WHY CIRCULAR ECONOMY?

20 reasons to switch
to the circular economy

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RIAL

Why circular economy is your best option

While we can rejoice in the sharp rise of the global middle class, especially in emerging economies, the accompanying growth in consumption puts further pressure on raw materials and underscores the limits of our linear economic model—"take, make, dispose." According to the Global Footprint Network, **it now takes the earth 18 months to regenerate the natural resources we use in one year. Obviously, this is not sustainable.**

But there are promising developments underway, too, as innovators around the world pave the way for a "circular" economy to emerge at all levels, giving rise to new business models and economic opportunities.

The circular economy tackles problems at their roots by reducing our dependence on finite products. It shifts our economies towards a more virtuous circle, designing out waste at all levels while restoring our manufactured, human, social, natural and financial capital. This new economy also represents a remarkable opportunity to protect the environment **while creating jobs and wealth—an estimated 1.8 trillion euros by 2030 in Europe alone.**

This publication features men and women who are making this transition a reality, from bold entrepreneurs to leading circular economy experts such as William McDonough, Claire Pinet, Elisa Tonda, Jean Viallefont or Jean-Marc Boursier. Divided into six different categories—new business models, eco-design, sustainable procurement, industrial and territorial ecology, responsible consumption and recycling—it analyses each of the links required to build a solid circular chain, and it portrays determined changemakers who believe that a more sustainable world is possible.

It's now time to tell their stories. **It's time to appreciate the magnitude of the opportunities offered by the transition to a circular economy.** And it's time to let yourself be inspired to join the movement.

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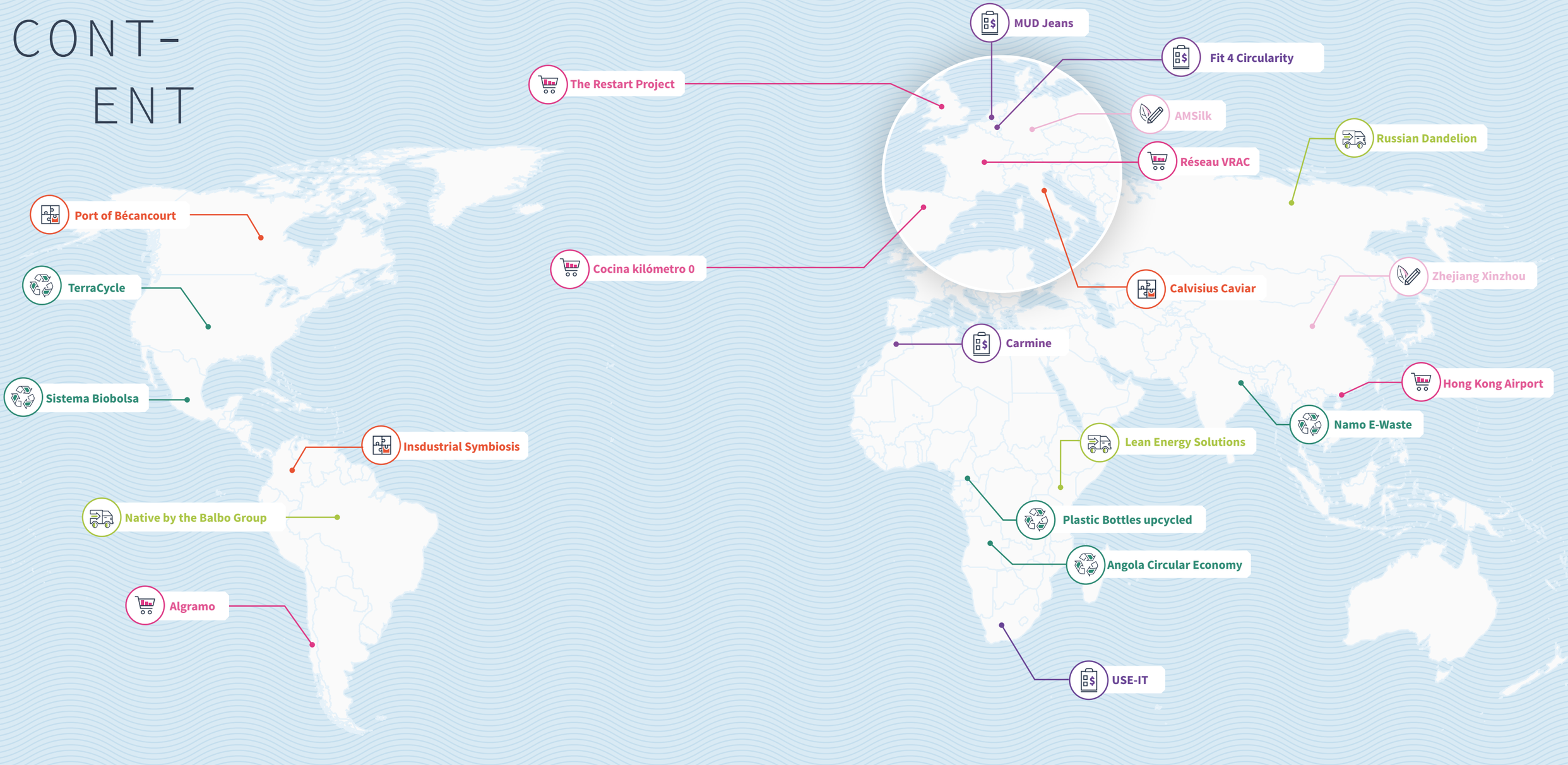

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Walter R. Stahel is a Swiss architect and industrial analyst. He is the founder of the Product-Life Institute, a not-for-profit consulting organization that promotes sustainable strategies and policies.

Circularity, Circular Economy, Circular Industrial Economy and Performance Economy

In order to structure the many facets of Circular Economy, I distinguish four types of "circularity", which exist simultaneously and in parallel all over of the world:

(1) Circularity has been inherent in nature — water, CO2, matter and energy — and also in early civilization — reuse, barter and cascading of goods and materials. A sustainable consumption of natural capital — food, land and water — and the protection of the global commons such as oceans, atmosphere, biodiversity and space is **a necessity to conserve the carrying capacity of nature and the survival of humankind.**

(2) The early Circular Economy was driven by scarcity and poverty and based on the reuse and repurposing of objects, as well as the skills of do-it-yourself and local craftsmen repairing individual objects — infrastructure, buildings and mobile goods — to maintain their use value. **This circular economy is locally integrated and lives on in many countries, motivated either by scarcity, ethical or religious convictions** (such as the Amish people in the USA and charitable organization worldwide) and increasingly as a result of social self-help initiatives, such as repair cafés, food donations and garment exchanges. Individuals are the key players of circular economy.

> "Eco-design is now a corporate strategy to increase long-term profitability. This opens numerous new business models both on the supply side and demand side."

(3) The Circular Industrial Economy (CIE) focuses on making the best use of the stocks of natural, human, cultural and manufactured assets. It was triggered by the emerging society of abundance in the mid-20th century and started through research on the impact of extending the service-life of objects on jobs and waste, energy and material resource consumption. The industrialization of reuse, repair and remanufacture in the CIE is a viable and regional low-carbon alternative to the global Linear Industrial Economy. The CIE took first roots in the industrialized regions of the USA and Northern Europe; Japan joined the trend in the late 20th century, with a special interest in Eco-Design; China adopted the CIE in the early 21st century as part of its national development and reform policy. The role of individuals' shifts in the CIE from consumers to users — sustainable consumption of manufactured objects is an oxymoron. **Eco-design is used to minimize environmental impairment.** As the CIE substitutes manpower for energy, the traditional focus of policymakers on recycling and waste management should shift to taxing resource consumption and waste instead of taxing human labour, which is a renewable resource.

(4) The Performance Economy (PE) integrates the principles of the CIE and in addition retains the ownership of objects and as a consequence internalizes the costs of liability, risks and waste. The PE **sells the performance or function of objects by, for example, renting or leasing instead of selling them.** In this 'sharing economy', liability and control are split between owners and users (stewardship). The fields of activities of the PE are broader and more competitive than those of the CIE because they include systems solutions and exploit prevention and sufficiency strategies, in addition to efficiency. **Eco-design is now a corporate strategy to increase long-term profitability.** This opens numerous new business models both on the supply side (such as Private Finance Initiatives and rent-a-molecule) and demand side (such as sustainable public procurement through buying objects as a service). Today, the PE rapidly expands with the growth of the Internet of Things (IoT). As users now become prod-users, producers of user data, policymakers are challenged to adapt the protection of authorship (intellectual property rights) accordingly.

What if
my product
was
actually
a service
?

NEW BUSINESS MODELS

Circular economy creates new economic models that favor usage over possession and sell services over products.

IN THIS CHAPTER

Economy of Functionality: Fewer Goods, Greater Effectiveness

CLAIRE PINET
is the Economy of functionality promoter for the ADEME Consumer and Prevention service.

> “Rather than focusing solely on the lifecycle of the products, ADEME’s approach favors the creation of value based on the service value of the offer and its positive effects.”

What future is there for an economy of functionality? For over a year and a half, ADEME has been working on this new economic model with intervention research laboratory ATEMIS, in collaboration with various other players deeply committed to the matter. A grounded exploration which anticipates a bright future for 2050, and many possible avenues for thought.

Let us imagine an economy where a producer would no longer simply sell their vegetables, but offer healthy eating guidance to citizens, together with other local bodies. Where earnings would increase as consumer health improved and waste and soil pollution decreased, putting an end to the sole prevailing logic of producing and selling an ever-increasing amount of material goods. Let us consider a world where we would not abide by the principle of selling equipment for a conference, but instead of comprehensively managing the organization of the meetings involved; making the appropriate technology available for customers, and most importantly ensuring the effectivity of a collaborative effort. **A world where businesses would be paid according to the value they added, their economy of natural resources, their social progress.** A world where everyone would not design their offers alone, but in close cooperation with relevant parties. This is the world of the prospective study carried out by ADEME: a vision of a sustainable economic model that deploys an economy of functionality.

Solutions towards sustainable development

This economy relies on selling effectiveness and no longer on selling goods. The point is to provide businesses, individuals or localities with comprehensive packages of services and goods without personal ownership of the goods required. These packages would entail the lowest possible utilization of material and natural resources in a circular economy perspective, increase people’s well being and provide sustainable development for localities. This accounts for ADEME’s particular interest in this economy. The prospective vision it presents shows **the coherence and benefits of this new economic model, which is ecological, humanist and sustainable; capable of creating employment and forging social ties.** Rather than focusing solely on the lifecycle of the products, ADEME’s approach favors the creation of value based on the service value of the offer and its positive effects, either direct or indirect, on citizens and the local social fabric. As it implies a relation of reinforced service between provider and recipient, this new economy relies on mobilizing the competencies of each and strong, adapted organization in an environment of mutual trust. It also relies on the cooperation of regional players - businesses, collectivities and civil society - to generate offers and call for innovative funding and governance strategies.

Means to be put into action

To make this vision a reality, ADEME’s study has identified six major challenges to be faced: implementing sustainable development policies in which environmental, social and economic dimensions remain closely bound together; being able to evaluate what holds value for different players (an effect, a resource etc.); creating conditions for spreading social innovation; developing a dynamic of cooperation and mutual commitment between players; initiating change at once in consumption habits, citizen behaviors and modes of production; ensuring collaboration between service provision and product lifecycle management dynamics. There may be a long way to go, but ADEME wishes to initiate change alongside other committed players, supporting their local and business ventures.

JEAN-MARC BOURSIER

is SUEZ Group Deputy CEO for the Recycling and Recovery segment in Europe.

How does the Circular Economy Transform Businesses at SUEZ?

What do you understand by 'Transforming its business by focusing on the circular economy'?

Jean-Marc Boursier: In a world which is constantly changing, there **is an urgent need to establish a growth model which uses fewer resources.** The world population is set to reach 8.5 billion by 2030. By 2035, 40% of this population will live in areas under water stress. According to estimations, world iron resources are set to run out before 2042, and copper resources before 2044. In the face of these challenges, SUEZ is fully engaged in the resource revolution: our role today is to help our clients to move from a linear model—based on an overconsumption of resources—to a circular one which reuses them. This orientation pertains as much to water-related activities as it does to waste-related ones. **Recycling and recovery activities are undergoing three transformations: the transition from an infrastructure business to a service business; the transition from a logic of waste disposal to one based on the recovery of waste in the form of materials and energy; and finally, the digital conversion.**

> "Historically, industrial players were essentially concerned about the waste produced by their factories. Today, they concern themselves with the impact of the waste that their customers generate, through the use of their products."

The circular economy is at the heart of our activities. It allows us to create local loops so that waste from some becomes resources for others. For instance, in places as distinct as the Rhone Valley and the Shanghai region, we transform waste from a chemical platform into steam we then resell to industries belonging to the same platform. To take another example: in the past, papermakers had to buy forests for their cardboard production, in order to secure a supply of their raw material. Today, nearly 100% of cardboard comes from recycled paper.

What are the most promising material streams?

J-MB: The three streams on which SUEZ has focused major research efforts are also those that the European authorities will regulate in the coming years, so as to speed up the emergence of new behaviors. The first of these is organic waste, which can be recovered as energy (bio-methane) or as matter (compost, agricultural fertilizer). The second is related to demolition debris, waste from construction sites and from materials, these being the most significant in terms of mass. **In France, of 350 million tons of waste produced, no less than 260 million tons are from the construction sector.** The government has set this sector the goal of a 70% waste recovery rate by 2020. We at SUEZ have been working with Bouygues, Saint-Gobain, Vinci and all players of the sector to consider how to improve the recovery of this type of waste. Finally, we work a lot on plastics, and in particular with Procter&Gamble, L'Oreal and Unilever. For certain resins, a quality level has now been attained for recycled materials which is comparable to virgin ones.

Are there activities which have proved successful for SUEZ in the past and which are less strategic today, for example incineration and landfill?

J-MB: Incineration is one of the components of energy recovery and still has a future. It is not possible today to sort all our waste; this means we have to use the energetic potential of residual waste. **Countries such as Sweden and Finland use the calorific potential of waste to heat their urban networks.** They even favor importing waste in the form of combustibles with a high calorific value over local deforestation. An activity which is set to decline massively in Europe in the coming years is waste disposal; the most extreme aspect of this being landfill. Landfill is tantamount to negating the resource that waste represents, be this energy or material. The role of a company such as SUEZ is to come up with solutions which can ease such changes.

Is digital conversion necessary for the introduction of a circular approach?

J-MB: Yes, on several levels. Digital technologies allow us to develop e-commerce solutions aimed at our clients in industry but also at citizens; on the other hand, to design data collection schemes, to monitor water consumption in real time for example. Finally, digital technologies allow us to design 'marketplaces' which facilitate the connection between players with complementary needs. This was how we set up Organix® (see p 70-71), a marketplace for organic waste, and also developed a commercial partnership with HESUS , a company which brings together producers of waste from construction sites with those who would like to recover this. We also took a minority share in Rubicon Global, a leader for waste collection and recycling digital solutions in North America.

What advice would you give to businesses wishing to integrate the principles of circular economy in their practice?

J-MB: Businesses often have the same needs and face the same concerns: how to reduce waste production from the onset, how to limit water and energy consumption, and finally how to recover the waste produced. We can support them with these different issues, but also provide guidance as to the stakes pertaining to their so-called "extended" responsibility. Historically, industrial players were essentially concerned about the waste produced by their factories. Today, they concern themselves with the impact of the waste that their customers generate, through the use of their products. We can for example offer solutions for designing packaging using recyclable materials, but also packaging which is easier to recycle. **The fact that the responsibility of businesses now extends beyond their direct environmental footprint is for them a major cultural shift.**

Circular Economy at Canon

FLORENCE LORETZIN
is the Business Compliance and Environment officer at Canon France.

What prompted Canon to start using circular practices as early as the 1990s?

Florence Loretzin: Canon had started to incorporate a holistic approach including all his stakeholders. since the 1980's. Being a multinational company, we must pay attention to sustainable development issues. The Brundtland report in 1987 followed by the Rio Conference in 1992 made civil society more aware of sustainable development and environmental stakes. We therefore took a logical turn towards circular practices and ecodesign.

Could you give us an overview of the different policies put in place at Canon in terms of ecodesign and sustainable sourcing?

FL: The very notion of environment has been integrated to all our processes. All Canon sites work according to the life cycle analysis methodology. This led us to rethink our production methods in order to create sustainably sourced, ecodesigned products, which contributes to reducing our logistics load. **Applying the life cycle analysis methodology allowed us to save on raw materials, energy, and water all along the life cycle.** We are one of the few multinational companies to have obtained a global ISO 14001 certification. Our ecodesign approach is also expressed by our commitment to the EuroVAprint program and led to the Energy Star 2.0 labelling of mostly all our products.

