

**PROJECT: ANCHORING
SUSTAINABLE VALUE
CHAINS IN BRAZIL**

CIRCULAR ECONOMY IN BRAZILIAN VALUE CHAINS

**CHALLENGES AND OPPORTUNITIES TO PROMOTE
THE CIRCULAR ECONOMY IN THE ENERGY AND
TELECOMMUNICATIONS VALUE CHAINS**

OCTOBER 2024

Proponent:



Co-proponents:



Funding:



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VALUE CHAINS IN BRAZIL

 **FGV EAESP**

*CENTRO DE ESTUDOS
EM SUSTENTABILIDADE*

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AL-INVEST Verde is a four-year program funded by the European Union (EU), which mobilizes EU expertise and investment to support the creation of partnerships with the private sector in Latin America. The overall objective is to promote sustainable growth and job creation by supporting the transition to a low-carbon, resource-efficient and more circular economy in Latin America.

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PRESENTATION

This publication, developed as part of the *Anchoring Sustainable Value Chains in Brazil* Project (“Project”), aims to present the results of a research aimed at **identifying the challenges, opportunities, barriers, and facilitators for promoting the Circular Economy in value chains in Brazil, with a focus on the energy and telecommunications sectors**. The research was based on literature about the Circular Economy, on information published by institutions relevant to this agenda, and on the data, lessons learned, and results generated throughout the Project.

The Project is being conducted by the Center for Sustainability Studies from Fundação Getulio Vargas’s Sao Paulo School of Business Administration (“FGVces”) in partnership with the Spanish Chamber of Commerce and the Official Spanish Chamber of Commerce in Brazil, with support from the European Commis-

sion’s AL-INVEST Verde program. Its goal is to support the transition to a circular, low-carbon economy by strengthening sustainability management in small and medium-sized enterprises (“SMEs”) that integrate the value chains of large companies in Brazil.

The Project selected the following large companies (referred to herein as “anchor companies”): Neoenergia S.A. (“Neoenergia”), part of Iberdrola, a Spanish economic group; and Telefônica Brasil S.A. (“Telefônica-Vivo”), part of Telefônica, which is also an economic group from Spain. These companies were chosen because sustainability is a key theme in both their operations and their management of the value chain, and because micro, small, and medium-sized enterprises (“MSMEs”) play a significant role in their value chains. After the anchor companies were selected, they then directly chose their MSME

partners and suppliers to participate in the initiative. These MSMEs were selected based on size, operations in Brazil, and stability in the relationship with the anchor company. Thus, the MSMEs selected from Neoenergia's value chain include suppliers of services such as engineering, environmental services, and materials for equipment and infrastructure in the sector. On the Telefónica-Vivo side, the MSMEs selected were of materials for building FTTH (Fiber To The Home) networks and telecommunications products and technological solutions.

To achieve its objective, the Project was structured around four lines of activity:

LINE OF ACTIVITY 1

Aimed at building capacity with companies belonging to the anchors' value chains, this line of activity included conducting a **Sustainability Diagnosis** for each company (anchors and MSME partners), as well as a training process on management for sustainability.

LINE OF ACTIVITY 2

Focusing on knowledge production, this line of activity included the development of two studies. The first study, coordinated by the Spanish Chamber of Commerce in partnership with Forética, reviews stan-

dards, regulations and best practices in Europe in relation to Environmental, Social and Governance (ESG) criteria, the Circular Economy and innovative technological solutions. The second study is materialized in this publication, produced by FGVces. As part of the research conducted for this study, between August 2023 and April 2024, an **active search was carried out to identify cases of innovative Brazilian solutions in the Circular Economy**, led by or with the involvement of MSMEs, and applicable to the sectors of the anchor companies. This process culminated in the organization and systematization, in this publication, of challenges and opportunities related to the Circular Economy brought by seven selected cases.

LINE OF ACTIVITY 3

This line of activity is directed towards networking and knowledge exchange, and includes the project's launch and closing events, an international study mission to Madrid/Spain, and the creation of the **Community of Practice: Circular Economy in Brazil**. Launched in October 2023, the Community of Practice is a multi-stakeholder network (including government representatives, companies of various sizes and sectors, financial institutions, sector associations, academia,

third sector institutions and other players in the sustainability ecosystem) whose aim is to share practices and knowledge about the Circular Economy from a perspective of Brazil.

LINE OF ACTIVITY 4

The fourth and final line of activity seeks to promote the dissemination and diffusion of the Project through the development and implementation of a broad communication strategy.

These four lines of activity and their activities are interconnected, working together and in parallel to achieve the Project's overall objective. Despite this, three specific activities have provided particularly valuable input for this publication: (i) the Sustainability Diagnosis conducted with companies that partner with anchor companies belonging to the anchors' value chains, (ii) the identification of innovative Brazilian solutions in the Circular Economy, and (iii) the Community of Practice: Circular Economy in Brazil.

This publication is structured as follows:

CHAPTER 1 provides context for the **vision of the Circular Economy** adopted in the Project, drawing on a brief literature review, examples of initiatives from around the world, and an overview of Brazil's regulatory framework. **CHAPTER 2** presents key insights based on analyses from the **Sustainability Diagnosis** conducted with the group of companies participating in the Line of Activity 1 of the Project. **CHAPTER 3** compiles **practical experiences** from companies implementing circular solutions and their main challenges, along with **reflections and recommendations** discussed within the Community of Practice: Circular Economy in Brazil, developed under the Line of Activity 3 of the Project and, finally, **CHAPTER 4** highlights the main challenges and opportunities identified throughout the document, as well as the **main findings and recommendations** for advancing the agenda in Brazil, with a particular focus on partnerships, financing, and regulation.

Enjoy your reading!
FGVces Team

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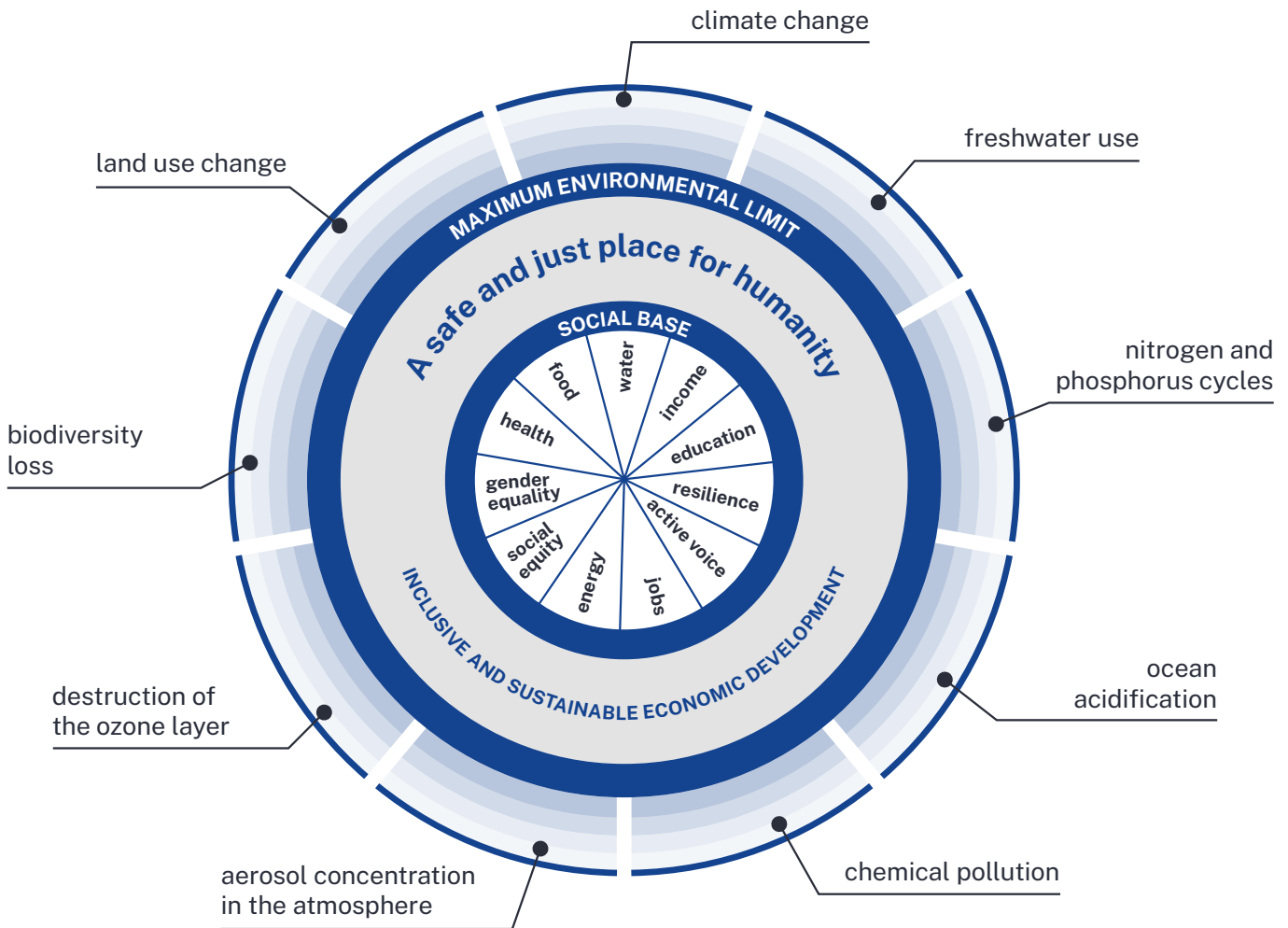
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CIRCULAR ECONOMY ON FOCUS

The Circular Economy has emerged as a promising alternative to the traditional linear economic model, which is based on resource extraction, production, and disposal. Given the growing environmental and social challenges faced today, the need to shift toward an economic system that respects the planet's limits and promotes regeneration is becoming increasingly clear. This chapter will explore the foundations of the Circular Economy, its principles, and its strategies, as well as the global efforts underway to drive this transformation. The Latin American context, along with specific initiatives in Brazil, will be examined, highlighting both the advances and challenges in building a more sustainable and inclusive economy.

1.1 CIRCULAR ECONOMY: A PATH TOWARDS SUSTAINABILITY

In 2012, economist Kate Raworth proposed a visual framework for development. The doughnut model, as it became known (Figure 1), was introduced in one of Oxfam's discussion papers ahead of the Rio+20 Conference (OXFAM, 2012). At the center of the figure is the foundation, or social base, where human needs and rights must be met. The outer boundary represents natural limits that must be respected. The space in between — the "doughnut" — is where we can live sustainably, distributing resources in a fair and viable way. The economy's role is to distribute these resources within society without exceeding the planet's physical limits.

Figure 1 – A safe and fair space for humanity to develop – a first illustration.

Source: OXFAM, 2012.

Raworth's model highlights that the economy should serve human rights while respecting environmental limits. Over a decade after the model's creation, extreme weather events have risen to the top of today's global risks. This is reflected in the 19th edition of the Global Risk Report by the World Economic Forum (WORLD ECONOMIC FORUM, 2024), which also indicates that over the next 10 years, the four

most severe risks are likely to be environmental. The risks are extreme weather events; critical changes in terrestrial systems; loss of biodiversity and collapse of ecosystems; scarcity of natural resources. Such phenomena are strongly linked to the way societies produce and consume, which still follows a predominantly linear economic model.

As the model suggests, the planet has limits, and natural resources are finite on a human scale. For more than three decades, scientists have questioned the modes of production and consumption that society has followed since the Industrial Revolution. However, the prevailing system remains based on a linear approach to economics (Figure 2), which involves extracting resources from nature, transforming them into products, and discarding them after use, in a logic of infinite growth.

Linear thinking presupposes exceeding planetary limits, consumerism, and social inequality, proving to be an unsustainable system. For instance, expert estimates from the global impact organization *Circle Economy Foundation* (2024) indicate that the world economy consumed 582 billion tons of resources in just five years (2016 to 2021), a volume approaching the entire consumption of the 20th century (740 billion tons).

Figure 2 – Representation of the linear model of production.



Source: ISO, 2024a.

Projections indicate that the planet will be home to 10 billion people in the coming decades (FGVces, 2017). To sustain this reality, overcoming the linear economic model is essential. Reviewing how products are designed, produced, and consumed is a critical step. This includes but is not limited to considering the origin of raw materials, the volumes produced, the quality and durability of products, the effectiveness and efficiency of processes. To achieve that, it is necessary to develop skills and knowledge that enable us to perceive, map, and understand the lifecycle of products and the socio-environmental impacts associated with each stage of production, distribution, consumption, and post-consumption. This understanding is crucial to avoiding and/or mitigating such impacts.

In this context, the 2030 Agenda, established in 2015 by the United Nations General Assembly, outlines many pathways to enhance resilience in the face of contemporary challenges and promote actions that respect planetary limits (NAÇÕES UNIDAS BRASIL, 2024). The 2030 Agenda represents a significant global commitment, outlining 17 Sustainable Development Goals (SDGs) and 169 targets to be achieved by 2030 by nations, sub-national governments, companies, and civil society. For example, SDG 12 aims to "ensure

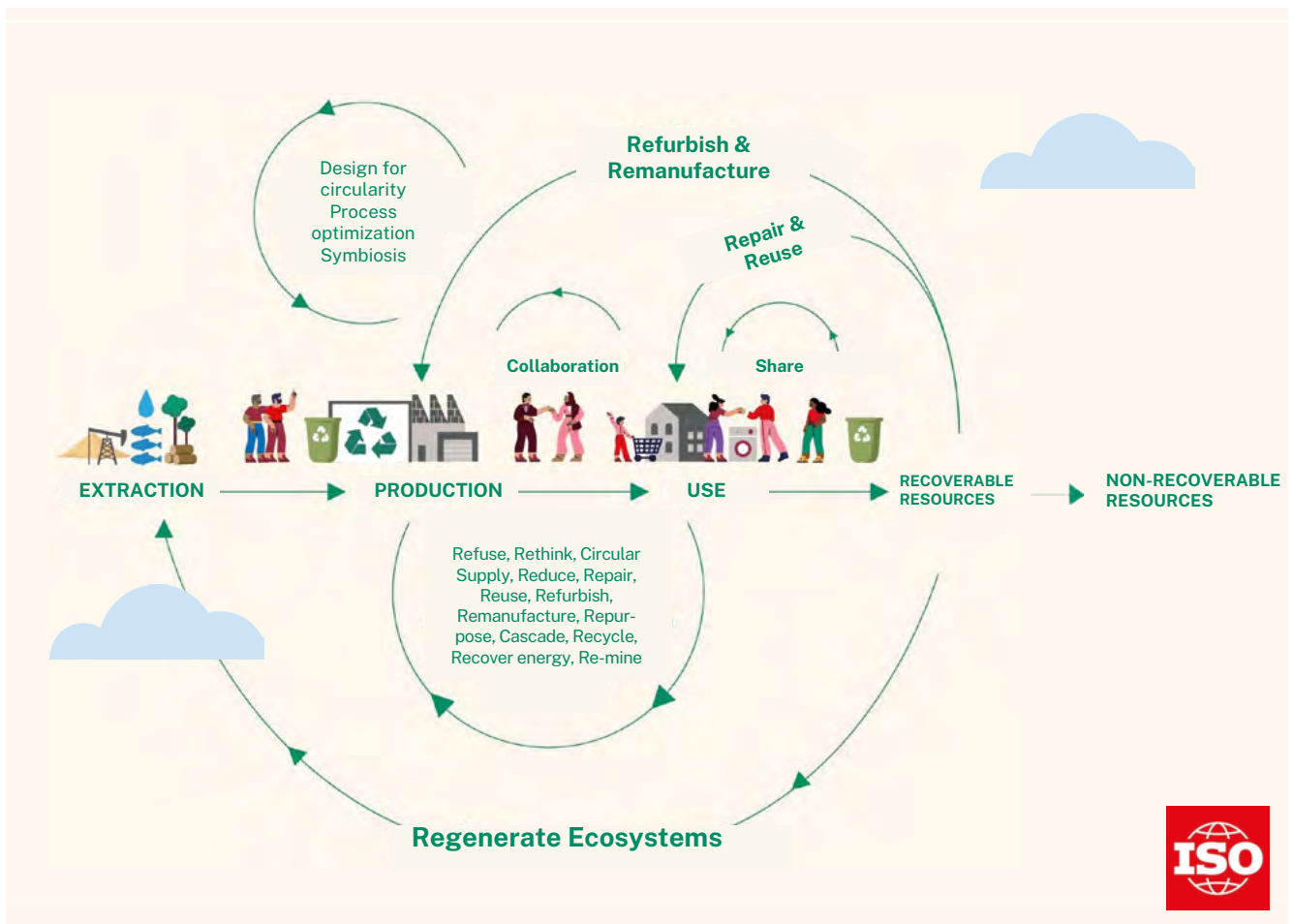
sustainable production and consumption patterns," aligning with the need for a transition from a linear economic model to a more circular one.



