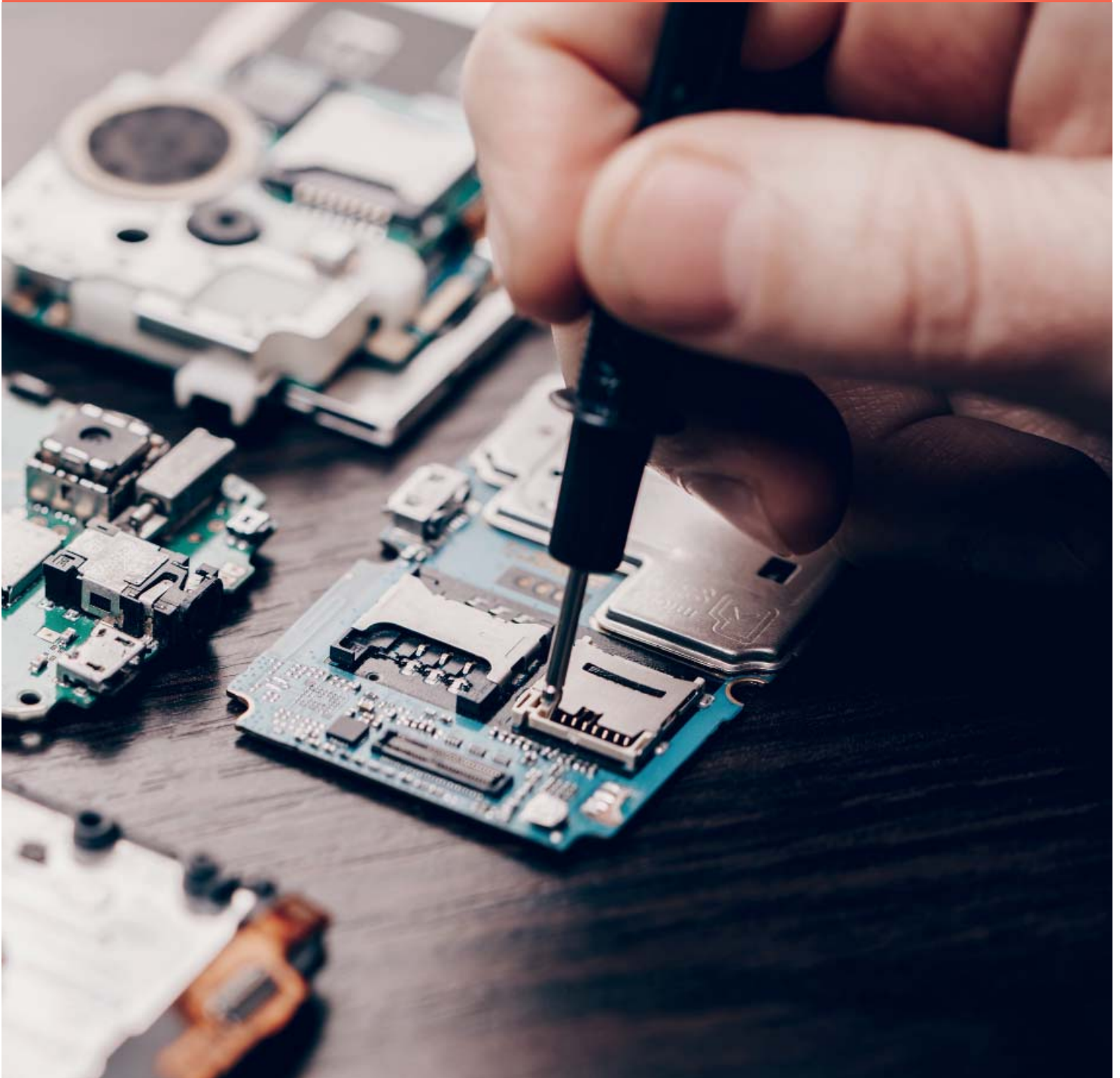


2. SHIFTING HOW THE VARIOUS ACTORS BEHAVE



Helping our models transition toward a circular economy requires efforts by the private sector actors involved in producing goods and services, public sector actors regulating the economic and social spheres, and consumers, whose purchasing choices influence businesses' current and future strategies. So, how can we nurture the emergence of new ways of consuming and producing? To answer this question, we need to examine the levers at our disposal for shifting the behavior of individuals, authorities and businesses. From new lifestyles and public policies to management indicators and industrial strategies, countless mechanisms exist for influencing the behavior of socio-economic actors and fostering the rollout of circular practices.

ALTER CONSUMER BEHAVIOR

The transition to a circular economy depends on the participation of consumers, who drive companies' demand for new products manufactured at low cost in emerging economies. The challenge here is to switch from mass consumption within a paradigm of limitless resources to lifestyles that are more environmentally friendly. Moving beyond reuse, recycling and eco-design, Professor Valérie Guillard from Paris-Dauphine University invites us to change our relationship with the world, rooted in our knowledge, skills and attitudes, encouraging us to shift to less resource-intensive lifestyles where quality is valued above quantity.

RETHINK LEGAL FRAMEWORKS

While consumers appear increasingly receptive to environmental considerations, their buying habits still need directing and guiding so they can identify the products that are the most sustainable. This is the idea behind France's law on the circular economy and combatting waste (AGEC), passed on February 17, 2020, and outlined for us by HOP, an NGO actively involved in drafting the new law alongside manufacturers and retailers of electronic devices, repairers and public bodies. This collective process led to the creation of an incentive-based scheme that will provide consumers with more information about the reparability and durability of electronic products while also promoting access to repair services at lower cost. At the local level, the example set by the town council in Aalborg, Denmark, shows how public and private sector actors can cooperate to transform municipalities' procurement practices and encourage businesses to change their habits in a wide range of spheres, from IT equipment to children's play areas.

THE AMBIVALENCE OF DIGITAL TECHNOLOGY

In addition, Xavier Verne, from the Shift Project, stresses the importance of taking into account the material footprint of digital technology, given that only 17% of electronic waste is recycled worldwide, and that it is difficult for companies to take into account, in their environmental assessments, the carbon impact of materials extraction and electronic equipment manufacturing. If digital technology can contribute to the emergence of more virtuous uses and behaviors in terms of consumption and mobility, it can also generate side effects if its impact is not analyzed throughout the value chain

DEVELOP INDUSTRIAL SYMBIOSES INSPIRED BY NATURE

Shifting to a circular economy also means looking to the natural world for inspiration, primarily by developing industrial symbioses that center on flows of materials and energy that are exchanged between regional businesses. Zhao Kai, Vice-President and Secretary General of the China Circular Economy Association, explains how Chinese policy aims to foster ecological transformation at industrial parks and describes a series of projects for green industrial parks developed in China to encourage synergies between actors from different sectors, including metallurgy, energy and agri-food.

DEFINE CIRCULARITY INDICATORS

It is critical that new management tools are created to drive the rollout of circular practices within businesses. Specifically, businesses need new indicators for defining targets and measuring their performance in this area. However, circularity indicators represent a complex issue that requires establishing a delicate balance between effectively addressing the systemic nature of exchanges of flows and materials and ensuring the clarity of information provided to pilot corporate strategies as accurately as possible. This painstaking work has been undertaken by the Ellen MacArthur Foundation and the World Business Council for Sustainable Development. In this issue they present two tools for measuring circularity: Circulytics and the Circular Transition Indicators.

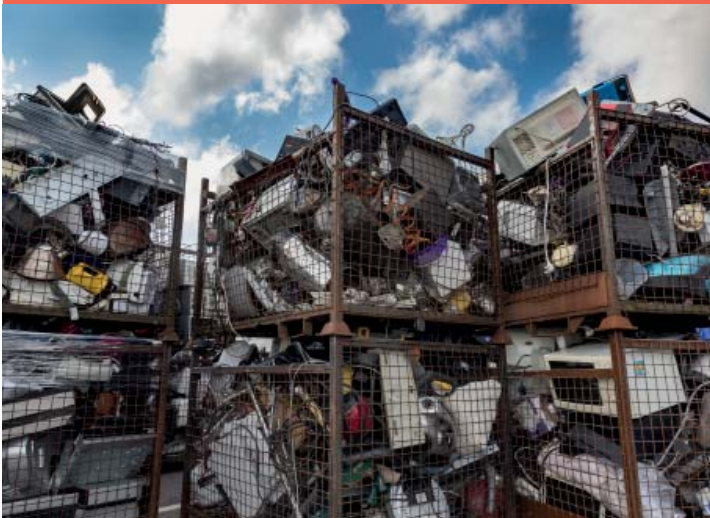
PROMOTE INDUSTRIAL PARTNERSHIPS AND COOPERATION

Aside from the question of how collective actions can be piloted, many technical obstacles face industrial companies seeking to transform their production processes so they can reduce their environmental impact, whether in terms of materials used or waste generated. SEB and Veolia describe how they set about creating an industrial cooperation project based on the introduction of recycled materials into the plastics production process. The initiative enabled them to solve an array of technical obstacles and lay the structural groundwork for a new-look production sector.

Joël Ntsondé,
issue coordinator

TOWARDS A SOCIETY OF SOBRIETY: conditions for a change in consumer behavior

Valérie Guillard
Professor at Paris-Dauphine University



Valérie Guillard is a professor at Paris Dauphine University - PSL. Her work examines peoples' relationships to objects. She seeks to understand practices relating to possession, dispossession, non-possession and consumer sobriety with the aim of reducing wastage and waste. She has coordinated and/or participated in research studies financed by ADEME, including most recently CONSCI-GASPI (understanding wastage through its conscientization) and SOBRADEME (conceptualizing sobriety). She won a prize for her thesis on "hoarding behavior" of consumers (FNEGE publication prize), leading to publication of a book *Garder à tout prix, une tendance très tendance [Keeping absolutely everything, a very on-trend trend]* (Éditions Vuibert, 2013). She has also edited several collective works on the accumulation of objects: *Boulimie d'objets, l'Être et l'Avoir dans nos sociétés [A lust for objects, the being and having of our societies]* (Éditions de Boeck, 2014) and *Du Gaspillage à la Sobriété, Avoir moins et vivre mieux? [From wastage to sobriety, having less and living better?]* (Éditions de Boeck, 2019). *Comment Consommer avec sobriété, Vers une vie mieux remplie [How to Consume with Sobriety, Towards a more fulfilled life]* (Éditions de Boeck, 2021) is a collection of reflections on the relationship of consumers to sobriety.

The negative impact our lifestyles have on the environment means we have to think beyond the circular economy (reuse, recycle, eco-design) and imagine lifestyles marked by greater sobriety. Sobriety is a lifestyle that involves not just consuming better but also, and critically, consuming less. It can be expressed in consumption of energy and digital technologies as well as via material objects. Making the commitment and embracing sobriety to live a more sober life are ways of living that are conditioned by changes in practices on the part of consumers, the units analyzed in this article, at every stage of the consumption process (perception and sensation of need, products purchases and places of purchase, use and non-use of objects, dispossession).

Changing your habits as a consumer entails seeking meaning through other ways of doing and being, which requires revisiting, or even initiating, relationships with objects, the self and others. Sobriety places notions of conscience at the center of relationships with the world, alongside the effort and determination involved in challenging personal and social norms.

Organizations, both public (local authorities, for example) and private (non-profits and businesses), could offer a range of mechanisms, products and services to restore to consumers the skills needed for this lifestyle (the knowledge, know-how and attitudes) as well as the opportunity to pursue it. Sobriety should be a space within which consumers and organizations alike can find fulfilment.

INTRODUCTION: FROM A CIRCULAR SOCIETY TO A SOCIETY OF SOBRIETY

Surely the society of tomorrow should shift from the circular economy to the sobriety economy? After the linear economy concept (produce, consume, dispose) and its limits in terms of waste, societies have evolved toward a circular economy, one that places a value on that materials that have become useless by reintegrating them into the production (eco-design¹) and/or consumption process. Although virtuous, this vision of society focuses on the downstream (recycle and reuse), in other words on managing what exists, with little thought to the upstream, in other words, on ways to avoid depleting reserves of resources. It would appear that, mindful of the state of planet, recycling or reusing the useless is not sufficient to cap carbon emissions. Consuming less would make a bigger impact. "Less and better" is a good way to sum up sobriety, which in academic terms centers on voluntary simplicity. This is a lifestyle rooted in reducing consumption of material objects, digital technologies and energy. Are consumers prepared to shift toward this lifestyle? What are the conditions needed for consumers to switch to sobriety?

¹ Franck Aggeri. *Vers l'innovation responsable. [Toward Responsible Innovation] Esprit* (Paris, France: 1932), Editions Esprit, 2020, pp.40-51.

ADOPTING SOBER BEHAVIORS: WHAT ARE THE IMPLICATIONS FOR CONSUMERS?

Committing to a process leading toward sobriety requires rethinking every practice at every stage of the consumption cycle: the purchase, use and dispossession of objects (A), which leads consumers to rethink their relationships to materiality, the self and the other (B).

(A) WHEN CONSUMING LESS AND BETTER ENTAILS A CHANGE IN PRACTICES

Consuming in a sober fashion starts with the expression of a need, or at least, what the consumers thinks is a need but is in fact often a desire or perhaps a whim. Consumers often purchase through habit, acting impulsively because they think they're getting "a good deal", or "just in case" they fail to find that same good deal. But purchases, especially of non-food items, rarely respond to a need. The function of objects is generally to heighten an experience and, by extension, the stimulating emotions that activate pleasure. The products purchased thus become emotional merchandise.²

To buy only in response to a need is something that can be learned. It implies that consumers ask themselves what their need is truly expressing. This is something that people who joined the Nothing New challenge run by non-profit Zero Waste discovered.³ Through trying to limit their purchases of new objects, these consumers (95% of them women) realized that the consumer society creates frustration that is experienced through the ceaseless quest for the new (spectacle, object, wellness experience, etc.). The challenge also enabled the women to transform their relationships to consumption through questioning the ways in which items are acquired.

A sober acquisition entails rethinking the types of objects to acquire, how and where they are acquired.

First of all, the idea is to swap from purchasing resource-intensive new products to acquiring pre-existing used products. Consumers are increasingly opting for secondhand thanks to the boom in the number of secondhand stores and platforms that bring private buyers and sellers together as part of the collaborative economy. However, it would seem that the portion of secondhand purchases varies according to the product category. Consumer electronics, for example, are less frequently purchased secondhand than other categories of objects: consumers prefer to buy new when it comes to computers, telephones and tablets, as new products come with better warranties (returnable if they break down or don't work properly, etc.) than secondhand goods.

A sobriety-led approach requires consumers to change their practices at every stage of the consumption cycle (defining need-purchase-use-non-use of objects and their dispossession)

Sober purchasing also involves buying quality products that will last, and paying attention to the materials used. This entails not merely thinking of the object but feeling it too, no longer deploying only representations and beliefs but also knowledge and senses (touch, hold, experience through the body). In other words, methods of relating to products and acquiring them that are little explored by consumers.

Consumers then turn to alternative non-market mechanisms to acquire what they need. Donations between individuals or between anonymous people via dedicated drop-off boxes (Givebox), swaps, picking up items from the sidewalk⁴ or, for the more militant, food from the trash, are all practices that save materials from being thrown away. People's motivations to adopting such practices might be economic:⁵ they take remnants and objects no longer wanted by other households,

restore or repair then and sometimes resell then via one of the platforms. Most people tend to be driven to act by the idea of "limiting the wastage that revolts them," a motivation that combines with the pleasure of rummaging through a pile of objects, seeking the hidden treasure and restoring it to use. Renting, lending, borrowing, making available, restoring, tinkering, repairing are also practices that extend the life of objects without purchasing them.

In addition, sober consumption entails selecting purchase places that align with this approach. Local outlets are favored where possible, such as small shops or producers, via local producer-consumer networks for example, where it is possible to ask for advice, create a relationship rooted in trust and avoid the packaging that comes with delivered goods.

In essence, being a sober consumer requires the quest for a type of consumption that takes full account of the consequences of consuming on the environment, doing "all that's possible" to avoid triggering production of a new object (and potentially its destruction at an unknown date in the future). This is an approach that requires time (research, collating information, comparing alternatives), during which the consumer may come to realize that they in fact have no need of the product. However, if a secondhand or free acquisition can be a way to "consume better" that fully aligns with the circular economy, such practices do not always help to "consume less." The lower cost of a secondhand object, or having almost unlimited access to something via a fixed-price rental (clothes for example) often leads consumers to "give in to temptation", failing completely to challenge their dependency on consumption. Sobriety demands breaking this dependency, as much for the acquisition of a product as for its use.

² Eva Illouz (2019), *Les marchandises émotionnelles [Emotional Merchandise]*, Premier Parallèle.

³ Laurence Auzary, Sophie Dubly, Lucie Guillory, Justine Loizeau, Capucine Olivier, Juliette Ricq, Cindy Tieu, Cécile Wajsblat, Philippine Weingarten (2019), *Etre et/ou devenir sobre en participant au(x) défi(s) « Rien de neuf » de Zero Waste France: analyse des profils, motivations, vécu et de la communauté Facebook [Adopting sober consumption by taking part in the Nothing New challenge(s) run by Zero Waste France: analysis of profiles, motivations, experience and the Facebook community]*, in Guillard V. (2019) (dir.) *Du gaspillage à la Sobriety [From wastage to sobriety]*, pub. De boeck.

⁴ Roux, D., & Guillard, V. (2016). *Circulations of objets entre étrangers dans l'espace public: une analyse des formes de socialité entre déposeurs et glaneurs [Objects circulating between strangers in the public space: analysis of forms of sociality between people who drop off and people who pick up]*. *Recherche et Applications en Marketing (French Edition)*, 31(4), 30-49.

⁵ Naturally, people living in poverty also search for items they can gather to have no-cost access to food and other objects. The choice of a sober lifestyle does not include people living in poverty or on society's margins.

Another condition for consumers to move to sober consumption concerns the use of products. Sober use equates to using fewer things for a longer time. Digital sobriety, for example, involves not having several devices that provide a similar function (such as computer, tablet, e-book reader and smartphone⁶) but just one, preferably a reconditioned purchase that is used to meet a need rather than to stave off boredom. 90% of total energy use occurs prior to the purchase of a digital device (metal extraction, production, assembly and transport).⁷ Manufacturing a two-kilo laptop computer emits 124 of the 169 kilos of CO₂ emitted over its entire lifecycle, and requires 836 kilos of raw materials.⁸ But consumers do not often wait for a device to break down before changing it. In France, cellphones are replaced approximately every 20 months,⁹ sometimes because they are slowing down but often simply so that people can swap to the latest version, the object representing its owner in the social sphere. Product obsolescence is partly due to aesthetics,¹⁰ technological aspects or, paradoxically, to the energy-saving promises of new objects.