What about the "zero waste to landfills" program?

FL: Our policy complies with the regulation demanding the establishment of collection routes and partnerships with businesses who are able to recycle our products. But we have chosen to go beyond this by setting up recycling points for our products and consumables in main geographical zones. France plays a key role because the site located in Brittany collects all of the laser cartridges used in greater Europe. This recycling is done in a very virtuous way, in a closed loop; the factory produces new cartridges made from used ones. More generally speaking, we have been recycling our products for more than 25 years. When the contract on printing equipment we have with a client comes to an end, we collect their products and sort them out depending on their overall state, before shipping them to Germany to be dismantled. We can then build new products and cartridges from these reused parts. Our zero-landfill policy applies to whatever is left after this process and cannot be recycled: it is taken care of by an eco-organization accredited by public authorities.

What environmental impact do these circular practices have?

FL: We saw a 34% reduction in CO2 emissions by product between 2008 and 2016 thanks to an improved management in product life cycle. When we collect the cartridges, we kill two birds with one stone: the materials are reused and represent as much avoided waste. **This environmental approach is also beneficial from a financial point of view.** That being said, circular economy brings new challenges in our supply chain. We must have enough flows of qualitative materials to make our recycling approach a lasting solution.

Is circular economy only the domain of certain visionary businesses or is it becoming the norm?

FL: Transitioning to a circular economy requires a true commitment and significant investments. At Canon, our organization has already allowed us to implement solutions based on local networks that collect waste on site and treat it locally so as to have a virtuous environmental process. **I think that it starts with a human commitment which leads to the development of relevant vision and savoir-faire.**

> "All Canon sites work according to the life cycle analysis methodology."

Reserved locations granted to Carmine by Casa Developement

Self-service Car Sharing Hits the Streets of Morocco

By Stéphanie Jacob, L'Economiste

Self-service cars, by the hour or day, accessible 24/7 and with parking, fuel and insurance costs included, are currently on offer in Casablanca from the startup Carmine. Now that self-service bikes have rolled into the country, cars are following suit and offer a much-wanted service in the economic capital, burdened with increasing, chaotic traffic. The firm was created in 2014, and tested the waters with a pilot project in July 2015.

According to CEO and founder Mohamed Mrani Alaoui, "People generally thought such a concept would not work in Morocco (...) But the pilot period was about making the new service more effective. And then, the hardest part was to find funding. I started out alone with my own savings and we were extra careful until we found investors." The deal was finalized when former Minister of Transportation Karim Ghellab signed up to the venture as an associate through his investment fund Massir Invest. This is the kind of backing that helped Carmine effectively expand in mid-October 2017.

To fathom the quality of the service, Carmine must take into account a sample of 40 individual users per shared vehicle; 3600 users in total for the 120 expected vehicles over a span of four years. Rates start at 30 MAD (US$ 3) per hour plus 1 MAD (10 US¢) per kilometer, with a subscription ranging between 290 MAD (US$ 31) for a quarter and 890 MAD (US$95) for a full year.

WEBSITE
http://www.carmine.ma/
COUNTRY OF ORIGIN
Morocco
EXTRACT FROM AN ARTICLE BY
L'ECONOMISTE

Claude Feiereisen, deputy manager of the EcoInnovation Cluster at Luxinnovation

Getting in Shape for the Circular Economy

By Cordelia Chaton, Letzebuerger Journal

Luxembourg's new "Fit 4 Circularity" program is designed to help small-and medium-sized companies interested in sustainable growth to breach the gap between the visions of such luminaries as Jeremy Rifkin and the day-to-day practices involved in running a business.

Fit 4 Circularity helps companies avoid waste, save water and design products so that they may be easily recycled or reused. It also encourages firms to consider different marketing strategies such as product leasing. According to various studies, adopting a circular economy could save Luxembourg between €300 million and €1 billion (US$ 359 million - US$ 1.2 billion) annually.

How does it work? "First, we send in professional advisors who check out every phase of a company's production and sales to determine how they can become compatible with the principles of circular economy," says Claude Feiereisen, deputy manager of the EcoInnovation Cluster, Luxembourg's agency for economic development and investment. These experts remain on site throughout the diagnostics phase, which can last from six weeks to six months. Fit 4 Circularity covers up to half of the cost, as long it doesn't exceed €10,000 (US$ 12,000).

The diagnostic results are used to generate a roadmap for actions to be taken during the following one to three years. The program reaps the greatest results when professional advisers and members of research and development help draw up a long-term plan. When this is the case, it's possible for Fit 4 Circularity to provide financial assistance to the company. Half a dozen firms have signed up so far.

WEBSITE
http://www.innovation.public.lu/en/innover/pme-artisanat/fit-for-circularity/index.html
COUNTRY OF ORIGIN
Luxembourg
EXTRACT FROM AN ARTICLE BY
Journal

Recycling Plastic and Rubble into Jobs

Siyabonga Shange of Sbumeister Plastics in his factory near Durban, South Africa

A South African company shows how waste recovery could reduce landfill while creating employment

— By Charlotte Mathews, Business Day

When temporary disability put electrical engineer Siyabonga Shange out of work for two years, making it nearly impossible to get his job back, he started Sbumeister Plastics, a plastics recycling business. Shange **sources his plastics with the help of Durban-based USE-IT, a waste beneficiation organization** launched eight years ago by an entrepreneur named Chris Whyte.

USE-IT has a partnership with (and funding from) the Durban City Metropolitan Area in the local eThekiwini Municipality, giving Whyte and his team access to the municipality's waste to create business opportunities and employment for people like Shange.

Umgibe, a co-operative with about 500 members, 95 percent women, also sources plastics from USE-IT, using it to **protect vegetable plants from pests or to transform into items such as handbags and coffee tables for sale.** The co-operative's members receive training from USE-IT as well. Nonhlanhla Joye, Umgibe's founder, said, *"We have got ourselves out of poverty, and Chris Whyte is part of that solution."*

Since 1994, South Africa's government has been trying to address rising unemployment, with little success. In the first quarter of 2017, the unemployment rate among those aged 18-34 was 58 percent—or about eight million people. The nation's recycling industry is relatively underdeveloped, but if more of its waste was turned into a resource, it could create thousands of new job opportunities.

Nonetheless, both USE-IT and the Recycling and Economic Development Initiative of South Africa (Redisa) —which was founded in 2012 to manage waste tire recycling—have faced intimidating hurdles, in some cases from the government. In May 2017 the Minister of Water and Environmental Affairs, Edna Molewa, applied to put Redisa into liquidation after a disagreement with management over the funding model. Redisa's team is fighting the liquidation order.

Stacey Davidson, Redisa's director, said that in its first four years, Redisa created 3,500 jobs and subsidized more than 200 businesses. With similar impact, USE-IT has created about 2,500 employment opportunities over the last six years. Whyte said that this injection of jobs provided by waste recycling is only a fraction of the potential in eThekwini and South Africa at large. The obstacles that his company has faced include red tape, a shortage of resources, difficulty in accessing funding, and a lack of public awareness about the need for recycling.

Despite these difficulties, USE-IT's contribution has been recognized by numerous awards. At the The Circular Economy Awards in 2017 the company was nominated as a finalist along with several bigger, better funded projects, and in May it was cited by the South African parliament as an example of green job creation.

Whyte said the public does not yet appreciate the full potential of waste recycling. ***"People believe they are supporting waste recycling by dropping off plastic, glass and paper at a recycling center. But that is only the first step in the chain. If we don't put money into developing the value in the whole chain it will not be sustainable."***

He said South Africa's focus is on "clean" waste, such as paper, glass and plastics, while the rest goes to landfill. **The total cost of dumping in landfills, including logistics, preparing sites and the loss of land use, is estimated at around 1,000 South African rand (US$77) per tonne—meaning that the country is throwing away about 37 billion rand per year of materials that could be turned to other uses.**

Building rubble makes up about 40 percent of South Africa's landfill deposits. And yet, Whyte noted, rubble should have no place in a landfill. USE-IT has developed a compressed brick made from rubble called RamBrick, which the company claims has superior properties to the cement bricks widely used in housing and is significantly cheaper, too. RamBrick has passed all the required standards, but it is proving difficult to persuade developers to use it because of the industry's resistance to new technologies.

USE-IT is planning to use RamBricks to construct its Hammarsdale Waste Beneficiation Centre in the outskirts of Durban, which will serve as a hub for small business opportunities around waste, a first for Africa.

Whyte's vision is to place a USE-IT in every urban center in South Africa, but he needs the government's support to achieve a national roll-out. That would entail two key engagements: widespread public programs to educate the public about comprehensive waste recycling and the financial gains to be had, and the establishment of a Green Development Agency to co-ordinate the diverse and small-scale initiatives across the country.

"eThekwini Municipality has shown the return on investment from diverting waste from landfill and turning it into new products is 1,500 percent," Whyte said. *"Where else will you get that kind of return?"*

WEBSITE
http://www.use-it.co.za/
COUNTRY OF ORIGIN
South Africa
BY
BusinessDay

Everlasting Blue Jeans

MUD Jeans is a Dutch "circular denim" firm that wants to make fashion a less dirty business — **By Senay Boztas for Sparknews**

WEBSITE
http://www.mudjeans.eu/
COUNTRY OF ORIGIN
Netherlands
BY
spark news

Despite the name, MUD Jeans is anything but dirty. In a business with a history of scandals, from child labor to hazardous processes such as sandblasting, this modest Dutch company aims to make good-looking jeans that are ethically and ecologically sound.

"Fashion is the second biggest polluter in the world," said 56-year-old chief executive Bert van Son, who has worked for 35 years in the clothing industry. "Some 24 billion tonnes of cotton are made every year, and 24 percent of all insecticides and 11 percent of pesticides are used on cotton. It's totally out of hand. We need to use organic cotton—which doesn't pollute the water—or recycle cotton like paper."

And so **MUD Jeans gives shoppers a unique opportunity: for a one-time €20 membership fee, you can "Lease A Jeans" for €7.50 a month (around US$9), paying €90 in installments as opposed to €98 to buy a pair of jeans outright.**

After a year, you have three options. You can keep your MUD jeans (the company will repair leased jeans free of charge), you can return them for recycling, or you can trade them in for a new leased pair. A €10 voucher towards a new pair is given to people who return any brand of jeans, which MUD Jeans patches and sells as "vintage." If the jeans are beyond repair, the company sends the fabric to a factory in Spain for recycling.

The company sells jeans online and through 260 shops in 27 countries, allows retailers to place small orders to avoid overproduction, and never holds sales. Today some 2,000 of MUD's customers rent their jeans, making up a quarter of sales. According to van Son, their average age is 35, they tend to be well educated, have children, enjoy traveling, eat organic food and welcome new experiences. He noted that **80 percent of customers send back their old jeans for recycling, whether they lease or purchase them.**

A typical pair of MUD Jeans, like the Regular Dunns that he is wearing, consists of 23 percent recycled jeans, 75 percent organic cotton and 2 percent elastane. It is colored using non-toxic indigo dye and has a printed, rather than leather, label to make recycling easier. The jeans are produced in Tunisia at the Yousstex factory, whose working conditions have been audited by the Fair Wear Foundation.

MUDs' leasing concept was the start of a turnaround for an eco-fashion firm that van Son rescued from bankruptcy in 2012. "We started with 'Lease A Jeans' in January 2013 and that brought us immortal fame as a company because it was such a crazy idea," he recalled, sitting in his office and distribution center in Almere, in the Netherlands. "Leasing and jeans together are not fashionable, don't fit, and that's why it's so interesting."

The initiative attracted the attention of the London-based Ellen MacArthur Foundation, which profiled the way the company "seeks to close the loop on jeans production" and has just launched its own circular fibers initiative to encourage retailers to design textiles for reuse. «Crucially,» the text reads, «[van Son] understands the resilience that circularity could bring to his business, and how this will become an even greater competitive advantage in the future.»

Reached by phone, a foundation spokesperson said the **MUD leasing model should be more widely adopted, given that today's take-make-dispose approach to fashion creates high levels of pollution and waste**—and many clothes are used only a handful of times before being discarded. By sharing clothing among different people, renting increases the number of times each item is used.

Photo of Bert van Son

There are challenges to MUD's approach. Recycled cotton is more expensive, the business has struggled to keep up with demand that has doubled year after year, and value-added tax charged upfront affects cash flow, as does the leasing concept itself.

And although MUD Jeans has made global headlines, is a Certified B Corp, and has won multiple sustainability awards with its rental idea, those distinctions didn't initially translate to sales. "You can have a great story and be as sustainable as hell, but if your product is not fantastically good, at a good price, and widely available, it doesn't mean anything," said van Son.

The company received a recent infusion of cash and know-how when three skilled investors bought shares: a denim "guru," a sales manager and a social media marketing specialist. MUD has a working capital credit line with Triodos Bank (a bank that finances projects for positive change) and a loan from the DOEN foundation. **The company expects to break even with €1 million in sales in 2017.**

"You can do a lot with water, clay and sand—put it on your face, build houses, then turn it back to MUD," mused van Son, covering a fresh pot of tea with a MUD Jeans cozy made by his 88-year-old mother from old jeans and a coat. "And out of the MUD, a beautiful lotus flower can grow."

Have I taken into account the whole life cycle?

ECO-DESIGN

Eco-design takes into account the entire life cycle of a good or service, from its conception to the end of its life. This process limits the environmental impact at each stage.

IN THIS CHAPTER

WILLIAM MCDONOUGH
is a globally recognized leader in sustainable development. An architect, designer, thought leader and advisor, he is the co-author of Cradle to Cradle and The Upcycle.

Cradle to Cradle Design and the Circular Economy

As designers, we promote a positive vision of the future; based upon the belief that **many of the environmental problems we face are, at root, design challenges.** There is no end game—there is only the infinite game, where materials are kept in safe and healthy closed-loop flows within effective material recovery systems generation after generation. We call it Cradle to Cradle® and our goal is very simple:

A delightfully diverse, safe, healthy, and just world with clean air, soil, water, and power—economically, equitably, ecologically, and elegantly enjoyed.

Rather than seeking to minimize the harm we inflict, **Cradle to Cradle** reframes design as a beneficial, regenerative force—one that seeks to create ecological footprints to delight in, not lament. **It expands the definition of design quality to include positive effects on economic, ecological, and social health, in addition to the traditional architectural standards of commodity, firmness and delight.**

Cradle to Cradle has five characteristics that are in order, not necessarily of importance, but as a set of applications.

First is healthy and safe materials designed for biological and technical cycles. Ideally, everything that goes into a product is beneficial not just for the product itself, but also for human and ecological health. Industry would no longer have to work at reducing harmful inputs because they wouldn't include those inputs to begin with. **In Cradle to Cradle-inspired designs, instead of seeing materials as a waste management problem, we see materials as nutrients within two safe metabolisms: biological and technical.** Materials designed as biological nutrients can biodegrade safely and restore the soil after use. Materials designed as technical nutrients can provide high-quality, high-tech ingredients endlessly reused generation after generation. Once you have defined, high-quality, safe and healthy ingredients, the second characterization of Cradle to Cradle is material reutilization, or what is now known as the Circular Economy. In nature, there is no such thing as "waste"- the waste of one system becomes food for another. If we apply this concept to commerce, a product is broken up into valued resources flowing in a continuous loop of natural and human activity at the end of its use or reuse. **The entire concept of waste is eliminated.**

> In nature, there is no such thing as "waste"- the waste of one system becomes food for another. If we apply this concept to commerce, a product is broken up into valued resources flowing in a continuous loop of natural and human activity at the end of its use or reuse. The entire concept of waste is eliminated.

For technical nutrients, **the idea of Products-of-Service has become an important concept for Cradle to Cradle** and the Circular Economy. It changes the language from what was conventionally referred to as "end-of-life," or lifecycle design, to "end-of-use," because a lot of materials, especially technical nutrition, aren't alive.

As designers, we should always ask ourselves, "What's next?" What is going to happen to this design after it's used? What will be its next use? Can it be endlessly reused? Will it return to the earth safely and contribute to healthy soil? Rather than designing for end-of-life, which typically means a product will end up in a landfill or incinerator, you're actually saying, «I'm designing for next use.»

