

ENVIRONMENT AND CLIMATE CHANGE PROGRAM

RIO DE JANEIRO, AUGUST 2019

Author: Maina Celidônio de Campos, Ph.D in Economics by Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Associate Researcher of the Brazilian Center for International Relations (CEBRI) and Casa das Garças Institute for Economics Policy Studies (IEPE/CdG)

The Circular Economy

How to develop sustainable business?

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The Brazilian Center for International Relations (CEBRI) is an independent think tank that contributes to establishing an international agenda for Brazil. For over twenty years, the institution has engaged in promoting pluralistic and proposal-oriented debate on the international landscape and Brazilian foreign policy.

CEBRI prioritizes themes with the greatest potential to leverage the international insertion of Brazil into the global economy, proposing pragmatic solutions for the formulation of public policies.

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Partnership:



ENVIRONMENT AND CLIMATE CHANGE PROGRAM

The Program contributes to the reflection and analysis of environment and climate change, considering their relation with Brazil's development, the strengthening of the country's external agenda, and its importance for international insertion.

The Program reflects upon the internal challenges in policy planning and formulation of development policies, with a view to better land use in Brazil and the consolidation of a national environmental agenda. It also analyzes opportunities for cooperation with countries such as China, Germany, Norway, England, the United States and with international organizations such as UN Environment, International Resource Panel-UNEP, UNDP, World Bank, IDB, among others. Also, it seeks to strengthen cooperation with academia and civil societies institutions in Brazil and abroad.



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José Luiz Alquéres

President of JLAlquéres Associates. He was previously the chair of the Board of Directors and the president of Eletrobras, and served as the CEO of Alstom Brazil, Light S.A., and of MDU Brazil. He was the executive director at the Bozano Simonsen Group and at BNDESPar, and served as the National Secretary of Energy. He is currently on the boards of Energisa, QGEP and Sterlite. He received a bachelor's degree in civil engineering from the Pontifical Catholic University of Rio de Janeiro and took postgraduate courses in energy planning at the University of Chicago.



SENIOR FELLOW

Izabella Teixeira

She was Brazil´s Minister of the Environment (2010-16). Served as head of the Brazilian Delegation in the Cancun, Durban, Doha and Warsaw Conferences of the Parties to the UN Framework Convention on Climate Change, and of the Brazil-South Africa-India-China (BASIC) Group. She was a member of the High-Level Panel on Global Sustainability. She was a key leader of the 2012 UN´s Rio +20 Conference on Sustainable Development. She was a member of the High-Level Panel on the Post-2015 Development Agenda. In 2015, served as Head of the Brazilian Delegation on negotiations of the Paris Agreement of the UN Convention on Climate Change. In 2017, she was elected as co-chair of the International Resource Panel



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Julia Dias Leite

CEBRÍ'S Executive Director since November 2015. Previously, she worked for 10 years at the Brazil-China Business Council (CEBC), where she occupied the position of Executive Secretary. Recently, she was chosen by the U.S. State Department to participate in the Young World Leaders program.

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PANELISTS



Beatriz Luz, Founder of Exchange 4 Change Brasil

Holds a Chemical Engineering undergraduate degree from the Federal University of Rio de Janeiro (UFRJ) in Brazil and a Master's degree in Environmental Engineering, which was granted by the University of Surrey in the United Kingdom. She represented the Brazilian delegation in the International Organization for Standardization's committee dedicated to Circular Economy and organized the first book about this topic in Portuguese. She was a pioneer in 2014, having taken this debate to the Brazilian chemical industry, while she led discussions with international clients about green plastic at Braskem. In 2015, she founded Exchange 4 Change Brasil, a specialized consultancy that aims to influence the transition to a circular economy in the country through the co-creation of global solutions adapted to the Brazilian reality. She also participated in the launch of the Program "The Netherlands as a Circular Hotspot" in Amsterdam.