And as for the non-use of objects, their accumulation in the home even when they are no longer used, is this also a practice that aligns with sobriety? There is no easy answer. It depends on the true use made of the object. Let's look at an example: a gardener will store bags, old crockery, old windows "just in case" he/she needs them to cover her seedlings, to make mini-greenhouses during a cold spring. On the other hand, some people tend to "keep everything"¹¹ without realizing these objects have lost their utility, and hence are wasted. Is keeping an object a waste if it serves no purpose? Again, it depends. A gift, personal souvenir or inherited item is rarely wasted in terms of the owner's representation, even when these objects are not used. They embody ties that go above and beyond their mere usefulness.

Lastly, adopting a sobriety-centric approach leads to the dispossession of objects by opting to transform them (for example, turning a pair of jeans no longer worn into a bag), reuse them by giving, handing on or swapping them in place of discarding them, or perhaps recycling them at a dedicated location.

All of these practices needed for a sober consumption approach are challenges to the ways of relating to materiality, the self and others.

(B) WHEN SOBRIETY ENTAILS CHANGING WAYS OF RELATING TO THE WORLD

Consumers who commit to an approach guided by sobriety do so for reasons that are economic or environmental, but also because they feel a need to give (back) meaning to their consumption or modify it. Consumption, and the objects, are a means of self-definition in the eyes of the other, but they also give meaning to daily life or work. We may accept a job that is not much fun but well-paid for the "quality of life" it offers, if quality of life simply involves the possession of objects that can be useless or very little-used, or having experiences supposed to be exciting but where the excitements last no longer than the moment they occur.

Finding a meaning to assign to sobriety in consumption can be conditioned by the quality of ties that bind us to the self and the immediate environment. As Françoise le Hénand explains,¹² "the question of the meaning of life for each human being seems to me to be closely linked to the ability to establish relationships. This is as much about creating links between different aspects of the conscious and sub-conscious subjective experience — sensation, affection, thought, dream, fantasy — as it is about situating components of a person's history within their spatial inscription and chronological ordering (past, present and the future to come) [...] This relationship to the self conditions the possibility and quality of relationships we are capable of maintaining with others and the world, our capacity to love." (p.20).

To question the meaning of consumption is to reflect on relationships to objects. This entails being able to tell the difference, when experiencing consumption and use, between the needs, desires and urges that these objects are supposed to nourish. Being conscious of experiences of consumption that do not nourish a person's individuality is something that has to be worked on, an approach that demands sufficient time be taken to gain consciousness as well as to make the required effort. According to Julia Faure, the founder of a company called Loom, sobriety, the approach she uses when designing her products, demands effort. She explains that one of the problems with our consumption model is the marginal comfort it supplies. A portion of our economy (and source of environmental and ecological problems) is predicated on our greatest weakness: laziness. The concept of effort lies at the interface between the physiology of action and the philosophy of taking action.¹³ Making an effort implies "deploying all the capabilities a living thing is capable of for the purpose of conquering resistance or overcoming difficulty."¹⁴ Effort becomes a category that can be used in the analysis of sobriety because it is so closely tied to the phenomenon that conditions it, an expression of will. Effort — that of doing something as much as of not doing something, of resisting — results from the assessment made to determine the quantity of energy to deploy to attain an objective. This means that to embrace sobriety requires making the effort to

6 82% of households owned a computer in 2017 compared to 45% in 2004; 76% have an internet connection compared to 45% in 2004. In 2018, almost 100% of 16-44-year-olds had a smartphone (INSEE, 2019).

7 GreenIT, 2019. The environmental footprint of the digital world: https://www.greenit.fr/wp-content/uploads/2019/11/GREENIT_EENM_etude_EN_accessible.pdf.

8 *La face cachée du numérique. Réduire les impacts du numérique sur l'environnement [The hidden face of digital. Reducing the impact of digital on the environment]*. ADEME. November 2019.

9 <http://www.journaldunet.com/diaporama/0610-mobile/4.shtml> (Source: Observatoire sociétal du téléphone mobile AFOM / TNS SOFRES), in the USA, the smartphone replacement cycle for individuals was 3.17 years in 2020 (<https://www.statista.com/statistics/619788/average-smartphone-life/>).

10 Guillard, V., & Le Nagard-Assayag, E. (2014). *Mieux comprendre l'obsolescence perçue des produits durables par les consommateurs [A better understanding of consumers' perceived obsolescence of products that last]*. International congress of the French Marketing Association.

11 Guillard V., Pinson C. (2012), *Comprendre et identifier les consommateurs qui ont tendance à "tout" garder [Understanding and identifying consumers who tend to keep everything]*, Recherche et Applications en Marketing, 27, 3, 57-79.

12 Françoise Le Hénand, *La quête du sens [The quest for meaning]*, Cahiers Jungiens de Psychanalyse, 125, pp19-28.

13 Seignan, G. (2013). *Psychologie de « l'effort volontaire »: les déclinaisons de l'énergie psychique entre le XIX^e et le XX^e [Psychology of the "voluntary effort": manifestations of psychological energy between the 19th and 20th centuries]*. Bulletin de psychologie, (5), 407-416.

14 CNRTL, CNRS dictionary.

challenge one's personal norms and habits: downloading films rather than watching them live, reducing temperatures in the home to cut energy consumption, keeping an eye on water use to detect leaks, fitting low-energy lightbulbs, traveling by bicycle not car whenever practical, not spending five minutes under the shower,¹⁵ and so on.

Committing to a sobriety-driven mindset also requires taking a position vis-a-vis the social sphere. Is it acceptable to you, but especially to the other, to receive a secondhand object as a gift? To offer an object that is new is one of the conventions that surrounds gifting (unless the secondhand object is a collector's item).¹⁶ The care, friendship and love that the receiver perceives in the gift depends on the effort made to find the right gift, which corresponds to what they feel the other person thinks of them, but also of the effort involved in having paid a certain price. It is very likely that to be given a designer pullover in perfect condition but that has already been worn and comes without the packaging that gives it all its value will risk damaging the relationship between the two protagonists in an exchange. Aside from gifts, people may encounter difficulties in staking a place in an interaction with others through a refusal, based on belief in their values of sobriety, to travel by plane for a holiday, purchase new trainers for a teenager, order a book from Amazon, or perhaps subscribe to Netflix.¹⁷

To sum up, the ability to move beyond personal and social norms is a necessary condition for the adoption of the sobriety-led approach. How can organizations help consumers with this approach?

HOW CAN SOBER CONSUMPTION BE MADE ACCESSIBLE?

Sobriety is an approach, and like any mindset it is based on willpower, knowledge and action, three characteristics that fall within the concept of skill sets, but also the ability to act, examined here through the prism of the territory.

In terms of knowledge, setting up workshops, conferences, and practical guides are all tools that help people to learn what can be done to consume less and better. The idea is to reduce consumers' ecological mental workload,¹⁸ particularly among women who are the group that feels the most concerned. Consumers need information that is simple, available when they need it, and sufficiently well-presented so that little effort is required to process it.

In terms of know-how, it seems that consumers need (and want) to learn by doing. How can they learn sober practices? How to find help putting them into practice? Knowing how to sew, drill a hole, plant lettuce, prune fruit trees or repair a bicycle are all skills that have been abandoned to the market for many years. Which does not mean that they could not be reintroduced as part of the curriculum at schools or even universities. Some habits require a real learning process, even though consumers fail to appreciate this. Home organizers, for example, teach consumers how to reconnect with objects, space and others through sorting and tidying their homes. But this as yet little-known profession, despite the popularity of Marie Kondo, is completely in tune with the idea of implementing a sobriety-led approach.¹⁹ Yet home organizers provide a know-how-to-be service, in the sense that they teach consumers to retain only that which truly corresponds to them by purifying their relationship to consumption.

The ability to act, in other words, the existence of suitable mechanisms, remains essential. People living in rural areas feel "penalized" by the lack of such mechanisms, which paradoxically leads them to increase their ties to the town in order to put their sobriety approach into action (buy in bulk, secondhand, attend workshops, etc.).²⁰

IN CONCLUSION: IS SOBRIETY REALISTIC IN THE CONTEXT OF THE HEALTH CRISIS?

The Covid pandemic leads us to question our lifestyles, which have suddenly become more sober. Consumers are focusing on buying only essentials, and have also become aware of the dangers that delivery workers are exposed to when delivering non-essential products. A social life that is absent, or limited, also leads to a fall in consumption. In September 2020, 54% of people interviewed, up from 49% in April, stated that they "want to enjoy life differently, by consuming less and renouncing purchases now seen as useless in the light of lockdown."²¹ The health crisis has strengthened ties between consumers and local producers, mainly but not only in the countryside,²² which has helped to initiate new practices.

Nevertheless, the road to hell being paved with good intentions, will these new habits continue over the long term? On the one hand, the negative consequences on national economies of reduced consumption are all too clear. On the other, sobriety can be an approach that offers potential in the economic (responsible production of good quality products or services that transform business models), social (reduce the inequalities caused by the purchase of social markers) and ecological spheres. Realizing this potential will take a great deal of will, especially political will.

15 <https://www.ademe.fr/sites/default/files/assets/documents/guide-pratique-economiser-eau-energie.pdf>.

16 Montant, S. (1998). *L'invention d'un code: du malaise à la justification [Invention of a code: from uneasiness to justification]*. Ethnologie française, 445-456.

Monjaret A. (1998). *L'argent des cadeaux [The money behind gifts]*, in Chevalier S. and Monjaret A., Ethnologie Française: Les cadeaux à quel prix?, XXVIII (4): 493-505.

17 Guillard V. (2020). *Etre ou ne pas être soi face aux autres dans un contexte d'anti-consumation, Une explication par le concept de congruence [Staying or not staying true to yourself in relation to other In an anti-consumption context]*, French Marketing Association symposium, May.

18 Mental workload is the cognitive load represented by all the domestic and professional tasks a person is required to think about (not just those that the person has to do themselves), leading to mental and physical fatigue. For example, thinking about having to pick up bread for dinner while you're in a meeting. Aurélie Schneider, La charge mentale des Femmes et celle des hommes: mieux la détecter pour prévenir le burn-out [Women and men's mental workload: Improving detection to prevent burn-out], Editions Larousse, 2018.

19 <https://theconversation.com/comment-expliquer-le-succes-du-home-organising-147768>.

20 Ben Kemoun N., Caitucoli PM and Guillard V. (2021), *La déconsommation en ruralité comme axe de développement territorial, L'analyse du lien au territoire dans le cadre du défi « Rien de Neuf » de l'association Zero Waste France [Deconsumerism in the rural environment as a strategy for territorial development, analysis of the ties with territory as part of the Nothing New challenge run by Zero Waste France]*, Revue d'Economie Régionale et Urbaine (awaiting publication). OR FORTHCOMING?

21 Crédoc, Lifestyle and aspirations surveys, April 2020 and September 2020.

22 Salomé Berlioux (2020), *Nos Campagne Suspendues [Our countryside suspended]*, La France périphérique face à la crise, Editions de l'Observatoire.

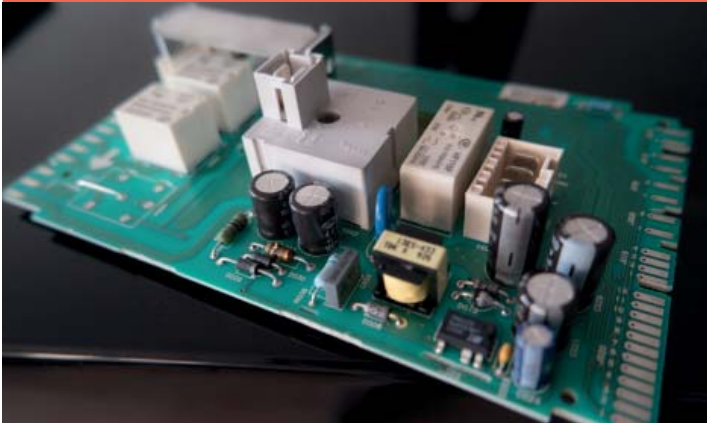
ACCELERATING THE TRANSITION TO CIRCULAR CONSUMPTION MODELS: the example of the AGEC law in France

Adèle Chasson

Public affairs manager at HOP - Halte à l'Obsolescence Programmée (Stop Planned Obsolescence) from 2019 to 2020

Laetitia Vasseur

Co-founder and executive officer at HOP - Halte à l'Obsolescence Programmée (Stop Planned Obsolescence)



Laetitia Vasseur is co-founder and general delegate of the association HOP / *Halte à l'obsolescence programmée* and Adèle Chasson, formerly in charge of public affairs. HOP aims to bring citizens together to influence laws and manufacturers towards more sustainable and repairable products.

The NGO HOP contributed to drafting the AGEC act (Anti-Gaspillage et Economie Circulaire) [Anti-Waste and Circular Economy] adopted by the French parliament in early 2020. HOP was an active member of the working groups that prepared sections of the new law dealing with repairability and extending the working life of electrical and electronic products. Working with government, manufacturers, retailers and repair specialists, organizations like HOP worked to represent consumers' interests, helping to ensure the adoption of a repairability index that will help consumers understand the extent to which certain categories of products can be repaired.

The process that ultimately led to the AGEC law also led to the establishment of a repair fund intended to lower the ultimate repair cost paid by consumers. These mechanisms should help to shift people's thinking. It is hoped they will also encourage manufacturers and retailers to improve their practices so that they offer products that are easier to repair and last longer. They may also encourage consumers to choose products that are more respectful of the environment.

What are HOP's main missions and activities?

Laetitia Vasseur and Adèle Chasson: HOP was founded in 2015 to unify citizens, influence policymaking and encourage manufacturers to make products that are easier to repair and last longer. It represents a community of 40,000 people and its day-to-day activities are run by a 20-strong team of volunteers.

Our work covers three primary areas.

- Raising awareness in the general public through activities such as conferences and studies designed to allow people to learn more about planned obsolescence (defined in article L.213-4-1 of the French consumer code as “any technique by which a provider seeks deliberately to reduce the lifetime of a product in order to increase the rate of replacement”) and the solutions that exist for extending the life of products. We also run an internet platform, at www.produitsdurables.fr, that offers French consumers advice about keeping their products working for longer and ranks products according to their longevity.
- Our lobbying activities seek to guide and influence policymakers in the drafting of new laws. Specifically, we contributed to implementation of the Anti-Waste and Circular Economy law (AGEC).
- The final pillar of our activities focuses on the Business Durability Club we have set up to encourage member companies to share best practices so they can offer products that are more durable.

Before the AGEC law was finally enacted in January 2020, working groups were established, made up of members from a wide variety of horizons, including retailers, manufacturers, repair specialists, NGOs and public bodies. How did the consultation process function?

LV and AC: In reality it began prior to 2018, with one of the main early achievements being the government's publication, in April 2018, of its roadmap for the circular economy. This law is the fruit of an extensive process of prior consultation between the various interested parties. Working groups with a special focus on the reparability index were set up following the measures announced in the roadmap, with sub-groups for each product category (washing machine, TV, laptop computer and electric lawnmower). The consultation process gave us a chance to think about the reparability criteria to include in the index, which we hope to extend to include other families of products. Specifically, we want to see it extended to include printers and small household appliances.

This was a true collective effort that involved lots of hearings with stakeholders at the national assembly and the ministry for ecological transition, including NGOs like us, even though we do not have the same resources as some industrial lobbyists. However, we certainly made an impact because our work inspired over 50 amendments that were lodged by members of parliament.



Logo of the HOP NGO

More specifically, what position did HOP adopt during the process of drafting the new law?

LV and AC: Our number one aim was to ensure that consumers were informed and protected. From the outset, we actually argued for a durability index to be introduced as of 2021/2022. However, the government's preference was to start with a reparability index in 2021 before moving, in 2024, to a durability index that would also take account of products' robustness. This means it will be more of a gradual process. And although we are happy with the overall result, we will keep a very close eye on how it is implemented.

For instance, consumers will be informed about the availability of technical documents (instructions, user advice needed to make repairs, product updates, etc.) and will benefit from a six-month warranty extension if their product is repaired.

But you must never lose sight of the fact that product durability depends essentially on manufacturers and not consumers. This is why we feel that there needs to be a requirement to make spare parts available during the entire life of the product, and that there should be a ban on products that cannot be repaired. For example, in 2016 HOP denounced Apple for one of its practices that meant that an error code was generated if a device was repaired by a repairer not certified by Apple. It is important to make sure that manufacturers do not force people to use their network for repairs.