The third aspect of Cradle to Cradle is clean and renewable carbon-free energy. The goal is to rely on energy that sustains resources rather than consumes them or endangers people. Instead of fossil fuels, which take carbon from the ground and release it into the atmosphere, or nuclear power that generates harmful byproducts, industry can use renewable sources that leave the world as well-endowed as before.

The fourth characteristic is clean water. Processes leave water supplies as good as or better than they were when production started, ideally at drinking water quality. Each process stage uses only readily available water, and effluent is so clean that it can be continually reused within the factory or released for the benefit of the surrounding community or ecosystem.

Finally, we have shared and fair abundance for all. Our economies are good not just in the quality of materials being circulated, but also in how the people who make them function are treated. Individual human dignity and creativity are promoted, with safe working conditions and accommodation for family living circumstances. Fairness is also promoted, so groups of laborers or suppliers aren't exploited with dangerously low wages or prices along the entire value chain.

The Cradle to Cradle Design Framework provides a set of quality-based guidelines for designers: «Let's do the right things, let's do the them over and over again, let's power it with clean energy, and let's make sure we have clean water and social benefit for everyone, everywhere, for all time.»

The questions around Cradle to Cradle are really quite simple, and the end goals are quite clear. Getting from here to there presents great opportunities for design innovation, creativity, and revolution.

RYAN GELLERT
is the General Manager of Patagonia EMEA (Europe, Middle East and Africa).

Patagonia's Journey Towards Circularity

When did Patagonia start embracing environmental responsibility?

Ryan Gellert: The founder of Patagonia Yvon Chouinard started making climbing equipment in 1972, but he soon realized that pounding pitons and removing them was damaging the rocks he was climbing on. So he and his team started emphasizing clean climbing techniques and acknowledged the need to take responsibility for the environment. At Patagonia, there has been a steady progress in this whole path towards greater environmental awareness and responsibility in the past 40 years. We started by protecting the river which flows behind our headquarters, we then decided to give a percentage of our revenues to environmental groups and we codified that with the cocreation of 1% for the Planet.

Do you consider yourself a circular company?

RG: We certainly are not a circular company, nor a sustainable company. We work really hard to be a responsible company, which means that we have certain commitments to improve our business and minimize and offset our impact. **Sustainability implies that we take as much as we can give back and as much as the Earth is able to regenerate.** We keep working on it but we're not there yet.

What achievements are you the most proud of?

RG: We've been using nothing but organic cotton for 21 years. We made that shift in 1996, when less than one percent of the world's cotton was organically grown. We opened a new store in Boston and many of our employees started complaining of headaches, so we did an assessment and found out that it was due to the formaldehyde in the cotton. What we learnt was increasingly disturbing and that led us on this journey to better understand our supply chain generally. In the case of cotton, Yvon said that if we couldn't reach 100 percent organic cotton by 1996, we needed to start canceling categories and make the business smaller, because we could not cut down our standards for ourselves, our customers and our employees. Another part is **the level of activism we have been able to support financially. With the current political climate in the US, we felt the need to become much more activists ourselves,** for example we publicly opposed Trump's decision to make large reductions and redesignations of public lands. Another **program that we're proud of is the program called Worn Wear that challenges people to reduce, reuse, repair, and recycle thanks to tools and platforms we put in place.**

What challenges are you still facing?

RG: Unfortunately, every key metric of the planet's health is heading at the wrong direction: ocean acidification, greenhouse gas emissions, the use of pesticides and fertilizers, biodiversity, etc. This is the biggest challenge that we face as humans and it is part of our problems as a business. At Patagonia, we try to develop supply chains and leverage more organic alternatives, such as regenerative agriculture to help offset the current emissions of greenhouse gases and the carbon in the atmosphere. That's why we started a food business called Patagonia Provisions.

Can you tell us about the "Don't buy this jacket" campaign?

RG: It was published in the New York Times during Black Friday in 2011. Our intention was to catch people's attention and tell them that despite all of our best efforts, **creating a single jacket required 135 liters of water, generated 20 pounds of CO_2 and spent off two thirds of its weight in waste.** So the message was: "before you buy something, just ask yourself if you really need it, and if you buy it, see it as something you own and that you should repair, share and keep in use as long as you can."

Are you optimistic about businesses' ability to switch to circular practices quickly enough?

RG: I think governments are not capable or incentivized or motivated to solve the problems that face us. Collectives of individuals and businesses have a real responsibility here. **Churchill once said "you can always count on America to do the right thing after they tried everything else." Same about businesses, when they run out of other options, they will probably come around to doing the right thing.** It would be nice if we could get there faster. Am I optimistic? Not really.

What is your advice for them?

RG: "To do good, first you have to do something". Get started, do something and stop talking about it. Another piece of advice would be: be bold in your thinking and if that is not compatible with everybody that has ever done business with your brand so be it! **The value of authenticity is really important and that is what people are increasingly looking for in big brands.**

> "If we couldn't reach 100% organic cotton by 1996, we needed to start cancelling categories and make the business smaller, because we could not cut down our standards for ourselves, our customers and our employees."

AMSilk Biosteel® fibers

Artificial Silk That's Tough

German startup AMSilk catches big brands in its silky web

— By Axel Höpner, Planegg, Handelsblatt

Outside of Munich, in the «science suburb» of Martinsried silk is being manufactured from bacteria. A small industrial biotechnology company named AMSilk, founded in 2008 and staffed with around 30 employees, has developed a way to produce synthetic spider silk by genetically manipulating E. coli bacteria.

Based on traditional fermentation techniques already established in the chemicals industry, bacteria is enhanced with engineered spider silk DNA and programmed to produce fibroin (the raw material of silk) in large bioreactors. This raw material is then purified by a proprietary purification processes. The result is a dry white powder, used for several of AMSilk's products. The process was inspired by the research of Thomas Scheibel, Professor of Biomaterials at the University of Bayreuth.

AMSilk calls the synthetic product Biosteel. "It's about taking the best from nature and using it in industrial-scale production," said CEO Jens Klein. Unlike the laboratory version, natural spider silk cannot be produced at an industrial scale, and its quality fluctuates.

Biosteel is heat-resistant, four times as tough as steel and three times more stretchable than a spider's weavings. It is softer to the touch and more flexible, too. Above all, it is 100 percent biodegradable.

New sustainable materials are a hot topic in Germany's garment industry, notably in the outdoor and sporting goods sector. Customers want functional, durable clothing that dries quickly, and they won't shy away from shelling out a few hundred euros for a jacket manufactured in an environmentally friendly manner.

AMSilk has wrapped up its research and development but isn't yet off the blocks with marketing. Klein said the company is talking with several potential partners, including Adidas. A few months ago in New York, the sporting goods manufacturer presented the prototype for a shoe manufactured using Biosteel. The Futurecraft Biofabric model contains 100 percent biodegradable materials, with the upper made entirely of Biosteel fibers. Working with AMSilk "allows us to attain an incomparably high degree of sustainability," said James Carnes, VP of Global Brand Strategy at Adidas, and the company is studying how to use Biosteel on a larger scale.

Though AMSilk has two dozen patents, the risk from competitors is very real, since a range of start-ups are working on similar developments. For example, outdoor product company The North Face has developed a parka made from artificial spider silk with the Japanese startup Spiber Inc. However, these projects have remained in the pilot phase, designed to show what is possible, since the material still comes with a hefty price tag. Opinion on whether or not variants of synthetic silk will conquer the market is divided. For AMSilk, production remains pricey, mainly down to the company currently producing in small amounts. The German start-up hopes that expanding to industrial scale production will lower costs. They argue that compared to other fibers, Biosteel adds value to performance products, and that when produced on a larger scale their product will be cost competitive with common fibers used in the shoe or garment industry.

AMSilk is financed by two institutional investors, AT Newtec and MIG funds. In total, the company's technology has attracted investments running into tens of millions of euros. Strategically, the company needs to develop more uses for its silk such as speciality chemicals. It is collaborating with top Swiss medical and cosmetics company Rahn AG to produce a range of skin care products, and is planning to start working on human implants.

Klein remains confident: "In a few years time, you will be able to walk through the textiles, sport or cosmetics sections of a department store and find our products everywhere."

WEBSITE
www.amsilk.com
COUNTRY OF ORIGIN
Germany
EXTRACT FROM
AN ARTICLE BY
Handelsblatt

Bamboo plant

Bamboo Shoots Higher

By Zhang Xia, Yicai Global

Bamboo is big business in China. Forests cover some 6 million hectares, and recent figures indicate that the industry is worth USD 24.6 billion (CNY167 billion). China also has a lot of pipelines—some 120,000 kilometers of oil and gas lines alone. Perhaps it was only a question of time before the two got together.

The matchmaker was Ye Ling, who pioneered wound bamboo composite pipeline technology in 2006. "Research finally culminated in industrial application in September 2016," says Ye. Today Ye is board chairman of Zhejiang Xinzhou Bamboo-based Composites Technology Co., Ltd. (Xinzhou Bamboo), with no fewer than 66 patents.

The key to transform bamboo into pipe is widing. Bamboo has good elasticity and flexibility, so it can easily be processed through weaving and winding. Wound bamboo composite pipelines with resin adhesive are fireproof, waterproof and anti-seismic. They provid good thermal and electric insulation, are corrosion-resistant and can bear high pressure.

And unlike plastic, steel, cement and other traditional pipe materials, they are environmentally friendly, given that bamboo is a sustainable, low-carbon resource with a short growth cycle. "Replacing traditional pipelines with wound bamboo composite pipelines means replacing high-polluting, high-energy-consuming, non-renewable materials with renewable resources," says Ye. It also means saving money, reducing costs by 20 percent.

Armed with these arguments, Ye maintains that bamboo composite pipelines can be used in many areas: the oil and gas industries, municipal water systems, irrigation, the telecommunications and chemical industries… The technology could also be adapted for use in high-speed rail cars, aircraft fuselages and military equipment.

WEBSITE
www.xzbbc.com
COUNTRY OF ORIGIN
China
EXTRACT FROM
AN ARTICLE BY
YiCai GLOBAL

How can

I do

more with

less?

SUSTAINABLE PROCUREMENT

Sustainable procurement aims to ensure that natural resources are extracted efficiently and sustainably, and that the energy used is derived from renewable sources.

IN THIS CHAPTER

ANDREA BROWN
is the Director of Circular Economy at the World Business Council for Sustainable Development (WBCSD).

The Hottest Business Trends are Circular

> Getting creative with the way we obtain, use and dispose of materials will be key for a successful and sustainable global economy. This is the basis of the circular economy. It's also one of the biggest business opportunities of our generation.

In a resource-constrained world, there's no room for waste. Getting creative with the way we obtain, use and dispose of materials will be key for a successful and sustainable global economy. This is the basis of the circular economy. It's also one of the biggest business opportunities of our generation.

The Business and Sustainable Development Commission report, Better Business Better World, indicates **that achieving the SDGs could create at least $12 trillion in business value by 2030 and generate up to 380 million jobs.** The report highlights the circular economy as being one of five key game-changing business models that are helping to realize the SDGs and the market opportunities that they represent. At the World Business Council for Sustainable Development (WBCSD), we work with 200 companies to accelerate the transition to a sustainable world and promote a "circular mindset" among CEOs and business leaders. Here are some of the hottest trends we're seeing:

Businesses want to better understand risks in the "linear" economy

The current linear model poses serious risks for businesses – and they know it. Aside from the obvious procurement issues associated with diminishing resources and growing demand, there are **wider financial, reputational and regulatory concerns that companies should consider.** For example, plastics marine debris is a serious problem for companies. Branded trash is literally crowding our oceans. Every year, 800 million tons of plastics leak into the ocean – that's a full garbage truck every single minute. If trends continue, we'll have more plastic in the ocean than fish in the sea by weight in 2050. Much of the trash can be traced back to its origin through brands and logos alone. Business wants to address this issue and close the loop on plastics to address marine debris. Better waste management and careful product design are important elements, but what should companies do with the waste that's already "out there?"

Companies are finding new uses for secondary materials

In this scenario, one company's waste can literally become another's treasure. Companies are finding creative ways to reuse waste within their operations, and are even looking to trade or purchase secondary materials that would otherwise be waste – which is why the MarketplaceHUB is so exciting. It connects a network of individuals and organizations practicing circular economy and allows them to find secondary materials marketplaces according to their location or preferred material. It brings together over 100 marketplaces around the world to share knowledge and best practices for anyone interested in getting started.

As companies partner up and buy valuable inputs and outputs from one another, we can hope to see entire industries start doing away with the concept of waste and move towards implementing the circular economy – but they can't do it alone!

Policies should encourage businesses to implement circular principles. Sustainability advocates in business need to help showcase positive, meaningful examples of success. The logical question then becomes, how can businesses tell if they're implementing circular economy principles successfully?

Increased focus on metrics and measurement

Understanding how effective circular strategies are will be key for taking them into the mainstream. Right now, companies are implementing circular economy solutions, but are still looking to quantify the positive impact they're having. Understanding and communicating the economic, social and environmental benefits of going circular goes a long way in helping sustainability professionals integrate circular principles across their businesses – there's a lot of work to be done on this. Companies need an agreed approach to define and measure success, and a clear framework for implementing the best principles across entire industries.

Overall, it's good news

The good news is that **companies and policymakers are starting to understand the benefits of going circular.** We're on this planet together, we might as well do everything we can to ensure that society and the environment are healthy by doing more with less!

ACHIEVING THE SDGS COULD CREATE AT LEAST USD 12 TRILLION IN BUSINESS VALUE BY 2030 AND GENERATE UP TO 380 MILLION JOBS.

Total Integrates Circularity by Exploring the Potential of Carbon Capture and Storage

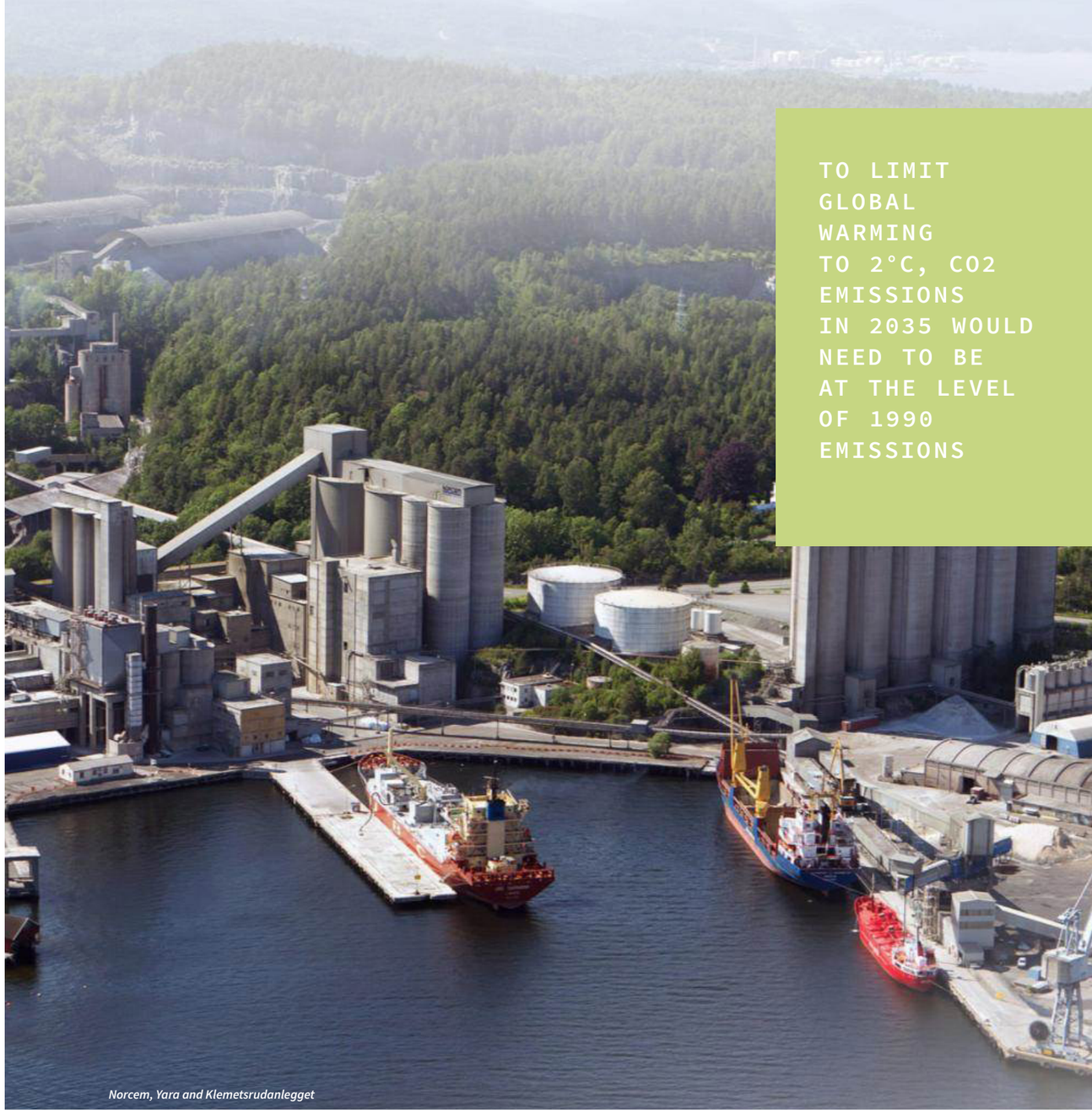
DAVID NEVICATO
is CCUS Research Program Manager, Total.