Izabella Teixeira. Senior Fellow of CEBRI

Senior Fellow of CEBRI´s Environment and Climate Change Program. Holds a B.Sc. in Biological Sciences from the University of Brasília (UnB), and a M.Sc. and Ph.D. in Energy Planning from the Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering of the Federal University of Rio de Janeiro (COPPE/UFRJ). She was Brazil´s Minister of the Environment (2010-16). Served as head of the Brazilian Delegation in the Cancun, Durban, Doha and Warsaw Conferences of the Parties to the UN Framework Convention on Climate Change, and of the Brazil-South Africa-India-China (BASIC) Group. She was a member of the High-Level Panel on Global Sustainability. She was a key leader of the 2012 UN´s Rio +20 Conference on Sustainable Development. She was a member of the High-Level Panel on the Post-2015 Development Agenda. In 2015, served as Head of the Brazilian Delegation on negotiations of the Paris Agreement of the UN Convention on Climate Change. In 2017, she was elected as co-chair of the International Resource Panel.



Pieter van Os. Co-Initiator of CIRCO

Specialised in early phase marketing which encloses proposition development for bringing new products and services to the market. After a successful period as consultant and entrepreneur in telecommunications, he chose, in 2005, to apply his skills and experience in the field of sustainability, bringing products and services to the market that are more efficient with materials and energy. In that role, he is one of the initiators of the CIRCO programme, that started in 2015, in the Netherlands. CIRCO is a circular design methodology that, so far, guided over 450 companies to develop a circular proposition including a business model, product (re)design and complementary services and processes. In addition, over 250 industrial designers and architects are trained in the methodology to become a circular change agent. He has been responsible for developing and rolling-out the methodology in the Netherlands and has personally trained over 250 companies. Currently, he is responsible for the international programme, making the circular methodology, cases and learnings available to the international designer and business community.

Are we really protecting the environment if we just destroy less? Are we, by being more efficient, becoming more sustainable or are we just postponing the resource depletion?

It is believed that a circular economy establishes the foundation for product redesign and a brandnew opportunity to foster innovation and creativity, leading to a new, more positive and replenishing economy.

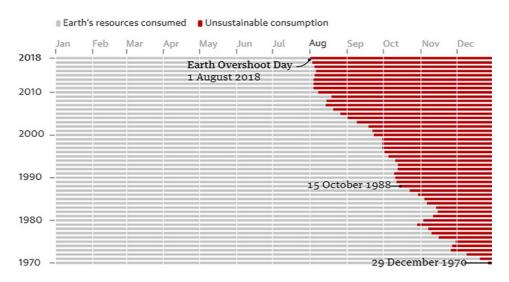
The debate is wider than just production issues and efficient consumption. It leads to a redefinition of values and systems: the product-to-services transition, consumers-to-users reshaping, and the focus on the reconstruction of natural and social capital.

(Ellen MacArthur Foundation, 2013)

THE CIRCULAR ECONOMY AND THE DEPLETION SCENARIO DIAGNOSIS

re we really protecting the environment if we just destroy less? From an environmental standpoint, to be efficient is just not enough. It is necessary to protect the environment, since resource consumption is already past the regeneration capacity of the planet. Figure 1 shows that, in the bulk, the world population has reached Earth Overshoot Day on August 1st, 2018. Figure 2 shows that this is far from being a particularity of few countries, but reflects a substantial majority, including Brazil. Therefore, it is paramount to rethink our production model.

Figure 1. Earth Overshoot Day, August 1st, 2018, marks the day when consumption exceeded nature's regeneration capacity.



Source: Guardian graphic/ Overshootday.org

Dec 18 | Indonesia Dec 14 | Ecuador Dec 7 | Iraq Dec 5 | Nicaragua • Dec 1 | Cuba . Feb 11 | Qatar Nov 25 | Egypt • Feb 16 | Luxembourg Nov 13 | Guatemala DEC JAN Nov 6 | Uruguay A. Oct 30 | Ghana Mar 8 | United Arab Emirates Mar 11 | Kuwait Mar 15 | United States of America Oct 18 | Colombia • → Mar 18 | Canada Oct 17 | El Salvador Oct 8 | Viet Nam Mar 29 | Denmark 2019 Apr 3 | Sweden Apr 6 | Finland Belaium Saudi Arabia APR Apr 10 | Republic of Korea Sep 23 | Peru SEP Sep 22 | Panama • Apr 12 | Singapore Sep 17 | Gabon Apr 18 | Norway Apr 26 | Russia Apr 27 | Slovenia, Ireland OND May 3 | Israel, Germany
 May 4 | Netherlands Sep 5 | Algeria, Djibouti JUNE Aug 28 | Thailand זחרג Aug 23 | Venezuela Aug 17 | Mexico Aug 10 | Costa Rica May 26 | Portugal May 28 | Spain