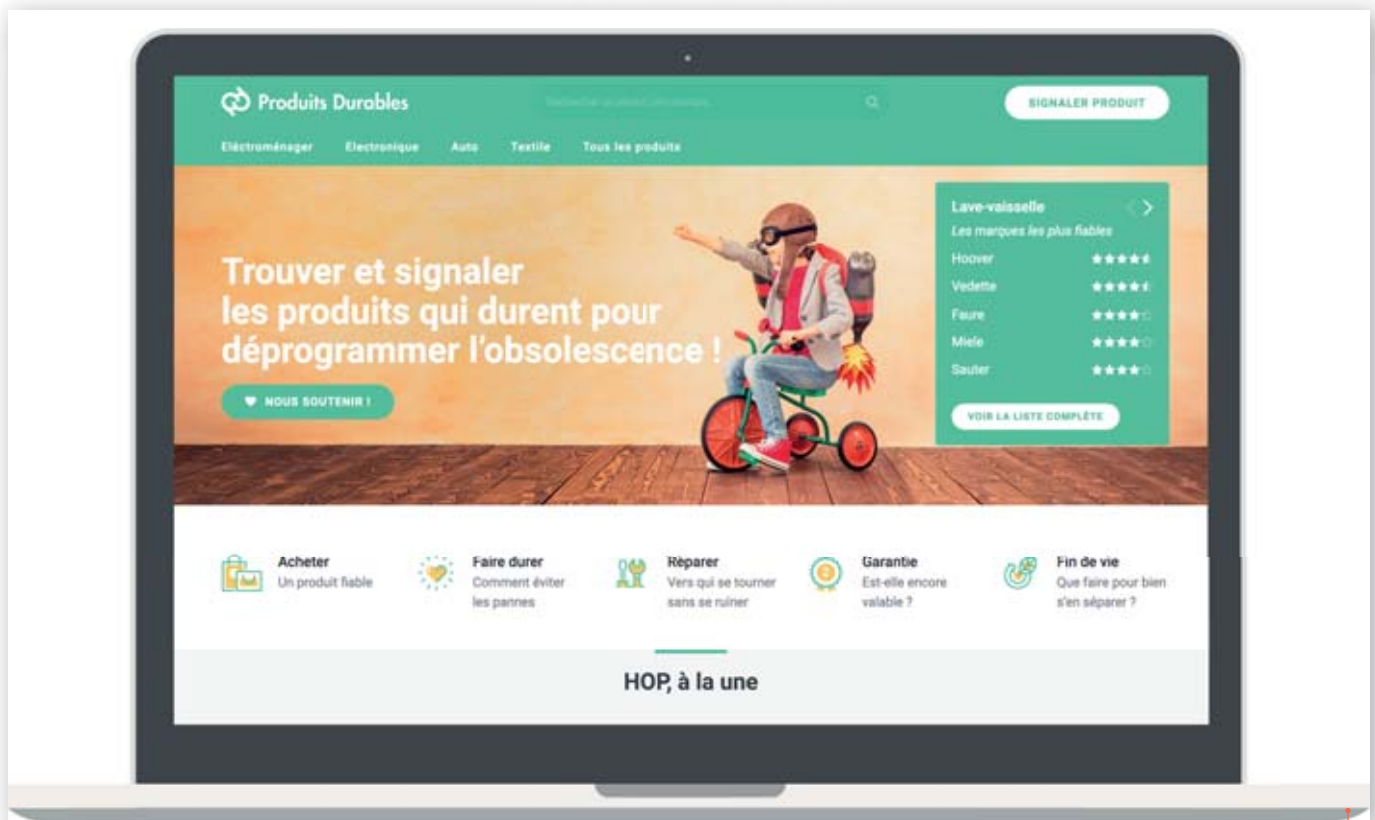
How have manufacturers received this new law? What are the risks and/or opportunities for them?

LV and AC: Some of them consider the new law to be a risk, because they worry that they will face greater restrictions in France than elsewhere. There is certainly a need to harmonize national regulations in this regard. But more and more businesses see this law as an opportunity.

In fact, the members of the Business Durability Club recently published an opinion piece in *Le Monde* newspaper in defense of the law at a time when it was under attack from various manufacturers' lobbies.¹

These businesses are doing their best to advise their customers about how best to use their products,

¹ Column published on June 2, 2020, *La crise que nous traversons nous oblige à repenser notre modèle économique et sociétal à l'aune de la durabilité* [The crisis we are living through obliges us to rethink our social and economic model in the light of durability]: https://www.lemonde.fr/idees/article/2020/06/02/covid-19-la-crise-que-nous-traversons-nous-oblige-a-repenser-notre-modele-economique-et-societal-a-l-aune-de-la-durabilite_6041448_3232.html



Internet platform launched by HOP on sustainable products

facilitate access to repairers and draw attention to their environmentally responsible practices. One example is Kippit, which has launched a durable and repairable kettle.

In your view, what are the main advances with the new AGEC law?

LV and AC: The two biggest advances are the establishment of a repairability/durability index to inform consumers about the repairability of certain product families (washing machine, TV, laptop computer, smartphone, electric lawnmower, etc.), as well as the requirement to provide spare parts for laptop computers and smartphones for at least five years.

What effects might these advances have on the economic and civil society actors concerned?

LV and AC: We think that it will become standard practice for companies to keep stocks of spare parts and to facilitate repairs to their products. Manufacturers and retailers might also choose to make a stand, reacting to pressure from the authorities and citizens.

Overall, this law will make it simpler for people to choose products on the basis of durability and respect for the environment.

In your opinion, what role should consumers play in the transition to a circular economy?

LV and AC: Consumers must make sure their demands for new types of offerings are heard, and they must also make full use of new tools such as the repairability/durability index so they can choose longer-lasting products. They also need to learn how to maintain their products so that they last longer.

People need to completely rethink their attitudes to consumption, avoid consuming things that have no purpose, and think about repairing before replacing.

What are the main risks and points to watch out for once the AGEC law is applied?

LV and AC: It is important that the repairability index is operational as of 2021.

We must also be vigilant in terms of controls and transparency and ensure we have access to the methods manufacturers use for their classifications. And the exceptions permitted by the law must not lead to lower standards when the law is implemented, as is sometimes the case. It is important to respect the spirit behind the law.

Building on the progress made with this law, what actions can policymakers take to promote the emergence of new circular practices such as eco-design, longer product lives, repairability and reuse?

LV and AC: Advertising is a question that emerged after the law, as reports have been published highlighting the links between advertising and the ecological transition. However, the advertising industry is not engaging with the issue. Advertising encourages excessive consumption which runs counter to laws like AGECE that are trying to give people the keys to change their behavior. The advertising sector also needs to transition to an ecologically led approach.

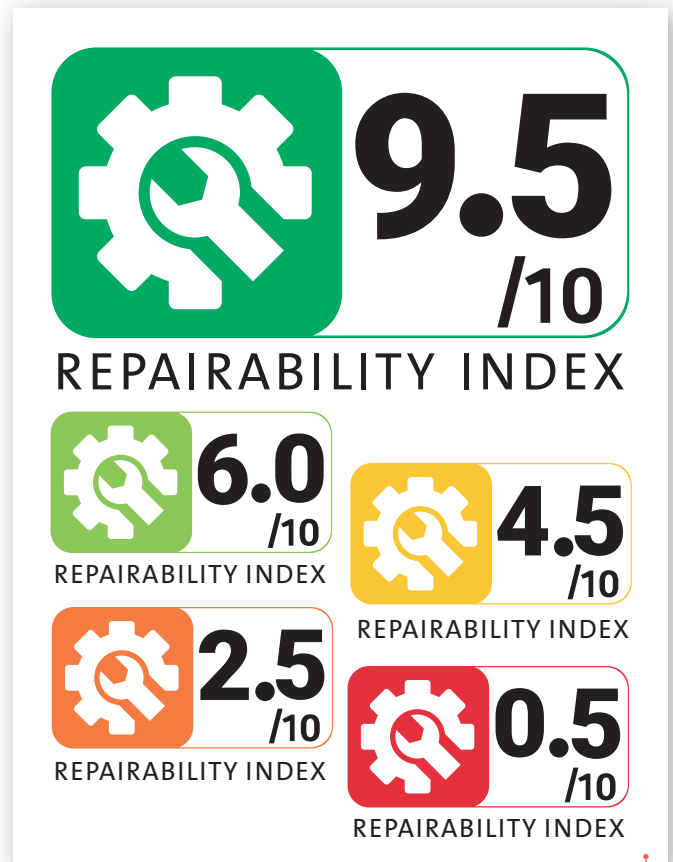
In France, the citizens' climate convention made several recommendations about advertising, but policymakers have not as yet shown any enthusiasm for the subject. Advertising agencies are, however, starting to make voluntary commitments.

There is also the issue of software obsolescence, defined in law as a "set of techniques that lead to degraded device performance caused by updates to content or digital services, or the absence thereof" (senate report number 242, 2020-2021). The law needs to require software publishers to provide long-term maintenance for their products in order to ensure their long-term compatibility with older computers, smartphones, or any other piece of electronic equipment that uses an application layer. The law does not have much to say about this aspect. We feel that a two-year software warranty is too short, and our organization is lobbying for an increase to eight years, which a number of software publishers confirm is feasible. We also want consumers to be able to accept or reject any software updates offered.

Would you say that the new law makes France a pioneer for the circular economy in Europe?

LV and AC: In terms of the messaging, yes, it is setting the pace. But, in practice, we are very far from where we need to be. We will have to wait a few years to see what is actually put in place. And the measures passed on repairs and spare parts should provide more detailed information than anything available right now elsewhere in Europe or around the world.

At the national level we can take things further, with the aim of inspiring future European measures. And being inspired by them since some measures will be more effective when taken at the European level.



Repairability index of the AGECE French law

Which countries in Europe and around the world do you think are particularly advanced in terms of implementing circular consumption models?

LV and AC: Some Scandinavian countries, such as Sweden, have taken concrete steps to encourage equipment repairs, with tax credits and extended warranties. The Netherlands and Belgium have also encouraged the development of repair cafes. There is a very active repair cafe association in Argentina. The RightToRepair movement is also developing in the USA. Canada is currently considering whether to introduce a law banning planned obsolescence. And while in places like Colombia the repairing culture is far less formalized, it is also second nature to its citizens. Each country has its own particular set of circumstances, and initiatives are emerging on every continent.

THE POWER OF PUBLIC PROCUREMENT IN THE TRANSITION TO A CIRCULAR ECONOMY

Ashleigh McLennan
Sustainable procurement and economy officer at ICLEI (International Council for Local Environmental Initiatives)

Birgitte Krebs Schleemann
Marketing manager for green transition at DGE and former project manager in the City of Aalborg



View of Aalborg City, Denmark

Ashleigh McLennan is a Sustainable Procurement and Economy Officer at ICLEI - Local Governments for Sustainability, a global network of more than 1,750 local and regional governments committed to sustainable urban development. Ashleigh works across a range of European circular economy projects with a particular focus on sustainable, circular and innovation procurement.

Birgitte Krebs Schleemann Birgitte Krebs Schleemann is a Marketing manager for green transition at DGE (sustainability consulting). For the past five years, Birgitte has worked as a project manager in the City of Aalborg to establish circular public procurement practices within the Municipality, including being part of the pilot projects described in this article.

The City of Aalborg in Denmark is home to around 207,000 inhabitants, making it the fourth largest city in Denmark. Aalborg has been committed to improving the sustainability of their municipality for over two decades, and for the past three years, Aalborg has been developing its use of procurement as a tool for developing innovative circular solutions which meet the city's needs. This article presents an overview of two pilot public procurements conducted by the City of Aalborg which have each challenged current working practices, and led to new understandings of how to meet workers' and citizens' needs, in ways which are both cost effective and sustainable in the long-term.

INTRODUCTION

The City of Aalborg in Denmark has been committed to improving the sustainability of their municipality for over two decades, even giving its name to the Aalborg Charter, which since 1994 has been used as the basis of the commitment of over 3,000 local authorities for local environmental action. Despite this long history, it is still challenged with very high levels of consumption and waste, even in a European context. In fact, the average Danish person consumes 24.1 tonnes of material annually, compared to the EU average of 13.3 tonnes¹.

It's within this context that circular economy solutions have become increasingly attractive to the municipality. The experiences of the City in two recent pilot procurements for the buy-back of ICT products and sustainable "learning environments" provide valuable lessons other public authorities looking to support circular transition.

¹ Metabolic (2020) Exploring Circular Solutions in the Waste System



From public procurement to circular public procurement: a change journey - ©City of Aalborg

WHY CIRCULAR ECONOMY?

In the year 2020, there is no longer any question of the scale of the environmental challenges we face – and their associated economic and social challenges. Despite this, current trajectories predict further decline. Global consumption of resources is expected to double in the next forty years, while annual waste generation is projected to increase 70% by 2050². The ability of our natural ecosystems to continue to function in the face of such degradation is in doubt, which is to say, business as usual is not an option. Any attempt to halt and reverse environmental destruction will need to address resource use and consumption, as it is estimated around half of global greenhouse gas emissions and more than 90% of biodiversity loss and water loss occur at the resource extraction and processing phase³.

It is therefore clear that a more radical change in the socio-economic structure of society is needed, one which goes beyond incremental efficiency improvements and instead reworks our relationship with materials. It is in this context that the concept of a 'circular economy' has emerged, providing fresh impetus in the search for a more sustainable socio-economic system, and signalling in an obvious way a break from the current

One of the most direct ways that government can incentivize the transition to a circular economy is supporting circular businesses and business models through its own spending

'linear' take-make-dispose industrial pattern in favour of material flow loops in which resources are retained in a closed industrial system.

PUBLIC PROCUREMENT IN THE CIRCULAR ECONOMY

A range of policy mechanisms are available for governments looking to support circular transition. For instance, governments can seek to influence the market, whether through soft approaches like encouraging voluntary agreements among industry, or harder measures such as waste and design regulations. They can also try to influence the market from above or below, running consumer-education initiatives or financing research & development programmes. But one of the most direct ways that government can incentivize the transition to a circular economy is supporting circular businesses and business models through its own spending.

Public procurement refers to the acquisition of goods and services by government or public sector organisations and it provides a direct means for government to engage in the economy (estimated to account for between 8 and 25% of the gross domestic product (GDP) of OECD countries). Many public bodies in Europe have already recognised the potential to use procurement to support wider policy goals,

² European Commission (2020) Circular Economy Action Plan

³ *ibid*



Workshop on sustainable development and the circular economy - ©City of Aalborg

such as promote sustainability. This is based on the premise that environmental innovation is risky, and often requires the complete rearrangement of product chains, or the creation of new sectors from scratch. By using government buying power to support sustainable activities, government is able to incentivise and support businesses to take on environmentally beneficial risks.

An increasing number of projects, policy networks, and individual public procurement agencies are now turning specific focus to the concept of 'circular procurement' i.e. "the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle"⁴.

However, while sustainable procurement policy and practice has already adopted principles related to the lower rungs of the waste hierarchy, those strategies which focus on front-end solutions or more holistic change in economic

patterns remain new and unexplored. For example, aiming to reduce packaging materials and asking suppliers to commit to waste reduction goals are more widespread than holistic practices, such as service models which challenge how we acquire, use and retire products within a whole life-cycle circularity model.

The potential of public procurement as a tool for achieving a circular transition is already acknowledged at a European level, with both the new Circular Economy Action Plan (2020) and the Green Deal Investment Plan outlining the Commission's intention to set minimum mandatory green public procurement (GPP) criteria and targets in sectoral legislation in the coming years. In practice however, the implementation of circular procurement is still in a nascent phase.

In Denmark, circular procurement has become a hot topic in the past year. In November 2019, Denmark enacted a new Climate Law, which obliges national government to implement measures to achieve a 70% reduction in CO₂ emissions by the year 2030. Circular procurement is recognised as a key tool for achieving this ambition. As well as national government, others are also aligning to

4 European Commission (2017) Public Procurement for a Circular Economy

this goal, including the Danish Assembly of Municipalities (KL) and the Confederation of Danish Industry (DI) both of which are developing strategies for the circular economy and circular procurement.

THE CIRCULAR PUBLIC PROCUREMENT (PP) PROJECT

For the past three years, the City of Aalborg has been working with a group of cities, government agencies, researchers and business representatives from across the Baltic Sea region to explore the potential of public procurement as a tool for advancing the circular economy, with the support of Interreg Baltic Sea Region. By building capacity among key stakeholders, and conducting pilot procurements to buy circular goods and services, Circular PP has developed new knowledge on public procurement for a circular economy, and has enhanced demand for innovative products and services.

In addition to internal stakeholder consultation, communication with suppliers has also been essential

As part of Circular PP, Aalborg has conducted two pilot procurements. The first explored options to create a service for buying back used ICT equipment from the Municipality (including, for example, mobiles, tablets, computers, laptops, wires, storage and servers). The ultimate goal is to prolong the lifetime of ICT equipment⁵.

The second pilot tender conducted in Circular PP was for a playground / outdoor learning area, which places emphasis on greater use of landscaping to achieve both circular and creative play goals. It builds on experience gained in Aalborg's first circular procurement pilot in 2017 for an 'indoor learning environment'. Both of these indoor and outdoor learning environment tenders share a common ambition to challenge our understanding of what schools and playgrounds should look like, calling attention to the needs of children and teachers, and using procurement as an intervention point for encouraging strategic connections between education and environmental policy and developing holistic solutions which better meet current and future needs.

FROM WASTE TO VALUE: ESTABLISHING A BUY-BACK SERVICE FOR USED ICT EQUIPMENT

Electrical and electronic equipment is one of the fastest growing waste streams in the EU (with an annual growth rate of around 2%)⁶. Aalborg like all large organisations, is a massive consumer of electronics, spending an estimated 2.5% of their annual budget on ICT equipment and software.

The average lifespan of a laptop in the City of Aalborg is 3-4 years. After this, they are usually replaced rather than repaired, because this is cheaper than the labour costs of maintaining old equipment. At this point, old laptops were considered as nothing more than waste which had to be disposed of – for a cost. This approach, however, overlooked the inherent value still contained within the laptops, including their material value.

When Aalborg began investigating opportunities to make their ICT consumption more circular, only three out of seven ICT departments in the municipality had agreements for the collection of old ICT equipment, and the financial value recaptured from these agreements was very low.

In addition, it was discovered that a municipality policy of engraving laptops with the City's logo was creating a large obstacle to laptop reuse. This requirement dated to a time when laptops and computers were still very expensive, and discussions about circularity, reuse and resale were non-existent. This policy is now being

changed, and will result in a relatively simple improvement in reuse opportunities.

In addition to improving the collection of old ICT equipment, Aalborg also wants to extend the length of time it is used for. The Environmental Department calculated that by simply keeping laptops for six years instead of three, the city could cut the same amount of CO₂ emissions created by heating and powering all municipality buildings in the city for a whole year. It would also reduce the waste by the same amount as produced by 3,000 households in one year.

Finally, Aalborg is also now considering other options to improve the use and collection of ICT equipment, including more effective systems for ensuring laptops stay within City's ownership (for example, ensuring that all old equipment is recollected from staff when it needs to be replaced with a new one), and better protection of laptops, smartphone, tablets, etc. to increase their lifetime (such as screen protection and protective covers). In the future, it would also like to ensure high durability and long lifetimes are a feature of new equipment it buys, which can be assisted through the purchase of equipment verified by ecolabels, such as the TCO label. Replaceable batteries for example, are one important circular feature the City would like to see more of.