> Total has decided to dedicate 10% of its global R&D to CCUS to fully embrace the potential of these technologies.

The world will emit 50 gigatons of CO2 per year in 2040 if business continues as usual, which would represent an increase in temperature of up to 6°C. **To limit global warming to 2°C, CO2 emissions in 2035 would need to be at the level of 1990 emissions,** 35 gigatons of CO2 per year, according the 2°C trajectory by the International Energy Agency (IEA) scenarios

David Nevicato, CCUS Research Program Manager at Total, outlines the International Energy Agency (IEA) scenarios incorporates this emissions reduction through **three pathways to reduce the carbon intensity of the fossil fuel mix, to switch to renewable energy and increase energy efficiency.** Carbon Capture, Utilization and Storage (CCUS) appears as a promising solution to contribute to the optimization of the energy mix as it not only reduces "locked-in" emissions resulting from fossil fuel combustion and industrial processes, but also offers an opportunity for negative emissions through integration of renewable energy from biomass (Bio CCS). CO2 can be captured either from natural gas production (native CO2), or from power or industrial plant emissions (anthropogenic CO2). Direct air capture could be another CO2 source although it is now at a very early development stage and not enough efficient.

At Total, David Nevicato says: "We are exploring a range of technologies and new energies to ensure that we can meet demand and mitigate climate impacts, and we have long been committed to developing CCUS technology. It is a way for us to explore the full potential of the CO2 utilisation". In August 2017, Total integrates Mongstad Technology Center (Norway) with Gassnova, Norwegian state company, Shell and Statoil, one of the world's largest sites to develop carbon capture technologies targeting industrial combustion smoke, with a capacity of 100 kT of CO2 per year. Total has also partnered with Statoil and Shell in October 2017 to design the first offshore commercial carbon storage site. Its target over the next 25 years is to store 35Mt of the CO2 coming from a waste plant, a cement factory and a fertilizer plant.



Norcem, Yara and Klemetsrudanlegget

TO LIMIT GLOBAL WARMING TO 2°C, CO2 EMISSIONS IN 2035 WOULD NEED TO BE AT THE LEVEL OF 1990 EMISSIONS

Another field of research and innovation for use of CO2 that Total has been exploring is production of fuels or polymers by microalgae. Through photosynthesis, which uses sunlight as an energy source and CO2 as a carbon source, microalgae can directly convert CO2 into lipids. Those lipids can then be converted into useful molecules, with a small carbon footprint. The advantages of microalgae is also that they're grown in ponds or photobioreactors and not on arable land, and marine species grow in seawater, so they do not consume freshwater resources. There is however still a long way to go before the potential of these resources can be fully tapped, the main challenge being to successfully produce molecules at an industrial scale and at a competitive cost. Based on its experience, Total has decided to dedicate **10 percent of its global R&D to CCUS to fully embrace the potential of these technologies.**

Novozymes: the Story of a Circular Success

CLAUS STIG PEDERSEN
is leading Sustainability and Public Affairs at Novozymes.

Can you tell us more about Novozymes?

Claus Stig Pedersen: We are the world's largest biotech company specialized in enzymes and microbes. **Our role is to use enzymes and microbes that we find in nature to enable our customers to be more circular and reduce the use of chemicals, raw materials and water.** For example, in the textile industry, using enzymes as catalysts enables to take out toxic chemicals while lowering the process temperature which reduces the energy use. Because you have less chemicals in the water, you can save more water and reuse the same water many times. There are many other examples where the enzyme technology can help close some loops and reduce the consumption of different inputs. I used the example of textiles, but enzymes have the same effect in other industries, like the food, feed and bioenergy industries. And this is a successful business: we have 6 500 employees, a turnover of two billion euros and an EBIT margin of 27 percent.

What are your activities with the United Nations and how do they impact your work at Novozymes?

CSP: Throughout my career, my mission has been to find ways for businesses to contribute to environmental and social sustainability while making profit. I have worked a lot with the UN, I was very engaged in the process of developing the Sustainable Development Goals (SDGs) which started in Rio in 2012. Our company is member of organizations like the International Chamber of Commerce, the World Business Council for Sustainable Development and the UN Global Compact so our role is to be a strong advocate for creating an SDGs framework that is appealing to businesses. Businesses really see the benefit of doing something that is more environmentally friendly and socially responsible if they see a profit in it. At Novozymes, **we have adopted the SDGs as early as 2014 to inspire our own process and develop our strategy. We have broken down the 17 targets to 169 sub-targets and many of the indicators into assessment and management tools. We also use the SDGs to develop commercial and non-commercial partnerships.**

How important is sustainable procurement?

CSP: Sustainable procurement is the key component of creating a circular economy. **As a buyer, you should use your power to inspire and influence your suppliers to become more circular** in the way they source materials and develop their processes. But sustainable procurement is not the only dimension. You need to look at the whole lifecycle to really understand what is the right thing to do. There are lots of benefits in closing loops but I also believe that there are loops that should not be closed because the costs to the environment of bringing the materials back into the loop can sometimes be too high.

What makes a circular economy strategy efficient?

CSP: Circular economy must always be context, geography and industry specific, because solutions differ in different parts of the world. You need to understand the context and the size of the circular model and what is suitable for that context. It is really important that circular economy does not become a religion and that we don't recycle everything at any costs, but that we use instead assessment, insights and knowledge to build your model upon.

> THIS IS A SUCCESSFUL BUSINESS: WE HAVE 6 500 EMPLOYEES, A TURNOVER OF TWO BILLION EUROS AND AN EBIT MARGIN OF 27 PERCENT.

> "There are lots of benefits in closing loops but I also believe that there are loops that should not be closed because the costs to the environment of bringing the materials back into the loop can sometimes be too high."

Photo of Dandelion

Can Dandelions Bounce Back?

In the 1930s, Russia experimented with making rubber from dandelion roots but abandoned the project after the war. Now, environmental and economic factors are reviving interest in this alternative raw material. — **By Nadya Krasnushkina, Kommersant**

COUNTRY OF ORIGIN
Russia
BY
Коммерсантъ

Oil palms—the source of the palm oil widely used in the commercial food industry—are usually the bad guys in any discussion of the impact of clearing forests to grow crops. Scientists maintain that replacing rainforests with these monocultures destroys biodiversity, deprives animals and birds of their natural habitats, and depletes soil and water resources. Moreover, run-off from fertilizers and pesticides into rivers and streams threatens fish and other creatures that live in freshwater environments.

Now, rubber plantations are getting that same bad rap, probably because of their dramatic expansion. **The total area under rubber production worldwide has reached nearly 13 million hectares—up more than 2 million hectares from a decade ago.** Researchers from the University of East Anglia estimate that to keep up with demand, another 4.3 to 8.5 million hectares will have to be planted by 2024. The environmental consequences could be catastrophic.

Most of the new plantations are in mainland Southeast Asia and Southwest China. To cite but one example of why this is worrisome, more than 70 percent of Cambodia's Snoul wildlife sanctuary, home to rare species of birds and animals, was given over to rubber plantations between 2009 and 2013.

The tire industry uses 70 to 75 percent of the world's natural rubber, yet only recently has it experienced the same kind of pressure exerted on palm-oil consumers to pay more attention to the sustainability of their supply chains and to combat deforestation. Indeed, goods made from natural rubber, derived from the latex tapped from rubber trees, are still often labeled "eco-friendly" in contrast to those made from synthetic rubber, which is made from petroleum.

As is the case with companies that use palm oil in their products, the tire industry's environmental efforts are entirely voluntary; a leading example is the Sustainable Rubber Initiative launched at the beginning of 2015. Some companies are also taking their own measures. Last year, Michelin announced that it would not purchase any rubber grown on newly deforested land and declared its intention to work with suppliers and local authorities to develop sustainable forest management. Bridgestone, Goodyear and Continental followed suit, making similar policy changes.

And this past May, General Motors pledged to buy only tires made from sustainably grown rubber and announced that it would work with other vehicle and tire manufacturers to combat deforestation and to uphold human rights in rubber production. "We felt that it was our duty to take this step," said GM Senior Vice-President Steve Kiefer, citing the fact that American carmakers purchase some 50 million tires annually.

Meanwhile, tire makers and car companies are also researching an entirely different solution to this problem, one whose roots literally and figuratively go back to a 1930s Soviet experiment.

Back then, it was already known that a number of plants besides the Hevea rubber tree also produce latex, and the Soviets, eager to have their own domestic rubber supply, launched a campaign to find them. They eventually discovered that two species of the Russian dandelion, the kok-saghyz and krym-saghyz, would do the trick. Both are native to the foothills of the Tien Shan Mountains and Crimea. Before long, dandelions were being cultivated on a massive scale in Russia, Kazakhstan, Belarus, Ukraine and the Baltic States.

Plant selection for favorable traits was a long, slow process, however, and by the time the USSR entered the Second World War, it still depended on its allies for rubber. Following the Japanese occupation of Malaysia in 1942, around 97 percent of the world's production of natural rubber was concentrated in the hands of the Axis powers, forcing the USA and Britain to devote intensive efforts to developing synthetic rubber. Dandelion rubber never did become commercially viable, and the Soviets abandoned the project after the war.

Today, dandelion research is bouncing back thanks to economic and environmental challenges as well as new developments in selection and genetic engineering.

Advocates cite numerous advantages: Dandelions can be grown in northern climates close to industrial centers, a proximity that significantly reduces logistics costs and greenhouse gas emissions. The plants are very low-maintenance, can be grown on land not suitable for conventional agriculture, and harvesting can be fully automated. And their production cycle is much shorter than that of the Hevea—one year vs. seven to eight years—making it possible to react quickly to spikes in demand.

It will probably be at least another 10 to 15 years before dandelion rubber becomes a viable alternative for the car industry. More research is needed into resistance to pests and diseases, and no one has yet developed simple and effective methods for controlling the spread of the plant. As any gardener will tell you, dandelions are persistent weeds whose seeds are carried by the wind, presenting the possibility of crossbreeding with indigenous species. These issues will be among the genetic selection criteria during the coming years.

Another unresolved problem is the fact that only 10 to 15 percent of the plant is used in rubber production, which means huge volumes of waste. One potential solution is the production of inulin, a polysaccharide used as a source of dietary fiber and in the production of prebiotics, now typically made from chicory root. The inulin market too small, however, to absorb all the waste. Yet another challenge is the availability of land; motivating farmers to grow the new crop will probably require government subsidies.

Among the companies sponsoring dandelion rubber research are Bridgestone, Cooper Tire, Goodyear, Ford, Linglong and Sumitomo Rubber. The German tire firm Continental has emerged as leader of the pack; in 2014 it received the GreenTec Award in the Automobility category for its project to develop snow tires with treads manufactured entirely from dandelion rubber.

Continental still regards this venture as a "major entrepreneurial risk" but is forging ahead nonetheless. Earlier this year, the company, whose annual revenue is around €40 billion, announced its intention to invest €35 million in the construction of a laboratory for the production of dandelion rubber in the German town of Anklam. It will also increase crop area from 15 to 800 hectares over the next five years, enabling it to move into commercial-scale production. If all goes as planned, the harvest will go "from grams to kilos to tons," as one enthusiastic executive put it.

Sugar cane production by Native

Sweet Success

A third-generation Brazilian farmer has adopted new methods and machines to make sugar-cane farming eco-friendly and more successful than ever.

— By Andrea Vialli, Valor Economico

WEBSITE
www.
nativealimentos.
com.br
COUNTRY OF ORIGIN
Brazil
BY
Valor Econômico

Sugar runs in Leontino Balbo Junior's veins. The 50-something Brazilian is executive vice-president of **Native (formerly Grupo Balbo), Brazil's biggest organic-sugar grower.** Founded in 1946 by Balbo's grandfather, the business has grown from a humble family run affair into one of the most successful organic-sugar producers in the world.

Agribusiness is an important cornerstone of the Brazilian economy, representing 23 percent of GDP and more than 30 percent of jobs. The nation produces more sugar than any other country in the world and exports approximately 28 million tons annually. But sugar production can leave a nasty aftertaste: Fertilizers and agrochemicals erode soil and pollute water, harming both people and wildlife, and the biannual cleaning of processing mills flushes vast quantities of toxic waste out into surrounding areas.

It was in 1986 that Balbo, fresh out of São Paulo University with a degree in agronomy, began to brainstorm more ecological methods for cultivating sugarcane. His objective was to boost productivity, increase pest resistance and reduce the resources required for cultivation. Balbo came up with a plan, which he christened "ecosystem revitalizing agriculture" (ERA); he was convinced that it would both revive failing crops and restore depleted soil.

Keen to prove the effectiveness of ERA to the world, Balbo chose to work with the failing sugar cultivar SP84-2025. Once a highly productive plant variety, SP84-2025 became susceptible to yellow-leaf virus in the late 1990s and was all but abandoned by São Paulo's sugarcane producers.

Central to Balbo's agricultural approach is a deep respect for the soil. He believes that modern farming harms soil in three ways: Farm machinery compresses it, reducing its water retention; fertilizers interfere with its natural chemical balance; and monocrops reduce its biodiversity. Yet healthy soil is essential for healthy plants. "So much soil used for agriculture is dead," Balbo said. "We need to revitalize it, to restore the energy of its ecosystem."

To achieve this, Balbo created a 16,000-hectare "test lab" on the family plantation and slowly began to try out his new farming methods. First he did away with the old farming technique of crop burning, whereby mature sugar cane is burned prior to being harvested in order to get rid of leafy material and stalk tops, which are about 20-25 percent of the plant. Not burning this "waste" would increase transportation and processing costs; what's more, it kills off pests and snakes. But there are downsides. "After burning, the cane releases a sugar melt, like honey, which drips down into the soil. So the harvesters also have to collect the melt, which is full of dirt," Balbo said. Washing off this solidified melt uses more than three million liters of water every hour—an immense waste.

Balbo spent five years, from 1988 to 1993, developing a new mechanical harvester that could cut the cane "green," while the leaves are still on the plant. The machine has a hopper device with opposing currents of air that remove the leaves and then scatter them on the ground. Balbo argues that this style of harvesting returns more than 20 tons of agricultural waste per hectare to the soil each year, restoring nutrients—notably nitrogen—and forming a protective mesh to help reduce weeds.

To address soil compression, Balbo modified the tires on his farming equipment. "Farm equipment is heavy," he said. "Wherever you drive, you compress the soil, changing its geometric structure and reducing its ability to hold water." He switched to ultra-soft tires that are partially deflated before going out to the field in order to reduce the impact on the soil.

At the heart of Balbo's approach and techniques is the principle that, if he can restore the condition of his soil to that of a forest, nature will do the rest. But Mother Nature works slowly, and from 1992 and 2000, Balbo noticed more than a few stress-related grey hairs. "We weren't getting good crop yields, and the environmental results took some time to kick in." Meanwhile, the number of pests skyrocketed. "I didn't know exactly where the problem was, was it in the tires or in the trash? It is difficult to know what causes what in the environment." But then, after five consecutive years of feeding the soil with layers of agricultural waste, an increasing diversity of micro and macro fauna emerged, and the sugarcane grew much stronger.

Now, Balbo can sit at his desk and look out over the lush São Paulo countryside that made up his childhood memories knowing that his gamble has paid off. His land is now home to hundreds of forest animals—fox, deer, capybara, armadillos, numerous species of birds and four types of big cats. From a business perspective, **the gains have been considerable: Native now produces 87,000 tons of organic sugar annually—34 percent of the world market.**

He also has an impressive list of international clients: The Body Shop, Green & Blacks and Yeo Valley to name just a few.