9 | Bahamas

Jun 12 | Montenearo

Jun 14 | China

Jun 26 | Argentina

Source: Global Footprint Network National Footprint Accounts 2019

Figure 2: Considering the use of resources in a year, if the world population shared the consumption habits of these specific countries, what would be Earth Overshoot Day?

Source: Global footprint Network National footprint Accounts 2019

Jul 31 | Brazil

lul 12 | Romania South Africa

Jul 6 | Iran, Bolivia

Jul 24 | Ukraine, Paraguay

EARTH **OVERSHOOT**

Taking these facts into consideration, Figure 3 (available in page 10) shows the availability of the most important natural resources if we are set in a linear model of production. The message is clear, even though it is quite obvious: resources are scarce! Therefore, the environmental debate should transcend the mitigation of emissions of final products, to focus in the cost of natural resources when we create new products from scratch. Even when we use renewable energy, we also use resources such as copper, zinc, silica, etc. Hence, initiatives such as green seals for ecofriendly products aren't enough if their production entails consumption of raw materials or low added value materials, such as plastics. Therefore, to reshape the production method requires going beyond recycling, as it demands resource efficiency and circular design.

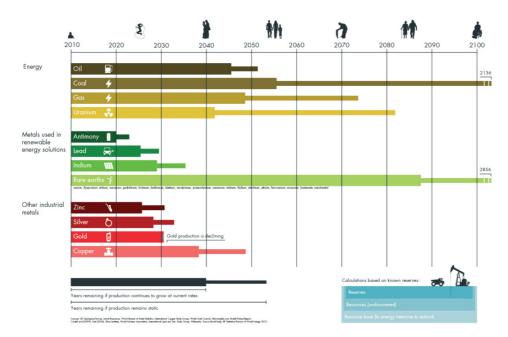


Figure 3: Lifetime resource availability considering 2010 as the year of birth

Usually, the daily consequence of the excessive use of resources is waste production. The population growth by 2050, according to UN previsions, is at the order of 25%, while waste generation should rise by 70%. The linear production model does not provide a solution for this problem, leading to dire consequences for the environment, welfare, and populations' health. As such, circular economy reveals itself as an innovative proposition because this enormous amount of waste is understood as an economic resource.

Circular economy aims, therefore, to create a brand-new production model which is sustainable and takes the existing natural resource depletion into consideration. Notably, the new circular economy models are seen as way to reach global temperature goals, also satisfyingly reaching the COP 25 goals.

CIRCULAR ECONOMY: BUILDING SOLUTIONS FOR GLOBAL PROBLEMS

ne of the main aspects for the development of a political environmental agenda is the promotion of the role of cities, notably the role of citizens. As such, there is a substantial behavioral shift in the new generations, as they question and give new weight to the tradeoffs embedded in the choice for conscious consumption. In the long term, those new lifestyles change the way that production chains generate value.

This change is fundamental for the reformulation of the concepts of development and economic growth. On the other hand, the environmental agenda also updates itself, introducing social and economic dimensions, such as inequality. This evolution is important for three main reasons. First, because of the necessity of widening the debate and formulating public policies that contemplate the diversity of social groups and realities. Secondly, due to the necessity of understanding how climate change and technological shifts will impact different social groups. Lastly, it is necessary to accurately predict and internalize the consequences of public policies that aim to mitigate climate change.

