue to hold the rest of the materials together, with small amounts of cardboard and aluminium adding, according to Diego, an aesthetic appeal and improved mechanical properties.

Diego is considered a pioneer in the Uruguayan circular economy, known not only for Uruplac but also for his involvement in an extended producer responsibility (EPR) scheme for rubber car tyres, which has resulted in large amounts of these tyres being recovered and burnt as fuel in a cement plant. The latter scheme was often held up by Diego as a model for the plastics industry, yet the diversity of plastic, its frequent contamination with organic matter (e.g. food) in its post-consumer state and its mixing with other materials in packaging products such as Tetra-Brik, means that a single end-of-pipe solution is unlikely. Diego himself is critical of both politicians and virgin plastics producers, arguing that measures such as minimizing printed advertising or legislating against the production of multi-layered and multi-material laminated packaging could have been adopted had there been political will. In the meantime, he added, he was doing the plastics industry a favour, and therefore he shouldn't be expected to pay for his raw materials and was fully deserving of his circular economy funding and accolades.

The Circular Opportunities funding that Uruplac received was for a specific project that involved another company closing a loop in their plastics production. Uruguay's national dairy cooperative, CONAPROLE, is regarded as a national treasure, is one of the country's largest exporters, directly or indirectly employs over 25,000 people and processes the milk of around 90 per cent of the country's small and medium dairy farmers. It is also indirectly one of the largest producers of plastic packaging in the country, manufacturing, through a subsidiary and procurement, flexible plastics for its range of milks, yogurts, puddings and ice creams. Most of this packaging is multi-layered and/or multi-material, making it extremely difficult to recycle. Even before the single-use carrier bag became an international symbol of environmental plastics pollution, CONAPROLE's milk sachet was a target for societal critique in Uruguay, after the cooperative switched from its traditional glass bottle and the sachets began accumulating in the environment, prompting an initial EPR recovery and recycling scheme in the 1990s. Now, with a huge increase in the amount and

diversity of its plastics packaging, CONAPROLE turned to Diego, to whom they sent their post-industrial packaging 'scrap' and in turn received large orders of corrugated plastic board to provide roofed shelter to its cows in two initial 'pilot' circular economy dairy farms.

It is worth stepping back to remember that, in general, the transformation of food-grade plastic packaging into something like plastic lumber or wood is not considered by organizations like the Ellen MacArthur Foundation as a prime example of circular economic activity but rather a case of down-cycling: the creation of a product that is inferior in its technical specifications and function to the purpose for which it was originally put. More valued is recycling that is closed-loop or 'bottle-to-bottle', where PET bottles can be recycled into new PET bottles, or in this case plastic dairy packaging can be recycled into plastic dairy packaging. In theory, such 'bottle-to-bottle' recycling decreases the demand for virgin plastics, while in the CONAPROLE–Uruplac example, virgin plastics are still required for CONAPROLE's food packaging.

A further weakness of this scheme is that it finds a partial solution for post-industrial but not for post-consumer plastic. The plastics industry, in Uruguay and elsewhere, tends to be rather good at recycling what is often called 'industrial scrap'. This consists of plastic off-cuts and trimmings, products with a default or, as in the materials that often arrived at Uruplac, rolls of packaging that contained printing errors. Although more difficult to recycle once it had been printed on, this material was still homogenous, available in relatively large quantities and unsullied by contact with food. The composition of post-consumer waste, by contrast, is more difficult to ascertain, is collected in small quantities from individual households and contains various degrees of contamination. There was no scheme for Uruplac to receive and recycle the 'problematic' mixed materials that CONAPROLE put onto the market, only the smaller fraction that never made it into the hands of the public to begin with.

Roseta

In Uruguay, expanded polystyrene (EPS) is known as 'Espumaplast', short for 'foam plastic', a term that is often cut down to simply 'espuma' or foam. The production of espuma was brought to Uruguay by a British plastics company in the early 2000s, with Prince Charles even stopping off to inaugurate the plant when he found himself nearby

on the Malvinas islands. After the plant burnt to the ground several years later – espuma is extremely flammable since it is injected with butane gas – it was rebuilt from scratch and is now run by a Mexican multinational, Roseta, which also operates an on-site sister plant that manufactures PVC film.