Laura Santos Prada, an agronomist with the environmental organization Imaflora, believes that Balbo has successfully demonstrated the possibility of achieving highly productive and regenerative agriculture on an industrial scale. Imaflora estimates that less than one percent of agriculture in Brazil receives any sort of environmental certification at all. "It's becoming increasingly necessary for conventional production systems to move towards ecological and agroforestry systems that combine the cultivation of agricultural plants with the maintenance of areas of native forest," said Santos Prada.

For Balbo, the motivation is simple: "I love so much what I do, I have a wonderful opportunity to help people eat healthy products while contributing to the environment." If only all farmers felt the same.

Clean Solutions

By African Business

Located in the Westlands area of Nairobi, Lean Energy Solutions Ltd. is an alternative energy manufacturer and consultancy firm that has found a new use for agricultural waste produced during sugar and coffee cultivation; repurposing it into "Lean Briqs," a cleaner and more environmentally friendly alternative to high-carbon-emitting energy sources such as gas and diesel. Sugar and coffee cultivation are a serious deal in Kenya, last year the country produced 620,000 tonnes of sugar and 50,000 tonnes of coffee. According to Dinesh Tembhekar, who founded the company in 2006, the logs are also relatively inexpensive, saving clients up to 25 percent on their energy bills. Tembhekar stresses that everything is produced on site in Nairobi—cutting transportation costs and pollution—and providing employment to local Kenyans. To produce the "Lean Briqs" briquettes, Lean Energy Solutions Ltd. combines sugar cane and coffee waste with agricultural byproducts such as sawdust, coal ash and water. Still damp, this organic mixture passes through an immense dryer with an integrated compressor. The final amalgamation is then tightly packed into the shape of logs, which can be burned in a furnace or boiler to produce power.

Every day the firm receives 80 tonnes of debris and produces some 40 tonnes of these logs for 14 companies in Kenya and Tanzania, including Unilever, Coca-Cola, Pepsi and the textile producer Spinners & Spinners. The company also conducts energy audits for other firms to help them reduce costs and embrace green fuel sources. The "Lean Briqs" experience would seem to indicate that there is a vast potential for the circular economy in Africa.

WEBSITE
http://leansolutions.
co.ke/
COUNTRY OF ORIGIN
Kenya
EXTRACT FROM
AN ARTICLE BY
African Business

What if
my waste
was
someone
else’s
resource?

TERRITORIAL ECOLOGY & BUSINESSES

Also known as industrial symbiosis, industrial ecology refers to an efficient territorial organization. Companies pool together and exchange their waste and needs.

IN THIS CHAPTER

ELISA TONDA

is the Head of the Consumption and Production Unit at UN Environment. In this interview, she tells us more about what UN Environment is doing to promote circular economy and what challenges remain.

Key Success Factors for Circular Strategies

What is UN Environment doing to promote the transition to a circular economy?

Elisa Tonda: First, we have initiatives to develop scientific knowledge and information around circular economy **like the International Resource Panel and the Life Cycle Initiative.** They help us understand the global opportunities, trends and figures to guide our intervention towards the most successful and relevant issues. Sustainable consumption and production is one of the Sustainable Development Goals and the work we have undertaken on this agenda will provide a solid basis to support the transition towards resource efficiency and circularity. We will continue to work with interested governments to embed circularity in their policy frameworks. **We also have more hands-on approaches with companies, focusing on SMEs in emerging economies and developing countries** that want to join the global transition towards circular economy but need advice, assistance and guidance. We will also continue to work with the financial sector via **UN Environment Finance Initiative that gathers actors of the finance community such as banks, asset managers and insurers, to incorporate circularity into financial instruments.** Finally, we promote sustainable lifestyles at the consumer level. Closing materials' loops entails that everybody is aligned and contributing to the same objective, including ourselves as individuals and other large consumers such as governments.

Does circular economy effectiveness depend on the context or is there a standardized circular economy strategy?

ET: Solutions towards a circular economy are context-based so it is difficult to envisage standardized solutions that would adapt to all situations. Approaches like shifting from product-centered to service-centered solutions and thinking about extending the lifetime of products can inspire anybody. But more specific solutions will need to be designed taking into account the "hotspots" of the specific value chain, including the materials that enter the product, the processes through which it is produced and the existing infrastructure, including recycling options.

Could you give examples of national regulations that have proved remarkably successful?

ET: More work needs to be done in the area of regulation. Today it is still difficult to identify the right mix of policies instruments that need to be in place to fully transition to a circular economy. While working with a number of countries, we however came across policy measures which helped strengthen the enabling environment for the inclusion of circularity in the policy framework. These included **the integration of circularity in the waste management regulation or in the innovation policies. Another element that proved successful is to work with governments as buyers** through their procurement policies. Just to give you an idea of the market impact of this approach: in South Africa, the size of the market covered by government procurement goes up to 29% of the GDP.

Would you say that policymakers are going in the right direction and moving fast enough?

ET: Not yet. There are lots of good initiatives but there is indeed a need to accelerate. Our system and our infrastructures are built for a linear system. **Where I do see things going at a much higher pace is at the level of cities and local governments.** Interesting examples and experiences have been shared at the World Circular Economy Forum in Helsinki in June 2017. It showcased many examples of cities advancing towards more circular approaches in mobility, building, and waste infrastructure.

What advice would you like to give business executives?

ET: The very first advice would be to be open to collaborate and join hands with other businesses, customers and policymakers. It is very difficult to achieve circularity in the economy if the different actors are not all aligned and working together towards the same objective. I also encourage them to look at the whole life and at the whole system behind their products. Sometimes the whole problem might not be addressed in their immediate boundaries but entails to look a little bit further, working jointly with their suppliers and/or their customers to design new solutions. Finally, they should explore opportunities in the cities where we already witness a very dynamic environment ready for circular solutions.

> "It is very difficult to achieve circularity in the economy if the different actors are not all aligned and working together towards the same objective."

JEAN-CHRISTOPHE LAUGÉE
is Vice-President for Nature and Cycles Sustainability at Danone.

Circular Economy at Danone

Please describe for us Danone's current circular economy policies.

Jean-Christophe Laugée: The circular economy embraces a number of issues: managing packaging waste and agricultural run-off, wastewater treatment and so on. The sector with which the public is most familiar is packaging, and Danone's commitment in to this domain is composed of five pillars.

First of all, our packaging policies call for using as many sustainable resources as possible, meaning recyclable materials and biomaterials. We have also entered a joint venture with Nestlé to develop a plastic bottle fabricated from biomass residue such as sawdust, rendering it 100 percent vegetal. Secondly, we are designing our packaging with circularity in mind. We start by making it lighter and simpler, then ensure that it can be recycled, which, depending on the country, can be complicated. **Thirdly, we have pledged that no plastic from our industrial production will go into landfills by 2020.** Given our expansion in Africa, this is proving to be difficult, as we lack local recycling facilities. Our fourth commitment concerns educating consumers, who are often confused by so many labels. We want to help them better understand the rules of sorting trash, and have consequently launched several initiatives. One example is our work with Lemon Tri, a social enterprise that sets up machines to collect and sort beverage containers. The last pillar is dedicated to recycling all plastics, ideally within a closed loop and using a minimum of energy, so that they don't end up in landfills.

What is your ambition in terms of environmental impact?

J-CL: As far as packaging is concerned, we are committed to having our water bottles manufactured with a minimum of 33 percent recycled plastic by 2025. And by 2020, 100 percent of our paper will be either recycled or sourced from sustainably managed forests. I should point out though that packaging represents only 10 percent of our carbon footprint; our major impact in this area is indirect and mostly related to agriculture. **We have pledged to become carbon neutral by 2050, and can only meet this objective only if we choose circularity in our agricultural activities, which means giving priority to the health of the soil by not tilling and using organic fertilizers. Equally so, we are also developing methanization and biomass to supply energy.**

What challenges are you currently facing?

J-CL: The major challenges that we face in agriculture are related to the use of chemicals, which is—promoted by certain segments of this sector—and a general resistance to change. **To help the transition, I think we need to compensate virtuous farmers, and that will only happen once environmental externalities, such as increased carbon sequestration in the soil, are recognized and paid for.** Additionally so, carbon, water and biodiversity are major environmental externalities that are not institutionally recognized. The leading message that I promote concerning circular economy is thus a call for institutions to recognize the value of externalities linked to circularity. And the externalities are not only environmental —they are also social externalities, given that the circular economy creates jobs.

What advice would you give other companies?

J-CL: Once you have defined the area you are going to become involved in and have defined your objectives, **you need to experiment with various parties in your area of activity to co-create innovations,** because one party's waste can be another's resource. And you have to be persistent, to learn by your successes but also by your failures, which are not valued enough. Circularity is a mix of technological innovations, common sense and commitment. And given diminishing resources and new trends in consumption, if this transformation is not done voluntarily, it may end up being imposed on us…

> “We have also entered a joint venture with Nestlé to develop a plastic bottle fabricated from biomass residue such as sawdust, rendering it 100 percent vegetal.”

Caviar

From Steel to Caviar

Italian caviar producer offers model of integrated economy

— By Elena Comelli, Il Sole 24 Ore

Based in a small town in northern Italy, Agroittica Lombarda is the largest producer of caviar in Italy and has achieved global success thanks to a model of integrated economy, which is regarded as an example of sustainability. In short, this is **the success story of how wastewater from steel manufacturing has been used to facilitate the leading production of one of the world's most high-end foods: caviar.**

It all started in the 1970s when Feralpi steelworks teamed up with a Californian biologist to find a solution to the huge amounts of water and heat that were being wasted during the steel manufacturing process. The answer lay in fish farming. In Calisano, a small town less than 30 kilometers from Brescia, Agroittica Lombarda began breeding eels in the 1970s and moved on to sturgeon in the 1980s. The farm uses the surplus heat from the Feralpi plant to keep what has grown to over 60 hectares of pools, containing 500,000 Pacific sturgeon, at optimum temperatures.

Italy has a tradition of fine food but it was Agroittica Lombarda who began the country's reputation for the production of caviar, selling predominantly under the brand name Calvisius. The world's most prized caviar comes from wild sturgeon in the Caspian Sea, but in 1998, under Cites, the international convention to protect endangered species, fishing of the Caspian sturgeon was restricted and later banned outright, in 2010. **In 1978 there were 140 million fish living in the Pacific Ocean, but by 2001 this number had already decreased considerably;** "This definitely encouraged the era of farmed caviar," said marketing director, Stefano Bottoli. Agroittica Lombarda, was well positioned, as the first sturgeon farmers in Europe, when the global caviar market shifted to farm fishing.

Agroittica Lombarda is now one of the world's largest caviar producers, with over 24 tons per year, of which more than 20 tons are exported abroad, covering 30 percent of the total caviar consumption. This is double the combined export of the two leading countries in the global production of caviar, Russia and Iran, who exceed no more than 10 tons a year.

This Brescian caviar is produced under four different quality categories, from the classic top-level Calvisius to Caviar de Venise; plus Oscietra Classic and Royal, which is limited to Italy. Agroittica Lombarda sells its caviar under different labels to different market segments, with the Caviar Club brand targeting a wider market via supermarkets. The company is flying high with its premium Calvisius though, as they are the exclusive supplier of Lufthansa and Singapore Airlines, and export more than 90 percent of its production to Germany, France, and the United States.

This successful business model runs on energy recovery, with the farm using the plant's energy to heat up rearing facilities, while the plant is refrigerated by the farm's water so that both of them save on energy costs. It is also an example of how high profits can be generated through a focus on sustainability. The caviar produced at Agroittica Lombarda is farmed from an eco-friendly environment. Since the 1970s, many sturgeon have already disappeared from the waters of the Po River, where they were once abundant. "Sturgeon are prehistoric animals, they have existed for 250 million years, but are very sensitive to pollution and when a certain threshold is exceeded, they cease to exist," explained Bottoli. By breeding these fish, Agroittica Lombarda is helping to protect the stock and, as a result, has received certification from Friend of the Sea, an international organization that promotes sustainable fishing.

As one of the world's biggest sturgeon breeding farms, they feature up to 6 sturgeon species: white sturgeons from North America, the Adriatic and Siberia as well as the belugas that produce the largest eggs that made Caspian caviar famous. The sturgeon are kept healthy in fresh spring water and are constantly monitored by biologists.

"The caviar cycle is extremely long and complex: the sex of sturgeon can only be determined when they reach 5-6 years old and at this point, the males are slaughtered for their meat, while the females take at least another 6 years before they start to produce eggs", explains Bottoli. A heat exchanger takes advantage of the high temperatures of the steelworks to keep the nursery above 20 degrees, and the other pools are maintained at around 16-18 degrees. The timing of the extraction of the eggs (20 kilograms per fish) is established through the constant ultrasound monitoring of the females, who are all equipped with a microchip. "This way, we ensure that we do not slaughter the fish before the point of maturity, which for wild sturgeon is not possible", notes Bottoli.

Some of the fish can exceed three meters in length and 500 kilograms in weight. Nothing is thrown away: the meat is eaten and the skin is turned into belts. "Apart from sturgeon meat, we are looking into the possibility of marketing the fish's cartilage, skin, and oil for use in cosmetics and regenerative medicine". Lelio Mondella, director of Agroittica Lombarda, said. "We're trying to build a second era, which is that of Italian caviar.»

WEBSITE
www.calvisius.com
COUNTRY OF ORIGIN
Italy
BY
nòva 24

The Industrial Park: an Unexpected Asset to the Circular Economy

By Matthieu Charest, Les Affaires

Beyond their importance to the economy, industrial parks are becoming significant for their role in ensuring a longer life for resources. The manufacturers clustered in industrial parks can play a big role by pooling resources, but they can take this a step further by setting up a system of industrial synergy: bringing together companies that exchange materials and even human resources with each other, or that interconnect within the same supply chain. Since Quebec province is immense, the concentration of industry in these parks ensures a reduction in transport costs, and a concurrent reduction in greenhouse gas emissions.

The Société du parc industriel et portuaire de Bécancour (SPIPB) develops and operates an industrial park and port facility situated halfway between Quebec City and Montreal. In this state-owned waterfront industrial park, companies have set up to benefit from exchanges and from resources made available by other companies. As an example, the company Olin manufactures chlorine-based products; a process which generates hydrogen as a by-product. Hydrogen is known for being highly combustible, consequently, a manufacturer and distributor called Arkema, which makes peroxide and therefore needs hydrogen, came to SPIPB because of Olin.

Such industrial synergies are thus enabling innovation, as well as ensuring savings for the firms involved and an extended life cycle for resources.

WEBSITE
www.spipb.com
COUNTRY OF ORIGIN
Canada
EXTRACT FROM AN ARTICLE BY
les affaires

Pioneering Industrial Symbiosis for Green Growth in Colombia

By Jooyoung Park, Universidad de los Andes School of Management, a contribution for Portafolio

Production of goods and services leads businesses to use water, fuels, and metals, which entails waste and emissions. In Colombia, agriculture and cattle grazing contribute only 6% of Gross National Product (GNP), but consume 40% of the country's water, generating 48% of greenhouse gases.

Colombia's 2016 peace accord with guerrilla forces, following 50 years of war, has triggered international aid to help the country build rural infrastructure and support green growth. Companies are encouraged to reduce costs and do less damage to the environment by using resources more efficiently, e.g., by controlling leakage, renewing equipment, and reusing waste. Efficiency increases by exchanging waste, because waste from one company can serve as input for another. Pulp and paper producers use bagasse, a residue from sugarcane processing, as a substitute for wood. Sharing infrastructure and services among companies, such as wastewater treatment plants, can also improve efficiency.

Collaboration among companies for resource efficiency is called industrial symbiosis (IS). Competition has promoted innovation and market development, but collaboration is the passkey to promote resource efficiency and sustainability.

The world's most famed IS experience was launched 40 years ago in Kalundborg, Denmark; a dozen plants developed 30 resource sharing projects. Today, industrialized countries employ IS as environmental policy. **In South Korea, 159 IS projects were undertaken by 592 companies from 2005 to 2014, generating combined benefits of USD 1.3 billion. In China, more than 108 industrial parks are accredited as eco-industrial parks, promoting a circular economy.**

In Colombia, IS has become a feature of the Sustainable Enterprise Network (RedES in Spanish) program led by Universidad de los Andes School of Management (UASM). In 2017, **a pilot IS project involving 13 companies was launched outside the capital city of Bogotá** with support from the Cundinamarca Regional Environmental Authority (CAR). These firms had previously engaged in RedES' cleaner production program, which currently includes some 330 companies. The IS project is pursued by ten large (over 200 employees by Colombian standards), two small (under 50), and one medium-sized company. All are located in relative proximity to each other, in sectors that range from building materials and construction to packaging, soft drinks, food processing, chemicals, cosmetics, poultry, and waste management.