As a result of her work exploring opportunities to extend the lifetime of ICT, Birgitte Krebs Schleemann, Project Leader at City of Aalborg recommends: "When selling used ICT equipment, make an agreement with sustainable and circular requirements, such as a requirement to do an annual evaluation of circularity, including data on how many laptops, mobile phones, tablets and storage devices have been resold, how many have been repaired and resold, and how much is being reused as spare parts and

⁵ <https://www.sustaineurope.com/a-journey-to-circular-procurement-%E2%80%93-the-unexpected-outcomes-of-aalborgs-circular-ict-pilot-20200428.html>

⁶ https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf



being recycling. This gives both the supplier and the City the information they need to improve their processes in future”.

FROM PLAYGROUND PROCUREMENT, TO PROCURING CREATIVE SPACES FOR PLAY AND LEARNING: AALBORG'S CIRCULAR PLAYGROUND TENDER

Building on their experience in the indoor learning environment tender, in 2018, Aalborg embarked on a similar journey to reimagine playgrounds and find opportunities to increase their circularity.

Play is an important part of a child's development, and playgrounds can support this by providing creative spaces to play and learn. Aalborg's Vision for Municipal Schools sets a target that at least 25% of all learning processes should take place outside of school, either physically or digitally. The goal is to encourage experimental learning and problem solving. Following the COVID-19 pandemic, the importance of outdoor spaces for teaching and learning has only increased.

This process required a shift in the procurement stakeholders understanding of playgrounds as a set of

equipment, to playgrounds as a space for learning and play. Starting in 2018, the Environmental Department began speaking with colleagues across all the relevant departments. First, Aalborg set a baseline by interviewing colleagues from a school and a kindergarten, the playground inspector, a landscape architect from the Department of Parks and Nature, and the Procurement Department.

Through speaking with the above, a set of core needs for playgrounds was identified. Procurers need playgrounds to be cost effective. Park officers need equipment to be durable and easy to maintain. The municipality's playground safety consultant needs to ensure that materials and equipment are safe for play. Education officers need space which can be used for teaching. Last but not least, the environmental officers need the park to be sustainable. In addition, several workshops were held with staff from schools, kindergartens and other relevant stakeholders to discuss their wishes for future outdoor play areas. Nature and the use of natural materials was a common theme.

In order to ensure that all these needs were represented in the process to acquire innovative new outdoor play spaces, a steering committee was formed, with a representative from the decision-making level in the Schools department, the Family and Employability department, the City and

Landscape department, the Procurement department, and the Building department. Together, under the leadership of the Environmental department, the steering committee helped to strategically connect the city's priorities in sustainability, health, and education, finding common solutions to issues which are often tackled in silos.

The result of this collaboration was the creation of a bold vision for a playground which avoids the use of materials altogether, by making the most of natural solutions, such as landscaping and vegetation. The lifetime of a landscape is longer than the lifetime of equipment, and when hills, terrain, and vegetation are established property, the ongoing maintenance of a playground can be kept to an absolute minimum. This nature-based solution for playgrounds can also have a positive environmental impact, such as encouraging biodiversity and capturing carbon. What's more, hills and plants can also create a landscape of possibilities for creative play.

This vision of a circular playground is now being put into practice as part of a large urban redevelopment project in Stigsborg, a former industrial docklands which is being converted into a residential area with education and leisure services for 8,000 people. The neighborhood's school will accommodate 1,000 pupils plus 160 pre-school places, and is being designed as a 'Universe of Children and Youth' – meaning that young people's needs are placed in the center of the design⁷.

In addition to internal stakeholder consultation, communication with suppliers has also been essential. Aalborg first announced their intention to procure a circular playground at the Aalborg Sustainability Festival 2018, giving the market several years notice of their future intentions. In February 2020 they visited a local fair on playgrounds organised by the building department in collaboration with several schools which were planning new playgrounds, where they discussed what was now more concrete ideas for a circular tender, and received feedback from suppliers on their ideas of how to buy sustainably, in particular, avoidance of harmful chemicals, and availability of spare parts and maintenance services. In April 2020, they hosted a further online "Meet the Buyers" event, where they presented their circular and pedagogical vision of the project, in order to prepare potential suppliers for the bidding process. Through market engagement activities, Aalborg developed a better understanding of the current capabilities of the market.

Traditional suppliers of playgrounds are primarily focused on equipment, and do not necessarily have in-house landscape architecture knowledge needed to create features using terrain and vegetation. As such, in their

tender, Aalborg asked bidders to provide a first draft of landscape modeling for the area, indicating their use of terrain, surface material, plants, and play and learning equipment. This should include a description of how the model supports learning and circular economy.

The process of developing a new vision for circular playgrounds has taken time, and it will still be several years before the results are seen as part of the Stigsborg Universe of Children and Youth. Circular solutions are still new and innovative, meaning they are not yet deeply embedded in the market. Innovation needs collaboration and creative thinking, both of which take time. But through proper preparation, the hope is that time and money can be saved in the longer-term.

Innovation needs collaboration and creative thinking, both of which take time. But through proper preparation, the hope is that time and money can be saved in the longer-term

CONCLUSION

Public procurement can be a powerful tool in the transition to a sustainable and just circular economy. There is no standard procedure for implementing circularity however, as much depends on an organisation's structure, current contracts, and local market, to name just a few factors.

Transitioning to a circular economy will require collaboration and concerted effort between new constellations of stakeholders, including internally within public administrations, and externally with market actors. Through implementing the two pilot procurements described above, Aalborg learned that these processes take time, and can sometimes be difficult. This is not a sign of opposition or resistance, but the result of uncertainty. But by focusing on the expected benefits, and ensuring these benefits are in line with organisational policies and goals, progress is always possible.

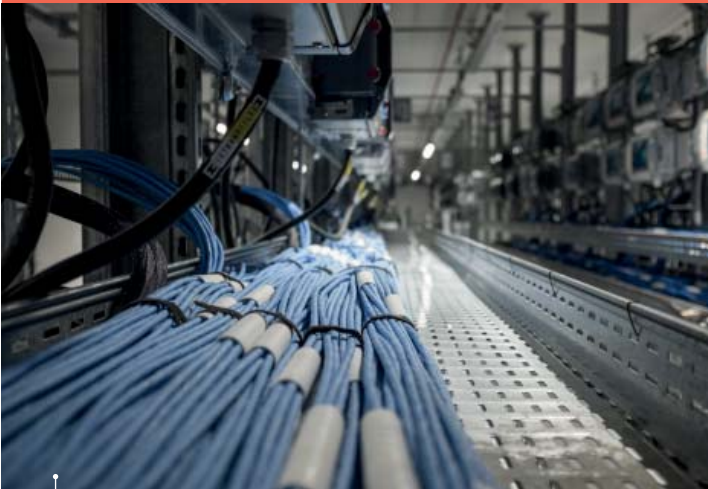
Based on her experience in each of the above change processes, project manager Birgitte Krebs Schleemann advises: "The best way to start circular procurement is to just start doing it! No matter what stage your organisation is at, there will always be opportunities to improve circularity, from getting started with criteria which are easy to insert into your current tender specifications – like criteria for lifetime guarantees, spare part availability, or use of recycled materials – to more ambitious approaches which bring stakeholders together for wider change." Finally, not all the answers lie in what we buy. Sometimes the biggest impact will be not buying at all: "Always ask yourself: is it possible to extend the life of the products already in use? Reducing our overall consumption is a quick win solution to avoid environmental impacts including use of virgin material and generation of CO₂ emissions."

⁷ <https://www.s2c-eu.com/stigsborg-boerne-og-ungeunivers/>

QUESTIONING THE DIGITAL REFLEX

Xavier Verne

IT expert, Lean ICT project, The Shift Project



Wires and optical fibers in a datacenter

The Shift Project is a think tank dedicated to exploring ways to strip carbon out of the economy as part of efforts to combat the climate emergency. It publishes recommendations, modelling, and research applicable to all sectors (energy, construction, transport and digital,...) and addressing the institutional, corporate and government decision-makers that control the levers of the real-world economy, seeking to steer it toward a post-carbon model.

Xavier Verne trained as an engineer at Télécom Paris, is head of digital projects at French national railway operator SNCF, and an active contributor to The Shift Project since 2016, focusing on digital and the Lean ICT project whose publications he co-authors. A qualified teacher of mathematics, he is passionate about the sciences in general and digital sobriety in particular and is introducing digitally lean best practices at SNCF.

Digital plays a double-edged role in humanity's quest for the ecological transition that will ensure its continued existence. As a standalone industry, digital uses massive amounts of hard-to-recycle resources and energy. As an industry that services other sectors of the economy, digital can be a driver of massive savings in resource use and CO₂ emissions, providing enough thought goes into ensuring it is used in the most appropriate and effective ways. Otherwise the rebound effect is inevitable, leading to huge increases in direct and indirect CO₂ emissions. Questions and best practices are now emerging that help make sure digital is part of the solution not the problem, and that it contributes to a more sustainable future.

INTRODUCTION

Bringing people together, providing ways to reuse and share objects, setting up car pools and swapping repair hints and tips all contribute to the circular economy and are facilitated by digital. But digital itself is also a source of pollution, so what is the best way for us to reap the environmental benefits and adhere to the Paris Climate Agreement commitments?

DIGITAL GENERATES HIDDEN WASTE BEHIND THE PAPERLESS CLOUD

Let's start by deconstructing two pieces of received wisdom about digital. The first is linguistic: digital doesn't cause information to vanish into an ethereal and harmless-seeming cloud. In reality, this cloud comprises millions of servers packed into datacenters, processing data that is routed via cables, antennae and network equipment all the way to users' devices. All this hardware generates waste: 2019 was a record-beating year, with 53.6 million metric tons of electronic waste,¹ a 21% increase over a five-year period. Electronics that are part of our daily lives — such as monitors, PCs and residential broadband terminals — account for 21% of the total.

The second concerns recyclability. E-waste recycling is very poor, with a rate of just 17% worldwide. The fault lies essentially in three phenomena. First comes the technical difficulty of extracting rare resources from an end-of-life telephone, with some metals present in trace quantities that are almost impossible to separate and recombine. A second difficulty lies in the availability of recycling plants with the technologies needed to do this work. Their viability is reliant on the long-term price of the recycled commodity, relative to the cost of acquiring the same commodity from direct extraction. A third difficulty relates to the existence of parallel circuits that prevent recovery via official WEEE handling channels that, in Europe, capture around 50% of potentially recoverable waste: the remainder is processed via channels that are less scrupulous about respecting applicable health and environmental standards.

Moreover, digital is seen in two distinct ways, as an economic sector in its own right, with its own value chain, clients and suppliers, but also as a tool that is used to fundamentally alter all other sectors of the economy, via the ubiquitous digitalization of processes. Let's look at these issues one at a time.

A SECTOR WITH A GROWING AWARENESS OF ITS ENVIRONMENTAL IMPACTS

As an industry, the sector's benefits are double-edged. It is resource- and energy-hungry and growing constantly year-on-year by 8 to 10%,² with little clear prospect of a disruptive technology that will dramatically lower levels of complexity, delivering the move to Low Tech,³ without abandoning most, if not all, of this growth. But

several strong signals give grounds for hope. First, the digital industry's awareness of environmental factors is very recent. Other industries, such as construction, via successive sets of thermal and environmental standards, and road transport, via the Euro 4, 5 and 6 emissions standards, confronted the issue some time ago and are subject to increasingly well-thought-out rules that take it into account. Recent reports by the French senate⁴ and the country's national digital council⁵ will sooner or later lead legislators to vote for regulations governing the digital sector, over and above the requirements to display CO₂ and environmental data that have already been passed and are in the process of being implemented. Companies that are prepared for this will have a clear and long-term competitive advantage. Turning to the circular economy, we are seeing the emergence of business models that are more ethically driven: in green design, Fairphone embodies the ideal of modular digital sobriety,⁶ showing that it is possible to double the useable life of telephones, complete with all necessary updates. In terms of extending useable lives, the Ifixit⁷ website takes this approach further and ranks high-tech items as a function of their reparability, thus creating a real purchasing criterion that is starting to gain traction. We are also seeing the emergence of the functional economy, with websites like Commown⁸ offering electronic equipment for hire rather than sale. Lastly, I should also mention the increasingly regular campaigns, in both the B2B WEEE sector and to promote recycling of consumer electronics in the B2C sector, that are having beneficial effects by reducing — slightly — negative externalities.

At the commercial and industrial levels, awareness of the impacts of digital is rising strongly, with (1) regular announcements from Big Tech on their measures to implement low-carbon or zero-emission strategies — which, however, currently overlook the manufacture of their gadgets when calculating carbon footprints — and (2) the adoption of responsible IT, an increasing feature of IT strategies over the past two years at a number of companies quoted on the Paris stock market, and higher standards demanded of the entire value chain as analyzed in the latest Shift Project report. The wastage is overwhelming, in both data storage and the ways that IT systems are built: these are all sources of potential environmental savings and performance just waiting to be discovered and exploited!

In digital, there are sources of potential environmental savings and performance just waiting to be discovered and exploited

1 The Global E-Waste Monitor 2020 report, Global E-waste Statistics Partnership (GESP)

2 Towards Digital Sobriety, October 2018, The Shift Project: <https://theshiftproject.org/en/article/lean-ict-our-new-report/>

3 L'âge des Low Tech, Philippe Bihouix, pub. Seuil

4 <https://www.senat.fr/notice-rapport/2019/r19-555-notice.html> Pour une transition numérique écologique [For an ecological digital transition]

5 https://cnumerique.fr/environnement_numerique_Travaux_Numerique_et_environnement [Digital and environmental studies]

6 <https://medium.com/@sophiejeanwilson/how-fair-is-fairphone-f3f0e046e40d>

7 <https://ifixit.com>

8 <https://commown.coop/>

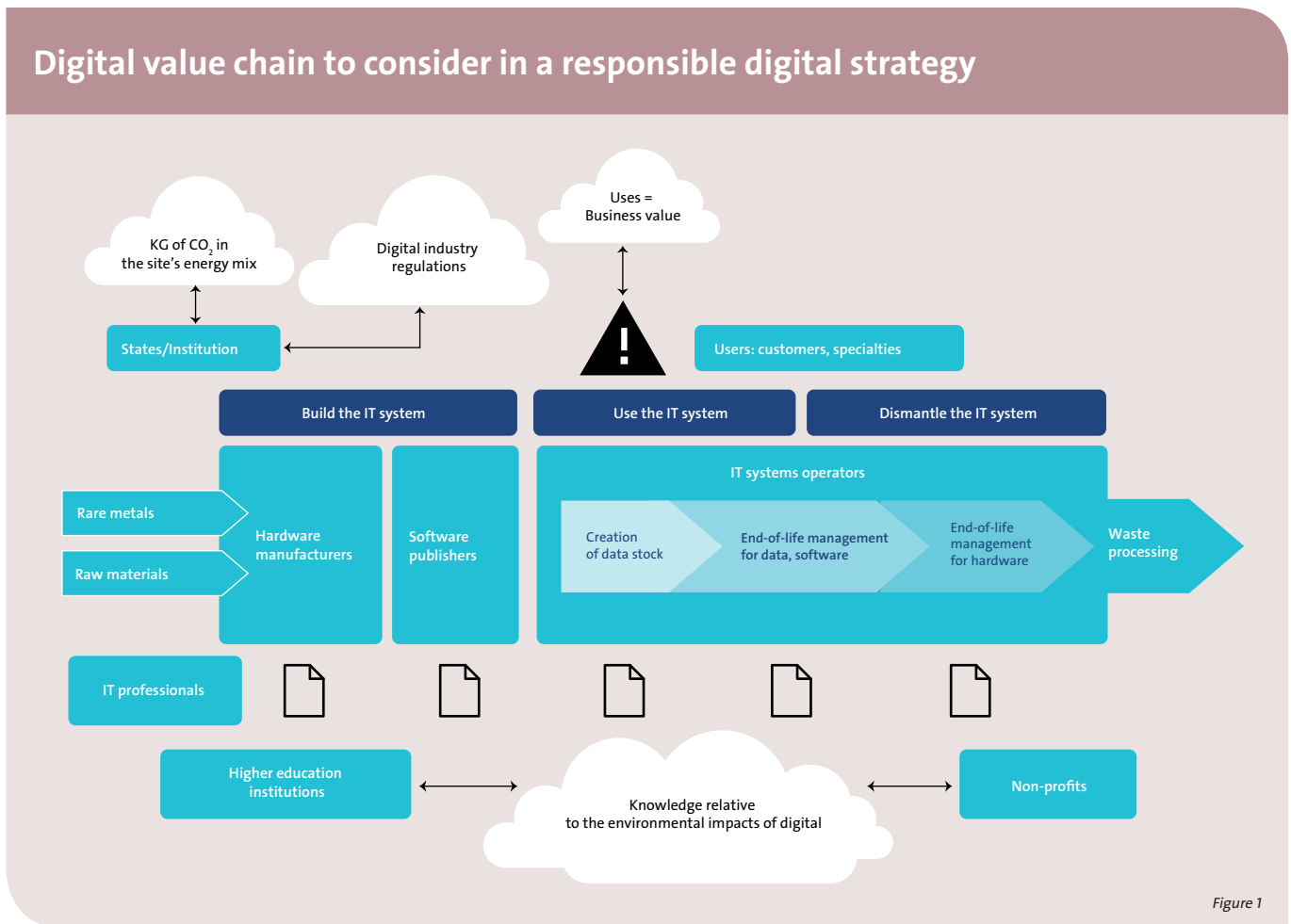


Figure 1

DIGITAL TOOLS: FROM PROMISES TO REBOUND EFFECT

Digital is also an industry at the service of other sectors of the economy, offering the promise of greater sobriety in industrial processes, lower CO₂ emissions and circular uses.

Digital is about the ability to bring things together, so that offer meets demand at a lower cost. In B2C, the website leboncoin.fr — well known for playing fast and loose with personal privacy¹ — has made reuse universally available, putting people from all over France in touch with each other in ways that were impossible in the past. In B2B, we are seeing the emergence of virtual marketplaces, such as Upply² for road freight. Unthinkable twenty years ago! The list is endless if we include car-share platforms, mailing lists and social media for lending equipment and swapping services.