In Uruguay, the advertising campaign for a new national waste management plan, subtitled 'a more Circular Uruguay', featured a picture of fruit sitting in a polystyrene tray and wrapped in cling-film, alongside the command 'reject', suggesting both state disapproval and that responsibility for rejecting single-use packaging is being delegated to the consumer. While EPS trays have been banned in both Peru and Chile, plans to ban single-use plastics in Uruguay have been watered down and the new national waste management strategy speaks of non-binding reduction targets rather than prohibition. A recent ministerial resolution that originally might have banned a series of single-use plastics was stripped down to focus on a single item: the plastic straw. One of the reasons why there is no hard ban is that Roseta and the Uruguayan plastics industry have been lobbying hard against it. The company is a significant employer, with a team of over 200 permanent staff and a contribution to thousands of indirect jobs. Its Uruguayan chief executive is the head of Environment for the multinational and was also until recently the vice-president of the Union of Uruguayan Exporters. Representatives of other plastics companies that make up the AUIP repeatedly named Roseta as the most professional plastics manufacturer in the country, one that met international standards in terms of its size and the quality of its production and processes.

Yet the company clearly has a problem: it manufactures a product at a rate of roughly 6 per second (0.5 million per day), for which there is to all intents and purposes no recycling market and no proven case of being transformed back into a food-grade product, which has effectively become the gold standard in food packaging recycling. One of espuma's selling points is its lightness, and this becomes a huge problem both for its collection and its economically viable recyclability. Empty polystyrene trays regularly blow away in Montevideo's strong coastal winds, and once I had an eye for them, I began to notice the trays dancing along Montevideo's twenty-kilometre-long riverside promenade, known as La Rambla. On a one-hour beach clean-up further along the coast in which I participated, I counted thirty-seven different fragments of EPS, many of which had been manufactured by Roseta.

A few weeks after the beach clean-up, I was invited to the circular economy audit to be carried out at Roseta by PLASTEC. According

to its website, BigCircle is an interdisciplinary project that seeks to improve the productivity of companies in the plastics industry value chain and that strengthens post-industrial and post-consumer plastics recycling through formalization. This initial definition is rather striking for its failure to mention waste and its focus instead on formalization and productivity. PLASTEC uses as the basis for its BigCircle audits a manual that it first published in 2018 and updated in 2019. The guide is divided into four sections or axes: *órden y limpieza* (good housekeeping or order and cleanliness), productivity, circular economy and associativity. It is interesting to note that although this is ostensibly a circular economy certification scheme, circular economy is only one of the criteria against which a company is evaluated. A few weeks after the audit, the verdict was out: Roseta were the first plastics company in Uruguay to have been granted a level 3 certification in Sustainability and Circularity.

This, then, is my ethnographic puzzle: How could Roseta, a company that produces up to 0.5 million polystyrene trays per day of which only a tiny fraction is recycled, be granted effectively the highest mark with regard to circularity in the national plastics industry, higher than that accorded to companies that produce plastics that are much more easily recyclable or that might contain recycled material? In answering this question, I shed some light on the way that the circular economy as a business proposal and policy aspiration is being rolled out and evaluated in particular places, as it moves from theory to practice and back again.

Uruguay is a small country with very few degrees of separation between its inhabitants. The plastics industry is accordingly small and PLASTEC has strong links with many actors. The president of PLASTEC is also the Chief Operations Officer for the country's largest plastics firm. Its lab manager is a former shop floor manager of the same firm. One of its teaching staff used to be the head of Roseta's PVC plant when it was run by the British firm, and when Roseta was looking to ensure that it performed well in the BigCircle audit, it contracted one of the authors of the manual as a consultant. These interconnections clearly demonstrate certain problems of governance and potential conflicts of interest at the heart of an emergent Uruguayan circular economy in plastics. The plastics industry, through its involvement in PLASTEC, plays a role in certifying itself with regard to how circular it is. Yet these links do not alone explain why a manufacturer of difficult-to-recycle single-use plastics might be given such a high circularity score.