At this writing, nine prototype IS projects are in design stage. In one project, the food processor provides 62 tons of its monthly wood and plastic waste to the building materials firm for free, which in turn produces plastic crates and provides them to the food processor in return, thus replacing the latter's wood crates; the plastic crates last up to five times longer than those made of wood. In another project, a restaurant chain provides about 400 tons of coffee residues to a poultry producer as an odor absorbent and compost ingredient. A third project links several companies that share a waste management service to collect and dispose of sludge and hazardous waste. This reduces waste management cost and optimizes transport needs, which in turn reduces carbon emissions. In total, nine projects were estimated to generate about USD 475,000 in economic benefits from cost savings and revenues; reduced environmental impact includes diverting 1,446 tons of waste and avoiding 1,018 tons of greenhouse gas emissions.

To generate IS economic benefits, companies must commit time and resources. The right match of inputs and outputs requires information on the attributes of materials exchanged, and compatible technologies. Infrastructure may be needed – such as a pipeline to channel steam from waste heat from one company's plant to that of its partner. **From an organizational standpoint, IS requires trust. Trust emerged among the 330 companies in the RedES program,** as each firm designs and implements its own cleaner production project with assistance from UASM consultants.

A second IS project will start soon, with a wider range of firms. All RedES program firms are provided with follow-up support for implementing IS and cleaner production projects. Also, companies reducing their environmental impact obtain recognition from the regional authority, thus reducing the latter's cost of enforcing regulations. As the program expands across Colombia, additional IS projects will be launched for green growth.

COUNTRY OF ORIGIN
Colombia
BY
Portafolio

Industrial City of Cartagena de Indias

Do I

really

need

to buy

this?

RESPONSIBLE CONSUMPTION

Responsible consumption must lead buyers, organizations and citizens to take into account the environmental impact of a product's life cycle.

IN THIS CHAPTER

“Beyond the act of purchasing, it is in particular about preventing waste, extending the lifespan of products or multiplying their uses.”

What does Circular Consumption Mean?

GREGORY GIAVARINA

is the circular economy executive for the Deloitte Sustainable Development Group. He previously cofounded and directed the Institute of the Circular Economy in France.

How would you define circular consumption? Is it limited only to *consumer citizen?*

Gregory Giavarina: Consuming in a circular way means consuming in such a way that a maximum of resources can be preserved. Beyond the act of purchasing, it is in particular about preventing waste, extending the lifespan of products or multiplying their uses.

This is a mainly a concern for businesses and public players, in particular regarding their purchases and supplies. **All over the world pioneers have proven such strategies to be capable of creating added value, as much economic as environmental or social.**

What are the most effective strategies for raising awareness regarding the importance of sustainable consumption?

GG: The last years have seen a multiplication of public awareness raising campaigns regarding sustainable development. Such campaigns, which work to create an increased awareness of environmental issues, have lost momentum in the context of the current economic crisis. Yet this context actually fosters collaborative consumption and even reuse. Labels are an effective strategy but one to watch, as too many labels spoil the label…

Do governments encourage circular consumption?

GG: Regulations and incentives have been put in place by countries convinced by this model and committed to its implication. These encourage a form of consumption adapted to the effective and sustainable management of resources. There are many examples. We might mention **Sweden where a reduction on VAT for repair work was introduced, or France, where planned obsolescence was recently declared a criminal offence.**

Can we speak of “responsible circular consumption”?

GG: The scope of responsible consumption is wider than that of sustainable consumption. Sustainability refers more specifically to the environmental dimension whilst responsible consumption goes beyond this by integrating social and economic justice. In my eyes, circular economy necessarily integrates these issues but everyone has a different way of interpreting the term. I was recently on a panel which awarded a prize for the recuperation of waste heat from an oil well so as to heat greenhouses, where tomatoes were being grown in winter. For me this is no circular economy; it is neither sustainable nor responsible.

DAVID BLANCHARD
is Chief Category R&D Officer at Unilever.

Circular Economy at Unilever

Awareness of the environmental and social impacts of plastics and packaging has grown considerably over the past couple of years. What are the key issues we're facing?

David Blanchard: Packaging plays an important role in delivering consumer benefits, whether it's protecting products, preventing food waste or leaks, or making transportation easier. But there's no denying that it comes with consequences – by ending up in landfill, in the ocean, or as litter. That's simply not sustainable. Shocking findings from the Ellen MacArthur Foundation suggest **there could be more waste plastic in the ocean than fish by 2050.** Over the past few years, there's been a growing movement to shine a spotlight on the issue. Quite rightly, people don't like what they're seeing – packaging in oceans and landfills – and they realise they can have an impact and change this.

Is Unilever switching to circular practices because of the pressure coming from consumers?

DB: Operating sustainably has always been part of Unilever's DNA and we have long said that to do so helps the business – by driving growth, cutting costs, reducing risks, for example in supply, and driving trust. On packaging, there are clear benefits for the business. Reducing packaging and embracing more circular thinking reduces costs both in the short and longer term. And, yes, we're seeing increasing evidence that consumers want sustainable and responsible products, so the opportunity for brands here is huge.

In fact, research carried out earlier this year revealed that **a third of consumers are now buying brands based on their social and environmental impact.** Over 50% of consumers are more likely to buy products that are sustainably produced.

What is the role for business in tackling this global issue?

DB: There is no question that business has a critical role to play in addressing this challenge, although it will take all stakeholders coming together to deliver an effective long-term solution.

Manufacturers like Unilever have to support the transition to a circular economy by designing products that are recyclable, reusable or compostable. At the start of the year, we announced our commitment to do this for all our plastic packaging by 2025. We're also working to increase the amount of recycled content in our plastic packaging to at least 25% by 2025.

As part of these commitments, we announced in May 2017 a new technology to recycle plastic sachets, called CreaSolv. Billions of sachets are sold every year, particularly in developing markets. They're an efficient way of reaching low-income consumers with products that would otherwise be unaffordable to them. However, without a recycling solution, sachets end up in landfill, waterways or the ocean. We hope this new technology will be successful in addressing this major challenge.

It is also important to reduce the amount of packaging we use. **By 2020 we will reduce the weight of packaging that we use by a third,** by reviewing the structure and design of packaging, eliminating unnecessary packaging, and even developing concentrated versions of certain products.

A good example is our UK Comfort Intense fabric conditioner. Because it's ultra-concentrated, there is less of it, which has reduced packaging by 43%, and it's just as efficient. We have also switched from rigid plastic bottles to flexible packaging – using less raw material and saving in terms of transportation (you can get more of it on palettes and trucks) and making energy cost-savings.

But Unilever can't solve the issue of plastic waste alone. We also need local governments to improve recycling infrastructure and set-up collection systems, so we can get these materials back and close the loop. In addition, we need governments' and others' help to deliver this infrastructure efficiently and consistently so consumers know what part they can play. Finally, we need to keep consumers informed, and to make it easy for them to recycle the packaging when they're done with it.

What are the key areas of cooperation between business, governments, NGOs and civil society organisations?

DB: Partnerships are the solution to this type of challenge. We need to work with others to ensure we come up with solutions at scale.

One example is the work led by the Ellen MacArthur Foundation to create a 'Global Plastics Protocol', which aims to build a set of global common standards for packaging design. As part of this, we will share all of the plastic materials we use in our packaging by 2020. **To move towards a circular economy we need the whole consumer goods industry on the journey, which means moving from individual company efforts to joint industry action.**

Another example is the role businesses can play in supporting local collections and infrastructure. To recycle plastic sachets using our CreaSolv technology we need to set up waste collection schemes to channel the sachets to be recycled. We're working with local waste banks, the government and retailers to make it easy for consumers to recycle. We all need to work together if we want a complete shift in how we think about and use resources, from the linear model of take-make-dispose to a circular model.

> "On packaging, there are clear benefits for the business.Reducing packaging and embracing more circular thinking reduces costs both in the short and longer term."

One of the dishes served at the restaurant Casa Elena

The Pleasure and Virtues of Eating Local Foods

By Sara Rivas, Cinco Días

If you've ever had the pleasure of eating a tomato plucked fresh from the vine, you'll understand one of the main differences between food that's in or out of season: the taste. This is undoubtedly one of the reasons that inspired Carlo Petrini to establish the Slow Food movement in the Italian city of Bra in 1986, but it wasn't the only one.

However, for members of this movement, reducing their foodie carbon footprint is another essential component. By opting for locally sourced foods from less than 100 kilometers away, slow foodies support producers through buying directly from them, respecting their prices and never bartering. Slow Food currently boasts over 100,000 members across more than 160 countries and turns the spotlight back onto foods that people had all but forgotten.

Els Garrofers is one of the 65 Km0 restaurants in Catalonia. To hold this title, restaurants must offer at least five Km0 dishes throughout the year. This means that 40 percent of ingredients, including the main component, should be sourced from within a 100km radius and purchased directly from the producer. The remaining 60 percent must belong to one of Slow Food's projects, such as Arca del Gusto or Baluarte, and no dish can contain GMO foods. Arca del Gusto and Baluarte are both online platforms aiming to educate the public and catalogue food types that have been identified as slowly disappearing from our plates.

WEBSITE
https://www.slowfood.com/
COUNTRY OF ORIGIN
Spain
EXTRACT FROM AN ARTICLE BY
CincoDías

Fix your iPhone and Everything else

By Claer Barrett, Financial Times 2017

When was the last time you repaired something?

The ethos of "make do and mend" may strike some readers as old fashioned. It is fair to say it reached its zenith at a time of national crisis. My parents — born in the early 1940s — can remember postwar rationing, which continued well into the 1950s. They are programmed not to throw anything away.

My dad once boasted he was wearing a pair of woollen hiking socks that were older than me. It wasn't that he couldn't afford another pair. There was a certain pride in looking after one's possessions and, if necessary, prolonging their life with a stitch or two (in time, to save nine).

This spirit was also apparent in children's TV programmes when I was growing up. Who can forget the thrifty mice from Bagpuss, whose squeaky voices chorused "We will fix it" as they repaired damaged antiques retrieved by Emily, the mysterious child shopkeeper? Or the Wombles of Wimbledon Common? (Altogether now: "Making good use of the things that we find / Things that the everyday folks leave behind").

Back in the day, if a kitchen appliance went wrong, you called the local repairman. Nowadays, you just whip out your smartphone and order a new one.

Globalisation has given us cheap imports, resulting in price deflation and a vastly shortened replacement cycle. New products are so cheap, it is generally uneconomic to pay someone to fix things if they break. Over time, we have gradually lost the skills passed down by previous generations of fixing things ourselves. But the backlash has begun, as I discovered recently when I attended a "restart party".

The concept of this growing movement is simple: to "fix our relationship with electronics". People with broken printers, laptops, fans, vintage record players and other gadgets queued to enter a marquee in our local park where volunteer "fixers" showed them how their possessions could last for years longer with a simple repair.

Organised by the Restart Project, a London-based social enterprise, the objective is not just saving money — it is also about saving the planet.

Restart party hosts around the world have saved an estimated five tons of electronic items from being thrown away. This sounds impressive — until you realise that **we are projected to create 50m tons of waste from electrical goods globally in 2018.** These figures have been crunched ahead of the first international "Fixfest" in October, where makers, designers, activists and tinkerers will gather in London to spread the word about why repairing matters.

Restart party organisers are frustrated that about half of the objects people bring along to their events cannot be successfully repaired. Things nowadays are not built to last. **Walking around in a pair of 30-year old socks might be good for the planet, but it is not good for businesses that want to sell you more socks (or for a UK economy propped up by consumer spending). And so the concept of "built-in obsolescence" was born.**

I had my last iPhone for several years, investing in a Speck hard case to protect the screen from cracking and installing all of the maddening software updates. Then the battery went.

If the phone is still in warranty, Apple will replace the battery for free. If it is out of warranty, it will charge a minimum of £86.44 (you can practically hear the salesperson in Carphone Warehouse saying "for that price, wouldn't you rather have a shiny new phone?") Yet you can buy the batteries yourself online for about £13 (they are the size of a stick of gum). Armed with a pentalobe screwdriver, you are just one YouTube tutorial away from fixing the phone yourself.

There are armies of "wombles" online nowadays spreading the word about how to fix things instead of throwing them away. There is even a Twitter hashtag #SOSRestart, where people post photos of troublesome objects in the hope of drawing on collective repairing wisdom.

The US website iFixit.org styles itself as the free repair manual of the internet, with how-to content from videos to digital instruction manuals. Its community of more than 600,000 members demands the "right to repair" the things they buy.

"Once you've paid money for a product, the manufacturer shouldn't be able to dictate how you use it," the site says. "But that's exactly what some manufacturers intend to do. It's common practice to refuse to make parts, tools and repair information available to consumers and small repair shops."

This, iFixit says, is fuelling disposable culture. Recycling, though, is not always the answer: while it is better than throwing things away, it argues, the sheer volume of electrical waste makes it unsustainable in the long term and "not as nearly as 'green' as manufacturers want you to believe".

In the US state of Nebraska, a "fair repair" bill recently attempted to take on the mighty consumer electronics companies and agricultural equipment makers which cite safety, security and intellectual property risks as reasons for withholding spare parts, manuals and software secrets needed for DIY repairs.

The bill failed. But the principle that consumers should not be deliberately prevented from making basic repairs to their purchases strikes me as unassailable. And who knows? It could be just the sort of populist message to appeal to a certain publicity-seeking president in need of a positive story.

WEBSITE
therestartproject.org/
COUNTRY OF ORIGIN
UK
BY
FT FINANCIAL TIMES

OBocal Store in Nantes

The Fight Against Waste and Food Spoilage: Surge in Popularity for Unpackaged Goods in France

By Agathe Mercante, Les Echos

Sales of loose goods currently represent 1.5 percent of purchases in France. The association Réseau Vrac is supporting and training entrepreneurs who are tempted to set up shop.

No more shelves crammed with products encased in layers of colorful packaging, in pre-determined sizes and formats and that seem to stretch out in endless rows in the supermarkets. There's an alternative that means less waste, less spoilage and that's (slightly) easier on the wallet… Bulk buying of food products—a mode of consumption that was widespread until the 1960s saw the rapid rise of supermarkets—is making a big comeback.

This distribution system, which consists of selling products free of packaging and that the client can buy by weight has been enjoying renewed interest in France in recent years. **"Today, sales of loose goods represent 1.5 percent of purchases, but in 2027 they could take up a greater share in the market, in the region of 6 to 7 percent,"** Célia Rennesson, director of the inter-professional association Réseau Vrac said.

Consumers are starting to become more concerned about the environmental impact of packaging, and especially that of food waste. According to a study carried out by the French General Commission on Sustainable Development (CGDD) published in March 2017, 47 percent of French people are careful about how much waste is produced through their consumption habits. 97 percent try to avoid waste. "Bulk buying can appeal to people of every social category, of all different professions and ages. It can be as attractive to people in the high-income bracket who wish to eat better, as to students on a low budget," Rennesson pointed out.

Launched in 2016, the association has 250 members and represents all the players involved in the selling of loose food products, from entrepreneurs to retailers and suppliers, in France and around the world. **For the moment, the majority of Réseau Vrac's members are based in France, Belgium, Luxemburg, Switzerland and Spain.** While the association initially reserved its membership to entrepreneurs who were developing 100 percent bulk-buy grocery stores—offering fresh produce (fruit, vegetables, cheese, meat) and dry goods (pasta, rice, cereals)—Réseau Vrac now also welcomes retailers that are setting up dedicated spaces for the sale of loose goods adjacent to conventional packaged items. The association offers workshops to entrepreneurs; covering topics from the creation of a bulk-buy grocery store to its management, as well as specific hygiene regulations for these types of product.

But if buying produce loose considerably reduces waste and spoilage, don't consumers choose the exact quantities they need? It doesn't necessarily mean significant financial savings. **A kilo of rice, whether bought in bulk, or pre-packaged will cost roughly the same. Nevertheless, certain products are up to 40 percent less expensive when bought in bulk, produce such as spices are a prime example.**

The loose goods purchasing trend can be seen as part of a wider movement: that of healthier living. "Consumers want to eat local and seasonal produce. They are also more attentive when it comes to the quality of ingredients," the director of Réseau Vrac said. But the unpackaged purchase model has its limits, starting with size. "For the moment, this type of business is small-scale; bulk-buy grocery stores rarely exceed more than 60m² in size," she noted.