The Circular Economy stands in contrast to the linear model and offers a potential solution for transforming the system. In the context of this publication and the Project, the Circular Economy (Figure 3) is seen as an **economic model that alleviates the strain on finite natural resources by promoting the circular flow of materials, aiming to optimize the use of resources already extracted from nature.**

Although often associated with recycling, the Circular Economy extends far beyond "end-of-pipe" strategies that focus solely on managing waste after it is generated. In fact, while recycling plays an important role, the Circular Economy encompasses much more than this. According to Ellen MacAr-

Figure 3 – Representation of the Circular Economy.



Source: ISO, 2024a.

thur Foundation, an international organization known for its research and promotion of the Circular Economy, the concept is based on three design-oriented principles: eliminating waste and pollution, circulating products and materials at their highest value, and regenerating nature (ELLEN MACARTHUR FOUNDATION, 2021). Ellen MacArthur Foundation emphasizes that the transition to a Circular Economy is closely linked to shifting energy and materials to renewable sources. Although the exact origin of the Circular Economy concept is

unclear in the literature (SEHNEM & PEREIRA, 2019), it has emerged and consolidated through the contributions of various schools of thought with multidisciplinary foundations (FARIAS et al., 2021). These include concepts like industrial ecology, eco-efficiency, industrial ecosystems, industrial symbiosis, performance economics, cradle to cradle, blue economy, and natural capitalism, among others. These ideas converge into a set of guiding principles (MODEFICA, FGVCES, REGENERATE, 2020), as illustrated in the following diagram (Figure 4).

Figure 4 – Principles of Circular Economy.

Extending the working life of materials and products over several cycles of use

- ✓ Designing durable products
- ✓ Product repairability
- ✓ Product refurbishment
- ✓ Product reuse
- ✓ Products as services

Recovering materials and ensuring that biological materials returning to the earth are benign

- ✓ Composting
- ✓ Reverse logistics
- ✓ Recycling materials

Retain process inputs for as long as possible

- ✓ Recycling materials
- ✓ Use of secondary raw materials

Adopting systems thinking methods when designing solutions

- ✓ Ecodesign/ Eco-design
- ✓ Stakeholder engagement
- ✓ Industrial ecology
- ✓ Sharing products

Regenerating or minimally preserving nature and living systems

- ✓ Regenerative agriculture
- ✓ Using non-toxic materials
- ✓ Using biodegradable materials

Promoting public policies to accelerate change

- ✓ Laws, regulations and standards
- ✓ Tax incentives
- ✓ Funding

Source: Prepared by the authors.





Given its growing relevance, the Circular Economy is increasingly gaining visibility and importance. A clear example of this is the international collaboration that brought together 100 countries and 19 international organizations to discuss standardizing the concept, which culminated in the recent issuance of the ISO 59000 set of standards (ISO, 2024b). Brazil participated in this process, represented by the Brazilian Association of Technical Standards ("ABNT") in working groups with professionals from 75 countries. The standards provide definitions, actions, and tools to support circular practices and are divided as follows: vocabulary, principles, and guidance for implementation (ISO 59004:2024); guidance on the transition of business models and value networks (ISO 59010:2024); measuring and assessing circularity performance (ISO 59020:2024); product circularity data

sheets (ISO 59040:2024); and sustainability and traceability of the recovery of secondary materials (ISO 59014, still under approval). This comprehensive set of standards is expected to significantly contribute to the practical application of circularity in business operations and other organizations.

Movements and organizations focused on the Circular Economy are also growing internationally. One example is the Intergovernmental Negotiating Committee for the treaty to end plastic pollution, launched in 2022 by the United Nations and currently under discussion (UNEP, 2024). Another notable initiative is the Plastics Pact Network, led by two British organizations (Ellen MacArthur Foundation and The Waste and Resources Action Programme – WRAP). This movement connects initiatives and actors worldwide to implement

circular plastic solutions and is now present in 12 countries (ELLEN MACARTHUR FOUNDATION, 2024).

In addition to these efforts, governments at various levels are collaborating to create and enforce laws, public policies, and regulations related to the Circular Economy. The European Union (EU), for instance, has been addressing the issue for several years and launched its first Circular Economy Action Plan in 2015. This plan was updated in 2020 as part of the European Green Deal, with goals to double the use of circular materials by 2030 and achieve climate neutrality by 2050. It also includes legislative proposals for member states. In Spain, the Strategy for the Circular Economy aligns with the European Parliament's Action Plan, setting quantitative objectives for 2030. These goals include, but are not limited to reducing material consumption, waste generation (including in the food chain), and greenhouse gas emissions (FORÉTICA & CÁMARA DE COMERCIO DE ESPAÑA, 2023).

Also within the EU, the Netherlands serves as a reference case, having gradually worked on Circular Economy issues for over 40 years. This effort began in the late 1970s with the introduction of a

waste management hierarchy in its environmental policy, prioritizing reduction, reuse, and recycling, followed by energy recovery, incineration, and, finally, landfill disposal. Over time, the Netherlands implemented strategies for closing resource cycles and adopting regenerative design. In 2014, a specific program aimed at reducing material waste and promoting entrepreneurship in the Circular Economy significantly boosted recycling rates, achieving the target of 75% domestic waste separation by 2020. In line with EU policies, the Netherlands has set a goal of developing a Circular Economy by 2050. To meet this target, a national agreement on the Circular Economy was established, involving extensive cross-sector collaboration. Transition agendas were created for key areas, such as food and biomass, plastics, manufacturing, construction, and consumer goods (CRAMER, 2020).

1.2 REGIONALIZATION OF THE CIRCULAR ECONOMY IN LATIN AMERICA AND THE CARIBBEAN

In addition to the environmental considerations already highlighted, addressing the Circular Economy must also consider the social aspects that reflect regional and local characteristics. In this sense, it

is essential that the concept of Circular Economy proposed here incorporates the fact that Latin America has unique features, such as large economies focused on raw material production (with Brazil being a leading commodity producer), significant negative externalities from extractivism, and the potential to lead the Circular Economy agenda by drawing on knowledge and experiences from different countries of the region (MODEFICA, FGVCS, REGENERATE, 2020). A Latin American perspective on the Circular Economy must also recognize the importance and complexity of peripheral recycling sectors, such as solid waste sorting cooperatives, which manage a large portion of the region's materials.

To advance this regional vision of a more circular economic model, representatives from governments, the private sector, and civil society from several countries, including Brazil, came together in 2021 to launch the Circular Economy Coalition for Latin America and the Caribbean (COALICIÓN DE ECONOMÍA CIRCULAR PARA AMÉRICA LATINA Y EL CARIBE, 2024). This group's shared vision acknowledges the role of various actors in driving the transition, while promoting resilience and valuing solutions tailored to local climates and biodiversity. By doing so, it aims to

create innovative opportunities for economic development and foster an inclusive and sustainable transformation.

To cite an example from the Global South, the Circular Economy agenda in Chile has gained significant prominence in recent years. In 2021, the country introduced a vision for transitioning to a regenerative, fair, and participatory Circular Economy. The Roadmap for a Circular Chile by 2040 (*Hoja de Ruta para un Chile Circular al 2040*, in Spanish) integrates the country's political strategies and aims to transform how materials are produced, used, and disposed of. It also supports the implementation of other policies that promote the social, economic, and environmental inclusion of the informal waste sector. The creation of this roadmap involved public consultation with the participation of more than 140 strategic actors from various sectors. Built on four key pillars—innovation, regulation, culture, and territories—the initiatives encourage actions across the entire supply chain and promote investments and economic incentives for the transition (ELLEN MACARTHUR FOUNDATION, 2022). Chile's approach, much like that of the Netherlands, highlights the strategic importance of collaboration for a successful transition to circularity.

1.2.1 FAVORABLE FRAMEWORK IN BRAZIL

In Brazil, although there is still a long way to go, the country has made significant strides toward adopting a Circular Economy. The government has established policies and laws at the national level. Notably, 2023 and 2024 have been particularly active for this agenda, with the launch of New Industry Brazil ("NIB"), the National Circular Economy Strategy ("ENEC"), the regulation of the law to encourage the recycling industry, and discussions surrounding the creation of a National Circular Economy Policy ("PNEC"), which is currently under discussion in the Chamber of Deputies.

Before delving into these recent developments, it is important to acknowledge the advances made by the National Solid Waste Policy (PNRS) (BRASIL, 2010). Although it does not explicitly mention the term "Circular Economy," the PNRS introduced key innovations in solid waste management. One example is the generator's responsibility for the waste produced, addressed through the concept of reverse logistics. The PNRS defines reverse logistics as a system designed to enable the collection and return of solid waste to the business sector for reuse in its own production cycle, in other production cycles,

or for other environmentally appropriate final destinations. The policy made reverse logistics programs mandatory for manufacturers and importers of products such as pesticides and their packaging, tires, batteries, fluorescent lamps, lubricating oils, and electronics. However, some sectors still face challenges in implementing reverse logistics for their products, due to issues like poor communication with consumers and high logistical costs. Looking ahead, in 2024, the Brazilian government regulated Law No. 14260/21, which aims to support the recycling industry (BRASIL, 2021). Known as the "Rouanet Recycling Law," this legislation establishes incentives for the recycling industry and creates two funds—the Support Fund for Recycling Actions (Favorecicle) and the Investment Funds for Recycling Projects (ProRecicle). The law to support the recycling industry, along with its regulating decree (No. 12106/24), is expected to play a key role in advancing the Circular Economy. By offering incentives for projects across the recycling supply chain, it supports everything from research and development initiatives for micro-enterprises, including the acquisition of machinery and vehicles by waste picker cooperatives.

In addition, ongoing discussions, such as Bill No. 2524 (BRASIL, 2022a), known as

the "Plastic Free Ocean Bill," propose establishing rules for the Circular Economy of plastics. These include the controversial ban on single-use plastics and the provision of payments to waste pickers for the environmental services they perform.

These bottom-up approaches to the recycling chain, which include and integrate waste pickers and recyclers of materials, are crucial in the Brazilian context. Waste pickers form a significant part in this process, despite facing stigma and receiving little recognition. A survey by the National Sanitation Information System ("SNIS") across 1,372 Brazilian municipalities found nearly 39,000 waste pickers associated with more than 1900 associations or cooperatives (MINISTÉRIO DAS CIDADES, 2023). In the case of plastics, 48% of post-consumer material reaches recycling industries through collectors and scrap dealers (ANCAT, 2022). However, the SNIS acknowledges that waste picking and sorting is also carried out by independent and informal individuals, many of whom are in situations of significant social vulnerability. This reality makes it difficult to obtain reliable data. Research by the social movement organizations Pimp My Carroça and Cataki (2022), which advocate for waste pickers across Brazil, highlights the potential of these workers,

who operate extensively in municipalities, providing an essential environmental and urban cleaning service by collecting and disposing of volumes far greater than those officially reported by the industry.

In a key step toward a more circular production model, the National Circular Economy Strategy ("ENEC") was approved by decree in June 2024 (BRASIL, 2024a). This strategy emphasizes the core principles and guidelines of the Circular Economy, such as waste prevention, extending product lifecycles, maintaining the value of materials, and regenerating the environment. One of the ENEC's objectives is to create a favorable regulatory and institutional environment, including the creation of targets, standards and indicators for circularity. Additionally, the strategy aims to propose financial instruments to drive circularity and promote coordination between different levels of government, as well as the involvement of Circular Economy workers. To advise, monitor, and evaluate the implementation of the ENEC, a National Circular Economy Forum was established in September 2024. It comprises representatives from public authorities (11 ministries, the Office of the President's Chief of Staff, the General Secretariat of the Presidency of the Republic, Health Surveillance, the Brazil-

ian Industrial Development Agency, the Brazilian Industrial Research and Innovation Company, the Brazilian Development Bank ("BNDES"), and representatives from state and municipal associations), as well as civil society and the business and entrepreneurship sectors, including trade unions (BRASIL, 2024d). The creation of this multisectoral body, which brings together diverse actors to collaboratively address common challenges, is a crucial step that aligns with the systemic approach required by the Circular Economy.

Another important driver for the Circular Economy will be the New Industry Brazil ("NIB"). The NIB is an industrial policy aimed at advancing the country's neo-industrialization and will guide the federal government's actions over the next decade. Created in the second half of 2023 by members of the National Industrial Development Council ("CNDI") — comprising 20 ministries, the BNDES, and representatives of civil society, the productive sector, and workers — this policy addresses the Circular Economy in two of its six key missions (Mission 3: Sustainable infrastructure, sanitation, housing, and mobility; Mission 5: Bioeconomy, decarbonization, and energy transition and security). Additionally, several elements of the Circular Economy agenda are included in the NIB's Strategic

Action Plan, such as enhancing regulations on reverse logistics and harmonizing federal, state and municipal legislation on the topic. These measures aim to improve the efficiency of the Circular Economy (BRASIL, 2024c). The ENEC is also mentioned as a tool for achieving the Bioeconomy mission, which includes among its goals to strengthen supply chains based on the Circular Economy and the sustainable, innovative use of biodiversity. Both the NIB and ENEC documents share the goal of fostering innovation and sustainability, through financial instruments designed to boost the Circular Economy.