Globally, proponents of the circular economy tend to put a greater emphasis on design interventions than on recycling. Accordingly, the

centrepiece for Roseta's presentation to the BigCircle audit committee, effectively its pitch for why it should earn a high rating, was a minute reform made to the curvature of its trademark polystyrene tray, which meant that it used less raw material for every tray that it manufactured. This adaptation started from the supposition that a bigger curved radius would provide better resistance in the product. According to Roseta, this was a proven hypothesis in metalwork, and they had 'taken it to the world of plastic'. Trials had occurred at a small scale (in the company laboratory), at a medium scale and then at an industrial scale, where new metal moulds had been cast with the adapted curvature and rolled out on the production line. The trials had shown that increased curvature enabled a reduction of 25 per cent of the thickness of the normal trays and 18 per cent in absorbent trays, meaning less plastic per tray. As the chief executive explained, this was a case where 'an economic improvement aligned with an environmental one'. Other production advances were also highlighted, particularly the way that the plant had become increasingly 'closed', with PVC and EPS obviously going out into the world but other by-products incorporated back into productive processes. They had reached a rate of 100 per cent reintroduction of internal EPS scrap back into the production line and 99 per cent of PVC. One modification that the company had made with regard to PVC was the capture of liquids that evaporate as the film is heated, then turn back into liquids when they are cooled during the production process, 80 per cent of which are 'plastifiers'.

One curious detail from the audit was that because a new circularity index was about to be launched, but which businesses hadn't yet seen, no stand-alone circular economy indicator was used, as it had in previous years. Indeed, the reason that a new index was being launched was partly due to complaints that its previous incarnation, which drew strongly on EMF principles, was unsuitable for single-use products, unduly favouring those companies that made more durable and reusable plastics. The original indicator was, according to PLASTEC staff, 'a bit basic and with unclear definitions'. It also used a single indicator, something that the revised index sought to address. Effectively, PLASTEC wanted to avoid products being 'penalized', in the words of one of its staff, for being of petrochemical origin, for being single-use or for having low national recycling rates, which were deemed to be outside of the producer or company's control. The new indicator paid attention to three phases in the life of a product: the production stage and the materials out of which it was made; the consumption stage and the efforts made to extend the active life of the product; and, finally, the disposal stage and the extent

to which the product was recyclable or compostable. Yet an exception was made for single-use plastics, which were only evaluated with regard to the production and disposal stages, discounting the possibility of an extended life. This was, according to the PLASTEC employee devising the new index, because 'it is understood that single-use plastics are designed to have a very short life cycle and so it doesn't make sense for us to measure the lengthening of their useful life'.

It is worth remembering that this new index was not used in Roseta's BigCircle audit, and what was being audited at Roseta were its company-wide processes rather than a single product. Nevertheless, Roseta's Uruguayan factory effectively makes two products, with very little difference in their specifications. As a product, however, it is hard to see how polystyrene trays could achieve a high rating within either the curtailed or the full circularity index given that it does not perform at all on two out of three of its indicators. Although they contain some post-industrial scrap or recyclate, they do not contain any post-consumer material; by definition they are designed to be single use and they are difficult to recycle into new products and have very low recovery rates in Uruguay. As much as Roseta are committed to minimizing internal waste, supporting local community and environmental initiatives and generally projecting a green image, the question nevertheless remains of whether a company that makes such a product could and should be given a Circular Economy certification, never mind the highest rating possible in PLASTEC's scheme.

This was a question that I put to the lead auditor and one of the authors of PLASTEC's manual. In response, he said that inclusion of post-consumer EPS in new trays was a moot point because in Uruguay it was forbidden to use recycled plastic in food-grade products. This was a key issue that linked both disposal and production and would bring them together in a new cycle, in that the possibility of incorporating recycled EPS into new trays would create a market for recycled EPS, which currently does not exist. The inclusion of recycled EPS would thus contribute to a higher score in both indicators for which they would be evaluated: that of production and disposal. Roseta was effectively being let off the hook on this point because it was assumed that even if it were technically possible and financially viable to reincorporate this material, it would still be illegal in Uruguay. Yet in fact this assertion was mistaken, because water and drinks bottles made with 100 per cent recycled PET (RPET) were both legal and widely available in Uruguay, meaning that there was no legal obstacle to using food-grade recycled EPS in the country.