Another obstacle, and a significant one, is that not all products are eligible to be sold loose or on-tap. For example, it's currently impossible to sell products that carry a 'controlled designation of origin' or 'protected designation of origin' certification in this way. A regulation that's limiting for the producers of these French culinary specialties; each with their own local character, which would easily have found a following among those who shop at bulk-buy stores. The sale of olive oil 'on-tap', for example in refillable bottles from a large container, is banned for fear of fraud.

Associations like Réseau Vrac won't be giving up the fight though. The latter recently requested a meeting with the French Minister of Agriculture Stéphane Travert, and is an active participant in the French Etats généraux de l'alimentation or national Food Convention which was launched in July 2017. Through public consultation via an internet platform, and a series of themed workshops that will run until November, the convention aims to ensure a thorough review of current practices, in the hope of encouraging a shift towards a production, distribution and consumption model that is both fairer and more sustainable.

WEBSITE
https://reseauvrac.org/
COUNTRY OF ORIGIN
France
BY
Les Echos

About 84 percent of the Airport Authority's airside saloon cars are electric vehicles.

How Hong Kong Airport Fights Waste for Greener Environment

By Jonathan Chong, EJ Insight, Hong Kong Economic Journal

Hong Kong International Airport (HKIA) is one of the busiest airports in the world, with an average of 200,000 passengers and 1,115 flights recorded every day in this year's Lunar New Year festive period. The Airport Authority Hong Kong (AAHK) is on a mission to make it the world's greenest airport. The AAHK has set a target to reduce, reuse or recycle 50 percent of the waste generated at the airport by 2021, from vehicle tires to cooking oil. The AAHK found in a study commissioned in April 2015 that aircraft cabins churned out the most waste, from toilet waste to half-eaten food trays, followed by the airport's food industry, then rubbish and recycling bins. Combined, these three sources accounted for more than 80 percent of waste produced at HKIA.

The study identified three key areas to address: First, waste production must be reduced at its source. Second, the management of waste contractors has to be optimised to strengthen the collection and sorting of recyclables. And finally, educational programmes have to be provided to airport customers, restaurateurs, retailers and contractors, to bring about a change in attitude towards waste reduction and separation.

So far the results have been impressive: in 2016/17, 2,130 tonnes of food waste were converted into fishmeal, and 24 tonnes of collected food waste transformed into compost for greening airport flowerbeds. As part of AAHK's social outreach programme, recuperated food deemed safe for human consumption is boxed up and sent to Bo Charity Foundation's Food Angel initiative.

WEBSITE
https://www.hongkongairport.com/
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Revolutionizing Shopping, Gram by Gram

Chilean entrepreneurs combine outdoor-market traditions with 21st century technology to make basic necessities more affordable—and environmentally friendly to boot.— **by Daniel Fajardo Cabello, Pulso**

Chile boasts many large shopping malls, and its retail sector—one of the most mature industries in the country—has expanded into the rest of Latin America. Yet a quick stroll through any neighborhood in Santiago reveals that local corner stores are still very much a fixture of Chilean life.

Chileans are in fact equally comfortable making credit card transactions in department stores and patronizing the hundreds of sprawling outdoor markets renowned for the quality and variety of their fruits and vegetables. In these ferias libres and in local grocery stores, many products are sold in bulk or by weight.

This traditional concept inspired commercial engineer José Manuel Moller and industrial designer Salvador Achondo to set up Algramo, a social enterprise that has rapidly expanded beyond Chile's borders and has already won numerous international awards and distinctions.

The company took shape in 2012, when its founders saw how poor families living in city outskirts, where there are few supermarkets, pay excessive prices for essential goods because they shop at small grocery stores and can afford to buy only small quantities at a time. Purchasing four 250 gm packages of a product can, for example, cost 40 percent more than buying a 1 kg package of that same item, creating what Algramo's founders call a "poverty tax."

With this in mind, **they invented a sales system that would benefit both stores and customers while also helping the environment. In a first, Algramo, which means "by the gram," developed vending machines that allow customers at neighborhood stores to purchase rice, beans, sugar and other staples by weight.** The price per gram is the same no matter the quantity, and products are dispensed into returnable containers. This eliminates multiple distributors, marketing, packaging and so on, generating savings that are passed along to the store and the customer. Algramo installs the machines for free and splits the profits with shopkeepers.

In addition to vending machines, **Algramo also offers products such as detergent in returnable packaging, meaning that customers pay only for the contents.** According to an Algramo spokesperson, "By using returnable packaging, we help society while contributing significantly to the conservation of the planet.

The young company has already launched two additional ventures: Altech, which is revamping neighborhood stores to make them more attractive and efficient, and Alcom, which provides pre-paid Internet service to areas with little or no access.

Achondo, now managing director of Algramo, said their concept "allows local stores to enter the Internet of Things and to become protagonists in a world from which they once felt excluded—the world of innovation." Chief Executive Moller added, "It's important that, beyond the products or services that Algramo provides today, all the research and development that our teams are carrying out is focused on **promoting local stores as neighborhood meeting places. In this way, we can further expose families to intelligent purchasing while building on the cultural link that exists in local communities."**

Algramo's fresh approach has won accolades from the international media and earned it several prestigious awards, including first place at the 2015 Chivas Venture, an annual competition that sees entrepreneurs compete for a share of US$1million in funding for their world-changing start ups. Algramo took home US$300,000, the largest share of the prize money. The following year, it was ranked 11th on B Lab's "B Corps Best for the World" list; founded in 2006, B Lab certifies companies around the globe that meet strict criteria for social and environmental performance.

Looking forward, Algramo has been invited to Expo 2020 Dubai, the first world expo to be held in the Middle East. Its participation includes a US$100,000 grant for the development of new technology prototypes to provide cheap food and Internet connections to the most vulnerable communities. Algramo is the only Chilean company and one of only three Latin American companies chosen among 600 grant candidates.

As of October 2017, the company website claimed that it was present in 780 stores, and the company states that it has tripled its sales over the previous year. Meanwhile, it has expanded into Colombia and has plans to introduce its innovative vending machines to consumers in Paraguay, Mexico…and beyond.

WEBSITE
www.algramo.com
COUNTRY OF ORIGIN
Chile
BY
PULSO

How can
I give
a second,
third,
tenth life
to this
resource?

RE-CYCLING

Recycling includes all processes that involve materials once deemed as waste being reused as raw materials or reintroduced into a production cycle.

IN THIS CHAPTER

GAËTAN MASSON
is director of the Becquerel Institute, a research center and consulting firm specialized in the development of photovoltaics. He also works for the Photovoltaic Power Systems Programme of the International Energy Agency (IEA - PVPS).

Recycling of Solar Panels, an Undervalued Business Opportunity?

How much solar power capacity has currently been installed worldwide, and what is the growth forecast?

Gaëtan Masson: The photovoltaics market has grown massively over the last ten years. It has been multiplied by a factor of one hundred and is continuing to expand. In the early 2000s, photovoltaics was considered a curious technology of limited interest that Germany, the Netherlands, Japan and the United States were starting to experiment with. Today it is the most rapidly expanding energy sector in Europe after wind energy. In 2016, 300 GW of solar panels had been deployed worldwide, and the aim is to reach nearly 400 GW between now and the end of 2017. **Since the lifespan of a solar panel is around 20 to 25 years, we will start to see first panels that were installed from the year 2005 onwards enter the market of waste materials.** What is to be done with these panels, which have reached the end of their lifespan? It's a question that's of little interest to the other producers of electricity; nuclear for example, but it's one that the photovoltaic industry itself wants to address. For more than ten years we have been preparing the decommissioning and recycling of photovoltaic installations so as to avoid repeating the kind of errors committed in the past and so that we can be – as we say in the industry – doubly green: green at the production stage, and green in terms of end-of-life management, so as not to leave future generations with hundreds of thousands of tonnes of solar panels that cannot be reused or recycled.

Is this type of waste toxic?

GM: 90% of solar panels don't pose any major problems in terms of toxicity because the main technology used in photovoltaics is crystalline silicon. A classic solar panel is thus composed of glass, aluminum, silicon, copper and plastic. Concerning the remaining 10%, half is made up of more toxic components, like cadmium telluride, for which a specific line of recycling will be needed, but this is something that has already been taken into consideration by manufacturers.

What kinds of solutions are emerging?

GM: At European level, the European Union has set out an extremely strict regulatory framework governing the management of electronic waste, including PV panels. There are obligations to be met in terms of end-of-life take-back, and recycling. The association PV Cycle has notably prepared a recycling system ready to receive future end-of-life solar panels. **Volumes of this waste stream are still too small for the recycling industry to really get behind it for the moment, but it is anticipated.** Recycling is an extremely important issue because it enables the recovery of existing raw materials. Take the example of the thin-film solar cell known as CIGS: it uses copper, indium, gallium and selenide. Indium is an extremely rare material used in flat screens and certain types of solar panel. It will be crucial to be able to recycle end-of-life solar panels as quickly as possible in order to recover this resource, which will enable manufacturers to continue producing PV panels. So there is an economic argument for recycling but also an industrial objective, which is to limit the use of primary resources.

In the IRENA - IEA PVPS report[1], you estimate that the total potential material value recovered through end-of-life PV panel treatment and recycling will amount to 450 million USD by 2030 and 15 billion USD by 2050. How did you get those figures?

GM: These figures depend on the development of the market as we reach 2030 and 2050, but the scenarios we have used are relatively conservative, I would say that 15 billion USD is in the lower bracket of what we are expecting.

What would be your recommendations to businesses and to political leaders?

GM: Firstly, the current EU regulation seems almost perfect to me, so best not to make it more complicated. On the one hand, it's certainly highly important to oversee that each member state, through national legislation, effectively ensures that the savings made over the lifespan of solar panels are correctly channeled into their decommissioning and recycling. On the other hand, it's imperative not to kill off the development of the market by being overly cautious, which could have a negative impact on the cost of PV panels. Secondly, it would be wise to prepare strategic plans that take into consideration the fact that we should see the real development of the photovoltaic sector at the beginning of the 2020s.

[1] *End-of-Life Management Solar Photovoltaic Panels, IRENA & IEA PVPS, June 2016*

THE TOTAL POTENTIAL MATERIAL VALUE RECOVERED THROUGH END-OF-LIFE PV PANEL TREATMENT AND RECYCLING WILL AMOUNT TO 450 MILLION USD BY 2030 AND 15 BILLION USD BY 2050.

> "For more than ten years we have been preparing the decommissioning and recycling of photovoltaic installations."

JEAN VIALLEFONT
is Vice President, Total Polymers Europe.

The Future of Plastic

What is global plastic consumption today and how is this set to change in the years to come?

Jean Viallefont: The global consumption of plastic amounts to 350 million tons a year. We are expecting an increase between 4 and 4.5% per year in the coming years, at least until 2025. This growth is distributed in very unequal proportions. In advancing economies, it is higher than the GDP, whereas it is more or less linked to population growth in advanced economies. Ten years back, plastic consumption in advanced economies was half of global consumption; today it is only a third.

How can we explain that today such a small proportion of post-consumer plastic gets collected for recycling (14% of plastic packaging in 2013 according to the Ellen MacArthur Foundation)?

JV: This is, in part, a technical issue. To begin with, there is a great variety of plastic. When we recycle colored plastic, we get a mixture in a greyish color which is unsuitable for many uses. This does not correspond to users' demands for color. Furthermore, most plastics on the market today must be food-safe, for packaging for example, and they lose this quality after recycling. These are two obstacles which show how we have relatively limited choices in terms of how we can recycle. This goes part of the way to explaining why there is such a low recycling rate today.

Which solutions have you developed in order to integrate the circular economy into Total's expertise in plastic production?

JV: We have a concept called "Circular Compounds" which involves mixing recycled plastics with new, very high-performance plastics we call "boosters". In this way, **we get a product which performs as well as virgin plastic and meets our clients' demands.** This product has already been commercialized and we sell the compounds at the price of virgin plastic.

In the future, what proportion of post-consumer plastic could come from recycled plastic, in particular through your solution?

JV: Prediction is a tricky business! What we can say, however, is that the **European Union is working on a number of standards and regulations which aim to ensure that 50-60% of all packaging put on the market gets recycled.** This gives you an idea of the goals that legislators and civil society have decided to establish in this domain.

> We have a concept called "Circular Compounds" which involves mixing recycled plastics with new, very high-performance plastics we call "boosters". In this way, we get a product which performs as well as virgin plastic.

Can we imagine a day when a type of plastic could be infinitely recyclable?

JV: Every time we recycle, the recycled product loses in quality compared to the original. This is mainly because the physical transformations involved cause it to lose some of its qualities. I find it impossible to imagine a plastic that could be recycled forever, just as we can hardly imagine a plastic capable of meeting all our needs.

At present, there is a tremendous variety of plastics. There are major plastics such as polyethylene (PE) polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET), each with different properties that meet different needs. I don't envision one single type of plastic that could replace all the others without losing the very features that make them popular. **Because they are lightweight and make cars and packaging lighter, plastics have a clear positive impact on CO2 emissions.** A European study[1] has shown that if we replaced plastic with other materials we would see an increase of around 60% of the CO2 emitted.

[1] *http://www.plasticseurope.org/Documents/Document/20101207165648-FINAL_Brochure_Climate_Protection.pdf*

> THE EUROPEAN UNION IS WORKING ON A NUMBER OF STANDARDS AND REGULATIONS WHICH AIM TO ENSURE THAT 50-60% OF ALL PACKAGING PUT ON THE MARKET GETS RECYCLED.

ANNE-VALÉRIE GOULARD
is Managing Director of SUEZ Organique, Recycling and Recovery France.

SUEZ Launches the First Digital Marketplace in France for Organic Waste

How did the idea of the Organix® project emerge inside SUEZ?

Anne-Valerie Goulard: It's a rather nice story. People at SUEZ Organique—professionals in organic waste recovery—came up with the idea of a marketplace as a contribution to the emergence and structuring of the biowaste market. **This idea has been submitted as part of SUEZ's annual innovation call for projects, and it was then selected and developed.** The marketplace opened up on the 26th June 2017, covering a zone with a large output of food waste that includes Brittany, the Pays de la Loire and Normandy. It is meant to be extended to the whole of France. It is the first digital organic waste marketplace in France.

What does this platform consist of?

Antoine Le Feuvre: This platform will facilitate the connection between players, thus generating virtuous local circuits in terms of material recovery. It is a truly innovative service, both disruptive and that will make a difference. It follows a simple principle: **on one hand, there are organic waste producers such as agricultural cooperatives, the agri-food industry, large distributors, canteens, etc.** They produce organic waste they would like to recover. **On the other hand, methanation unit operators seek materials to supply their installations and produce biogas.** Organix® allows these different players to get in touch with one another in real time, and therefore optimizes their connection. Users of the platform also benefit from transparency about prices and the intervention of a trusted third party, SUEZ, who provides logistics and transportation.

How has this new marketplace been perceived by users?

A-VG: It has been very positively received, which shows that a genuine demand exists on both sides—from producers of organic materials as well as waste-to-energy operators. **The marketplace facilitates the access to flows and contributes to improving the rate of recovering organic waste.** The platform benefits from a favorable legal framework, especially since the energy transition bill, and is interesting for the agri-food sector, supermarkets and businesses producing more than 10 tons of organic waste a year, as they need to find ways to recover it.

In terms of recovery, the platform is currently aimed at methanation unit operators. Do you imagine, or are you working towards finding other outlets for organic waste, such as organic soil conditioning, or even the production of mycelium or bioplastics?

A-VG: Focusing on methanation was a pragmatic way forward, as it is a field in which solutions already exist for the recovery of biowaste. There are obviously other sectors, and this way of connecting players could be adapted for different uses. When we think of new uses, two questions arise: would there be a market—a demand—and how much of the waste can be recover? In all cases, there must be a need on both sides; an offer and a demand.

Is a digital transition key to revolutionize the recovery of resources?

ALF: The Organix® project is central to the digital strategy of SUEZ in its recycling and recovery activities. Digital technologies provide major leverage to simplify the life of our clients at every stage, and to lead to the development of new economic models through the creation of new interchanges. We live in a world which changes extremely quickly. The market regulations will move towards ever-higher levels of complexity. It is therefore essential to reinforce knowledge of the different waste flows in order to optimize their recovery. I cannot imagine a world marked by increasing resource scarcity, in which digital technologies would not play a major role, both for the identification and the circulation of resource flows.

ANTOINE LE FEUVRE
is Managing Director of SUEZ Digital BL, Recycling and Recovery France.