Digital is also about the ability to be better informed, which we use today to make our exchanges easier, as Asimov predicted in the 1980s when he anticipated videoconferencing.³ It is used to promote responsible

policies, inform people about recycling options, and compile and disseminate best practices in business, management and environmental responsibility. It would not be hard to imagine the businesses of tomorrow using dedicated platforms to help their customers cut direct and indirect carbon footprints via the services they offer. Using this ability to deliver information, digital is nurturing the emergence of completely new business models, such as repairs and websites like Spareka.com.⁴ France’s Anti-Waste and Circular Economy Act introduced the requirement that electronic goods display a reparability rating, which should give further impetus to this business model.

Lastly, digital is about the ability to save resources: for example, a simple temperature sensor cuts off the heating when a room is up to the required temperature or switches it on before frost and freezing can cause any damage. When connected to an overall system monitoring buildings or installations, it delivers substantial gains in terms of energy and resources. The latest report from The Shift Project⁵ sets out a simple methodology for clarifying under what circumstances the introduction of a connected or digital

1 <https://www.pixeldetracking.com/fr/le-bon-coin-donnees-personnelles-rgpd>

2 <https://www.upply.com/fr-fr>

3 <https://www.franceculture.fr/emissions/la-methode-scientifique/la-methode-scientifique-emission-du-vendredi-18-septembre-2020>

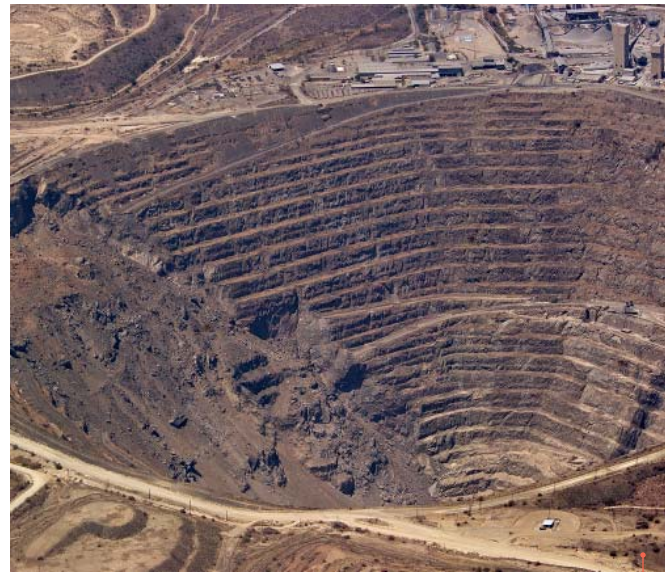
4 <https://www.spareka.fr/>

5 Towards Digital Sobriety, The Shift Project: <https://theshiftproject.org/article/deployer-la-sobriete-numerique-rapport-shift/>

layer is or is not relevant, using examples based on smart lighting and the introduction of a Smart Technologies Energy Relevance Model (STERM).

But the moment you roll out a technology that delivers efficiency gains — in terms of energy, performance or working time — the risk of using greater net amounts is all too real! This is the rebound effect which, whether direct or indirect, comes into full effect and prevents us from achieving net carbon gains. Take the example of the Internet of things, whose rapid development is accelerating digital transformation in industry and agriculture: industry 4.0. The idea behind applications for optimizing processes and procedures, or for predictive maintenance, is to fit sensors to production lines. The goal is (1) to predict breakdowns, boost the productivity and reliability of machinery to drive down costs, but also (2) to optimize use of resources such as water, energy, and raw materials, thereby reducing the environmental impacts of industrial processes. European projects such as CE-IoT exist to promote a circular economy model improved by the Internet of things.⁶ This trend for what is known as Tech for Good is interesting, certainly from the climate standpoint. However, the greenhouse gas emissions involved in manufacturing, transporting, installing, operating, maintaining, removing, recycling and eliminating all these connected systems and sensors are only of any worth if they genuinely deliver net CO₂ emission savings once everything is taken into account. And the fact is that these calculations are not always made, even at the most superficial level. Why are our hard drives always almost full when their capacity has doubled every year over the past 35 years, faster even than predicted by Moore's Law?⁷ Because this increase has been accompanied by ever larger photo and video files thanks to their higher resolutions, along with the ability of our smartphones to produce ever greater numbers of images! Similarly, European telecoms operators continue to lay transoceanic cables on behalf of Big Tech companies even though there has never been more capacity between Europe and North America.

Looking at other sectors shows that the rebound effect is not restricted to digital: in road transport, for example, great efforts are made to optimize flows of goods, transshipments, journeys, return legs loaded rather than empty, and so on. And yet never have there been more trucks on the road! Similarly, it has been demonstrated that Uber increases CO₂ emissions in cities where it operates.⁸ And then there is the boom in home delivery services over the past decade, which continue to grow as a consequence of the coronavirus crisis. Global virtual storefronts, originally expected to cut the number of journeys made by private individuals and thus, ultimately, greenhouse gas emissions, have had exactly the opposite effect by making it easier than ever to purchase everyday goods and household



Aerial view of copper mine at Palabora, South Africa

appliances. And that's before we even start to think about the soil sealing that results from the construction of new warehouses, which is a further issue of real concern.⁹

In the car industry, two current phenomena are also worthy of mention. The constant increase in the weight and technology content of vehicles,¹⁰ up 60% in 50 years, is directly caused by the fact that technologies for in-vehicle comfort and safety are available and ever more affordable. This is felt in the net impact per vehicle manufactured which, when added to increasing vehicle use over the same period, is in no way offset by efficiency gains in manufacturing and vehicles' improved immediate fuel consumption.

CONCLUSION

These numerous examples show us that it is important to question the digital reflex and that digital, like any technology, should be looked at on a case-by-case basis, with objective examination of CO₂ versus resources, benefits and possible rebound effects. Each and every negative externality impacts the future of all of us and of society.

All companies need to think in terms that reach beyond their product, collaborating with other actors across the entire value chain and asking their IT suppliers to take an objective approach to their social and environmental responsibilities; in other words, an end-to-end approach that includes scopes 2 and 3.¹¹ Then, and only then, will they become part of the solution not the problem.

6 <https://cordis.europa.eu/article/id/413173-where-the-circular-economy-and-the-internet-of-things-meet/en>

7 https://en.wikipedia.org/wiki/Moore's_law

8 <https://www.forbes.com/sites/davekeating/2019/11/20/uber-adding-to-air-pollution-in-europe-report/>

9 <https://www.banquedesterritoires.fr/centres-commerciaux-les-prefets-appelles-renforcer-la-lutte-contre-l'artificialisation-des-sols>

10 <https://fr.motor1.com/news/266197/poids-moyen-voiture-augmentation-etude/>

11 Scope 2: indirect energy emissions

Scope 3: other indirect emissions. Other emissions indirectly generated by the organization's activities that are not accounted for under Scope 2 but that relate to the total value chain. In digital, this may include manufacture of employees' computers, servers used in outsourced datacenters, and public network equipment. They represent a very significant portion of a company's carbon footprint, typically 15 to 20% for a services business.

INDUSTRIAL SYMBIOSIS: PRACTICES IN CHINA'S INDUSTRIAL PARKS

Zhao Kai
Vice Chairman and Secretary General
China Association of Circular Economy



Panoramic view of Suzhou Industrial Park

A senior engineer and Certified Energy Manager with an MBA from Guanghua School of Management, Peking University, Zhao Kai is the current Vice President and Secretary General of the China Circular Economy Association. He has long been engaged in researching and promoting energy conservation and the circular economy and has experience in international project cooperation. He is also a member of various national technical committees, regarding standardization, environmental protection, recycling and energy. He has won the second and third prizes in the China Standard Innovation Contribution awards.

Administered by the State-owned Assets Supervision and Administration Commission of the State Council, the China Association of Circular Economy (CACE) is a nationwide organization, whose role is to formulate both strategic planning for government on the development of the circular economy and development and implementation programs for industries, as well as promoting the development of the circular economy in accordance with the relevant laws and regulations.

As an important driver for regional economic development, industrial parks are not only a zoned area consuming resources and energy while generating pollution, but also an excellent tool to improve the ecological environment and achieve high-quality development. Industrial symbiosis refers to the cooperation between different companies to achieve resource sharing or complementarity, and directly or indirectly enhance resource allocation efficiency within or outside them. It helps foster synergistic developments among industries, efficient use of resources, continuous extension of the industrial chain, and further develop the industrial cycle, symbiosis or coupling.

INTRODUCTION

Around 2000, China began to actively explore industrial symbiosis within industrial parks and adopted various policy measures promoting park circular transformation and demonstration eco-industrial park and green industrial park construction, aiming at symbiotic and sustainable development in industrial parks.

This article summarizes the policy measures taken, main focus and practical experiences in three areas – park circular transformation, demonstration eco-industrial park construction, and green industrial park construction – to explore the pathway to industrial symbiosis within industrial parks in China.

POLICY MEASURES TAKEN TO PROMOTE INDUSTRIAL SYMBIOSIS IN INDUSTRIAL PARKS

PARK CIRCULAR TRANSFORMATION

Issued in September 2005, «Several Opinions of the State Council on Speeding up the Development of the Circular Economy» proposed to carry out trial demonstration work on the circular economy in industrial parks, and to explore its effective development. Park circular transformation has been explicitly listed as a key project of the circular economy in the Outline of the 12th Five-Year Plan for the National Economic and Social Development of the People's Republic of China.

In 2011, Baiyin High-tech Industrial Development Zone in Gansu Province and other eight parks were approved to carry out the pioneering demonstration of park circular transformation; in 2012, the National Development and Reform Commission (NDRC) and the Ministry of Finance (MOF) issued the «Opinions on Promoting the Circular Transformation of Industrial Parks», proposing to develop 100 national demonstration parks and thus provide model for all kinds of industrial parks to achieve transformation by developing the circular economy.

In order to give full play to the leading role of the pioneering demonstration, NDRC, MOF and other relevant departments released “Administrative Measures for Mid-term Evaluation and End-of-term Acceptance Test of the Circular Transformation of Demonstration Industrial Parks”, strengthening mid- and late-stage supervision and gradually form a long-term mechanism of park circular transformation.

Policy measures regarding park circular transformation mainly focused on:

Improving the efficiency of resource utilization.

- By-products and waste could be fully utilized by extending the industry chain;
- Energy and resource efficiency could be ameliorated by conducting energy-saving transformation;
- Overall resource efficiency and output could be substantially improved by promoting utilization of waste heat and pressure, adopting graded, quality-based and cascaded use of water, and material exchange.

Leading industrial transformation and upgrading.

In accordance with the comprehensive requirements of «industrial clustering and integration, quantity control and quality improvement, energy conservation and emission reduction», industrial parks will optimize their industrial layout, complete the supporting facilities such as sewage



Hengqin Free Trade Zone, Zhuhai City, Guangdong Province, China

and solid waste treatment, eliminate backward production capacity and promote advanced technology. Traditional industries will be thus optimized and upgraded.

Encouraging the green transformation of industrial parks.

By building centralized energy supply centers to replace small coal-fired boilers, parks could optimize their energy structure with a shift towards green energy; by outsourcing waste management services and developing recycling systems, parks could reduce emissions and promote green development.

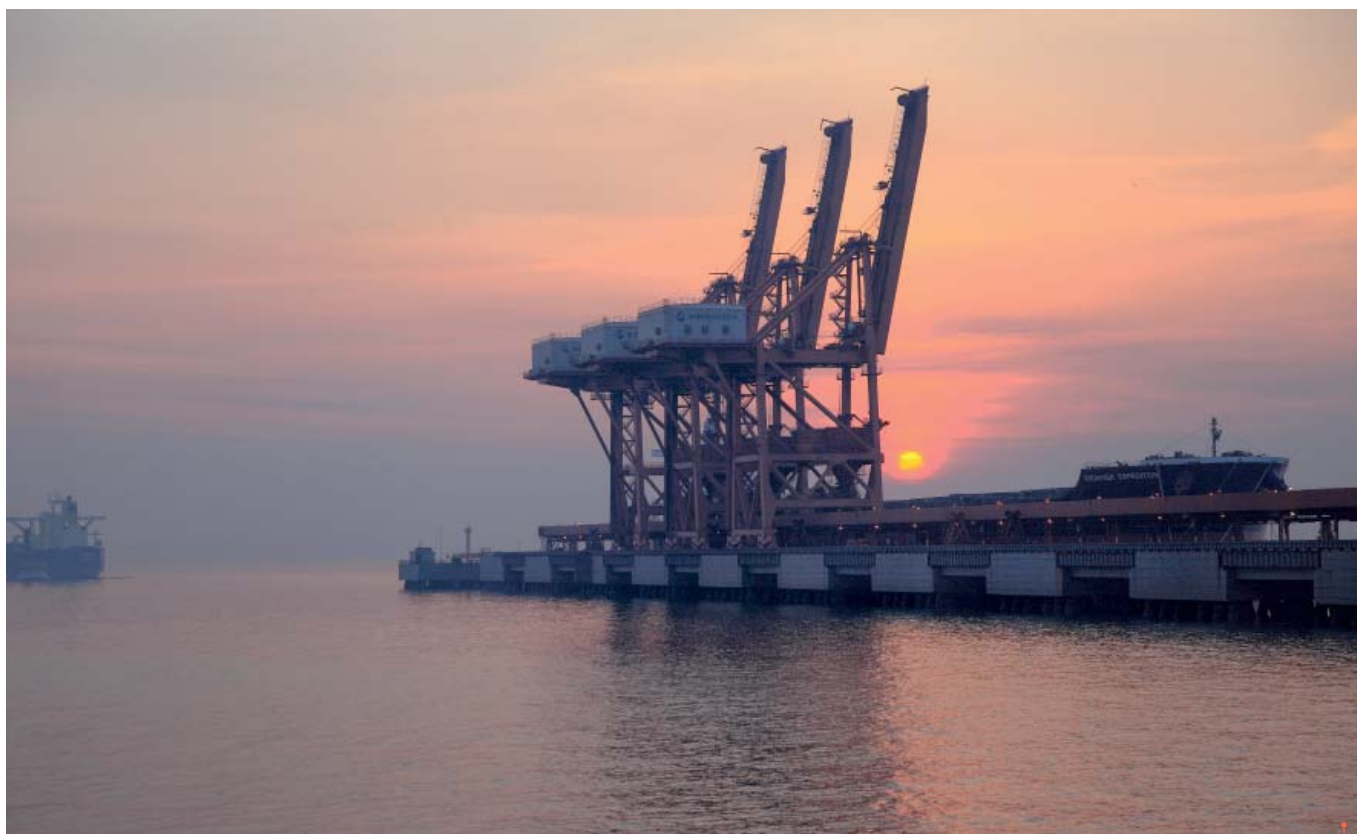
CONSTRUCTION OF DEMONSTRATION ECO-INDUSTRIAL PARKS (EIPs)

In 2000, the State Environmental Protection Administration (SEPA, restructured and renamed the Ministry of Environmental Protection in 2008, then the Ministry of Ecology and Environment in 2018), started to implement EIPs in different regions for different industries, including sugar, aluminum, chemical and high-tech, for local authorities and companies.

Industrial parks will adopt ecological transformation and reduce pollutant emissions to build an eco-industrial system with resource conservation, clean production and waste recycling

In December 2003, SEPA issued the “Notice on the Issuance of the ‘Regulations on the Declaration, Naming and Management of National Demonstration EIPs (Trial)’ and other documents”, which clarified the main characteristics of demonstration EIPs, standardized procedures of declaration, naming and supervision, and formed the basic process of declaration, planning preparation, feasibility analysis, approval, naming, supervision and implementation. The Notice also established a supervision mechanism based on regular reporting, an annual summary and regular assessments.

To comprehensively boost EIP construction, relevant departments have issued several policies including “Guidance on Strengthening the Construction of National Demonstration EIPs”, “Management Measures for National Demonstration EIPs”, “Standards of National Demonstration EIPs”, “Notice on Strengthening the Development of the Low-Carbon Economy in National Demonstration EIPs”, “Notice on Review and Evaluation of National Demonstration EIPs”, etc. The policy documents encouraged the formation of a long-term mechanism for the construction and development of EIPs.



Sunrise at Caofeidian Industrial Dock

Policy measures regarding construction of demonstration eco-industrial parks mainly focused on:

Promoting the construction of an ecological civilization within parks.

Industrial parks will adopt ecological transformation and reduce pollutant emissions to build an eco-industrial system with resource conservation, clean production and waste recycling. Contributing to a resource-saving and environmentally friendly society, and to sustainable social and economic development in parks, these are essential requirements for the construction of ecological civilization.

Optimizing economic development by complying with environmental requirements.

Industrial parks will transform their concept of environmental management through scientific planning, reasonable industrial layout, raising the environmental access threshold, completing the environmental risk prevention mechanism, and strengthening environmental infrastructure. Environmental management could gradually extend from traditional end-of-pipe treatment to the whole process control, from production, circulation, consumption and trade to investment, etc. This will also help the integration of the environment and economy in industrial production in the region.

CONSTRUCTION OF GREEN INDUSTRIAL PARKS

In September 2016, the Ministry of Industry and Information Technology (MIIT) issued the "Notice on the Construction of a Green Manufacturing System", proposing the construction of one hundred green parks with industrial clustering, green structure and ecological links by 2020, and specifying a green park evaluation system including green indicators covering six aspects: energy utilization, resource utilization, infrastructure, industry, ecological environment, and operation and management. MIIT has taken the lead in organizing the declaration and review of green parks and has established a long-term mechanism for the construction of green parks, which is a post-evaluation based on construction results.

Policy measures regarding construction of green industrial parks mainly focused on:

Improving the level of green development of the park. In accordance with the concept of green development, the park will continuously improve by completing infrastructure construction, creating a green industry chain, enhancing energy structure, increasing energy efficiency, optimizing industrial structure and boosting the technological progress of green industries.

Encouraging the development of industrial clustering. By centralizing promising industries, developing clusters, playing a driving role for promising industries and

companies, helping companies in the park to carry out collaborative support, and improving the industrial collaboration level, parks will develop a circular economy with a closed-loop industry chain. Relevant policy measures help effectively protect the environment, achieve economical, comprehensive and circular use of resources, and promote the transformation of industrial development. They also strengthen intensive and economical land use and strive to improve the comprehensive utilization efficiency of industrial land.

PRACTICAL EXPERIENCE OF INDUSTRIAL SYMBIOSIS IN CHINA'S INDUSTRIAL PARKS

China has explored and practiced synergistic development among different industries by promoting park circular transformation, and eco-industrial park and green industrial park construction.