The issue of 'closing the loop' ('cerrando el círculo'), that is to say, recovering post-consumer EPS trays, was not neglected during the audit, however. Roseta's management highlighted their commitment to an extended producer responsibility (EPR) scheme, whereby they, along with other, smaller, importers and manufacturers of EPS, committed to purchasing post-consumer EPS from public–private waste sorting plants. They effectively engineered a market in this material, paying 40 US cents a kilo, which is transferred to the sorting plants by a recycling and waste management company. This company compacts and melts down the EPS into 20kg blocks, which are then sold to Asian markets, particularly Malaysia, where they might be transformed into items such as clothes hangers, skirting boards and picture frames. Even though the recycling company is effectively giving these EPS blocks away, they do not find easy buyers and must be sold as part of a mixed plastic 'selection box' container that includes more valuable plastics such as polyethylene.

Between 2017, when it was launched, and 2021, the scheme increased the amount of EPS recovered from 1.3 to 5 tonnes per year, but with roughly 50 tonnes of EPS released onto Uruguayan markets every month, the latter figure only amounts to a recovery rate of less than 1 per cent. Roseta were keen to stress that they wanted to increase this amount, and they are thinking of creating a school utensil kit that they currently make from recycled EPS elsewhere in Latin America and import into Uruguay to distribute in schools. The problem, said the company director, was that they simply couldn't get a hold of the stuff: they weren't responsible for segregated collection and recycling schemes, he said, and 'when you have alienated the product, it is very difficult to maintain circularity'. The local governments responsible for collection had put out some publicity about the recyclability of EPS but were reluctant to do more, given concerns about how long the recycling company would continue to be able to find a buyer for it. The director accompanied his criticism of municipal collection with oft-repeated comments about Uruguayans not having a sufficiently developed environmental consciousness and not engaging in domestic classification, an example of what the climatologist Michael E. Mann (2021) calls 'deflection strategies' that shift blame for pollution away from producers and onto consumers.

It is worth comparing the actual destination and flows of Roseta's EPS with that put forward in the publicity for its EPR scheme. The publicity plays with temporal frames positing a linear past before (*antes*), in which EPS ended up in landfill, and a present circular now

(*ahora*). The author (O' Hare 2021) and others have made the point that in its dichotomous framing of a current linear economy, proponents of the circular economy often obfuscate the variety of loops, circles and deviations in which many materials and objects are embedded. In the case of EPS, it is hard to argue with the idea that it mostly follows a linear pathway, yet the fragments of *espuma* that I found on my beach clean-up highlighted that not all of the material ended up in landfill. Thus, the starting point of a supposedly bad past, where all EPS was landfilled, was not fully accurate and would have been an improvement on the current situation. A striking feature of the diagrams that greeted company visitors is that they are given temporal markers, something that is absent from the generic circular economy graphs from which they are adapted. Even more striking is the fact that within this temporal framework, the linear economy is banished to the past, despite the fact that, as we have seen, the EPR scheme currently captures less than 1 per cent of the polystyrene that Roseta produces for the Uruguayan market, the rest ending up in landfill or dispersed in the environment.