In this line of thought, circular economy emerges as a priority. Abandoning a linear economy mindset is fundamental in order to deal with local and international interests. Internationally, economically efficient environmental policies are key to address the new political, economic and commercial realities. One example is the set of restrictions included in the EU-Mercosur Association Agreement. Furthermore, the debate about the efficient use of resources is not limited to local contends between new generations and the private sector, as is it also present at the supranational level of UN system bodies and agencies, such as the *Global Resource Use* initiative. Nationally, many countries from the European Union (EU), as well as China and Chile, among others, are moving towards establishing their own regulatory marks for the circular economy.

Therefore, it is paramount for Brazil to join this global movement. Historically, the country has adopted municipal waste management policies aligned to international standards and as part of a national development strategy. Despite this legacy, similar propositions are currently debated as if they were innovative, and the environmental discourse is hijacked by the political polarization. Brazil must reconsider its current position, redeem its past experiences and, together with scientific innovation, negotiate with the world economy players.

It is important to underscore that circular economy presents itself as a relevant alternative because it is not limited to recycling. It proposes a transformation of the productive process as a whole: from raw materials extraction to the disposal of final goods. Such an agenda

contemplates a wide array of experiences and movements, ranging from the reuse of waste to e-waste management platforms¹. Thus, circular economy is a broad concept with diverse components.

In this wide-ranging agenda, some sectors have the capacity to drive the debate. In the first place, the plastics sector gathers a great amount of attention – on both national and international, public and private scopes – especially because its environmental damage is tangible in the population's daily routine. Beyond the environmental importance, there are matters related to food security and economic costs.

Another important sector is electronics. The challenge of discharging electronics gains relevance in the debate about solid waste management within the urban context, especially with the advancement of the latest industrial revolutions and the development of the global economic periphery, or the global south. On the other hand, circular economy may bring new perspectives for the use and resource efficiency of electronics since the growth of the urban population and the digitalization of cities translates into more intensive use of electronics.

No less important is the debate about the circular economy in the food sector. Such discussion is of uttermost relevance for Brazil (a large producer) and China (a large consumer), since food waste becomes an increasingly concerning issue with population and income growth in developing countries. Even more importantly, urban growth creates enormous pressure on the use of agricultural resources so that food security gains new contours. The challenge of promoting circularity in the food sector becomes even more central to the sustainability agenda with the introduction of new technologies, changes in eating habits and increasing preoccupation with the security of hydric resources.

Faced with these great challenges, the circular economy approach brings advantages and solutions. First, the core concept of circular economy is value creation, through the principle of "no value destruction" which helps to overcome the narrative that environmental preservation leads to economic stagnation. Secondly, the efficient use of resources concurs with the Sustainable Development Goals (SDGs) and the Paris Agreement, so it is strategic for foreign policy. Thirdly, the circular economy agenda does not depend entirely on government, but largely on business. Thus, the advance does not imply fiscal cost, nor does it necessarily depend on legislative debate. Finally, as a business, the gains from circular practices are easily measurable, and success stories, such as Michelin's tire industry and Osklen Ecodesign, have great potential to disseminate good practices.

I. As digitalization advances, there is a rapid growth of electronic waste, or e-waste, which presents new challenges in waste management. With the rapid obsolescence of electric and electronic products, coupled with products with highly complex maintenance and the unicity of their parts, in a context of surging consumption, the specific management of this type of waste is becoming a growing concern of public authorities. Furthermore, these materials are highly complex and sometimes toxic. For a good exposition on the environmental and health risks associated with e-waste management, Kishore & Kishore (2010) provides an in-depth analysis of the Indian context (available here).

^{2.} Through a circular economy lens, the traditional process of production destroys the economic and environmental values of the objects by the discarding and waste generation, as reusing and other circular initiatives may activate the full value of the product.

THE CIRCULAR ECONOMY IN BRAZIL: NEW PRACTICES AND EXPERIENCES

In practical terms, a circular economy may be characterized by four types of actions. The first one is transforming the product to related services that can be sold. For instance, instead of buying a CD, the consumer subscribes to a streaming service. The second one is the use of circular inputs: the use of commodities that may be, or have been, reused in that specific productive cycle. The third one is the extension of the lifetime of products. Lastly, the recycling of the final product. Even though it is the most common practice, recycling is just one and, in fact, the last option of the circular economy. Consequently, it is the most expensive practice of the circular production model.