CAOFEIDIAN INDUSTRIAL ZONE: INDUSTRIAL SYMBIOSIS BETWEEN STEEL AND SEAWATER DESALINATION

Located in Tangshan City, Hebei Province, Caofeidian Industrial Zone was approved for trial demonstration work on industrial park circular transformation in 2013. Caofeidian has gradually established a circular economy system covering the whole region and spreading to the surrounding areas by forming a circular economy industry chain, promoting the construction of key projects, improving the efficiency of resource and energy utilization, and cultivating strategic emerging industries. Thanks to circular transformation, the resource output rate of the park has increased by 162.2%, the comprehensive utilization rate of industrial solid waste has reached 97.5%, and the reuse rate of industrial water has reached 94.1%.

The Caofeidian Industrial Zone achieved material recycling and graded use of energy within the steel industry and between related industries, creating a symbiosis between the steel industry and seawater desalination

In accordance with the reduce-reuse-recycle principle, Caofeidian Industrial Zone introduced chain-supplementing and chain-extending projects and formed a relatively complete material and energy circular network in the steel industry. The iron slag in steelmaking slag and steel scrap from steelmaking and rolling are recycled as feedstock to achieve the recycling of iron elements. The zinc slag is returned to the smelter for remelting, and tar slag and biochemical treatment sludge are mixed into coking coal for reuse to achieve waste recycling. The reuse of high temperature exhaust gas in sintering circular cooler and dry quenching flue gas, the recycling of sensible heat during coke dry quenching, residual pressure at the top of blast furnace and extra blast furnace coal gas, marked the recycling of waste heat, waste pressure and waste gas resources. Waste heat steam,

exhaust steam of power generating units, and blast furnace slag water can be used as low-temperature heat sources to power low-temperature multi-effect seawater desalination devices, creating synergy between steel industry and seawater desalination projects.

The Caofeidian Industrial Zone achieved material recycling and graded use of energy within the steel industry and between related industries, creating a symbiosis between the steel industry and seawater desalination.

YEJI ECONOMIC DEVELOPMENT ZONE: INDUSTRIAL SYMBIOSIS BETWEEN BAMBOO PROCESSING AND BIOMASS POWER GENERATION

Located in Lu'an City, Anhui Province, Yeji Economic Development Zone was approved for trial demonstration work on industrial park circular transformation in 2015. Aiming at becoming an industrial cluster, centralized market and future urban area, Yeji implemented circular transformation while focusing on investment attraction, infrastructure construction, project promotion and service improvement, which brought revitalized development to the Zone. Thanks to circular transformation, the park's resource output rate increased by 2.8% in 2017 compared to 2014, the comprehensive utilization rate of industrial solid waste increased by 60%, and the reuse rate of industrial water increased by 100%.

The Zone was closely tied into regional socio-economic factors. With limited resources and restricted environmental conditions, it actively promoted the adjustment of enterprise organization. Based on the basic development strategy of differentiation, cost reduction and recycling, the Zone formed a development mode mainly focused on differentiation and recycling. It has gradually established a sound operation mechanism with furniture and artificial board as flagship products, bamboo and rattan products and crafts, biomass fuel, activated carbon, bamboo charcoal, high value utilization of low-quality wood and targeted cultivation of forest resources as the new growth point. Yeji Economic Development Zone has gradually built several circular economy industry chains, such as the deep processing of raw bamboo and logs, the reuse of forest harvesting residues, the reuse of bamboo and wood processing residues and the recycling of waste wood and bamboo products. This not only extends the deep processing industry chain for the wood and bamboo industry, but also achieves 100% utilization of processing residues, harvesting residues and other waste generated from furniture and panel processing, forming a circular economy model of "make the best use of everything" for wood and bamboo processing and use.

GUIGANG NATIONAL ECO-INDUSTRIAL (SUGAR) DEMONSTRATION PARK: INDUSTRIAL SYMBIOSIS BETWEEN THE SUGAR, ALCOHOL AND PAPER INDUSTRIES

Located in Guigang City, Guangxi Zhuang Autonomous Region, Guigang National Eco-Industrial (Sugar) Demonstration Park is the first national demonstration EIP in China, approved by SEPA in 2001, representing a milestone in the history of China's eco-industrial development.

Guigang National Eco-Industrial (Sugar) Demonstration Park actively carried out environmental management innovation, explored third-party pollution management, built an industrial chain for graded use of resources in the park, offered specialized services for applying clean production policies, norms and standards in the park, provided ongoing consultation and training on environmental protection and clean production, and improved comprehensive environmental management services and management in the park. Taking cane sugar production as its core activity, the Park formed an ecological industry chain to produce alcohol from waste molasses, produce paper from bagasse, and generate power from bagasse pith. The ecological industry chain covered six segments: cane field, sugar production, alcohol production, papermaking, cogeneration and comprehensive environmental treatment. The interdependence and symbiosis between segments positioned them mutually upstream and downstream in the ecological industry chain, and the «resources-products-re-resources» production process presented a cyclical material cycle.

SUZHOU INDUSTRIAL PARK: DIVERSIFIED INTEGRATION OF GREEN INDUSTRIES

Located in Suzhou City, Jiangsu Province, Suzhou Industrial Park was approved for the first batch of trial demonstration work on a green park in 2017. The park insisted on implementing the national strategy of green development and ecological civilization construction, focused on the top-level design of green development, transformed the institutional mechanism for green development, built an ecological green development system, and strived to be a representative project of China's green development. In 2017, the park achieved a 7.2% year-on-year growth in gross regional product, a 2.1% year-on-year reduction in energy consumption per unit of GDP, a 91% industrial water reuse rate, and a comprehensive regional environmental quality index of 97.4. The park also realized a 2.47% year-on-year decrease in the comprehensive energy consumption of six high-energy-consuming industries, and a centralized sewage collection and treatment rate of about 98%.

Guided by ecological civilization construction, the Park focused on the transformation of economic development, acting in various fields including spatial layout, energy utilization, resource utilization, infrastructure, green industry, ecological environment and operation management, etc., and making use of the capacity-building

and management innovation system offered by green development. It also promoted the completion of high-level green parks with the delineation of an ecological red line, improvement of public transportation efficiency, rational layout of public service facilities, underground space utilization, ecological landscape and green space coverage, steady progress in construction of an Energy Internet Demonstration Park, resource recycling, centralized treatment of pollutants, green operation and management in various aspects such as guiding ideology, industrial structure, performance assessment and lifestyle.

ROADMAP ANALYSIS ON HOW CHINA FOSTERS INDUSTRIAL SYMBIOSIS IN INDUSTRIAL PARKS

By reviewing the measures and practices implemented by China to foster industrial symbiosis in industrial parks, we may find that symbiosis is only achieved through space optimization, symbiosis planning, resource reutilization, integrated pollution treatment and shared infrastructure.

SPACE OPTIMIZATION

Based on material and industrial connections in industrial parks, space design and planning are optimized to achieve industrial symbiosis and effective land use. For example, during the planning stage, industrial park A fully considered the industrial system in the park and adopted an integrated development model. Driven by the leading industry, industrial park A divided the park into areas based on different functions of the circular economy, including the harbor area, Lingang industrial area and Liaobin City Area. The regional circular economy is thus enhanced and supported by space planning.

EFFECTIVE RESOURCE UTILIZATION

By promoting clean production in industrial parks, waste is reduced from the source. Industrial parks adopt clean and high-efficiency technology to replace old-fashioned energy and promote renewable energy consumption. Industrial parks promote the use of waste heat and pressure and encourage utilization of local-generated waste and wastewater in a bid to promote efficiency of the circular economy and boost industrial symbiosis. For example, industrial and municipal energy-saving are fast to develop in industrial parks. Resource utilization efficiency is promoted by enhancing recycling of water, by-products and waste gas.

SYMBIOSIS PLANNING

Material loops can be achieved among projects, companies and industries. Along the industrial chain, by-products and waste can be traded as resources. For example, desulfured plaster, coal ashes and slag which is produced by power plants can be used by cement producers as raw materials. The steam and heat generated by cement producers can be used by brewers. Waste diatomite produced by brewers can be put into coals which are burned by power plants

and cement producers. Some of it can even be used as raw materials for cement plants. Wastewater generated by brewers can also be used as cooling water for power plants after treatment. Condensate water can be used as boiler water in power plants.

INTEGRATED POLLUTION TREATMENT

Industrial parks boost the construction and upgrading of pollution treatment facilities. Professional waste treatment companies are built to treat pollution with an integrated approach. Environment management is enhanced and certified. An environment management system is adopted at the industrial park level, corporate level and product levels. Emissions are reduced to the maximum level. For example, industrial parks are equipped with wastewater and waste gas treatment facilities to achieve standard emissions. Building treatment facilities which are more connected reduces the operating cost.

GRADED USE OF ENERGY

Water can be used by grades. For example, wastewater can be treated and reused as reclaimed water to save water resources and level up water use efficiency. Energy can also be used in the same way to promote energy efficiency. For example, an energy land can be built in an industrial park to distribute high, medium and low-pressure steam. It can ensure the graded use of energy. Waste heat can also be reused at the company level to promote energy efficiency. Waste heat boilers and supply networks can be built to provide heat for other users. Public heat and pressure pipeline construction are a preferred option to boost energy recycling.

INFRASTRUCTURE SHARING

Infrastructure in industrial parks can be shared and optimized to promote efficiency and reduce costs, including environmental facilities - such as WWTPs, solid waste recycling centers, transportation, water/power supply, lighting, construction, warehouse and public networks. Integrated underground networks can enhance the use of underground space and overall city capacity. An integrated heat and water supply is also necessary.

INDUSTRIAL ECO-PARKS AS DRIVERS OF THE CIRCULAR ECONOMY

Franck Aggeri, Professor at MINES ParisTech

Industrial eco-parks are one of the oldest forms of circular economy. A recent report for the World Bank¹ summarizes the position and puts forward recommendations for ways to promote them as drivers of the circular economy. Eco-parks are industrial zones that promote collaborations between businesses and with local communities, generating environmental, social and economic benefits. Eco-parks that foster exchanges of materials, water, energy and information between interdependent businesses operating complementary activities—along the lines of natural symbioses—are described as examples of industrial symbiosis.

Worldwide, the number of industrial eco-parks is growing rapidly: up from 245 in 2001 to 438 in 2020. They are found particularly in Asia (China, Japan and South Korea) and Europe. Some of them, such as Kalundborg in Denmark, are very well known and have been studied extensively. Every empirical study highlights the potential these forms of symbiosis have to drastically reduce the environmental impacts of industrial activities by promoting synergies, as well as the economic benefits associated with shared resource management. The report stresses that creating industrial symbiosis, including the choice of technologies, depends on the types and quantities of materials and resources available in and around the parks, as well as the number of possible local uses for them. Every situation is different and must be studied in detail beforehand to identify the potential that can be exploited.

The report looks at technologies, infrastructure, governance systems and business models in three types of activity found at industrial eco-parks: energy, water, and materials and waste. 35% of eco-parks have installed renewable energy sources; almost 50% have adopted efficient water practices to optimize water use and recuperation; and 52% have set up an industrial symbiosis program to recover waste and material flows within the park, particularly to generate heat.

Aside from the adoption of technologies that favor circular economy approaches (water treatment, cogeneration, waste processing, pyrolysis, CO₂ recovery units, etc.), the report focuses on business models and collective governance, two key factors for success. Promoting circularity necessarily entails designing

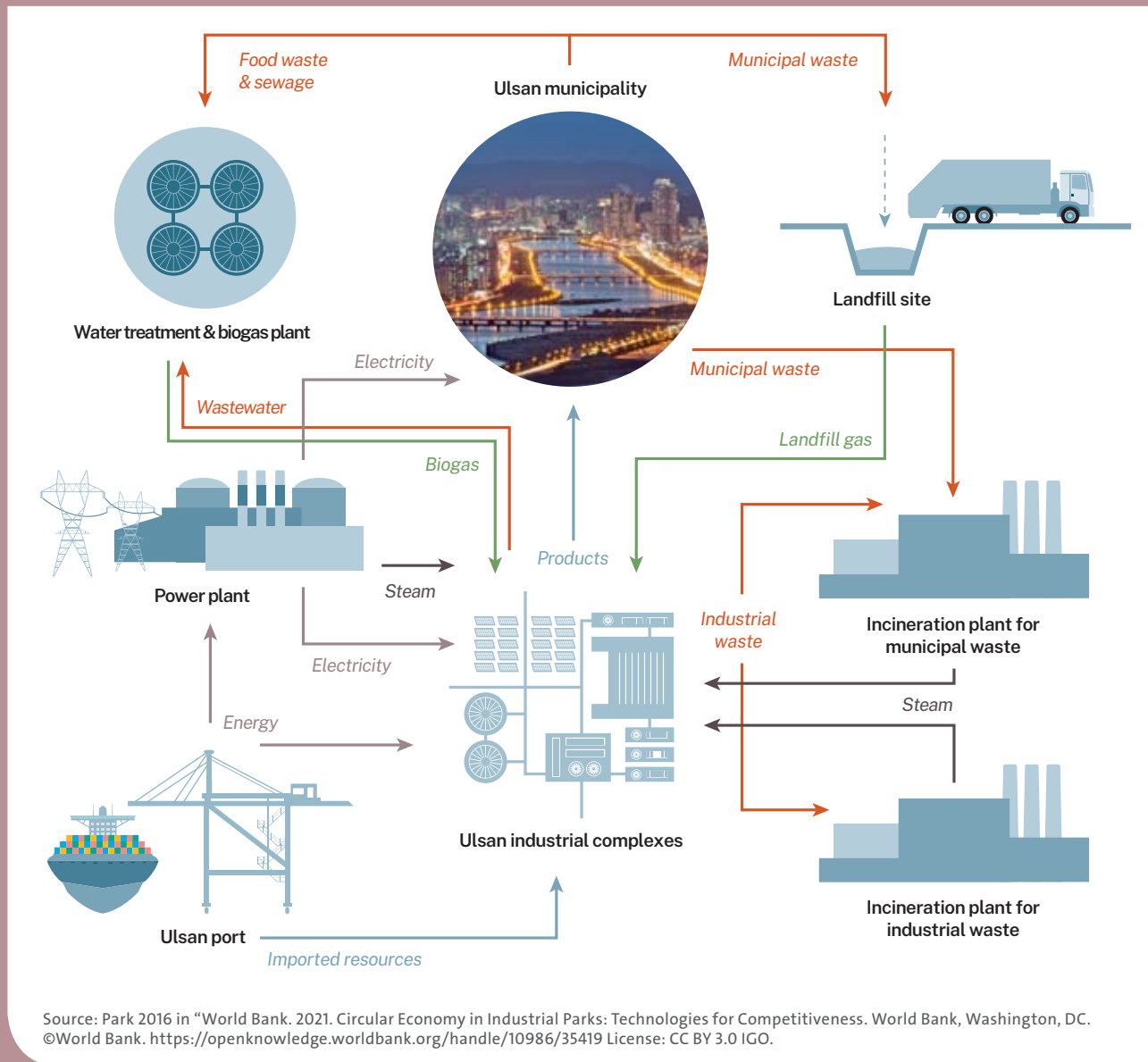
business models that demonstrate the tangible benefits of resource pooling for all participants. And adopting collective governance is crucial to this. The report highlights the fact that designing symbiotic networks requires a park operator that can organize exchanges of flows of materials, water, energy and waste between companies; establish legally binding contracts between the parties; invest in and manage pooled infrastructure; take charge of R&D and trials on behalf of industrial companies; monitor the technical and scientific horizon, and set up dashboards and performance indicators. In other words, park operators play an essential role in promoting and incorporating the principles of the circular economy. Their actions can overcome the two main impediments to ramping up exchanges between industrial companies: lack of information about resources and materials available for recovery, and lack of trust between actors when it comes to sharing confidential data and committing to joint investments.

The report lists three recommendations for leveraging circular economy strategies. First, it recommends setting up digital platforms to identify reserves of materials and waste and their sources, as at the Norrköping industrial park in Sweden. Second, it encourages local and national authorities to establish tax incentives, create financing mechanisms and make it easier for parks to share the lessons learned. Third, it recommends that park operators adopt the World Bank and UNIDO industrial eco-park toolbox, which provides detailed guidance on rolling out circular economy principles for projects of this type.

Among the examples examined in the report, the Ulsan industrial eco-park in South Korea illustrates the symbiotic relationships that have emerged between an industrial eco-park and its surrounding metropolitan area (see diagram). Part of the municipal waste is incinerated to produce energy that is used to power the park. Another part of the municipal waste is used to produce gas by methanization, and sewage is used to generate biogas through aerobic digestion. The gas produced is then used as fuel by industrial companies in the park. Integrating urban and industrial ecosystems in and around an eco-park makes it possible to increase and scale up circular economy practices.

¹ World Bank. 2021. Circular Economy in Industrial Parks: Technologies for Competitiveness. World Bank, Washington, DC. ©World Bank. <https://openknowledge.worldbank.org/handle/10986/35419> License: CC BY 3.0 IGO.

Urban-industrial symbiosis in Ulsan EIP, Republic of Korea



MEASURING CIRCULARITY AT THE CORPORATE LEVEL

Irene Martinetti
Manager Circular Metrics project
World Business Council for
Sustainable Development

Jarkko Havas
Insights and Analysis Lead
Ellen MacArthur Foundation



Irene Martinetti is the Manager for the Circular Metrics project at the World Business Council for Sustainable Development. Irene joined WBCSD in 2017, she supports the development and global adoption of the Circular Transition Indicators with the objective to accelerate the transition to a circular economy. She has an MIA from the School of International and Public Affairs at Columbia University in New York, USA and extensive experience in stakeholder and project management in both the public and the private sector.

The WBCSD is a global, CEO-led organisation of over 200 leading businesses working together to accelerate the transition to a sustainable world.

Jarkko Havas leads the EMF's Insights & Analysis work (I&A). I&A consists of the Data & Metrics Initiative with a focus on measuring company level circular economy performance (Circulytics), and teams working on upcoming focus topics for the Foundation, as well as the case study programme. Prior to joining the Foundation, Jarkko was an Engagement Manager at McKinsey & Company, based first in Tokyo and then in Brussels. His consulting work focused on agriculture and chemicals industries in both private and public sectors. Jarkko's academic background is in environmental engineering and sustainability science.