We might thus say that the 'now' of the circular economy is only accurate for 1 per cent of Roseta's Uruguayan production, while 99 per cent of its trays live in a linear past, that is, in fact the present. Yet we can challenge whether or not the circular graphic, which carries the title 'process of sustainable utilisation' (aprovechamiento), even accurately describes what happens to the 1 per cent of the polystyrene that is recovered. The diagram, to a certain extent, sets a high standard that the recycling of EPS is seemingly unable to meet, since it suggests that after it has been classified, it will then be recycled into a 'high-quality raw material' that will re-enter the production line to be transformed into another product. The language of 'high-quality recycling' is not accidental – it is the concept used both by the EU in its Circular Economy plans and by the Uruguayan government in its national waste management plan. In Uruguay at least, there has been criticism that this term has been thrown around without a sharp definition, while in the EU there have been belated attempts at conceptual clarity. A publication from the EU Commission Joint Research Centre (Grant et al. 2020) has proposed the following definition for the quality of recycling: 'the extent to which, through the recycling chain, the distinct characteristics of the material (the polymer, or the glass, or the paper fibre) are preserved or recovered so as to maximise their potential to be re-used in the circular economy'. The report goes on to note that 'these characteristics vary by material but may include for example food contact suitability, structural characteristics (e.g. uniformity and viscosity), clarity and colour, form,

and odour'. What is first used as a definition of quality is then used to define 'high-quality recycling' against recycling per se: 'whereas recycling keeps resources in circulation within the material economy; high quality recycling preserves the characteristics of materials which make them most useful (avoiding the loss of material characteristics relevant to its re-use in key product sectors)' (7).

In the case of the EPS that is recovered and melted down into blocks for export, it is difficult to see how the 'distinct characteristics' of the material are conserved. Effectively, through the heat applied, expanded polystyrene foam becomes polystyrene or PS ingots. As I have noted, the expansion of polystyrene is caused by the injection of butane gas into solid polystyrene beads, with the gas expanded by heating. Through this process, the volume of the bead is increased forty-fold, giving EPS its key properties of lightness and voluminousness, with 98 per cent of EPS composed of air. The melting of EPS through the application of heat and physical force effectively brings about the reverse process, with EPS densifying at a rate of at most 50:1 as it is transformed back into polystyrene. Yet this is not a simple reversal of EPS back into PS. As Kazuyuki Hattori (2014) notes, 'the melting process is simple, but brings about some chemical degradation and cannot avoid debasing the quality of the original polystyrene.' Not only does melting bring about chemical degradation, the fact that Roseta's trays have been in contact with food means that its post-consumer foam is contaminated to varying degrees by organic particles. Finally, and notwithstanding these issues, it is white EPS that finds a more stable Asian export market. Despite this fact, Roseta continues to produce a wide gamma of colours that correspond to the different products that their packaging is used to enclose: white, black, red, yellow and blue.

The Ellen MacArthur Foundation, for its part, has put out its own 'vision for a circular economy of plastic'. It follows the waste hierarchy in suggesting that the first steps towards such a circular economy should be the elimination of unnecessary plastic packaging and then the creation of reusable packaging as a priority for what remains. At the very least, all plastic packaging should be fully recyclable, reusable or compostable by 2030, with a preference for the so-called 'bottle-to-bottle' or closed-loop model, where a product is recycled into the same product. The rationale behind this is fairly obvious: the so-called down-cycling of food-grade plastics into plastic lumber, synthetic fibre or in this case skirting boards does not decrease the demand for the virgin plastic that is generally used for food packaging. The amount of plastic generated, and the dependence of the plastics industry on

fossil fuels, continues apace. This is what the EMF refers to as 'open loop recycling' where, 'since such applications are not economically recyclable after use', this 'often adds just one additional use cycle rather than creating a truly circular model' (World Economic Forum et al. 2016: 4). Recycling in this variant is a cycle then, but not a circle.

Returning to our ethnographic puzzle, how then did Roseta manage to receive its high circularity rating? In part, this was because what was being audited at Roseta were its company-wide processes rather than a single product. High scores in the three axes of the manual of good practices on which the audit was based – good housekeeping, productivity and associativity – were able to offset the fact that EPS is barely being recovered and even where it is, it does not comply with standard definitions of high-quality recycling. Associativity in this context meant creating alliances with other businesses and community groups in order to attain a common objective, under the premise that 'circularizing production requires cooperation between providers, clients, consumers and public bodies, according to the third Circular Economy principle'. Yet the third CE principle, according to the EMF website that is referenced, is the regeneration of natural systems, something that seems very far removed from the examples of potential associative ventures given by the manual that guides the audit: joint purchase of machinery, joint commercial missions, launch of new products, access to new markets. These have little to do with any circular economy. Rather, they have migrated directly from the founding aims of PLASTEC – which obtained public money in order to improve the efficiency, competitivity and knowledge base of the plastics sector – into a circular economy manual, audit and certification scheme.