According to a CNI³ report called *Pesquisa de Percepção da Economia Circular* (a research on perceptions of the Circular Economy), developed in 2016, 71% of the Brazilian economic practices are about recycling (see Figure 4). Hence, even though companies are practicing this innovative way of rethinking the productive chain, many are still restricted to the most conservative aspects of the circular economy.

80%

70%

60%

50%

40%

20%

PRODUTO COMO INSUMOS CIRCULARES RECUPERAÇÃO DE EXTENSÃO DA VIDA DO PRODUTO

RECURSOS DO PRODUTO

PRODUTO COMO INSUMOS CIRCULARES RECUPERAÇÃO DE RECURSOS DO PRODUTO

Figure 4: Percentage of types of circular economy practices amongst Brazilian firms

Source: CNI (Brazilian National Confederation of Industry)

^{3.} Brazilian National Confederation of Industry

A good example of an innovative national project is the *Rice husk ash*. The husk of the rice, which used to be discarded, started to be burned and its ashes are rich in silica. The project consists in the processing of 140 thousand metric tons of rice husk per year energy production⁴, which produces 28 thousand metric tons of ashes. Then, these ashes will be converted to high value-added silicon based products. Their final value can potentially reach R\$25 million. This is an example of a modern circular economy practice, because it is beyond the simple recycling process, and emanates from partnerships and a reformulation of a production chain.

Another extremely interesting process comes through the management of the paper waste used in currencies. The recycling of the paper used for money production is extremely complex due to the metals and toxic substances present. So, in general, the notes were burned. The solution was using the residuals in the creation of new products with traceability⁵. The material was directed to designers as a high-quality material for the production of objects that could be rented to companies (chairs, tables, etc). In conclusion, it is a program that introduces new markets in which waste is used as a raw material and is also reincorporated as a service and not as a product.

In the electronics sector, Brazil has successful cases of reverse logistics⁶ practices, under which cost reduction is attained through the adoption of innovations in the production chain. A clear example is the reutilization of sewage as input for the manufacturing of printing ink.

Regarding civil society initiatives, there is an array of initiatives that connect actors with local, national and international scope and governance, both in the public non-governmental and corporate spheres. Considering the novelty of the circular economy concept, there is a great demand for connecting the multiple chains. This dialogue between many sectors and stakeholders allows for the comprehension of the challenges of each sector and leads to

^{4.} Rice husk contains 30%-50% of organic carbon and high heat value, in other words, it contains an elevated caloric concentration and energy level, which can be used as fuel or energy input through thermic or biochemical processes. For scientific references, please see Fernandes et al. (2015) (available here), Pode (2016) (available here) and Kalapathy et al. 2000 (available here)

^{5.} Traceability, in the context of an ethical and environmental analysis of the supply chain, is the process of making the whole supply chain information public for retailers and consumers. It can be seen as an ethical process, regarding the publicity of information available for costumers, but also as a value adding process, as individuals can see the de facto use of resources in the fabrication process, which can match their individual preferences regarding the environmental responsibility of the company. Furthermore, it can be seen as an important regulatory measure to promote circular economy as an aggregate process.

^{6.} Reverse logistics is the process of redesigning a logistic and production chain, moving from the traditional linear logistic chain towards a more responsible resource efficient one. The Council of Supply Chain Management Professionals glossary defines the traditional logistics management as: "The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements". On the other hand, reverse logistics is defined as: "The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal". In sum, the traditional logistics chain aims to maximize the profit and minimize the costs, considering a traditional production-to-sale business model, while the reverse logistics model aims to maximize the profit and minimize the costs, considering the waste production and resource efficiency. For further references, please see (https://cerasis.com/what-is-reverse-logistics/).

innovative solutions, always having the welfare of the user/consumer and value generation as the main objective.

One of the foremost initiatives is Exchange 4 Change Brasil. This independent institution, founded in 2015, has the mission to influence the transition for a circular economy in Brazil, through the co-creation and the adaptation of global solutions to the Brazilian reality. The think tank works as a platform of educational services, designer of strategies and products, risk analysis and the development of an ecosystem of companies and actors of circular economy in Brazil.