The Ellen MacArthur Foundation is a UK-based charity, committed to the creation of a circular economy that tackles some of the biggest challenges of our time, such as waste, pollution, and climate change.

Indicators are essential for steering companies' circular economy strategies. Over the last ten years, many tools have been developed in this sense, which were mainly designed to assess circularity at the level of material flows and products. Without questioning the usefulness of these early tools, a need has emerged for more holistic tools that assess circularity at the level of the company as a whole. What are the appropriate tools capable of integrating the complexity inherent in circular economy practice?

The Ellen MacArthur Foundation and the World Business Council for Sustainable Development (WBCSD) have worked closely and coherently to develop tools to support companies in their transition towards more circularity. This cross interview outlines the design of two tools: Circulytics by the Ellen MacArthur Foundation and Circular Transition Indicators (CTI) by the WBCSD.

INTRODUCTION

As a new objective, the circular economy needs indicators to enable each stakeholder to understand where it stands in this transition, to measure the effectiveness of the actions implemented and to assess the progress that remains to be made.

The Ellen MacArthur Foundation and the World Business Council for Sustainable Development have made a major contribution to the development and dissemination of these new tools. These first tools were mainly designed to assess circularity at the level of material flows and products. A need has emerged for more holistic tools that assess circularity at the level of the enterprise across its operations. But what are the appropriate tools to apply at company level? What is the right data to look at?

This is a challenge as holistic tools need to aggregate complex material flow data, take into account the many interdependencies of the value chain and incorporate the complexity inherent in circular economy practice, while remaining easy to use for practitioners.

CIRCULTYCS: A HOLISTIC MEASUREMENT OF CIRCULAR TRANSFORMATION

The Ellen MacArthur Foundation has developed many tools in the past such as Material Circularity Indicator or the ResCom Project, why initiate a new tool?

Jarkko Havas: The Material Circularity Indicator tool (MCI) is primarily a product level circularity assessment tool, designed for internal decision making on product design aspects, and to think about tradeoffs that different design decisions bring.

At another level, the ResCom project developed a suite of tools to support organisations in identifying opportunities to shift to a circular economy. These tools ranged from high-level decision making about the type of business model that might be most beneficial for a product, to detailed life cycle analysis (LCAs), and analytical modelling of the business case. They were designed for use by organisations to inform specific aspects of their circular economy strategy and product development, rather than present a holistic measurement of progress against circular economy indicators.

Besides these tools, Circulytics was developed based on the demand from our network of companies to have a holistic, independently developed and free to access method to measure circular economy performance on a company level. We also used the wealth of knowledge gathered from developing MCI, ResCoM and other Ellen MacArthur Foundation initiatives, such as product design, innovation, the New Plastics Economy, and our Food initiative.

Circulytics has been received well by companies with over 600 sign-ups in the first nine months since launch and over 1,000 sign-ups to date, which is a testament to the timeliness to answering companies need to measure circular economy performance. Particularly since the Covid-19 crisis, many companies are looking to create strategies for better growth — to create economic opportunities that also address global challenges such as climate change and biodiversity loss. In order to create the right strategies, companies need the right data, and that is what Circulytics provides.

How does Circulytics work and what was the methodology to build this tool?

JH: It is an independent assessment of a company's circular economy performance, based on information that a company reports using a secure online platform.

The methodology mirrors the way in which many ESG methods have been built (e.g., using weighted averages to

aggregate indicator scores into themes) to make it familiar and easy to understand.

It is framed carefully around circular economy to avoid overlaps with other non-financial indicators, but so that it covers all aspects of what circular economy means on a company level. Of course, as it is a company level tool, it has its limits in assessing on a more granular level like products and projects.

All these three aspects of Circulytics are unique: It is the only independent analysis of circular economy performance on company level, done free of charge by a leading organisation fully focused on circular economy. The indicators make the tool one of the most comprehensive out there — it considers the enabling factors companies need for the transition to a circular way of doing business, it has service-specific outcome indicators, and it measures the circularity of water flows for water intensive industries.

What were the challenges in the development of Circulytics and in its implementation by companies?

JH: We encountered two main challenges in building Circulytics. First, finding a balance between being holistic while keeping the number of indicators low in order to make it meaningful but easy to use. Second, finding ways to develop a general set of indicators that apply to as many industries as possible, while being specific enough to be actionable.

We have managed to solve both of these challenges together with the 30 companies and other organisations that have been part of developing Circulytics, and the development will continue in order to

keep Circulytics as the most comprehensive, cutting edge method to measure circular economy performance for companies.

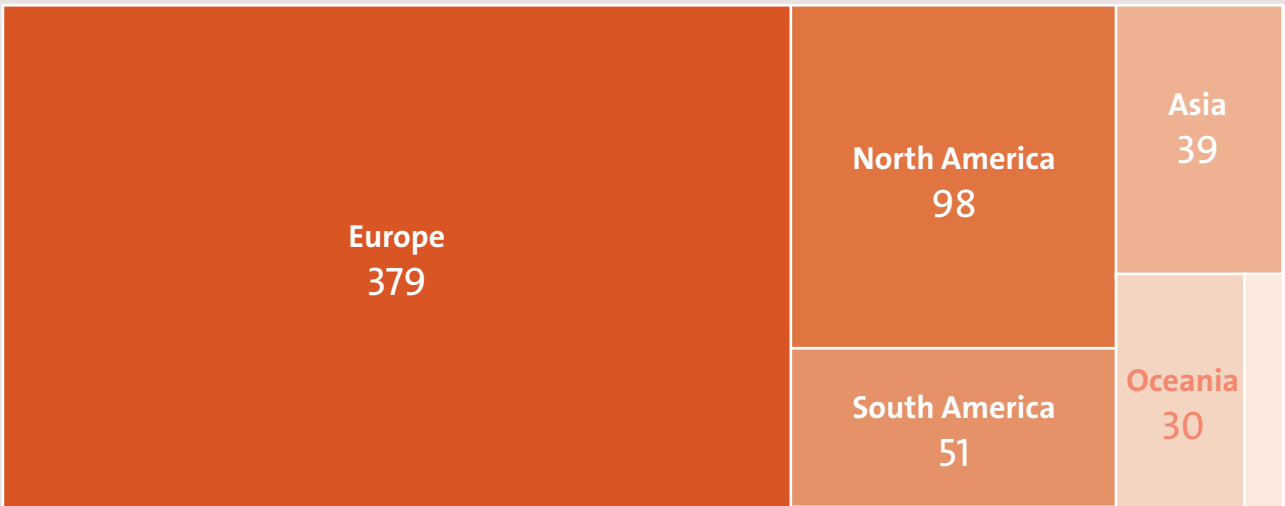
When it comes to using the tool, material flow data collection and aggregation into the right format on company level has been the most common difficulty. Most of the time, companies have all the data needed to use Circulytics, but because circular economy is a relatively new concept for accounting, procurement and other key functions, there is work needed to split material flow data in the right way (e.g., non-virgin vs virgin input).

What are the feedback from companies using the tool?

JH: Almost 1,000 companies have signed up to use Circulytics since it was launched in January 2020 and we have gotten positive feedback on how it has helped companies in finding blind spots in their circular economy

Circulytics was developed to have a holistic method to measure circular economy performance on a company level

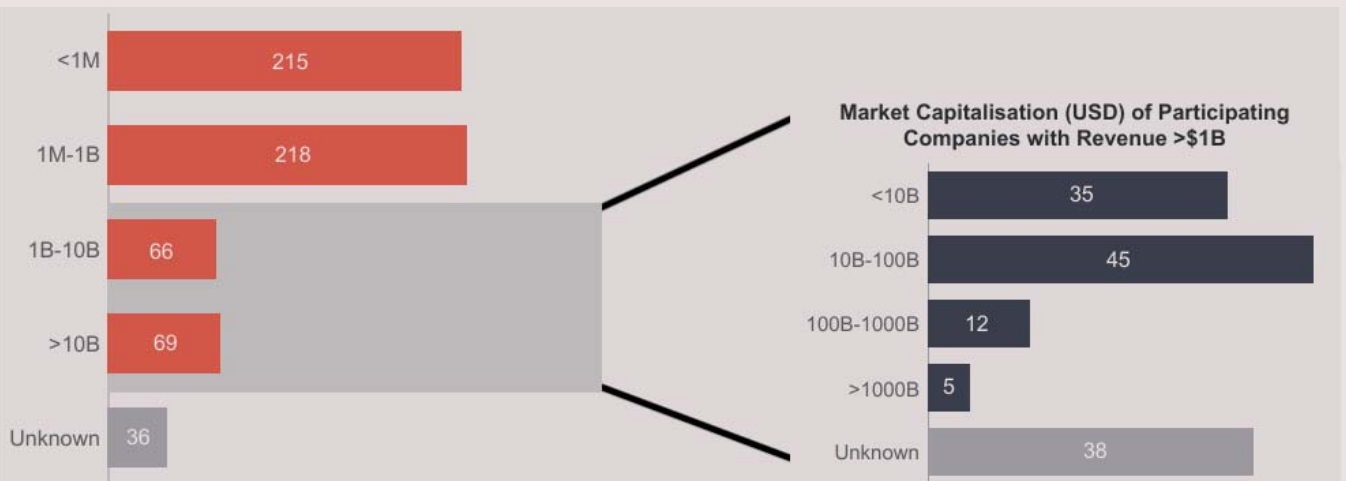
HQ Region of Participating Companies



Location of company headquarters for the 604 companies that signed up Circulytics 1.0 in the first nine months (today over 950 companies have signed up). The majority (63%) have their headquarters in Europe.

Figure 1

Annual Revenue (USD) of Participating Companies



On the left, the annual revenue in USD of the 604 companies that signed up to Circulytics in the first nine months (over 950 today). On the right, the market capitalisation in USD of the 135 companies (22%) with an annual revenue greater than USD 1B. The « unknown » bar in the market capitalisation chart includes all privately held companies as well as subsidiaries of publicly held companies.

Figure 2

strategies and informed their internal KPI setting. It has also been used as a tool to get CEO level buy-in to the importance of circular economy, amongst other things.

Of course, we also received constructive feedback from early adopters, which has been incorporated into a second V2.0 released in October 2020. V2.0 features an improved user experience, a new theme on the circular water economy, and has been translated into Chinese, Portuguese and Spanish to better suit audiences in different regions.

Although companies can (and do) disclose their results, as a way to talk about their circular economy journey with customers and stakeholders, we do not disclose company level results. However, we published anonymised data from Circulytics 1.0 company assessments in December 2020 to describe themes in aggregated company results (see Figures 1 and 2).

The three modules of the Circular Transition Indicators methodology : Close the Loop, Optimize the Loop and Value the Loop

What are the next steps?

JH: In 2021, we will focus on further developing the digital product, to make it even easier to use and access results. We will also be working on linking Circulytics results to Sustainable Development Goals, to indicate how companies are working towards those. Additionally, we will work with financial institutions and non-financial accounting standards projects to bring Circulytics, or parts of it, to the use of financial decision making and broader non-financial accounting standards.

THE CIRCULAR TRANSITION INDICATORS FRAMEWORK: ASSESSING CIRCULARITY AT ALL LEVELS

The Circular Transition Indicators (CTI) framework was shaped by 30 WBCSD member companies representing 16 countries, 16 different industries and over 1.7 trillion in annual revenue to answer companies' needs to measure circularity and support them in their transition towards a circular economy.

How was this project developed with companies? What were the challenges of building a common framework?

Irene Martinetti: This work started in 2018 with the Circular Metrics Landscape Analysis¹ which concluded that there was an existing need for an inward facing, quantitative

approach and guidance to measure circularity for the whole company, business unit or product (group) with a framework that complements assessments and tools already used by companies today.

With that in mind, WBCSD member companies joined forces to design a framework that could provide quantitative, data-based insights into circular performance, associated risks and opportunities. We designed the Circular Transition Indicators (CTI) to be an inward facing tool, easy to implement and versatile in scope with an aim to empower companies in their circular transition by allowing them to better understand their circular economy potential. CTI is simple, applicable across industries and value chains, complementary to a company's existing sustainability efforts and agnostic as to material, sector or technology. CTI is an iterative framework, and it is regularly updated to respond to evolving challenges in circular economy.

To develop the framework, we worked in collaboration with an advisory group consisted of some of the most prominent organizations with expertise in the field of circular economy.

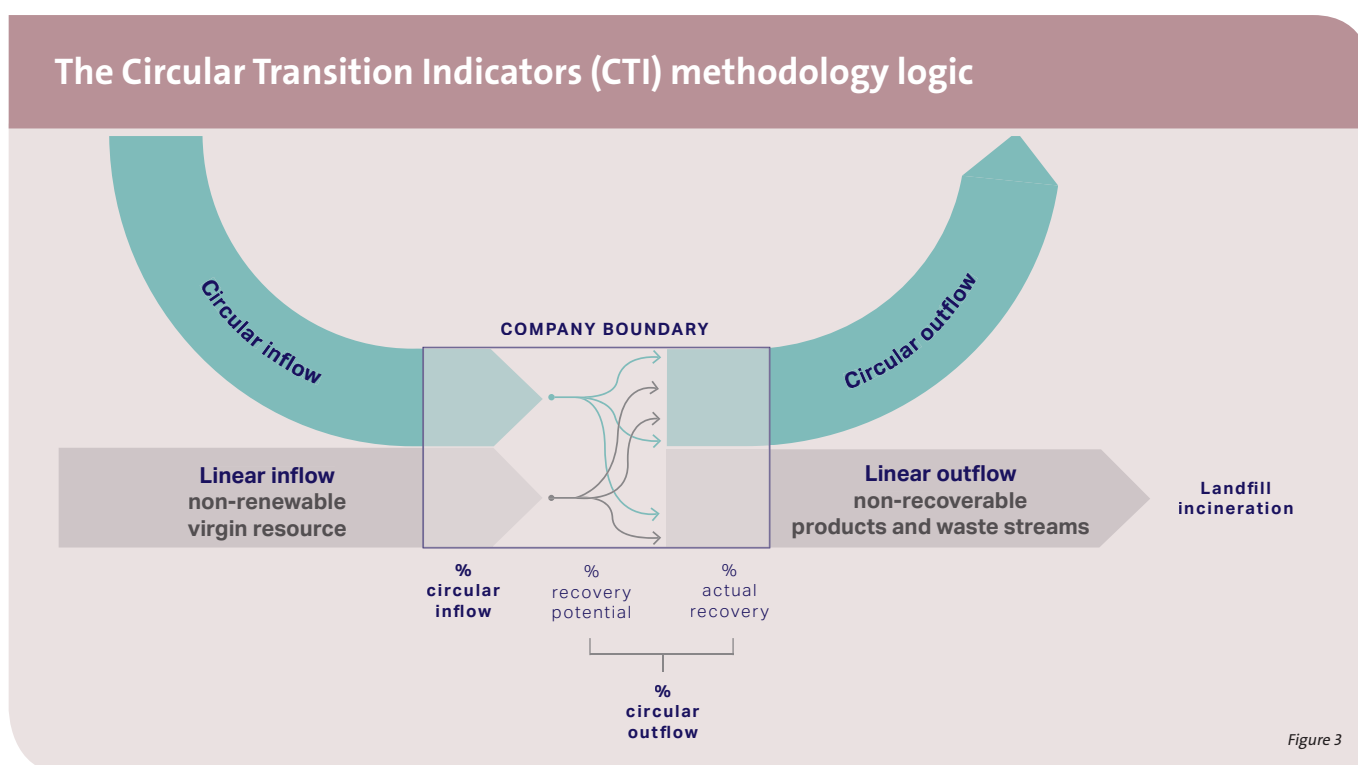
In January 2020, CTI v1.0, a first version of the report, was launched with a set of fundamental indicators for the three modules of the methodology (Close the Loop, Optimize the Loop and Value the Loop). Throughout 2020, WBCSD's water group developed additional metrics to measure water circularity while WBCSD members focused on developing an additional indicator to make the link between circular and financial performance and provide extensive guidance on how to apply CTI consistently for the bioeconomy.

The main challenges during the development of the framework revolved around finding commonality across industries and value chain positions. We wanted to develop a set of metrics that each user could benefit from, regardless of where they are in the value chain or which industry they belong to. We found common ground by maintaining a balance of pragmatism and focusing on metrics that can provide information that would be valuable for more effective decision-making recognizing that CTI v1.0 would not be perfect and that further iterations would be needed.

How does the CTI framework work and what are its limits?

IM: The CTI framework is based on a self-assessment of material flows within company boundaries (see Figure 3), combined with additional indicators on resource efficiency and efficacy, as well as the value added by circular business. In addition to the ability to close the loop, CTI provides insights into overall resource use optimization and the link between the company's circular material flows and its business performance.

¹ WBCSD (2018). Circular Metrics – Landscape Analysis. World Business Council for Sustainable Development (WBCSD). Retrieved from: <https://www.wbcd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Resources/Landscape-analysis>



The framework does not evaluate the environmental and social impacts of the company's circular activities. However, understanding mass flows is a major step in knowing their impacts. Moreover, in its current set-up, this is not a methodology designed to share or celebrate achievements but rather to measure progress regularly as circular solutions are identified and tested across products and facilities.

The framework has been developed around 5 core principles: to be as simple as possible within the context of the circular economy (Simplicity), to use one common, cross-industry language that provides consistent insights into circular opportunities and linear risks regardless of organization size, sector or value chain position (Consistency), to offer a complete set of metrics with the flexibility of accommodating diverse business needs (Completeness), to complement other existing sustainability and business metrics (Complementarity) and to refrain from prioritizing specific materials insofar as they all contribute to the circular economy (Neutrality).

How was the CTI methodology received by companies?

IM: The CTI methodology has been very well received by companies globally. With CTI, business now has a clear and common language for circularity with a set of quantitative metrics. Companies find the methodology straightforward and intuitive, user-friendly and comprehensive, complementing companies' existing sustainability efforts.

The CTI online tool counts over 1,000 organisational accounts since its launch in January 2020. User groups from diverse sectors and positions in the value chain are piloting the methodology, enriching it with sector specific application and providing feedback for further upgrades to the indicators.

CTI's Value the Loop module has been particularly welcome by the investors community as it is the only methodology to provide a solid grasp of value created through circular investments allowing to recognize and reward companies that make progress on circularity.

What are the challenges in the implementation of the CTI and its use by companies?