Conclusion

There are several ways in which the case of circular economy initiatives in the Uruguayan plastics industry might prove instructive for examining the international roll-out of CE schemes in the plastics sector and more broadly. The first point to note is that the universalizing principles of the circular economy advocated by the EMF and international organizations inevitably become grounded in specific places and entangled with local priorities that might only tangentially connect to the circular economy or that may indeed undermine moves towards circularity. This is the

case for instance with the associativity strand of PLASTEC's circularity audit, associativity being a founding aim of the centre that was only latterly tagged on to the circularity index with the justification that no company could hope to 'close the loop' by themselves. Yet associativity for Roseta in part involved leveraging its links to PLASTEC to present a united front with its competitors and national research institutions against the prohibition of its product. The involvement of such research institutions in PLASTEC helped it to present its circular economy certification scheme as independent, despite the influence of the plastics industry in the development of its manual, metrics and audits. A circularity certification scheme, legitimized with a national circular economy prize in which international organizations participated as judges, thus became a shield with which plastics companies could protect themselves against economically damaging national legislation, while simultaneously spurring them to reduce waste and make efficiency savings in their industrial processes.

The second point to emphasize is that the prioritization of so-called eco-design over recyclability enables companies that continue to produce unrecyclable products to be classified as circular or transitioning to a circular economy. Another case from the Uruguayan plastics industry involved a company that switched from high-density polyethylene containers to layered polypropylene sachets for one of its product ranges, lowering not only its costs but also the amount of plastic packaging used. Yet the switch also entailed a move from a plastic that is relatively easy to recycle and has a robust market to one that is difficult to recycle and has no active market. As Diego stated, Uruplac is currently the only company in Uruguay that recycles these plastics, and the company in any case only has a capacity to process a limited amount of post-industrial rather than post-consumer packaging. On the one hand, any 'valorization' avenue for packaging, whether it is a one-way ticket to Malaysia for some of Roseta's EPS or the transformation of CONAPROLE's polypropylene rolls into shade provision for its cows, enables such companies to signpost the possibilities of recycling while continuing to churn out materials that are difficult to recycle and invariably are not. On the other hand, of course, Uruplac and Roseta's recovery schemes, however limited, meant that some plastics that would otherwise end up in landfill or the environment were given a new lease of life.

Rather than only making the negative assertion that neither Roseta nor Uruplac constitute valid examples of a circular economy in plastics and that the awards and certification schemes are flawed, my ultimate

point in this chapter has been to highlight the effects of a particular definition of the circular economy in Uruguay. This brings with it enhanced company productivity and efficiency, less industrial waste, strengthened associativity, and assessments and prizes that are both internally coherent and designed in such a way as to allow for the continued production of single-use plastics with low rates of recovery and recycling. In this instance at least, the circular plastics economy is not the same as recycling, and in the sense that it provides legitimacy to the mass production of difficult-to-recycle packaging, it is potentially much worse for the environment.

As to the question of whether the circular economy is enabling companies to carry on with business as usual, the two cases presented indicate that large plastics producers seek to avoid closure and a switch to replacement materials by emphasizing design innovations and the fact that their products can be recycled, however difficult that may be in practice. Through the creation of Uruplac, meanwhile, Diego sought to make a meaningful intervention in the plastics industry, but by providing an outlet for the recycling of small amounts of Tetra-Brik and flexible laminates, he also provides an excuse for the continued production and use of such packaging, even if most of it will never find its way to his plant. The informal practices, poor working conditions and low wages in the wider Uruguayan plastics waste picking and recycling industry continue unabated, despite the fact that it is these cottage industries that continue to do the lion's share of plastics recycling in Uruguay and can arguably be considered the unsung heroes of a Uruguayan circular plastics economy.

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