As mentioned earlier, discussions are also underway for the creation of a National Circular Economy Policy ("PNEC"). Proposed under Bill No. 1874/2022 (BRASIL, 2022a), this policy aims to promote the conscious use of resources by focusing on waste reduction and prioritizing durable, recyclable, and renewable products. It also includes a conversation around traceability, a key element in international discussions on the topic. The main goals of the PNEC are to raise awareness across society about resource use, encourage research and the implementation of innovative Circular Economy solutions, map and trace the stocks and flows of resources within the national

territory, and strengthen value chains by promoting the recovery and valorization of resources. The policy proposal also includes the participation of civil society through the National Circular Economy Forum, with the aim of ensuring a just transition to the Circular Economy. This approach seeks to create opportunities for employment, work, and income.

While significant progress has been made in developing public policies and national strategies for the Circular Economy in Brazil, pointing to an optimistic outlook for the agenda starting in 2024, the greatest challenge continues to be the effective implementation and practical application of these instruments by all actors in the ecosystem, such as governments, businesses,



civil society, and consumers. For the transition to a more circular economic model to succeed, alignment, engagement, and coordinated action among these various actors are essential, taking into account the regional and local specificities in which they operate. Only through collaborative, long-term efforts can barriers be overcome, and markets and business models created to truly contribute to the shift toward a more circular economy.

This is a summary panorama of the regulatory framework, and of certain activities and networks aimed at promoting the Circular Economy both globally and in Brazil. The following sections will take a sectoral approach to the Circular Economy, focusing on the challenges and facilitators identified in the energy and telecommunications value chains, within the scope of the Project.



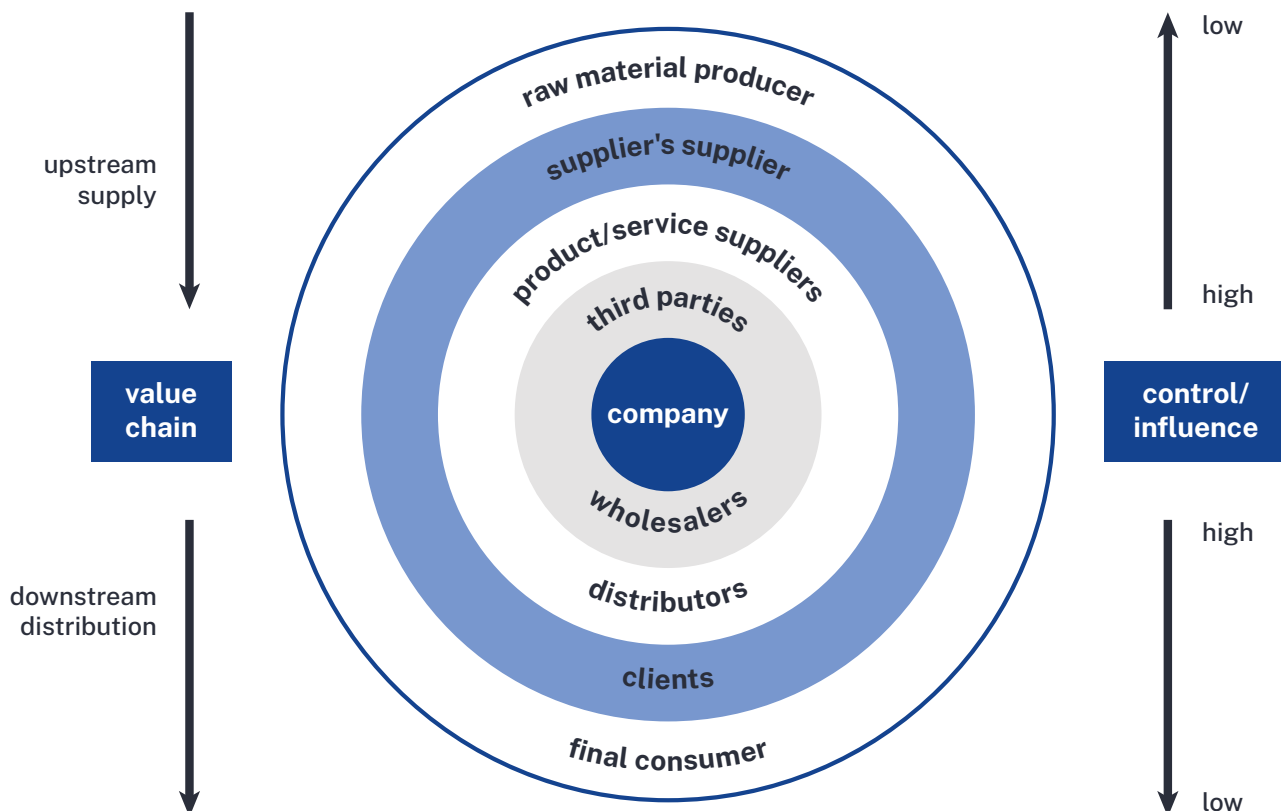


2

DEEPENING THE VIEW ON SUSTAINABILITY AND CIRCULAR ECONOMY IN THE ENERGY AND TELECOMMUNICATIONS VALUE CHAINS

The concept of sustainability, like circularity, must extend beyond the boundaries of individual companies to encompass the entire production process that contributes to the development of a product or service, as well as the stages that follow until they reach the end consumer. Line of Activity 1 of the Project, focused on capacity building, facilitated a training process based on this systemic vision and generated knowledge about sustainability practices and the Circular Economy among MSMEs within the value chains of the anchor companies Neoenergia and Telefónica-Vivo.

According to the Global Reporting Initiative (GRI, 2022), a value chain consists of the "range of activities carried out by the organization and by entities upstream and downstream of the institution to bring its products and services from conception to final use" (GRI, 2022). This means that a company's value chain is composed of entities upstream (such as contractors, suppliers, service providers, and raw material producers) as well as downstream (entities whose production activities stem from or follow the products or services provided by the company or institution). The concept is illustrated in Figure 5 below.

Figure 5 – Representation of a value chain.

Source: GRI (2005) *apud* FGVCES (2012).

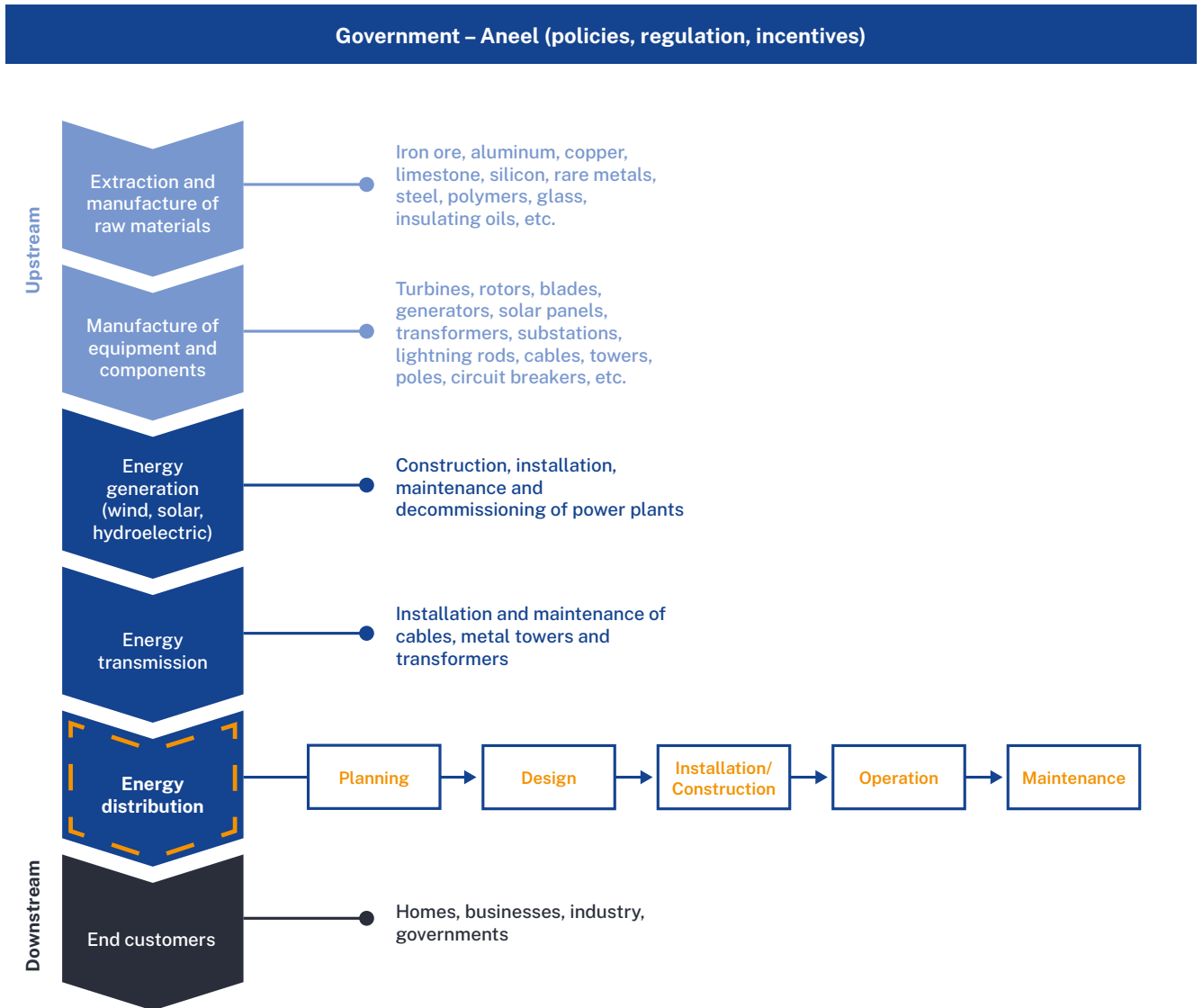
Understanding the value chains in the Energy (distribution) and Telecommunications (fixed-line, mobile, and broadband) sectors is essential, as these are the focus of the Sustainability Diagnosis discussed in the following section. A general, non-comprehensive view of these chains reveals the segments where challenges and opportunities emerge, as well as the barriers and facilitators for advancing sustainability and the Circular Economy.

For illustration, Figure 6 provides a simplified, non-exhaustive representation of the electricity generation and distribution value chain. In the image, the anchor company, Neoenergia, is highlighted in orange. The company operates in energy generation, transmission, distribution, and commercialization, and has an extensive value chain of companies of various sizes that supply products, equipment, and services across the different parts of its operations, activities, and processes. In the context of

the Project, the focus was on the company's supply related to energy distribution (blue arrow with an orange dashed border)

and its respective suppliers of products, equipment, and services, primarily small and medium-sized companies.

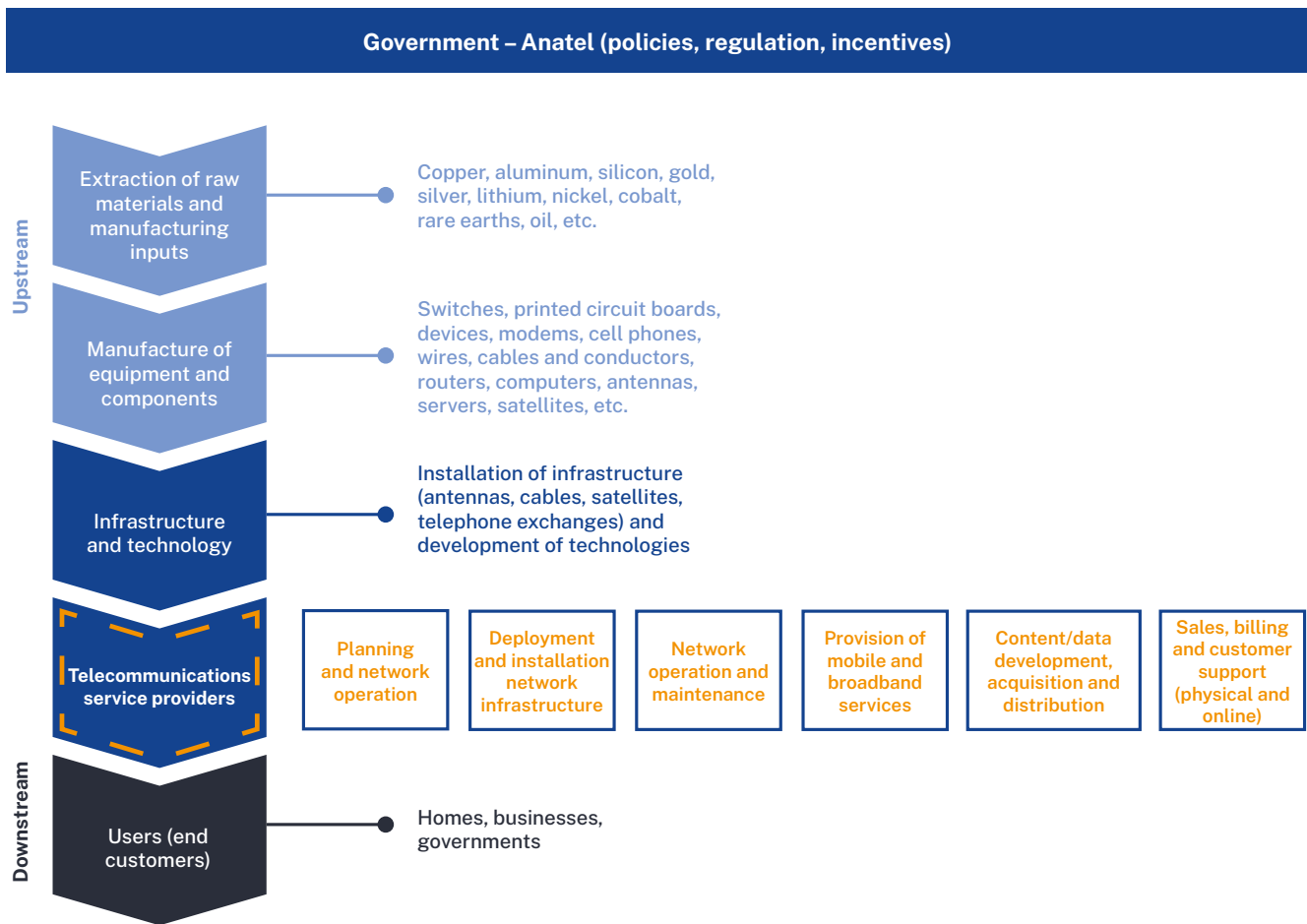
Figure 6 – Representation of the value chain in the energy sector.



Source: Prepared by the authors, based on Neoenergia (2024), Sebrae (2017), and Liu *et al* (2017).

The telecommunications value chain, also illustrated in a non-comprehensive manner in Figure 7, is represented in the Project by the Spanish company Telefónica, which operates in Brazil through its subsidiary known as Vivo. Vivo offers services

in mobile, fixed-line, and internet telephony, along with other telecommunications services. Similar to Neoenergia, the Telefónica-Vivo value chain consists of companies of varying sizes.

Figure 7 – Representation of the value chain in the telecommunications sector.

Source: Prepared by the authors, based on Vivo (2024), Flevy Management Insights (2024), Soares (2021), and Paethus (2023).

To develop a comprehensive view of sustainability and the Circular Economy within the value chains of the energy (renewable generation and distribution) and telecommunications (fixed-line, mobile, and broadband) sectors – both of which are the focus of this publication – FGVces developed and applied a sustainability assessment tool to the anchor companies and MSMEs involved in the Project. This assessment aimed to evaluate the posi-

tioning and actions of these suppliers in the value chain with regard to sustainability management, including environmental, social, economic, and governance strategies, processes, and practices.