Urban agriculture in used plastic bottles

In Yaoundé, a Youth-Oriented Urban Agriculture Project is Sprouting Out of Used Plastic Bottles

By Pierre Nka, Le Quotidien de l'Économie

In the rainy season, the Mfoundi river that meanders through Yaoundé, the political capital of Cameroon, resembles a giant garbage tip. The association J2D_Afrique intends to change this situation, thanks to its urban agriculture project. Jean François Kondzou, National Coordinator of the association, has set about to give these used plastic bottles a second life. "What the ordinary man calls waste is now perceived as the starting point for the creation of a new source of wealth," he says.

Given the scarcity of fertile land in the urban environment, urban agriculture using discarded plastic bottles has emerged as a potential alternative in Yaoundé, a city that is facing demographic pressure. For J2D_Afrique, the solution lies in growing vegetables out of kits made up of old plastic bottles and rice sacks. To produce the substrate required for this type of urban agriculture, soil is bought from the outskirts of Yaoundé at a cost of around 1 000 FCFA (US$ 1.79) for a 50kg bag. Plastic bottles are attached to each other with string, forming a ladder-like structure, which is hung upon the wall of a beneficiary's house. As for the 50kg sacks, these are left in the outside corners of the house. These sacks offer a competitive advantage when it comes to growing vegetables.

Kondzou's strategy involves moving around to bring urban farming techniques to a wider audience.

WEBSITE
http://j2d-afrique.blogspot.it/
COUNTRY OF ORIGIN
Cameroon
EXTRACT FROM
AN ARTICLE BY
L'ÉCONOMIE MAGAZINE AFRIQUE

Sistema Biobolsa, the Company Transforming Manure into Biogas

This company helps small farmers to convert natural livestock waste into renewable energy — **By Elizabeth Meza Rodríguez, El Economista**

Family making use of the biobolsa system

Livestock farming is the fastest growing agricultural sector in the world and provides sustenance for some 1,300 million people. Yet in its highly influential 2006 report, the **FAO (Food and Agriculture Organization) claimed that agricultural livestock was responsible for 18 percent of greenhouse gas emissions.**

In a later 2016 report, FAO stated that adopting sustainable practices in livestock farming could reduce up to 41 percent of methane gas emissions. One endorsed alternative is biodigesters, which convert livestock manure into biogas and bio-fertilizer.

This is the principle of Sistema Biobolsa, a Mexican business based in Mexico City and founded in 2009 by Alex Eaton and Camilo Pagés. **The company uses its technology to help small farmers convert natural livestock waste into renewable energy, produce electricity and save money by avoiding the purchase of LP (Liquefied petroleum) gas.** "It is something that helps us in this economy instead of buying gas," said farmer and Sistema Biobolsa client Nicolas El Castillo.

"I grew up on a small farm in the U.S. and realized that although small farmers provide 80 percent of food on a global level, they lack access to technology, training or fair credit. That's why I began to design biodigesters, because in the countryside there's an excess of organic waste that can be converted into a reliable source of energy," explained CEO Eaton.

The biodigester facilitates low-cost production of both fertilizer for plants and methane gas. The latter is generated during the decomposition process and can be piped directly into a stove or other appliances. Farmers are able to create their own gas and fertilizer and sell off what they themselves don't need, providing an extra source of income for their families. Clients have also noticed respiratory health as they turn away from traditional firewood.

The benefits are multiple—environmental, health and economic—as a biodigester can yield thousands of pesos worth of savings. **"A small family can spend around 300 pesos (US$17) a month on energy and another 300 on fertilizer, all costs which can be reduced with the use of the biodigester. The saving for a larger farm could reach up to thousands of pesos (hundreds of US dollars) a month,"** Eaton said.

How does it work? The system consists of a tubular container made from dense a membrane that is resistant to the surrounding environment, and fed daily with organic farm waste. Inside the reactor, manure is mixed with water, creating an oxygen-free environment, "where the same bacterias that are active in cows' or pigs' stomachs thrive, and which convert waste into methane gas while generating biogas," Eaton explained. This process also produces biol, a type of fertilizer which replaces chemical products and increases crop productivity and improves soil quality.

Tailor-made financing

The energy needs of a house can be met with the manure produced by two cows, while the manure of 200 cows can produce enough renewable energy to be introduced into the electricity network of a community. The systems are priced at between 10,000 (US$ 560) and 500,000 pesos (US$ 28,000) depending on the size, and can be bought through microcredit from Kiva, a platform which aims to lower financial barriers. **The system provides a return on investment within eight to sixteen months and has a lifeline of around 30 years.** El Castillo said that using his biodigester enabled he and his wife to live at peace with their surroundings, "We try to use everything like this - ecologically - so that it is in harmony with nature."

Innovation without borders

With offices in Mexico, Colombia, Nicaragua and Kenya, the company has currently installed 3,200 systems globally and treated over 4 million tonnes of waste. "We've exported to 16 countries from Mexico including the United States, Central America and South America," Eaton said.

In five years, the company hopes to be installing systems at a rate of over 10,000 a year in Mexico and up to 50,000 on a global level. To achieve this, Sistema Biobolsa is focusing on improving their distribution network and on forming alliances with government bodies and business leaders in the energy and agricultural sector in Mexico, Central America and the Caribbean.

"This is Mexican technology and it has been recognized as the best of its kind. We are seen as leaders in other parts of the world, which allows us to grow and export while establishing Mexico as a world-class producer of this type of technology," said the CEO.

WEBSITE
http://sistemabiobolsa.com/
COUNTRY OF ORIGIN
Mexico
BY
EL ECONOMISTA

Turning E-Trash into Cash

An Indian start-up has built a prosperous business out of refurbishing and recycling electronic waste — **By Preeti Mehra, Hindou Business Line**

Process of dismantling and refurbishment at the Namo unit

Akshay Jain occasionally finds himself referred to as a sophisticated kabadiwala (rubbish collector), but he's the one having the last laugh. His e-waste recycling start-up, Namo E-Waste Management Ltd, is poised to reach a turnover of 120-150 million Indian rupees (US$1.8-2.3 million) this fiscal year—an impressive increase over last year's 45 million Indian rupees (US$700,000).

India ranks just behind the US, China, Japan and Germany in the production of e-waste—old computers, mobile phones, TVs and other obsolete electronic gear. The Global E-Waste Monitor 2014, compiled by the UN think tank United Nations University, estimates that India discarded 1.7 million tonnes of electronics and electrical equipment that year. Since then, the annual amount has likely doubled.

But one man's trash is another man's treasure, and Jain, who studied waste management while completing his MBA at Greenwich University in the UK, saw a business opportunity in the mounting piles of unwanted electronics. In 2014, the then-25-year-old launched Namo E-Waste. He spent two years doing extensive research, sorting out funding issues, acquiring the necessary licenses and sourcing the required technology for his plant. Then in 2016, he was finally ready to build a refurbishing and segregating unit on land leased from his father in the Delhi National Capital Region of Faridabad, also the site of his company's headquarters.

Namo E-Waste collects all kinds of electronic waste (laptops, air-conditioners, refrigerators, microwaves) and reconditions many of these items for continued use. Items that are beyond repair are dismantled for useful parts, with hazardous materials being segregated from other waste, which goes through a separation process to recover semi-precious metals such as copper and aluminum. The hazardous waste is also separated so that metals may be extracted from it; it is then safely stored and transported to a government-approved treatment, storage and disposal facility (TSDF). To date, Jain and his team have recycled more than two million tonnes of electronic waste.

Last year, Namo E-Waste won two awards—Best Green Start-up and Refurbisher of the Year —from Franchise India. Another boost came from new rules for disposing of e-waste, introduced by the government in 2016.

The regulations put the onus of managing e-waste on the producer. The Extended Producer Responsibility (EPR) rule requires every company to formulate an EPR plan and submit it to the Central Pollution Control Board. The plan must include details of its e-waste channelisation system for targeted collection, including a Producer Responsibility Organization (PRO) and an e-waste exchanger.

The deadline for implementing the rules was September 2017. In anticipation, Namo E-Waste positioned itself to be the PRO for several top

Indian companies. Today, its clients include some of the biggest names in Indian business: Flipkart, Telenor, Havells, Voltas, Tata Sky and Godrej. It is also a selected vendor for companies such as Samsung, Whirlpool, Blue Star, Hitachi and Carrier, and can participate in their e-waste auctions. So far, Jain has encountered little competition for their business.

Jain and his team are now drafting a consumer-centric model with the aim of expanding into the B2C sector through a programme called **Planet Namo. This initiative will create an extended marketplace to buy and sell second-hand electronics** and will reach out to the community with e-waste collection drives and a door-to-door pick-up service. "The biggest challenge we face to growth is procurement," says Jain. He notes that his semi-precious metal recovery machinery can handle 500 kg/hour. "But today, it runs at just 10 percent capacity, even though we buy waste from all available sources—companies, small kabadiwalas, electronics dealers...."

Jain also plans to set up a precious metal recovery plant, enabling the company to extract gold and silver from e-waste, a process that is currently carried out only in Belgium and Japan. For now, however, the young founder is single-mindedly focusing on just one goal: to collect and recycle as much e-waste as possible. It seems that for some, going round in circles can be a profitable entrepreneurial adventure.

WEBSITE
http://www.namoewaste.com/
COUNTRY OF ORIGIN
India
BY
BusinessLine


The kupapatas arrive early to take their place in the queue

Angola's Scrappy Micro-Entrepreneurs

By Isabel Costa Bordalo, Expansão

The crowd at the gate of Fabrimetal, an Angolan steel rebar manufacturer, starts gathering early. Dozens of motorbikes loaded with discarded pieces of iron, steel, copper, aluminum, zinc, magnesium and other metals begin arriving at the Viana Industrial Park outside the capital city of Luanda at the crack of dawn to take their place in line. On a good day, kupapatas, as the motorbikes are known, can complete two trips and take home 8,000 kwanza (US$ 48).

Luís Diogo, Fabrimetal's commercial director, gives this development a positive spin, saying that more families are gaining from "the conversion of waste into a certified quality product." His company currently meets 40 percent of Angola's domestic needs, estimated at between 16,000 and 18,000 tons per month. Today its has 563 workers; they will be joined by another 150 once the $5 million expansion project is completed.

"We have come a long way," said Diogo. "Five years ago, nobody paid any attention to scrap except those in the export business." Representatives from Fabrimetal and Angola's two other steel companies began crisscrossing the country, asking people if they had scrap to sell. They practically went door-to-door, planting the seeds of micro-businesses that proliferated like mushrooms once people realized that they could sell waste to be recycled. In 2016, the Ministry of Industry banned the export of scrap to avoid jeopardizing the "development and functioning of the Angolan steel industry," whose scrap consumption is estimated to be 600,000 tons per year.

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The End of Waste

TerraCycle finds value in the lowliest of trash, from cigarette butts to chewing gum — **By Angelo Ragaza for Sparknews**

Humans produce a staggering amount of trash—in the US alone, 2 kilograms per person per day, according to the Environmental Protection Agency. Yet even the most eco-minded cannot avoid creating waste—that empty ballpoint pen, those yards of bubble wrap—that ends up clogging a landfill or suffocating ocean life.

Recycling maverick Tom Szaky, 35, says it doesn't have to be this way. He runs TerraCycle, a company determined to be the global leader in the business of recycling the unrecyclable. Szaky co-founded it as a freshman at Princeton University in 2001, after discovering a way to make plant fertilizer from the droppings of worms that fed on organic waste. By 2007, TerraCycle's plant food was selling at Home Depot and Walmart, and had become a $3.3 million business.

That year, when the CEO of Honest Tea asked Szaky to figure out how to repurpose used juice pouches, TerraCycle upcycled them into tote bags and pencil cases, then sold them at big box stores. It was the start of a whole new business model. **Today, TerraCycle has agreements with some 200 major brands and 100 cities around the world who pay the company to collect different types of waste and recycle it—mostly into plastic pellets, metal alloys, fibers and glass, which it sells as raw material.**

At the same time, Szaky has come as close to pop icon status as one can get in the world of sustainability. He is the subject of numerous magazine articles and author of three books. The fourth season of Human Resources, a reality show about TerraCycle, just aired on the US network Pivot. It was shot at the company's headquarters in Trenton, New Jersey, where a team of young, mostly female employees work in an open-plan setting, furnished entirely with reused items and surrounded by the constantly rotating work of local graffiti artists.

The company focuses on difficult-to-recycle waste (the majority of waste), which is traditionally costlier to deal with than it's worth. The company figures out how to collect it, then has a team of scientists and designers who find innovative solutions for recycling it. "Most importantly," said Szaky, "we figure out business models to make the economics work."

Operating in 21 countries, TerraCycle has collected car seats in partnership with Target, contact lenses with Bausch + Lomb, and musical instrument strings with D'Addario. In Germany, it gathers used deodorant canisters for Unilever and recycles them into bicycles for children's charities. In Mexico, it partners with Cadbury, turning used chewing gum into a polymer that goes into frisbees. Cities such as New Orleans are working with TerraCycle to collect cigarette butts—the organic parts are composted while the filters are made into plastic products from ashtrays to park benches. Next year, TerraCycle and a leading brand will start recycling used diapers in Amsterdam.

TerraCycle also sells boxes online that individuals and smaller organizations can use to recycle common consumer goods including automotive parts and action figures. To encourage people to collect their waste, TerraCycle awards points that can be redeemed for a donation to a school or charity.

The French company BIC has been a TerraCycle program sponsor since 2011, helping to collect 23 million writing instruments (all brands) in seven European countries, while giving €400,000 (US$478,000) to schools and charities. Bénédicte Cusinberche, BIC's Business Development Director Europe, said the program is important for the brand—as leaders in the writing market, they have a role to play in modifying consumer habits. She mentioned a new project that launched this month, "Ubicuity," turning plastic from ballpoint pens into urban furniture. "Kids who recycled their pens will see them transformed into the benches they sit on," Cusinberche said. "This puts us squarely into the circular economy."

TerraCycle is working on another platform for 2019, helping major brands switch from disposable packaging for their products to good-looking, durable alternatives, which it will pick up from customers and sterilize to be refilled

Seeded in several stages by angel investors,- TerraCycle has turned a profit for the past five years, bringing in just under $20 million in revenue in 2016 and on target to bring in nearly $25 million this year. Around 65 percent of the company's earnings comes from fees from its corporate and municipal partners. Another 30 percent is from the sale of raw materials and some products that TerraCycle manufactures itself, while the rest comes from the new durable platform. In several overseas markets, large local waste management companies have taken a stake in TerraCycle's operations; last year, for example, France's SUEZ* acquired 30 percent of its activities in France, UK, Belgium, Holland, Sweden and Finland.

In 2006, when **Inc. magazine named Szaky "The No.1 CEO Under Thirty,"** he predicted an IPO or an acquisition in five years. Growth has not been fast enough to make that happen, and he said revenue must triple before it does. **"Recycling is a tough business," he explained, "primarily because oil prices are cheap and China stopped importing recycled plastics."** Looking for other ways to scale, the company will soon announce the acquisition of a hazardous-waste recycling company.

In the meantime, TerraCycle has convinced 150 million people to collect waste via its free platforms and has gathered more than $15 million for charities. Szaky, who was expecting the birth of his second son at the very moment of this interview, remains committed to his company's audacious objective: to eliminate the very concept of waste. "That's a big, hairy mission," he said, "but it's our mission."

* SUEZ is a partner of Solutions&Co

WEBSITE
www.terracycle.com
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USA
BY
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TerraCycle Pen Recycling Program

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Sparknews presents this publication as part of Solutions&Co, our editorial operation involving leading economic media from around the world.

This publication is part of Solutions&Co, a broader editorial opera- tion that gathers 20 international business newspapers to highlight business solutions to climate. Prior to this edition, previous editions focused on access to energy and sustainable cities.

Sparknews' mission is to identify and share solutions to inspire action and accelerate positive transformation on a global scale. Since 2012, Sparknews has empowered newsrooms to implement solutions-based journalism through various media operations. The largest one is Impact Journalism Day, which now gathers 50 leading media outlets worldwide.

These operations follow a collaborative model: Each paper writes articles on solutions within their geographical area, all the articles are then shared with the alliance of media partners and published as a supplement on the same day.

For this third edition of Solutions&Co, on October 27, 2017, rea- ders in China, Brazil, South Africa, India, France, Germany, the UK and elsewhere have discovered a range of initiatives accelerating the world's transition towards a circular economy. By sharing these stories, our media network spreads the word about innovative solu- tions to climate issues near and far.

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