IM: Probably the most significant challenge for companies relates to data collection. This may be because it is the first time that it is gathered or because the range of products assessed is very broad and with a complex supply chain. It is key to set the correct scope at the onset and begin by products or product groups for which data may be already widely available. In many cases, data along the supply chain resides with suppliers who may be reticent to share confidential data externally. To address these challenges, WBCSD developed the CTI Tool which supports companies in structuring data and allows them to invite suppliers to provide their data for relevant products in a confidential manner. Expert guidance is available to support companies to set up their first assessment in the form of advice from

experts or coordination of user groups by WBCSD and its partners. User groups are especially helpful as companies can share challenges, solutions and best practices.

What are the first results?

IM: Based on feedback, companies find that it allows them to analyze their circular performance through a structured process. Applying CTI helps them translate their vision into a strategic roadmap and monitor progress as they embark on their journey towards circularity.

CTI supports innovation. When used in the early stage of products development, CTI helps evaluate possibilities to improve its circularity before it goes to market. Additionally, companies found that using CTI not only helped them characterize how circular their product, product lines, facilities or entire company is but also to identify more efficiently risks and opportunities. By using it at corporate level, CTI can help companies identify opportunities for improvement and highlight areas that can have highest impact on closing company's loops.

Finally, beyond internal communication, companies find that CTI helps them communicate more responsibly and more transparently with suppliers and clients, building close relationships and developing a common understanding of priorities. The process of data collection to calculate the indicators fosters collaboration across the value chain.

Find feedback from companies that have applied CTI on our CTI case studies page.²

What are the next steps to improve the CTI methodology?

IM: In February 2021 WBCSD published an updated version of the CTI methodology. CTI v2.0 features three main additions to the existing methodology, including:

- **Water Circularity:** New calculations for Circular Water Inflow/Outflow and Onsite Water Circulation.
- **CTI Revenue:** Acknowledging growing investor interest for metrics that link circular and financial performance, the new CTI Revenue indicator provides a consistent way to credibly respond to investor inquiries.

- **Bioeconomy Guidance:** CTI now includes extensive instruction and interpretation on the bioeconomy across all indicators and process steps.

The new content builds on CTI's existing data and makes it easier and more valuable to companies that apply the methodology.

What are the differences between Circulytics and CTI and how are the tools complementary?

IM: CTI is a self-assessment framework that provides insights into overall resource use optimization and the link between the company's circular material flows and its business performance.

CTI is a fully quantitative methodology based on demonstrable data. Its objective is to empower companies in identifying linear risks and circular opportunities and which effectiveness can be measured and monitored in reoccurring (annual) cycles.

Circulytics is based on the combination of quantitative data and qualitative insights on a company's readiness to do business in a more circular way, for example in terms of strategy and business functions. Circulytics helps

companies explore their circular potential through the scoring of "outcomes" (i.e., how circular you are today) and "enablers" (i.e., how ready you are to be more circular in the future).

No company can drive the transition to a circular economy on its own. The circular economy requires a larger industry, value chain and cross-sector effort. To transform, companies must speak the same language, regardless of size, industry or value chain position.

Having a common approach to measuring and monitoring circular performance is essential. This will allow value chains to become value cycles, progressing towards a shared vision. Collaboration and coordination in the context of circular metrics is essential for accelerated and higher impact results. WBCSD and the Ellen MacArthur Foundation methodologies and definitions are aligned so that companies can use similar data sets in their calculation for material flows and benefit from both approaches in their journey towards circularity if they so choose.

No company can drive the transition to a circular economy on its own. The circular economy requires a larger industry, value chain and cross-sector effort

² <https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Circular-transition-indicators/Case-studies>

CO-DEVELOPMENT OF INDUSTRIAL-QUALITY POST-CONSUMER RECYCLED PLASTIC: the example of Groupe SEB and Veolia

Ingrid Tams,
Environmental Manager,
Groupe SEB

Jacques Tanquerel,
Plastics Procurement Category
Leader, Groupe SEB

Françoise Weber,
Head of Extended Producer
Responsibility Schemes, Veolia
Environmental Services

François Guéneron,
Head of Industrial Plastics
Recycling, Veolia France

The introduction of quality recycled plastics from closed loop post-consumer waste is an important issue for manufacturers in their efforts to roll out circular economy strategies. But the lack of pre-existing recycling capabilities means that tackling it requires a co-development approach that presents unexpected difficulties and potential. The project discussed in this interview centers on a pioneering partnership between Groupe SEB and Veolia to develop post-consumer recycled polypropylene for use in electrical and electronic appliances. The project proved highly beneficial for both partners. For Groupe SEB, it was a way of highlighting the potential for incorporating post-consumer recycled plastics, which now encompass various product families, types of plastics and geographical regions. For Veolia, it was the first stage in the development of a recycling process that is now applied worldwide across a range of different sectors.



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With a degree in mechanics and production from T121 Caen, Jacques Tanquerel is Plastics Procurement Category Leader at Groupe SEB. He co-ran a pilot project looking into using recycled plastics as part of the sustainability and procurement strategy.

Ingrid Tams is a materials engineer who studied at INSA in Lyon. From 2012 to 2015, she jointly ran the first project to introduce closed loop recycled plastic into household appliances. Since then, her activities have broadened to cover all aspects of eco-design.

François Gueneron studied engineering at ISPA and has worked in the recycling industry for the past 10 years, joining Veolia in 2016.

Françoise Weber is an engineer with an MBA from Darden University in Virginia, USA. She is currently Head of Extended Producer Responsibility Schemes at Veolia.

Can you tell us about the initial issues surrounding this co-development project?

Ingrid Tams and Jacques Tanquerel (Groupe SEB): We've been looking at product recyclability since 2000 as part of our eco-design efforts. In 2010 senior management at Groupe SEB asked us to switch focus onto recycled plastic, which emits up to three times less CO₂ than virgin plastic. In concrete terms, as early as 2011 laundry care marketing teams were telling us they saw real advantages in incorporating recycled plastic into our products. We initially decided to work on recycled polypropylene since it is the most commonly found material in our products. In 2012, the project to develop use of recycled materials was identified as one of the four key issues facing Groupe SEB in its sustainability approach. This approach was part of a long-term strategic vision that we strongly felt was fully aligned with client and consumer demand, but that also had the potential to reduce supply costs by using recycled materials.

For the first three years, we didn't know if we'd succeed. There were new skills that both sides needed to acquire

Françoise Weber and François Guéron (Veolia): Working at our waste electrical and electronic equipment (WEEE) processing site at Angers, we set up a plastics waste sorting unit to eliminate brominated flame retardants. As soon as we succeeded in obtaining decent quality resin, we wanted to produce a plastic mixture and develop high-added-value applications in a closed loop. At the time, Veolia was keen to expand its plastics recycling activity but we needed to scale up. We knew how to sort, but we didn't have the capacity to produce recycled plastic from post-consumer plastics.

Why did you choose to work together?

IT and JT (Groupe SEB): Precisely because Groupe SEB has the manufacturing know-how needed to co-develop and then use this recycled plastic. We are founding members of an eco-body called Ecosystem, and at the time it was running a tender for recycling plastics from WEEE. Veolia offered advanced skills in sorting plastics using infrared sorting techniques. We did sound out other recyclers, but our discussions with Veolia were the most productive. They were actively engaged and listened closely to us, but were also prepared to sign up for a process that would inevitably be long and difficult. And we knew that working with Veolia meant we would be able to use post-consumer plastic from WEEE. This aligned with our determination to use material recycled from our own products, in a closed loop. With over 360 million of our products sold each year around the world, it's a responsibility we have to assume.

FW and FG (Veolia): We have a longstanding relationship with Groupe SEB via Ecosystem, which is our primary partner in France for WEEE collection and processing.

SEB had a proactive attitude to the issue and Ecosystem pointed them in our direction. From the start of the project we already knew a lot about the process of sorting plastics to separate out brominated flame retardants using our infrared sorting technology and we could sort resin by type (polypropylene, ABS, etc.). Veolia is well known as a serious player and that worked in our favor. But we were missing the final stages of the value chain we needed to meet their requirements. At the time, we didn't have all the stages in the plastics recycling value chain in place. So we reached out to a French specialist in compounding recycled materials. Today, Veolia has in-house recycling capacity thanks to its acquisition of four recycling plants in France. We teamed up with PMG, which specializes in preparing recycled plastics.

What commitments did the two parties make to each other?

IT and JT (Groupe SEB): We undertook to develop recycled material for our laundry care products, where the constraints were pretty reasonable. We wanted a black material that met our exact specifications and was available in the volumes we required. For the first three years, we didn't know if we'd succeed. There were new skills that both sides needed to acquire.

FW and FG (Veolia): It was a long learning curve for us. We had to acquire new skills: setting up a quality control process, applying REACH classifications, and building a process for characterizing the material. We also had to guarantee the stability of the material supplied. In the beginning this was not a commercial project. The management team gave us the freedom to explore. We really wanted to successfully develop a commercial activity in a closed loop in collaboration with Ecosystem, and to show that we could embed a project of this type into our long-term operational processes.

What were project's key stages?

IT and JT (Groupe SEB): It began with a visit to the WEEE sorting site at Angers to assess Veolia's ability to develop a product that would meet our requirements. We then set up a project team at Groupe SEB comprising experts from various departments: marketing, environment, procurement, the plastics design office, site procurement and materials innovation. The second stage was to develop the first samples that matched the specifications and carry out testing to look at mechanical and thermal resistance and regulatory compliance (RoHS and REACH). We hit various unexpected problems during the project. Tests using presses, for example, showed up problems with offensive odors that troubled the operators. It took

a year to sort it out. The solution included investing in smoke extraction systems for the presses. Once that obstacle was dealt with, the third stage was very much like a conventional development process: prototyping, mold tests, laboratory tests, quality tests, etc. Only then did we settle on prices and shipment frequencies. Overall the project took three years, from initial discussions to characterizing the final material. Production was officially launched in July 2015 and the first products to include recycled material were on the market in September the same year.

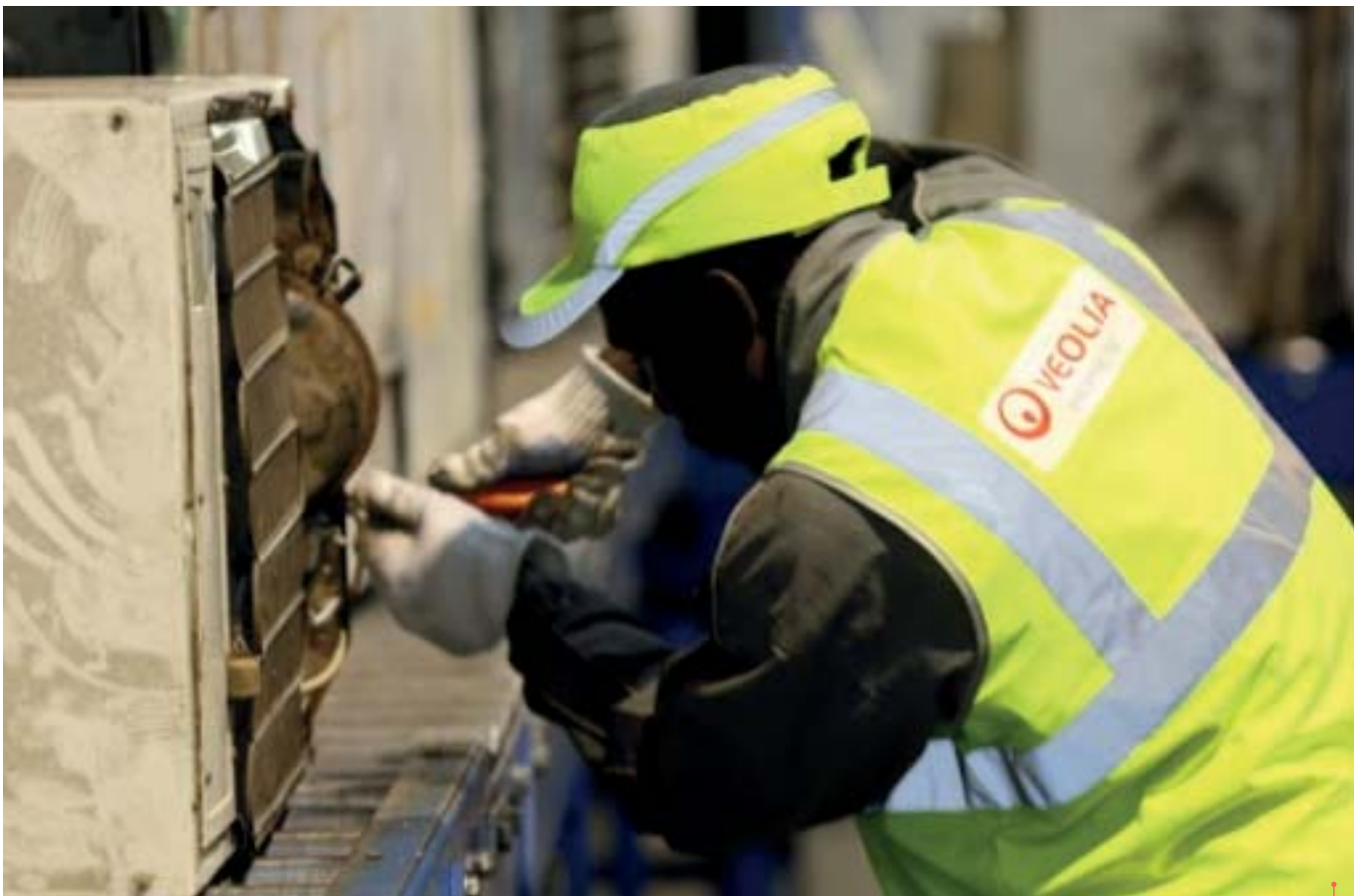
FW and FG (Veolia): At one point we thought the project would fail, particularly because of problems centering on the recycled material's smell. ADEME (France's environment and energy management agency) helped Groupe SEB with the design of an odor extraction system for the extrusion phase. Once feasibility was established, we opted to acquire the compounder so that we would have end-to-end in-house recycling capabilities. Our goal was to ensure the project would be a success. We were able to move a lot faster after that. For us, the project was a crucial component in developing a comprehensive

We were able to show our clients and management that we had the skills to run a closed loop post-consumer recycling process for industrial quality applications

recycling capacity, from sorting to grading, washing, grinding, formulating and extruding resin polymers and manufacturing compounds.

What have you learned from this co-development project?

IT and JT (Groupe SEB): There were three key takeaways for us: above all it showed us that it is possible to recycle material from our products to make new ones. It was tricky at the beginning, and some experts didn't think we would manage it. Then there was the fact that projects of this type require patience. It takes six to 18 months to develop a new product, but this project took three years. Lastly, there are the spin-offs from new learning about the latest developments in recycled materials. It now takes us much less time to run the pre-qualification phase, although still longer than when using a virgin material as adjustments are inevitably required. Recycled materials take three or four months longer.



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FW and FG (Veolia): We were able to show our clients and management that we had the skills to run a closed loop post-consumer recycling process for industrial quality applications. The project also gave us an insight into the difficulties of co-development with clients that manufacture technically demanding products.

What are the outcomes you have noticed?

IT and JT (Groupe SEB): The savings achievable from using recycled materials depend on the price of oil, as the price of virgin material is indexed to it. If oil is expensive, recycled material is attractive. This is less true when the price of oil is low. But the most important point is the impact the project had inside the company as well as among our clients and with the general public. We are starting to see consumer surveys that indicate the public is very receptive to recycled plastic. There is also strong impetus from policymakers – which we saw in France, for example, with the draft climate law – encouraging manufacturers to make voluntary commitments in this field. Within the company, recycled plastic is now seen as being a major plus in terms of customer value. The senior management team are very committed to it. They have set a target of 50% recycled materials for our products and packaging. The increasing importance of recycled materials is reflected in the ever-growing number of requests we're receiving from our brand management teams and manufacturing division, asking us to develop new materials and new colors.

FW and FG (Veolia): Our plastics recycling business has grown very quickly, extending way beyond the market for electronic and electrical equipment, which is small from our standpoint. We currently sell 60,000 metric tons of recycled plastic a year (post-consumer, post-industrial and post-use). We hope to bring this up to 100,000 metric tons a year in France. Worldwide, we currently operate 32 plants for a capacity of 500,000 metric tons. Creating a fully structured sector requires the investment of very large sums. Our plastic recycling subsidiary currently employs 1,000 people worldwide and generates €500 million in earnings.

The difficulty facing us now lies in finding an economic balance when oil prices are low. There are fixed costs involved in developing and producing recycled materials. Not only is material qualification testing required, but production molds designed for virgin material also have to be modified. Demand needs to be kick-started to drive these costs down. Mentalities are clearly changing. But action on several fronts is needed if recycling is to be viable over the long term, such as eco-modulation with a bonus for recycled materials, eco-design, and consumer acceptance.

Within the company, recycled plastic is now seen as being a major plus in terms of customer value



© SEB

What are the latest developments and the outlook for recycled plastic?

IT and JT (Groupe SEB): We've extended the process to other, more sophisticated, product families (vacuum cleaners, coffee machines, etc.), which has led us to alter the material to meet impact resistance standards for vacuum cleaners, for example. We are also working on the development of new materials (ABS, ABS-PC) with other suppliers, aside from Veolia. One of the current issues we face in trying to take things to the next stage is how to change the product designs. Recycled material is a dark color, either black or grey. But a lot of our products are white. At the moment, our design teams are working on this to make sure that consumers will accept black as a color. Working closely with all our specialties, we are innovating to help consumers transition to more responsible and sustainable consumption habits. To boost the quantity of recycled plastic we use, we are working on co-development projects with local partners (in Brazil and Vietnam) in other parts of the world, as well as on the development of food-grade recycled colored plastics. We are looking into new techniques for removing color from plastics as well as examining chemical recycling processes. There's still a lot to do!

FW and FG (Veolia): We're working to develop additional materials (PET, ABS, polystyrene, polyethylene, etc.) in addition to polypropylene, and looking into different outlets, particularly packaging and vehicle manufacturing. Other post-consumer flows will emerge with the expansion of EPR recycling schemes, such as for garden furniture and in the construction industry. One of our aims for the future is also to be able to work on other continents, because the ability to supply local products is the crux of the circular economy. We are currently working with the vehicle manufacturing industry.