This tool led to the Sustainability Diagnosis of the participating companies and their respective value chains. The insights from this diagnosis, combined with the debates, reflections, and propositions

raised within Line of Activity 3 of the Project — focused on *creating networks and exchanging knowledge* (see Chapter 3) — could serve as a valuable resource for improving sustainable management in these sectors. The diagnosis outlines quantitative performance parameters for the companies and their sectors, highlighting key areas for attention and offering potential ways to enhance sustainability performance and promote the Circular Economy.

2.1 DIAGNOSIS OF THE CIRCULAR ECONOMY AND SUSTAINABILITY IN COMPANIES WITHIN THE ENERGY AND TELECOMMUNICATIONS VALUE CHAINS

Between July and August 2023, the group of companies participating in Line of Activity 1 of the Project, representing the energy and telecommunications value chains, completed a survey designed to assess their level of maturity across various sustainability agendas, including the Circular Economy. This evaluation aimed to facilitate the implementation or improvement of practices related to sustainability management.

The method used to construct the survey was based on two widely recognized tools

in the Brazilian context, both originally developed by FGVces: the Corporate Sustainability Index ("ISE") (ISEB3, 2023) and the Exame Sustainability Guide (EXAME, 2022)¹. In addition to these core tools, five other references were utilized - the Ethos Indicators for Sustainable and Responsible Business (INSTITUTO ETHOS, 2019a), the Ethos-SEBRAE Indicators for Micro and Small Companies (INSTITUTO ETHOS, 2019b), the Global Reporting Initiative (GRI) report (GRI, 2022), the NBR ISO 26000:2010 standard for Social Responsibility (ISO, 2010), and the Ellen MacArthur Foundation's Circulytics tool, which focuses on the Circular Economy (ELLEN MACARTHUR FOUNDATION, 2023).

The structure of the questionnaire consisted of two parts - an **introductory header** and the **main body of the questionnaire**. The header contained open-ended questions designed to gather general information and characterize the companies, such as the sector, year of establishment, region of operation, number of employees in the sustainability department, and the degree of knowledge and maturity of the Circular Economy theme in the organizations.

¹ Including its ISE B3 versions, from 2022/23 (ISEB3, 2023) and EXAME's Best of ESG Ranking.

The questionnaire included 62 thematic indicators, divided into five dimensions: General, Economic, Environmental, Social, and Value Chain (Panel 1). Each of the indicators in the questionnaire was made up of a series of questions about business practices (539 in total) that sought to measure the situation of each company in relation to general aspects of sustainability and aspects and business practices that directly touch on or are tangential to the Circular Economy. The sequence of questions that made up each indicator was generally organized to gradually increase the complexity of practices within each theme, with companies responding in a binary manner (yes/no). It is important to note that all indicators included a “neutral” option, meaning the company had no practices related to the specific indicator.

In analyzing the results, a scoring logic was established for all the affirmative answers to the practices indicated by the indicator questions, with the aim of allowing the respondent companies to know their stage of sustainability from a quantitative perspective. Furthermore, by averaging the affirmative responses, it was possible to make comparisons between each company and the entire group of respondents.

Scores were calculated as a percentage, reflecting the proportion of affirmative answers in relations to the total number of questions for each sustainability practice indicator. In short, the closer the score was to 100%, the more “yes” answers were given, indicating better performance by the company on that particular indicator. Conversely, a lower percentage implied fewer affirmative responses, suggesting the company was at a less advanced stage on the topics of interest.

As part of Line of Activity 1 of the Project, the questionnaire results led to individual reports for each participating company, highlighting their own results and comparing their scores to the group average for each indicator. These results were discussed among the companies during a training workshop, with the companies' identities kept confidential at all times.

Although this was a self-reporting assessment tool, it is important to emphasize that the questionnaire was not intended to audit the companies' performance on sustainability and Circular Economy topics. Instead, it was aimed to serve as a self-assessment tool designed to encourage information sharing, reflection, and the improvement of business practices for sustainability.



Panel 1 – Structure of the 5 Dimensions that make up the Sustainability Questionnaire, Consisting of 11 criteria and 62 indicators.

DIMENSION	CRITERION	INDICATORS
General Dimension	CRITERION I Commitments to Sustainable Development	Indicator 1 – Fundamental Commitments
		Indicator 2 – Voluntary Commitments and Institutional Alliances
	CRITERION II Governance, Transparency, and Conduct	Indicator 3 – Governance and Corporate Structure
		Indicator 4 – Ethical Behavior and Anti-Corruption
		Indicator 5 – Accountability and Communication
		Indicator 6 – Financial Information
		Indicator 7 – Sustainability Report
Economic Dimension	CRITERION III Strategy, Management, and Economic Performance	Indicator 8 – Strategic Planning and Management
		Indicator 9 – Quality Management, Performance
		Indicator 10 – Risk Management
		Indicator 11 – Fair Competition and Fair Contractual Practices
		Indicator 12 – Products and Services
		Indicator 13 – Product and Market Innovation
Environmental Dimension	CRITERION IV Strategy, Management, and Performance	Indicator 14 – Compliance with Environmental Legal Requirements
		Indicator 15 – Compliance with Occupational Health and Safety Legal Requirements
		Indicator 16 – Adoption of Environmental Mitigation and Compensation Measures
		Indicator 17 – Environmental Responsibility
		Indicator 18 – Product/Service Lifecycle Analysis
	CRITERION V Core Themes	Indicator 19 – Environmental Education and Awareness
		Indicator 20 – Water
		Indicator 21 – Biodiversity and Ecosystem Services
		Indicator 22 – Effluents

continue

continuation

DIMENSION	CRITERION	INDICATORS	
Environmental Dimension	CRITERION V Core Themes	Indicator 23 – Energy	
		Indicator 24 – Pollution and Air Emissions	
		Indicator 25 – Climate Change and Greenhouse Gas Management	
		Indicator 26 – Materials	
		Indicator 27 – Solid Waste and Post-Consumption	
		Indicator 28 – Circular Economy	
Social Dimension	CRITERION VI Strategy, Management, and Social Performance	Indicator 29 – Human Rights	
		Indicator 30 – Civil and Political Rights	
		Indicator 31 – Economic, Social, and Cultural Rights	
	CRITERION VII Core Themes	Indicator 32 – Hiring and Compensation	
		Indicator 33 – Employment Experience for Youth	
		Indicator 34 – Inclusion of People with Disabilities	
		Indicator 35 – Relations with Trade Unions and Class Associations	
		Indicator 36 – Child, Forced, or Compulsory Labor	
		Indicator 37 – Non-Discrimination	
		Indicator 38 – Affirmative Action and Promotion of Diversity	
		Indicator 39 – Moral and Sexual Harassment	
		Indicator 40 – Professional Development and Employability	
		Indicator 41 – Relations with Outsourced Workers	
		Indicator 42 – Quality of Life and Working Conditions	
		Indicator 43 – Occupational Safety and Health	
		CRITERION VIII Communities	Indicator 44 – Community Impact Management
			Indicator 45 – Local Development
			Indicator 46 – Investments in Social Action
		CRITERION IX Society	Indicator 47 – Participation and Monitoring of Public Administration

conclusion

DIMENSION	CRITERION	INDICATORS
Social Dimension	CRITERION IX Society	Indicator 48 – Public Policies
		Indicator 49 – Contributions to Political Campaigns
Value Chain Dimension	CRITERION X Suppliers	Indicator 50 – Supplier Selection Mechanism
		Indicator 51 – Supplier Evaluation and Management
		Indicator 52 – Communication and Dialogue with Suppliers
		Indicator 53 – Support for Supplier Development
		Indicator 54 – Regularization and Combating Informality in the Chain
		Indicator 55 – Traceability and Origin of Raw Materials
		Indicator 56 – Child and Forced (or Slave-like) Labor in the Production Chain
	CRITERION XI Customers and Consumers	Indicator 57 – Social Responsibility of Suppliers
		Indicator 58 – Commercial Communication Strategy
		Indicator 59 – Service Excellence
		Indicator 60 – Knowledge and Management of the Potential Impacts of Products and Services
		Indicator 61 – Post-Consumption Products and Services
		Indicator 62 – Education for Sustainable Consumption

Source: Prepared by the authors.

Within the scope of this publication, the analyses presented offer a general, synthesized, and partial assessment of the results from the Sustainability Diagnosis. The analyses were conducted in a grouped manner, using the average scores of the companies participating in Line of Activity 1 of the Project. In some cases, the results were disaggregated by sector, company size, or by separating the anchor compa-

nies from the others to provide certain points for reflection.

For the analysis of the Sustainability Diagnosis, the performance of the companies was compared based on size (anchors and MSMEs) and by sector (energy and telecommunications) to assess the challenges and opportunities in both fields. The names of the companies will

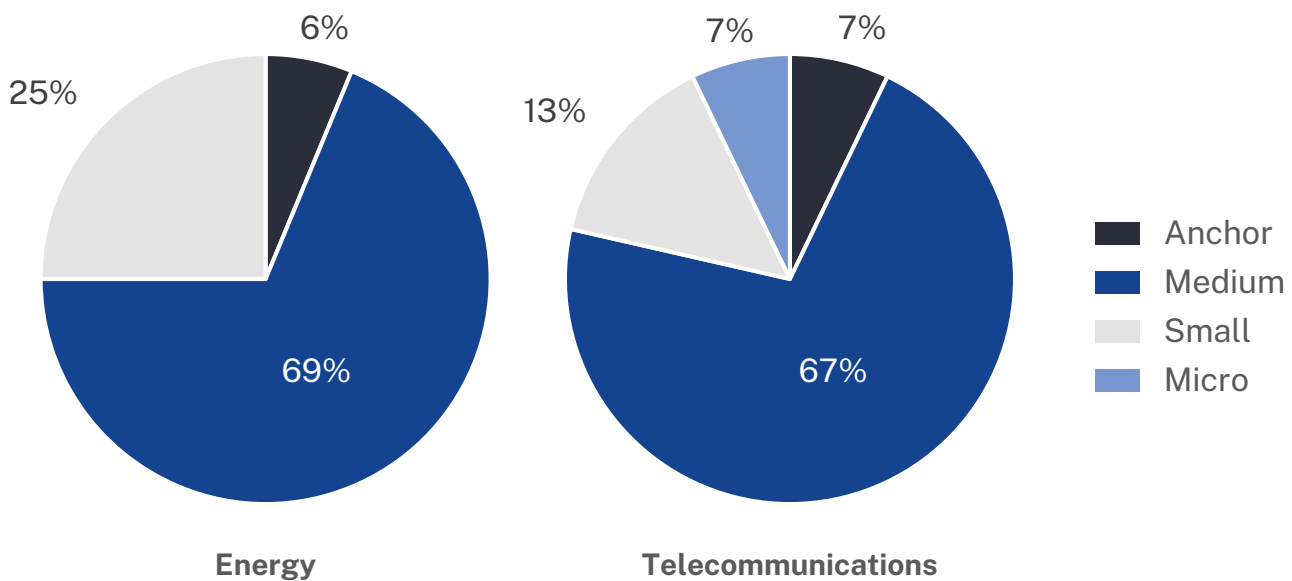
not be identified in the analyses discussed here. It is important to note that the **data for the anchor companies is always presented in aggregate form, combining data from both sectors to ensure the anonymity of the two anchor companies involved.**

In terms of results, the Sustainability Diagnosis in this chapter reflects the responses of 30² companies, with 16 from the energy value chain and 14 from the

telecommunications value chain. Located in different regions of the country, most of the respondent companies are medium-sized, followed by small enterprises. Large companies (anchor companies) and micro-enterprises appear in smaller proportions, as shown in Figure 8 below.

The respondent micro, small, and medium-sized companies, divided into product suppliers and service providers of various sizes and market activities, were catego-

Figure 8 – Size of companies responding to the sustainability questionnaire, disaggregated by value chain.



Source: Prepared by the authors.

² Of the 30 organizations whose responses are included in the diagnosis, all except the anchor companies are micro, small, and medium-sized enterprises. In total, 31 companies answered the questionnaire, including one large company from the telecommunications value chain. However, the data and analysis in the diagnosis do not reflect the information provided by this large company, as the document aims to focus on the Circular Economy in the context of micro, small, and medium-sized enterprises within the energy and telecommunications value chains.

rized into 10 self-declared macro sectors, including construction, technical consultancy, electrical and electronics, electricity, renewable energy, electrical engineering, smart grid, information technology, telecommunications, and telephone sector.

As previously mentioned, the Sustainability Diagnosis conducted in Line of Activity 1 of the Project covered the sustainability agenda in its broadest sense. In this publication, the results and analysis will focus specifically on the Circular Economy. The following section (2.2) discusses the results of a header question that addresses the level of maturity on the agenda, along with the specific Circular Economy indicator (Indicator 28) and a selection of cross-cutting indicators for the Circular Economy.

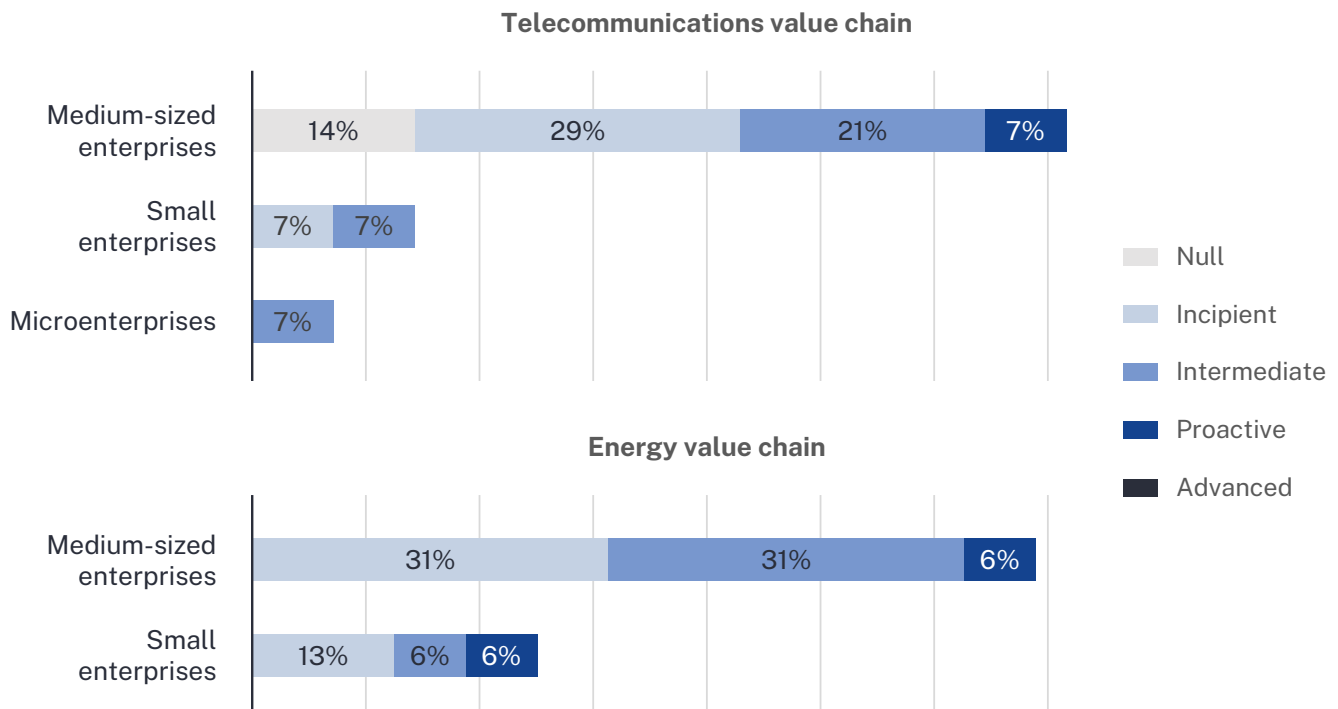
2.2 DEVELOPMENT OF THE CIRCULAR ECONOMY IN THE ENERGY AND TELECOMMUNICATIONS VALUE CHAINS

This section provides an overview of the Sustainability Diagnosis conducted in Line of Activity 1 of the Project, covering three key aspects: the degree of maturity of the Circular Economy agenda, Indicator 28 – Circular Economy, and the 20 indicators that intersect with circularity. The analysis begins by focusing on two

aspects of the Diagnosis specifically related to the Circular Economy. The first is based on a question that asks companies to **self-assess their maturity level** regarding the **Circular Economy** agenda, located in the introductory part of the questionnaire (header). The second is based on the **results of Indicator 28**, which falls under the environmental dimension of the tool and **addresses issues directly related to the Circular Economy**. Following this, the results and analysis of another **20 cross-cutting indicators for circularity**, meaning they include elements or are connected to the Circular Economy agenda, are presented.