HOW TO PROMOTE CIRCULAR PRACTICES?

ircular practices may be promoted by different actors: governments, companies and consumers. There are also international cooperation policies amongst governments, civil institutions, professional cooperatives and companies. In reality, the Circular Economy movement expands through a bottom-up approach: initiatives adopted in companies, civil institutions and think tanks - such as CEBRI, CIRCO and Firjan - that will eventually become public policies.

The public sector may promote this agenda through many mechanisms: circular purchases; circular finance; product design incentives; public policies and legislation; and population awareness campaigns. If a government adopts a policy of purchases in circular products, for instance, it creates a relevant market due to the weight of the government in national consumption. Another fundamental point concerns circular finance and the discussion about how to finance the process of circular economy. Besides the traditional mechanisms, such as subsidies and incentives, a regulatory change that demands new environmental requirements can be an important driver.

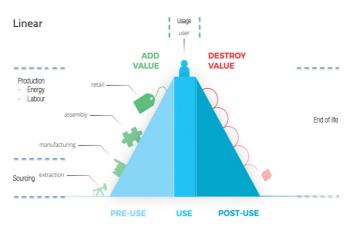
A good example is the Netherlands, which developed a circular economy agenda with the objective of reducing the extraction of natural resources by half until 2030, and zeroing it by 2050. It is important to highlight that the country's population, because of the constant flooding risk due to rising sea levels, possesses a clearer perception of global warming and climate change consequences. As previously mentioned, the citizens may have an enormous weight in the adoption of circular practices through the construction of conscious consumption standards.

In this scenario, companies play a central role in pursuing the demands of new consumers and leading the innovation process. From a practical standpoint, the so-called *circular design* emanates from corporative practices and the establishment of *new mindsets*. The central goal is to avoid the waste and, at the same time, generate value.

In order to reach this goal, companies can follow a 5-step strategy. First, it is necessary to identify how the products' value is destroyed. For instance, a product may lose value because there isn't a product repair service. Another possibility is because the consumer starts to consider the product as obsolete, even though it works perfectly. According to the value loss diagnosis, it is possible to go through the second step: defining the circular design challenge. Such a challenge may implicate in product maintenance, reuse, remodeling, remanufacture or recycling. The final goal is the sustainability of the product value even

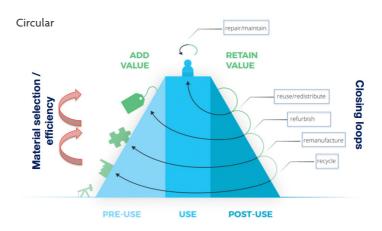
after its use. Figure 5 illustrates these steps and concepts involved through the comparison of the linear and circular economies.

Figure 5: The linear and circular economies



MASTER CIRCULAR BUSINESS WITH THE VALUE HILL

Elisa Achterberg (Circle Economy & Sustainable Finance Lab), Jeroen Hinfelaar (CIRCO), Nancy Brocken (TU Delft)



With this diagnosis in hand, it is possible to go to the business models and circular design strategies. There are three basic circular business models: high-quality products and higher lifetime; products with a high repairability; and products as services. Rolls Royce, for instance, has made the transition from selling airplane motors to selling the service of motor potency per hour. It is important to highlight that these models are not mutually exclusive and may be combined into hybrid models.

Regarding the circular design strategy, the products may be conceived based on different principles. In one extreme, the product may have a sentimental value for the consumer. The trust and affection for the product may be fomented through the preferences for environmental efficiency, for example. In the other extreme, the product may be modular, with high adaptive capacity to technological advances. Adaptability and the upgrade possibility lead to gains in consumer fidelity. Another relevant strategy is to design products that may be dismounted and reassembled, and their pieces may be reused with ease by the company and the consumer. Lastly, after these four steps, it is necessary to develop a roadmap for the implementation of these changes.

In the end, the introduction of these business models in a company may have the potential to drive aggregate changes in the sector if, through competition, other firms are compelled to adapt. In this sense, circular economy and circular design are not just environmental politics and practices. They are also lucrative actions because they generate value for the business and lead to market differentiation.



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