Regarding the **companies' level of maturity in the Circular Economy agenda**, the analysis explored their knowledge and actions integrated into procedural management and policies focused on the Circular Economy. In the introductory part of the questionnaire, companies were asked to select the option that best described their maturity level on the topic, with five choices: i) Null: Unfamiliar with the subject; ii) Incipient: Subject introduced by clients or in a search for information; iii) Intermediate: Some practical actions taken; iv) Proactive: Integrated programs in place; and v) Advanced: Considered an expert on the agenda.

Figure 9 – Level of maturity of the respondent companies in relation to the Circular Economy agenda, disaggregated by value chain and size.



Source: Prepared by the authors.

In terms of results, as shown in Figure 9, the majority of respondent companies considered themselves to be at an incipient level of maturity. Specifically, 44% of companies in the energy sector and 36% of those in the telecommunications sector identified themselves as being at this initial stage in relation to the Circular Economy agenda.

Following this, companies at the intermediate level of maturity came in second, with 37% of energy sector companies and 35% in telecommunications reporting themselves

at this stage. This suggests that the Circular Economy has at least been introduced to these companies by their suppliers and/or customers, or that they have initiated some actions aimed at the Circular Economy.

As the data is disaggregated by company size and value chain, information from anchor companies has been omitted to maintain confidentiality. However, it is worth noting that these anchor companies have self-assigned advanced and proactive levels of maturity, indicating greater engagement with the circular agenda.

Considering that only 14% of all companies rated themselves at a "null" level of maturity, indicating no knowledge of the subject, it is clear that **the Circular Economy is at least on the radar for most companies, either due to pressure from clients or through active information-seeking.**

The incipient level of maturity has shown progress, as **more than half of the companies have taken some practical action toward the Circular Economy**, as reflected by the combined percentage of companies at the intermediate, proactive, and advanced levels of maturity. Given this, it is crucial to consider that **further devel-**

opment and advancement of the Circular Economy agenda can be driven by the dissemination of ideas and information. This exposure allows organizations to engage with the topic and, as a result, recognize, strengthen, or integrate practical actions related to circularity into their management practices.

Moving on to the questionnaire, Indicator 28 – *Circular Economy* was included to assess aspects directly related to the Circular Economy. It consists of 14 questions addressing knowledge, practices, programs, and positioning on the issue, as detailed in Table 1.

Table 1 – Performance results for Circular Economy Indicator 28, disaggregated by anchor companies, value chain, and company size across the 14 questions.

Questions about the Circular Economy	Overall Score	Anchors	Energy Value Chain		Telecommunications Value Chain		
			Small	Medium	Micro	Small	Medium
01. Is “Circular Economy” a well-known concept?	73%	100%	75%	73%	100%	50%	40%
02. Does the company adopt actions/programs aimed at transition?	51%	100%	0%	27%	100%	50%	30%
03. Does the company have a plan for implementing Circular Economy actions/programs?	40%	100%	0%	18%	100%	0%	20%

continue

continuation

Questions about the Circular Economy	Overall Score	Anchors	Energy Value Chain		Telecommunications Value Chain		
			Small	Medium	Micro	Small	Medium
04. Does the company have measurable targets for Circular Economy?	20%	100%	0%	9%	0%	0%	10%
05. Is information on actions, programs and targets publicly available?	18%	100%	0%	9%	0%	0%	0%
06. Do the actions include innovation projects and/or the development of products and/or services designed to maximize the use and exploitation of materials and products?	48%	100%	0%	27%	100%	50%	10%
07. Is the Circular Economy considered as key for the company's strategy?	18%	0%	0%	0%	100%	0%	10%
08. Is there internal communication about the Circular Economy strategy, actions and/or implementation plans?	30%	0%	0%	18%	100%	50%	10%
09. Does the company talk to suppliers about expanding supply based on the principles of the Circular Economy?	28%	50%	0%	18%	100%	0%	0%
10. Does the company talk to customers about best practices?	22%	0%	25%	9%	100%	0%	0%
11. Does the company talk to its investors about aspects related to the Circular Economy?	3%	0%	0%	9%	0%	0%	10%

conclusion

Questions about the Circular Economy	Overall Score	Anchors	Energy Value Chain		Telecommunications Value Chain		
			Small	Medium	Micro	Small	Medium
12. Does the company engage with policy-makers to promote and encourage the transition to a Circular Economy?	20%	0%	0%	9%	100%	0%	10%
13. Is the company associated or actively engaged in initiatives focused on Circular Economy?	8%	50%	0%	0%	0%	0%	0%
14. Does the company not have any of the practices mentioned above yet?	33%	0%	50%	36%	0%	50%	60%

■ Performance below 20%

Source: Prepared by the authors.

For Indicator 28, the average result across all 30 respondent companies shows that 32% of the questions related to Circular Economy practices were answered positively. Out of the 62 indicators in the questionnaire, this indicator ranked as the 8th lowest in terms of overall average performance. Specifically, within the environmental dimension, of which this indicator is a part, Indicator 28 had the 4th lowest performance in the overall averages. These rankings suggest that there is still considerable room for improvement in advancing the Circular Economy agenda,

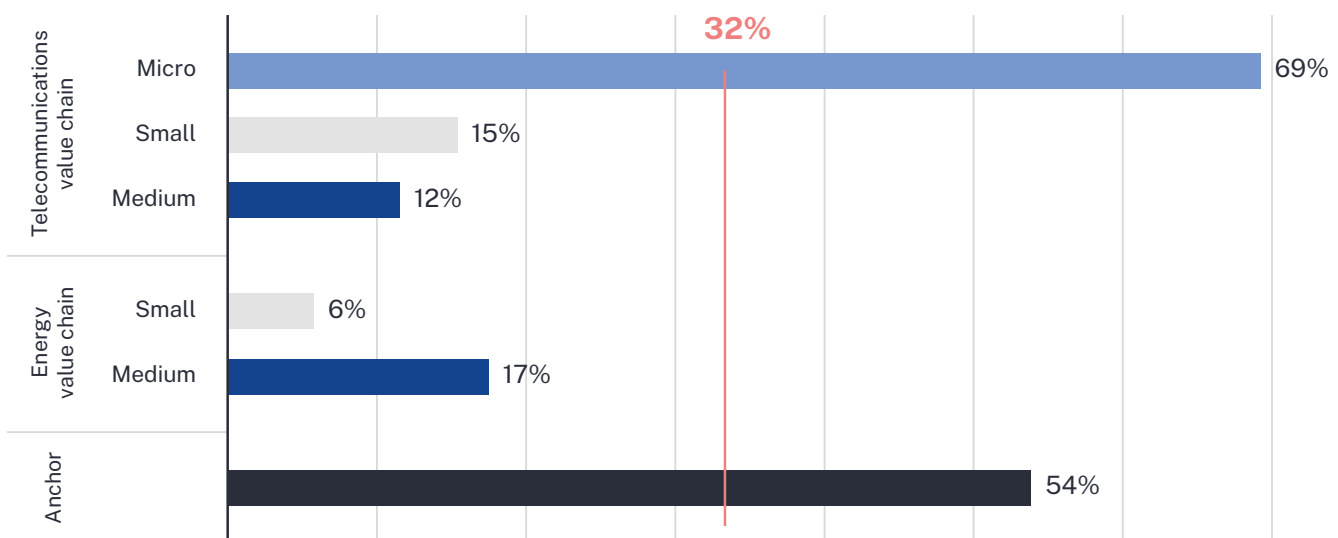
aligning with the results from the question on the level of maturity (found in the tool's header).

To better understand the performance of Indicator 28, companies were analyzed by size and value chain, as illustrated in the chart in Figure 10. In terms of Circular Economy practices, small and medium-sized companies in both value chains performed the lowest, with less than 20% of affirmative responses. For the anchor companies, both of which are large enterprises, the average performance was 54%.

When examining sectors separately (Figure 10), small companies in the energy sector had a performance of 6%, while medium-sized companies scored 17%. In the telecommunications sector, small companies achieved around 15%; medium-sized companies scored approximately 12%; and micro-enterprises achieved

69%, the highest performance in the group, even exceeding the anchor companies' average. Thus, aside from the micro-enterprise score, which appears to be an outlier, the size of the company seems to influence business performance related to the Circular Economy agenda.

Figure 10 – Performance in Indicator 28 (Circular Economy) among respondent companies, disaggregated by anchors, company size, and value chain.



Source: Prepared by the authors.

As mentioned, Indicator 28–*Circular Economy* consists of 14 questions addressing practices related to the agenda. Table 1 presents the companies' performance on the various questions in the Indicator, disaggregated similarly to Figure 10, with companies divided by value chain and size, and anchor companies grouped together.

The overall group average is also provided for reference.

In Table 1, when analyzing the column of **general averages for the group of companies**, it becomes clear that most respondents (75%) say they already have prior knowledge of the term "Circular Econo-

my." This overall average appears to be influenced by the energy sector, where small and medium-sized companies performed at 75% and 73%, respectively, as well as the micro-enterprise in the telecommunications sector, which performed at 100%. However, **in the telecommunications sector, small and medium-sized companies scored lower, with performances of 40% and 50%, respectively.** In comparison, a 2019 survey by the National Confederation of Industry (CNI), which included 170 large, medium, and small industrial companies across different regions of Brazil, found that only 30% of respondents were aware of the Circular Economy theme (CNI, 2019). Although the surveyed universes and the methodology applied are different from the Sustainability Diagnosis presented in this publication, it is interesting to note that the data obtained by this Diagnosis is much higher than that obtained by the CNI survey. The fact that the topic is relevant to the anchor companies provides their partner companies with greater exposure to it and can be seen as a contributing factor to this result.

While the respondent companies are familiar with the term or concept, when the questions about effective actions to implement it are examined, the results are lower. Only 51% of the organizations

report having implementation plans or programs aimed at the Circular Economy agenda, and nearly half (48%) of the companies have actions focused on innovation or the development of products or services designed to maximize the use and exploitation of materials and products. This information indicates that **the Circular Economy agenda still lacks structure, and existing programs need to be formalized within organizations. The results also reflect that the agenda is not yet considered key for most organizations,** with only 18% of the respondent companies treating it as such. Drawing a parallel with the CNI survey mentioned, the figures identified in the Diagnosis differ from the results of the 2019 survey, where 76.5% of respondents reported developing at least one Circular Economy practice when presented with a list of circular practices (CNI 2019). Another noteworthy point is the low level of engagement in Circular Economy initiatives among respondents, with only 8% providing affirmative responses to this question. As discussed in Chapter 1 and further explored in Chapter 3, **participation in information exchange environments between companies is crucial for the successful transition to circularity.**

Looking at the column for **anchor companies** in Table 1, it is evident that such

companies perform well in several areas, indicating that they implement various actions and initiatives related to the agenda. However, their performance drops to 50% on questions related to dialogue practices with suppliers and engagement in Circular Economy initiatives. Furthermore, on questions about the centrality of the agenda within the company, as well as communication and dialogue about the agenda with both internal and external stakeholders, including customers, investors, and public authorities, their performance is zero. This suggests **significant opportunities for anchor companies to leverage their influence along the value chain, both downstream and upstream, to advance the Circular Economy agenda.**

In line with this data, the responses to questions about promoting the Circular Economy debate and exercising influence (questions 07 to 12 in Table 1) are particularly relevant. **For anchor companies, this highlights the potential to further disseminate knowledge and practices related to the agenda.** In these questions, except for the performance of the micro-company in the energy sector, which scored nearly 100%

on almost all of them³, the remaining companies, including the anchor companies, scored close to 0 on most questions. The exception was the 50% score (aggregated between the anchor companies in both value chains) related to dialogue with suppliers.

It is important to note that the data analyzed so far is based on responses to (i) the agenda level of maturity scale and (ii) Indicator 28, which contains key elements of the Circular Economy agenda. However, this data does not fully represent the adoption of circular practices by the companies that participated in the Sustainability Diagnosis, which comprised a total of 62 indicators.

Given the broad and cross-cutting nature of the Circular Economy agenda, and the systemic vision that sustainability entails (as noted at the beginning of this chapter), a selection of 20 indicators that correlate with circularity was made from across the five dimensions of the questionnaire (Panel 2). The following paragraphs will analyze the results of the Sustainability Diagnosis regarding the development of the Circular Economy agenda based on this selection of cross-cutting indicators.

3 The micro-company's perfect score on question 11, which addresses discussions with and influence over investors, may be due to the fact that, as a micro-enterprise, it likely does not have external investors beyond the owner(s).



Panel 2 – Selection of cross-cutting indicators for the Circular Economy, within the 5 dimensions of the questionnaire.

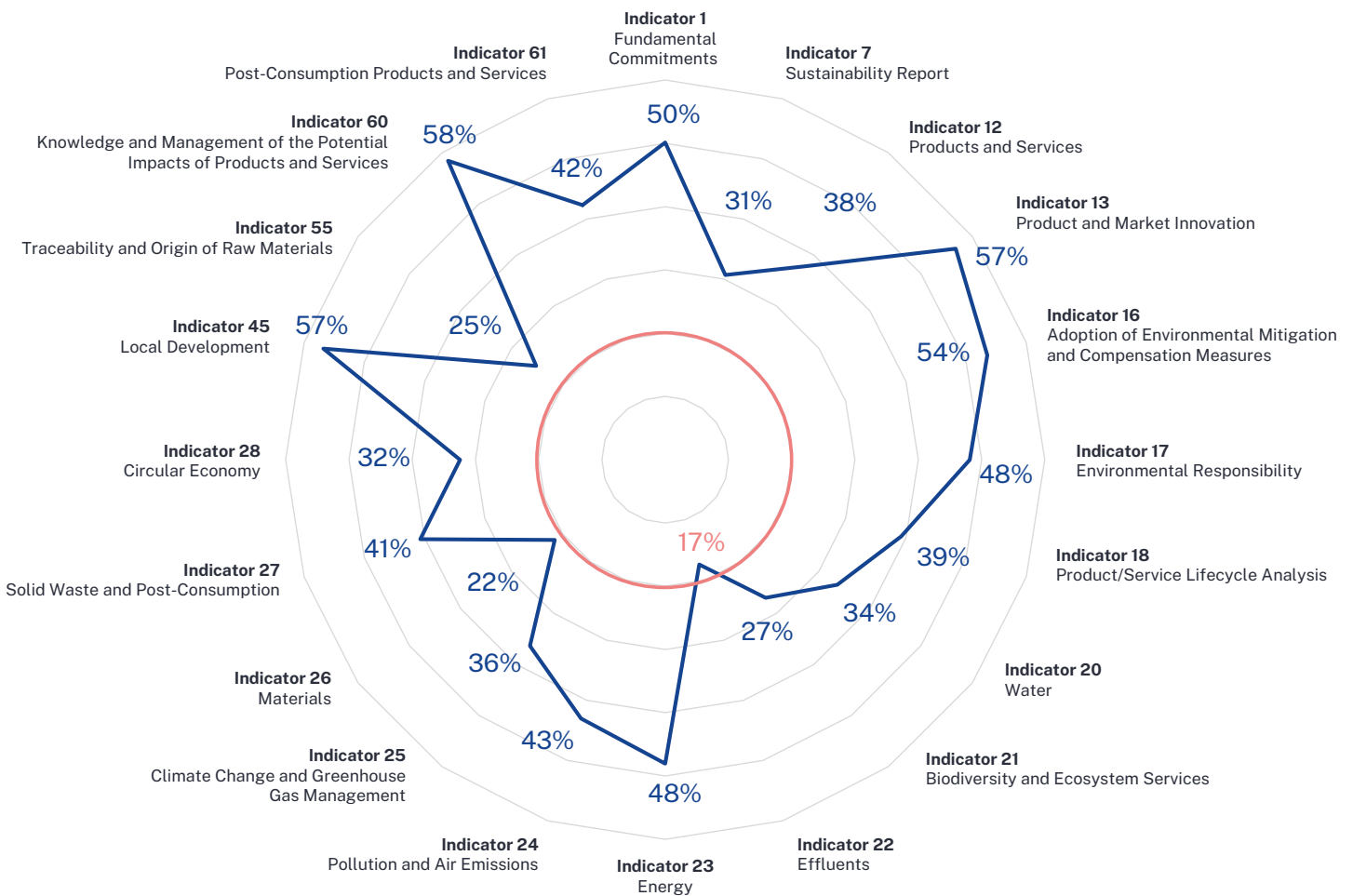
DIMENSION	CROSS-CUTTING INDICATORS FOR THE CIRCULAR ECONOMY
General Dimension	Indicator 1 – Fundamental Commitments
	Indicator 7 – Sustainability Report
Economic Dimension	Indicator 12 – Products and Services
	Indicator 13 – Product and Market Innovation
Environmental Dimension	Indicator 16 – Adoption of Environmental Mitigation and Compensation Measures
	Indicator 17 – Environmental Responsibility
	Indicator 18 – Product/Service Lifecycle Analysis
	Indicator 20 – Water
	Indicator 21 – Biodiversity and Ecosystem Services
	Indicator 22 – Effluents
	Indicator 23 – Energy
	Indicator 24 – Pollution and Air Emissions
	Indicator 25 – Climate Change and Greenhouse Gas Management
	Indicator 26 – Materials
Social Dimension	Indicator 27 – Solid Waste and Post-Consumption
	Indicator 28 – Circular Economy
Social Dimension	Indicator 45 – Local Development
Value Chain Dimension	Indicator 55 – Traceability and Origin of Raw Materials
	Indicator 60 – Knowledge and Management of the Potential Impacts of Products and Services
	Indicator 61 – Post-Consumption Products and Services

Source: Prepared by the authors.

Figure 11 below presents a radar chart⁴ illustrating the average performance of the group of participating companies in each of the 20 cross-cutting indicators for the

Circular Economy. For each indicator, performance closer to the center of the chart indicates lower results, while performance closer to the edges shows higher results.

Figure 11 – Overall performance of the group of companies in the cross-cutting indicators for the Circular Economy.



Source: Prepared by the authors.

4 About this type of chart and how to interpret it: The radar chart, or spider web, provides a quantitative comparison of multiple variables—in this case, the performance of the group of companies in each indicator. The center of the chart represents the zero point for each axis, with the outer edges showing the maximum value. A line connects the group's results, forming a polygon; the larger the area of this polygon, the greater the performance. The concentric lines represent grid lines and serve as references for each 10 percentage points (10%, 20%, 30%, 40%, 50%, and 60%).

When analyzing the overall average performance of the group of respondent companies on these cross-cutting indicators – understood as being related, albeit indirectly, to the Circular Economy – only four indicators exceed 50% (Figure 11). These are: Indicator 16 - *Adoption of Environmental Mitigation and Compensation Measures*, with 54%; Indicator 13 - *Product and Market Innovation*, with 57%; Indicator 45 - *Local Development*, with 57%; and Indicator 60 - *Knowledge and Management of the Potential Impacts of Products and Services*, with 58%. On the other hand, the indicators with the lowest results, scoring below

20% in the group’s overall averages, were as follows: Indicator 21 - *Biodiversity and Ecosystem Services*, with 27%; Indicator 55 - *Traceability and Origin of Raw Materials*, with 25%; Indicator 26 - *Materials*, with 22%; Indicator 22 - *Effluents*, with 17%. These results may suggest opportunities for improvement along both the energy and telecommunications value chains.

To gain further insight, the same radar chart from Figure 11 was disaggregated to compare the performance of the anchor companies with that of the MSMEs in their value chains, in aggregate (Table 2).

Table 2 – Performance results for the 20 cross-cutting indicators for the Circular Economy agenda, disaggregated by size (anchor companies x MSMEs from both value chains).

CROSS-CUTTING INDICATORS FOR THE CIRCULAR ECONOMY	Average	Anchors	MSMEs
Indicator 1 – Fundamental Commitments	50%	94%	33%
Indicator 7 – Sustainability Report	31%	93%	6%
Indicator 12 – Products and Services	38%	44%	35%
Indicator 13 – Product and Market Innovation	57%	71%	51%
Indicator 16 – Adoption of Environmental Mitigation and Compensation Measures	54%	86%	41%
Indicator 17 – Environmental Responsibility	48%	89%	32%
Indicator 18 – Product/Service Lifecycle Analysis	39%	63%	30%
Indicator 20 – Water	34%	60%	23%
Indicator 21 – Biodiversity and Ecosystem Services	27%	46%	19%
Indicator 22 – Effluents	17%	25%	14%

continue

conclusion

CROSS-CUTTING INDICATORS FOR THE CIRCULAR ECONOMY	Average	Anchors	MSMEs
Indicator 23 – Energy	48%	72%	38%
Indicator 24 – Pollution and Air Emissions	43%	71%	32%
Indicator 25 – Climate Change and Greenhouse Gas Management	36%	88%	16%
Indicator 26 – Materials	22%	11%	26%
Indicator 27 – Solid Waste and Post-Consumption	41%	69%	29%
Indicator 28 – Circular Economy	32%	54%	24%
Indicator 45 – Local Development	57%	58%	56%
Indicator 55 – Traceability and Origin of Raw Materials	25%	10%	31%
Indicator 60 – Knowledge and Management of the Potential Impacts of Products and Services	58%	80%	50%
Indicator 61 – Post-Consumption Products and Services	42%	75%	29%

■ Performance below 30%

Source: Prepared by the authors.

Table 2 shows the performance differences between MSMEs as a whole, from both value chains, compared to the two anchor companies combined. The anchor companies performed well in most indicators, with half scoring above 70%. In contrast, the MSMEs in both value chains only scored above 50% in two indicators: Indicator 13 - *Product and Market Innovation* (51%) and Indicator 45 - *Local Development* (56%). It is worth noting that these two indicators also scored above 50% for the anchor companies. These results suggest that **companies in both groups are agile in working on innovation projects, exploring sustainability trends in the de-**

velopment of new markets and products that contribute to the more efficient use of natural resources. Another key point is the **recognition by these organizations of the importance of promoting local development, particularly by prioritizing the hiring of local workers and suppliers.**

A circular approach to local development could also involve partnerships with local waste pickers, cooperatives, or recycling companies to encourage waste recovery.

The results for the cross-cutting indicators for the Circular Economy (Table 2) suggest that **MSMEs face significant challenges in adopting Circular Economy practices,**

while anchor companies perform relatively better. However, there are still opportunities for both groups to improve practices related to traceability and the circularity of materials. The themes with the lowest scores among anchor companies, with performances below 20%, were: Indicator 55 - *Traceability and Origin of Raw Materials* (10%) and Indicator 26 - *Materials* (11%). This reflects opportunities for improvement in the traceability of inputs and raw materials used throughout the supply chains, and suggests a need for enhanced information management on the topic and stronger partnerships with suppliers to address it. Additionally, these results highlight the potential for implementing programs aimed at material use efficiency, particularly in the use and planning of renewable materials and secondary raw materials, as well as mapping the use of and dependency on scarce materials..

For the MSMEs in both value chains, four indicators scored below 20% in the selection of cross-cutting indicators: These are: Indicator 21 - *Biodiversity and Ecosystem Services*, with 19%; Indicator 25 - *Climate Change and Greenhouse Gas Management*, with 16%; Indicator 22 - *Effluents*, with 14%; Indicator 7 - *Sustainability Report*, with 6%, the lowest score among the MSMEs (Table 2).

A closer look at the questions within these four indicators reveals several findings. For instance, most MSMEs lack biodiversity protection and conservation practices, and most of them do not assess the negative impacts of their activities, operations, and products on biodiversity and the habitats they affect, such as forests, aquatic, and marine ecosystems (Indicator 21). As mentioned in Figure 4 (Chapter 1), the regeneration of nature is one of the six principles of the Circular Economy. Therefore, actions that contribute to conserving and maintaining biodiversity are important for advancing this agenda within companies.

Another key point is that most MSMEs are unaware of the impacts their businesses have on climate change, as well as the effects climate change might have on their operations, sectors, or regions (Indicator 25). This suggests a possible lack of resilience and preparedness, as preventive measures and risk mitigation strategies have not been adopted.

In terms of sustainability reporting (Indicator 7), most MSMEs do not publicly disclose or produce structured reports on their economic, social, and environmental performance. This is likely to be the case because sustainability reporting is not yet

a mandatory practice for smaller companies, unlike for large, multinational corporations or publicly traded companies, which face greater demands from investors and socio-environmental risk assessments in the financial sector. For comparison, anchor companies performed above 90% on Indicator 7, as they are publicly traded multinationals with highly regulated activities. These companies must meet the expectations and pressures of both shareholders and governments. However, it is worth noting that a **sustainability report can be a valuable communication and governance tool, even for smaller companies, as it helps build trust around sustainability and the Circular Economy agenda. Additionally, reporting can enhance value capture and, in some cases, facilitate access to financing**, which can be particularly beneficial for MSMEs..

Regarding Indicator 22 - *Effluents*, which showed low performance in both anchor companies and MSMEs, one possible explanation is that liquid effluent generation is not a significant issue for most of the respondent companies, and thus it may not be considered a material aspect of their environmental management.

The results presented by the Sustainability Diagnosis reinforce the understanding

that **MSMEs face significant challenges in adopting Circular Economy practices, while anchor companies demonstrate more advanced performance on the agenda, having made commitments, implemented actions, and structured programs**. The differences in performance between anchor companies and MSMEs can be attributed to the varying sizes of these organizations. Large and multinational companies typically have greater access to certifications and face more external pressure to comply with environmental, social, and sustainability regulations from financiers and shareholders. Additionally, large companies are often better equipped to internally structure sustainability programs because they have dedicated departments with professionals focused on the topic, as well as allocated budgets for these initiatives.

The disparity in performance between anchors and MSMEs in the cross-cutting indicators for the Circular Economy suggests that **anchor companies have either been unable or have not yet succeeded in creating a cascade effect, whereby their high performance in circularity influences the practices of the companies in their supply chains**. This aligns with findings from a 2022 World Economic Forum study, which highlights the lack of collaboration

between anchor companies and their supply chains as one of the reasons for inefficiencies in circularity initiatives (WORLD ECONOMIC FORUM, 2022).

In summary, the data in this section provides an overview of the performance of the companies participating in the Project with regard to the Circular Economy agenda. Despite growing recognition of the issue, significant challenges remain. The predominance of companies identifying themselves at incipient and intermediate levels suggests that while circularity is beginning to be integrated into business practices, its effective and structured implementation is still limited, as demonstrated by the performance of MSMEs

in the cross-cutting indicators. Anchor companies, while performing at a more advanced level, still face challenges in promoting circular practices throughout their supply chains. They should leverage their influence over the companies within their chains to further develop Circular Economy practices in the sectors in which they operate. It is clear from the discussion throughout this chapter that **collaboration and information sharing between companies are crucial for encouraging the adoption of circularity and advancing the Circular Economy agenda. Additionally, regulation can play an important role in structuring and formalizing sustainable practices.**



CIRCULAR ECONOMY EXPERIENCES IN BRAZIL: COMMUNITY OF PRACTICE AND INSPIRING CASES

As outlined in the introduction of this publication, the Project was structured around four lines of activity, some of which are reflected in the chapters of this document.

Chapter 2 presented the consolidated results of the Sustainability Diagnosis developed in Line of Activity 1 of the Project, while Chapter 3 brings together insights and lessons learned from Lines of Activity 2 and 3. These lines focused on circularity-oriented solutions, as well as the barriers and opportunities for advancing the Circular Economy agenda. Section 3.1 presents the process of mapping and selecting case studies of Circular Economy solutions, which were gathered as part of Line of Activity 2. Section 3.2 discusses these circular solutions, drawing on the knowledge exchanged during the Commu-

nity of Practice meetings: Circular Economy in Brazil, promoted in Line of Activity 3.

As mentioned, the Community of Practice: Circular Economy in Brazil is a multi-stakeholder network formed under the Project to promote the sharing of common challenges, practices, and knowledge regarding the Circular Economy, specifically from the perspective of value chains in Brazil. The network includes MSME organizations from the Circular Economy and corporate sustainability ecosystems, such as the Project's anchor companies, MSMEs from their supply chains, and other companies from various sectors. It also includes governments, MSME support agencies (such as Sebrae), financial institutions, academia, and sector associations, among others. Between October 2023 and October 2024, the Community

of Practice meetings were held online, with invited experts. These meetings focused on discussing key issues for advancing the Circular Economy agenda and were organized

around the following themes: innovation and governance for the Circular Economy, the regulatory environment, and financing, as shown in Panel 3.

Panel 3 – Community of practice: Circular Economy in Brazil.

Date of meeting	Topic	Guest expert	Institution
18/OCT/2023	Innovation and governance	Beatriz Luz	Founder of Exchange 4 Change Brasil (E4CB) and Specialist in Circular Economy
13/DEC/2023	Regulatory environment	Tasso Cipriano	Attorney at Cipriano & Castilho Law Firm, and Professor at the Centro Universitário Fundação Santo André
		Carolina Zoccoli	Sustainability Specialist at the Federation of Industries of the State of Rio de Janeiro (FIRJAN)
24/APR/2024	Financing the Circular Economy for MSMEs #1	Márcio Henriques	Market Intelligence Manager at the Basic and Extractive Industries Department of the Brazilian Development Bank (BNDES)
22/AUG/2024	Financing the Circular Economy for MSMEs #2	Lorena Benitez	Investment Department of the International Finance Corporation (IFC)
		Gabriela Weber	Sustainability Specialist at Natura

Source: Prepared by the authors.

The lessons learned during these meetings are presented in Section 3.2 and are discussed alongside the challenges and solutions identified from the Circular Economy case studies analyzed.

Drawing from these experiences and their insights, which combine knowledge

and practical applications, the aim is to provide recommendations for integrating circular processes into production and value chains, with a view to expanding, improving, and developing the Circular Economy in Brazil.

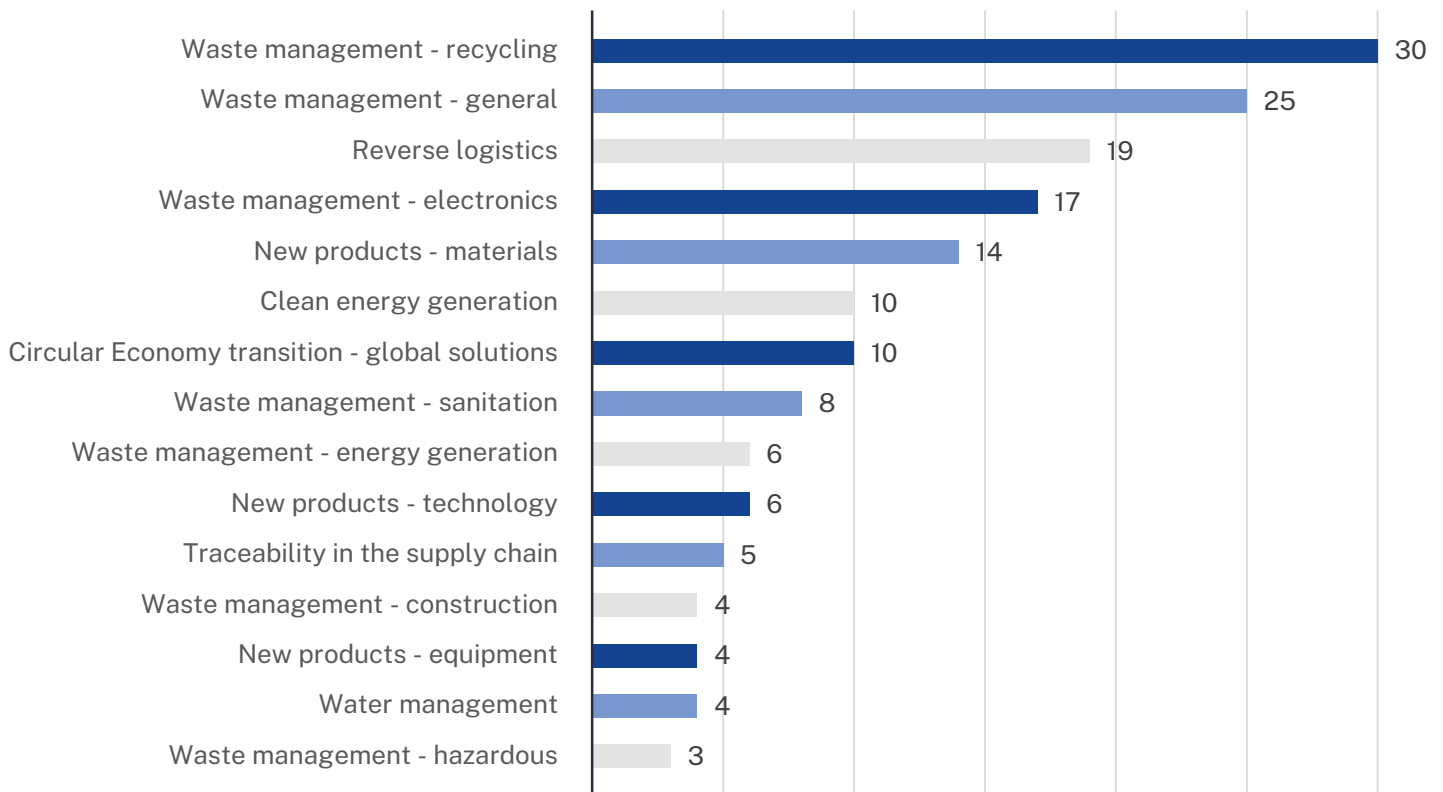
3.1 MAPPING, IDENTIFYING, AND ANALYZING INNOVATIVE CIRCULAR SOLUTIONS

To identify challenges, opportunities, barriers, and facilitators for promoting the Circular Economy in Brazil within the scope of Line of Activity 2, the Project conducted an active search for innovative Circular Economy solutions developed or led by Brazilian MSMEs, and that could be, even indirectly, applicable to the energy and telecommunications sectors targeted by the Project. The search occurred

in three stages. First, innovative solutions were mapped through an active search on the internet and referrals from partner institutions. Next, a survey was shared with mapped organizations to gain a deeper understanding of the innovations. Finally, interviews were conducted with the organizations that responded.

In the first stage, the mapping process identified 78 potential circular solutions developed by various companies, spanning different areas of activity, as illustrated in Figure 12 below.

Figure 12 – Entities mapped by sectors of activity.



Source: Prepared by the authors.

After mapping the cases, the companies representing them were contacted and invited to complete the aforementioned survey. The purpose of the survey was to gather more details to better understand the solution offered, allowing for the qualification and categorization of

solutions based on their circularity elements and applicability to the energy and/or telecommunications sectors. A filtering process was applied, and by the end, eight fully completed surveys were received, as shown in Panel 4.

Panel 4 – Companies selected and invited for interview.

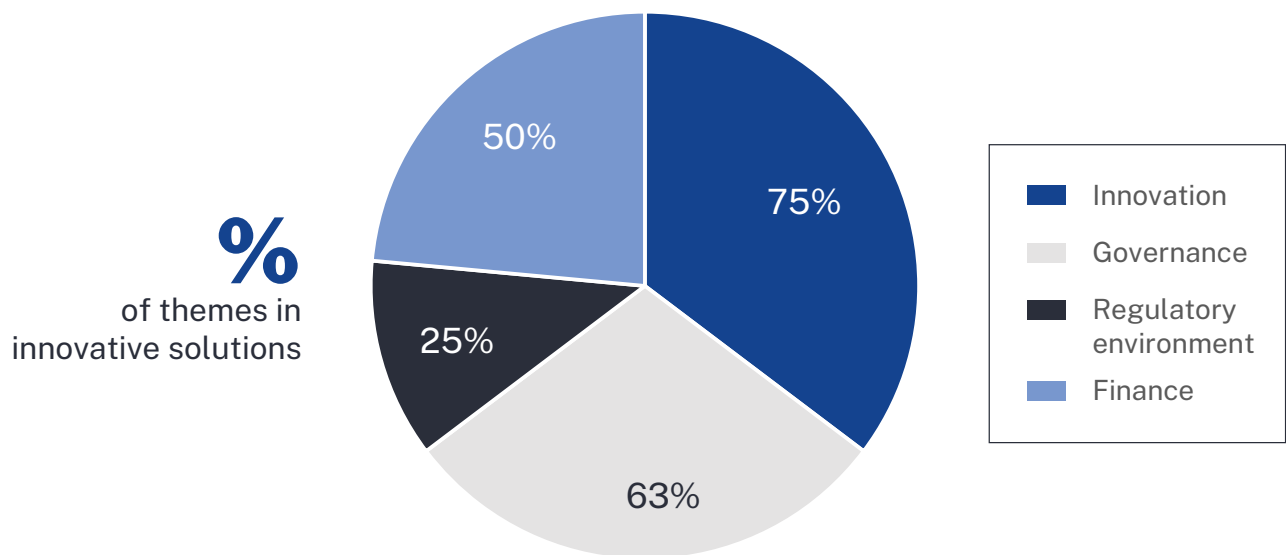
CASE/INITIATIVE	COMPANY	COMPANY SIZE	COMMUNITY OF PRACTICE TOPIC(S) IDENTIFIED IN THE CASE ANALYSIS
Ecopostes	Electra Pré-moldados Ltda.	Medium company	Innovation
ESG and Circular Economy business model: Recycle your decisions, Redefine your actions	ReUrbi Socioambiental Ltda	Medium company	Innovation; Governance; Regulatory environment; Financing
Composteira HumiBox	Morada da Floresta	Small company	Innovation
Recycling and Second Life of Photovoltaic Panels	SunR - Photovoltaic recycling	Small company	Innovation
Recycling of High Temperature Vulcanized Silicone Rubber (HTV)	Isoelectric Brasil	Medium company	Innovation
“ByePlastic” product lines	Indústria e Prestadora de Serviços Ratoroi Ltda	Small company	Innovation; Governance; Regulatory environment; Financing
Cassava Starch Bio-Packaging	Já Fui Mandioca	Small company	Innovation
ColOff® Green + Recycled Plastic, and ColOff® Fushable	ColOff® Industrial Ltda. - EPP	Small company	Innovation; Regulatory environment

Source: Prepared by the authors.

Although a small number of the respondent companies belong to the energy and/or telecommunications sector⁵, most of the identified cases (except for one) can be considered applicable to these sectors. Furthermore, since all the cases address

at least one of the themes discussed in the Community of Practice (Figure 13), the eight companies listed above were interviewed to gain a deeper understanding of their circular initiatives.

Figure 13 – Community of Practice topics identified in the innovative Circular Economy solutions analyzed in the project.



Source: Prepared by the authors.

Based on the results of the surveys and interviews, Section 3.2 explores the Circular Economy solutions developed by the Brazilian MSMEs that participated in the process described in this section. The lessons learned from this process

can serve as a reference for other organizations facing similar challenges, even in different sectors, and can inspire improvements in the energy and telecommunications value chains targeted by the project.

⁵ The case of ColOff, which consists of a device that allows the patient to take biological samples (stool or urine) while sitting on the toilet in a physiological position, is not considered to be applicable to the energy and telecommunications sectors. Two versions of the ColOff® device have been developed: one made with green plastic produced from sugarcane and recycled plastic, and another made from biodegradable paper, intended for use in the European Community, which is moving to ban single-use plastics.

3.2 CHALLENGES AND OPPORTUNITIES FOR THE CIRCULAR ECONOMY: LESSONS FROM THE PROJECT'S REFERENCES CASES AND COMMUNITY OF PRACTICE

As discussed, the Circular Economy, as an alternative to the linear economy, is a relatively new concept in the modern economy. In transitioning from one model to the other, companies encounter various barriers. These obstacles include redesigning products and services, reconsidering the origin of raw materials, adjusting production volumes, improving product durability, and enhancing process efficiency. Several factors are believed to contribute to overcoming these challenges, such as fostering innovation, improving access to finance, strengthening circular governance, and enhancing laws and regulatory frameworks.

Considering the challenges faced by MSMEs in advancing the Circular Economy in Brazil — some of which were highlighted by the indicators related to circularity in Chapter 2 — this section aims to integrate those challenges with the innovative solutions developed by the MSMEs identified in the Project's search for reference cases. In parallel, this section will also compare these challenges and solutions to the themes and insights developed during the Community of Practice: Circular Economy in Bra-

zil meetings. The aim is to identify ways to overcome obstacles so that innovative solutions no longer remain as isolated cases, but instead scale up through greater incentives for promoting and developing the Circular Economy in Brazil's value chains.

As seen in the previous chapter, among the four indicators from the Sustainability Diagnosis where anchor companies and MSMEs performed the lowest are: *Materials* (Indicator 26) and *Traceability and Origin of Raw Materials* (Indicator 55). Despite the challenges companies must overcome to improve their performance in these areas, there are already solutions that offer pathways for progress. Some of these initiatives, which have been mapped as reference cases, will be presented below.

In the *Materials* (Indicator 26) category, the case of Electra Pré-moldados and its solution for recycling electricity poles, known as **ECOPOSTES**, stands out. This initiative emerged in response to the improper disposal of electricity poles, which led to environmental and social liabilities due to violations of environmental legislation and dangerous handling by people near landfills. Individuals would use sledgehammers to break the poles apart and retrieve hardware for resale, generating safety and environmental concerns.



In response to these challenges, the **ECO-POSTES** initiative offers a solution by centralizing the collection of disused poles and disaggregating the raw materials used in their production. This process allows for the reuse of these materials in other products, including the creation of new poles made from recycled materials. To achieve this, machinery was developed to dismantle the poles without compromising the integrity of the raw materials (such as sand, cement, gravel, and steel). After two years of research and development, the initiative began producing poles made entirely from recycled materials obtained from disused poles.



Further details on page 70

The innovation behind **ECOPOSTES** made it an inspiring case, which was selected for presentation at the first meeting of the Project's Community of Practice, which focused on *Innovation and Governance*. During the meeting, the entire process of designing, developing, and implementing the initiative

was discussed, including the technological, financial, and regulatory challenges associated with the new product.

As discussed during the meeting, particularly in the presentation by guest expert Beatriz Luz on the topic of Innovation and Governance, while technology is essential for the development of circular solutions, it cannot, on its own, drive the structural transformations required for the transition to a Circular Economy. The integration of supply chains, along with economic, social, and environmental contexts, is crucial for fostering these changes.

For inspiring cases of reverse logistics to move beyond isolated solutions and scale up into full-fledged reverse chains for new raw materials, a broader, systemic view of the material lifecycle is needed.

This means considering the use, post-use, and end-of-life phases of products to ensure that solutions deemed sustainable in some contexts do not generate future problems, as may be the case with solar energy panels.

According to data presented at the first meeting of the Community of Practice, photovoltaic solar energy currently accounts for 14.8% of all electricity generation in the country, with record growth in 2023, up from just 1.9% in 2021. However, with an average lifespan of around 30 years, solar

panels are currently designed for performance, reliability, and cost reduction – but not for recycling. If technological solutions are not developed for the post-use phase of these materials, they will soon become a significant environmental liability.

In response to this challenge, SunR - Photovoltaic Recycling created the solution **RECYCLING AND SECOND LIFE OF PHOTOVOLTAIC PANELS**. This initiative, based on the free collection of discarded panels, works through partnerships with energy sector companies and educational and research institutions. It has developed mobile equipment for the mechanical separation of raw materials from photovoltaic panels for recycling. Additionally, by collaborating with civil society organizations already engaged in social sustainability, the initiative has built partnerships at every stage to ensure its effectiveness. This approach demonstrates how governance can be successfully combined with innovation.

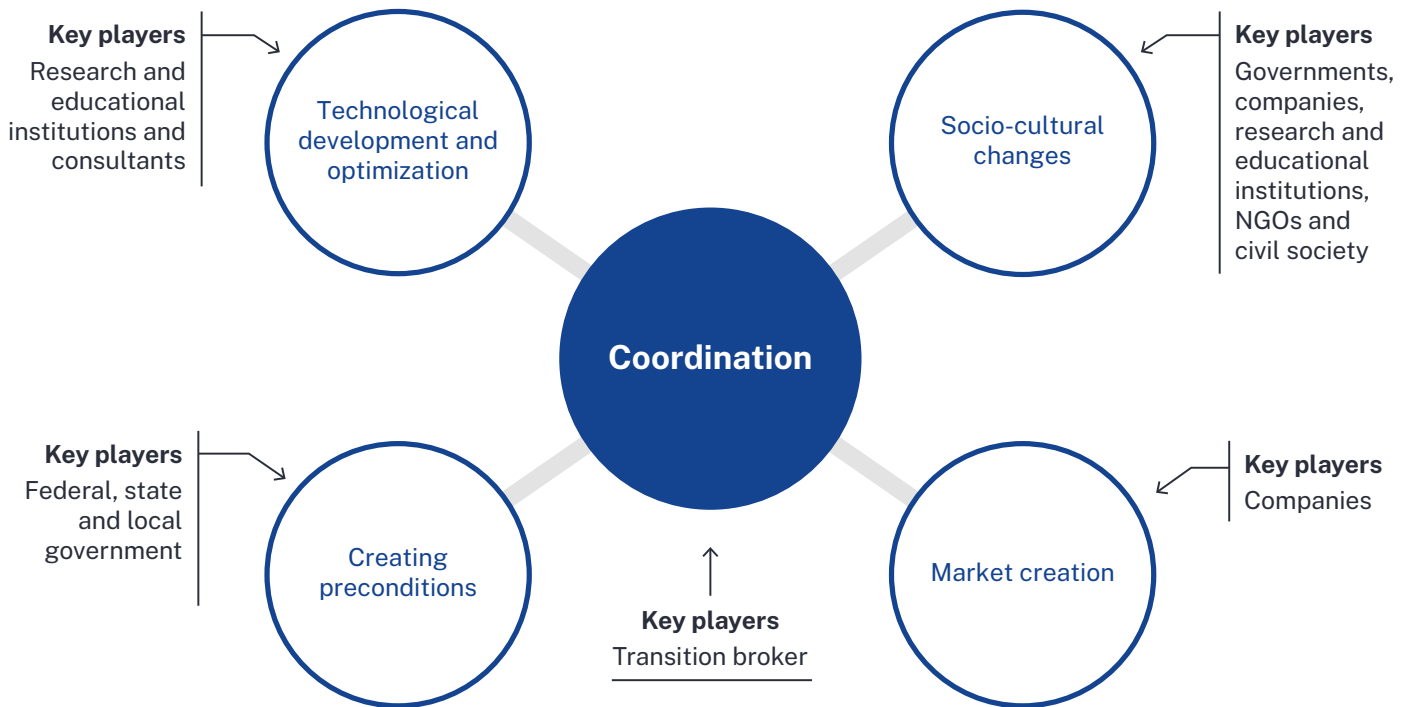


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For innovation and technology to evolve from one-off solutions to instruments for creating circular business models, they must be integrated into a new governance model, as established by *circular governance*. Such model requires complementary roles and knowledge, the integration of various stakeholders, and the development of multi-sector partnerships. It involves creating collaborative networks and building trust through the redistribution of roles and responsibilities, as illustrated in Figure 14 below.

As shown in Figure 14, the development of circular governance involves the participation of different categories of stakeholders. The public sector is responsible for driving change, leveraging commitments, developing public policies, and formulating guidelines and regulatory frameworks that reflect the self-regulation among the various stakeholders. Companies and the private sector will play a key role in creating markets, developing new commercial relationships, and integrating different actors of the supply chain, involving businesses of various sizes and nationalities. Education and research institutions, in turn, will contribute to technological development and innovative solutions. Civil society, alongside these actors, will drive cultural and market shifts, influencing consumer demands to ensure

Figure 14 – Circular Governance Model.



Source: CRAMER, 2020.

that the Circular Economy becomes a new paradigm for development.

Among the multi-sector networks working to make the Circular Economy viable, the Circular Economy Hub Brazil, an initiative by Exchange 4 Change Brasil ("E4CB") – an institutional supporter of the Project's Community of Practice – stands out. Such Hub aims to accelerate the transition to circularity in Brazil by bringing together representatives from industry, government, and academia to discuss strategies and roadmaps for advancing the Circular Economy agenda in practice.

Building this **complex and complementary network of cooperation** – what we call **circular governance**, from which a new **collective consciousness can emerge** – **requires embracing a circular mindset**. **This mindset calls for integrated solutions, given that many challenges are shared across sectors.**

It was this understanding that led to the solution developed by ReUrbi Socioambiental, which launched the **ESG AND CIRCULAR ECONOMY BUSINESS MODEL INITIATIVE: RECYCLE YOUR DECISIONS, REDEFINE YOUR ACTIONS**. This

initiative was also studied in Line of Activity 2 of the Project and invited to present its journey at the second meeting of the Community of Practice. The initiative, which involves building a reverse logistics model for reconditioning certified used computers, was developed to address the growing issue of electronic and electrical waste disposal, a problem that affects nearly every economic sector, including energy and telecommunications.

ReUrbi Socioambiental's reverse logistics solution for IT and telecom electronics is built on a governance structure that integrates various actors in the supply chain, ensuring both traceability and product assistance. Each batch of electronics undergoes identification, evaluation, de-characterization, and reconditioning, allowing for traceability of certified electronics from their origin to final destination. The reconditioned equipment can be donated to social projects, and partner companies that donate their disused electronics also participate in identifying the projects that will be benefited. This approach fosters close and collaborative partnerships throughout the supply chain. Additionally, in terms of regulation, ReUrbi Socioambiental ensures that the entire reconditioning process complies with the country's normative and regulatory frameworks related to the re-

manufacturing of electronic equipment. This results in the production of certified computers at low cost, with guaranteed quality and technical assistance.



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Electronic equipment such as those are remanufactured, reprocessed and reconditioned by ReUrbi Sociambiental is governed by technical standards that ensure product quality and legitimize the very existence of the company's business model. However, **many Circular Economy initiatives, such as the reference solutions described in this document, still lack specific regulations tailored to their reality. This means that innovation in circular initiatives encounters barriers in the regulatory environment itself.**

During the second meeting of the Community of Practice, dedicated to the theme of the regulatory environment in the Circular Economy, sustainability expert Carolina Zoccoli (FIRJAN) mentioned in her speech the obstacles posed by consumer legis-

lation itself when it comes to reinserting lower value-added products, such as electrical and electronic goods, into the market. By undergoing unofficial maintenance, this equipment loses its warranty, even if the original characteristics of the equipment have been preserved. This situation, in addition to compromising the product's useful life and its permanence in the hands of the consumer, also contributes to the increase in the disposal of electrical and electronic equipment in the country.

What's more, **while in this case the challenge is posed by legislation that conflicts with the principles of the Circular Economy, it is also compounded by the lack of specific regulatory standards**, as highlighted by professor and environmental lawyer Tasso Cipriano in his presentation at the same meeting. At the time, he noted that, from a legal perspective, the Circular Economy regulatory tripod is divided into: *product regulation; chemical substance regulation; and waste regulation*. He also pointed out that interesting progress has been made in the regulation of waste, but this is not the case for the regulation of products and/or chemical substances, for which there is still a certain regulatory vacuum.

It is precisely this lack of regulation on chemical substances that poses barriers

to the recycling of **HIGH TEMPERATURE VULCANIZED SILICONE RUBBER ("HTV")**, a solution found and developed by the company Isoelectric Brasil, which promotes the reverse logistics of polymeric insulators that make up the structure of electric poles. Due to its chemical and structural composition (silicon, oxygen, and sulfur), the disposal or reuse of the material is not supported by regulatory standards. This makes reverse logistics a major challenge for all the companies and sectors that deal with the material, which has to be disposed of in landfills, representing an environmental liability. Faced with the challenge involved in its disposal, and in the quest to reduce this liability, Isoelectric Brasil began its journey in search of scientific and empirical knowledge that would make it possible to break down the raw materials used in polymeric insulators. The solution was identified in cryogenics, which makes it possible to freeze and grind silicone rubber into granulometries that can be reused.



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As discussed at the Community of Practice meetings, **the lack of a regulatory environment that supports innovative solutions for circularity implies numerous challenges for the companies that develop them.** In the absence of regulatory technical standards, companies are unable to demonstrate that their new solutions meet official and regulated safety and quality standards, whether these relate to products, equipment, or processes. This makes it difficult, if not impossible, for these innovations to enter national and international markets..

Among other cases mapped and identified by the project, this is the situation faced by the **CASSAVA STARCH BIO-PACKAGING** produced by the company *Já Fui Mandioca*, which developed biodegradable packaging based on cassava starch to replace single-use plastic packaging. In this case, the lack of regulations relating to the concept of a biodegradable product made it difficult for bio-packaging to enter the market. The same happened with regulations relating to more complex processes, such as research procedures for thermo-plastic products. **To overcome this type of obstacle and encourage the development of new technical standards, it is essential that partnerships are established with research institutions and that governance**

is structured for equipment and product testing protocols.



However, *Cassava Starch Bio-Packaging* is not the only type of packaging facing challenges related to regulatory frameworks. As Carolina Zoccoli highlighted during the second meeting of the Community of Practice, there are also regulatory barriers for packaging made from recycled or reused raw materials, especially those sourced from post-consumer waste, particularly for food and beverage packaging.

In general, as Tasso Cipriano pointed out, Brazilian regulations related to the Circular Economy remain broad, consisting mostly of general concepts and principles that do not translate into concrete obligations. In this scenario, **it is recommended that, alongside legislation aimed at promoting the Circular Economy, technical standards be formulated for specific sectors and products.** These standards would address the practical issues highlighted by the Circular Economy reference cases discussed in this publication.

In addition, **the importance of self-regulation fostered through dialogue between the state, society, and the business sector must be emphasized. This collaborative approach would ensure that the national regulatory framework for the Circular Economy effectively responds to the demands and needs of various sectors, helping to foster and develop the Circular Economy within complex value chains that include companies of all sizes.**

In this context, promoting the Circular Economy throughout supply chains requires addressing the difficulties faced by MSMEs in obtaining funding for their innovative and technological solutions aimed at circularity.

According to the companies interviewed by the Project during the case selection phase, seven of the eight companies financed their innovative solutions using mostly personal resources from partners, owners, or people close to them. One of the initiatives was able to obtain external funding, although this was exclusively for the purchase of machinery, and not for the development, testing or implementation of new products.

One of the reasons companies struggle to access financing is that financial institutions often require an entrepreneur's own financial contribution as a precondition for

obtaining a loan. However, because most of these initiatives have been developed with the personal resources of partners and owners, companies face difficulties in meeting the required capital contribution. As one initiative explained, recounting the challenges of financing their venture, **“the counterparts to the financing were totally unrealistic for a company of our size and stage.”**

Among many stories of financial challenges in developing circular solutions, the case of the **HUMIBOX COMPOST BIN** stands out. This composting system, designed for large quantities of organic waste, includes an automatic liquid fertilizer feedback process that accelerates and improves the quality of composting. It also complies with environmental regulations, which prohibit the disposal of untreated liquid into the soil. With the aim of avoiding sending organic matter to landfills or constructing large treatment plants, the HumiBox was built in a simple, modular fashion to facilitate both indoor and outdoor installation. It has already been implemented by several large companies.



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Implemented by a small company, the venture has faced various financial challenges, some common to other initiatives, and has been severely impacted by the Covid-19 pandemic. In addition to external and uncontrollable factors like the pandemic, market conditions and difficulties in accessing financing must also be considered when managing small and medium-sized enterprises. **Due to the high collateral and conditions required, credit lines often hinder rather than support the financial sustainability of MSMEs.** As highlighted by one of the companies that presented their journey in the Community of Practice meetings, public notices and funding agencies must make deadlines, requirements, and preconditions more flexible to create more feasible opportunities for MSMEs to access investments.

In addition to creating easier financing alternatives for these companies, **it is crucial for large companies, which anchor small and medium-sized enterprises in their supply chains, to take a leading role in the redistribution of financing and expanding its availability.**

In this context, it is worth mentioning the example of the "angel financier" obtained by **HUMIBOX**. As a large company, the "angel financier" was able to obtain resources di-



DID YOU KNOW

The International Finance Corporation ("IFC") offers a wide range of financial products to help improve the environmental, social, and governance performance of companies and value chains. Among these products are the *Sustainability-Linked Loans/Bonds*, a general-purpose loan tied to the achievement of Key Performance Indicators ("KPIs") related to sustainability. IFC offers this loan to large companies or local banks, which can then use credit lines to finance their smaller partners along the value chain.

BNDES offers a credit line specifically for supply chains.

This resource is intended to offer working capital to MSMEs linked to large or anchor companies (upstream and downstream). The anchor company secures the funding and passes it on to its smaller partners. This financing can be directed towards the Circular Economy, offering a valuable way to promote sustainability within the supply chains of large companies.

rectly from the financing agency and then pass them on to **HUMIBOX** under the same conditions offered to it, exempting the small company from the collateral or counterpart it would have otherwise needed to provide.

As discussed in the Community of Practice, **developing the Circular Economy within complex value chains requires large companies, financial institutions, and government bodies to create mechanisms that provide both financial and intellectual capital support to small and medium-sized enterprises.** These institutions can play a crucial role in promoting the Circular Economy. In this regard, it is important to consider the significance of circular governance, which includes public policies, incentives, and financial regulations that encourage the private sector, including companies and commercial banks, to direct investments and financial support toward developing circular businesses.

One such mechanism worth highlighting is blended finance, which can help support circular business models. As mentioned during the third and fourth meetings of the Community of Practice, this model involves combining reimbursable and/or non-reimbursable investments from public, private, and/or philanthropic sources to finance solutions with an environmental or social

impact. By minimizing and sharing risks, this model creates a greater incentive for the private sector to invest in innovative initiatives. As Beatriz Luz highlighted at the third meeting of the Community of Practice, it is essential for commercial banks, development banks, corporate capital, *venture capital*, and other financial products and operations to collectively form a *circular financing ecosystem*. Such an ecosystem would foster initiatives that work together to advance the development of circular value chains.

DID YOU KNOW



The BNDES has the BNDES Blended Finance Fund, which provides non-reimbursable resources to leverage private capital for financing initiatives with significant socio-environmental impact, including Circular Economy projects.

Additionally, the bank also offers BNDESpar, a fund involving BNDES and other investors (seed capital and venture capital), aimed at supporting business models related to the Circular Economy, among others. The fund is managed by GEF LatAm Climate Solutions.

Furthermore, the recommended blended approach for funding Circular Economy initiatives should not only rely on the diverse origins of financial resources but also on the very nature of the projects being funded. Funding, often contingent on the success of the proposal, should focus not just on specific products but also on processes, such as research, studies, and experimentation. In this sense, it is crucial that funding supports not just isolated reverse logistics solutions, but also solutions that promote circularity across entire supply chains.

One of the key proposals from the Community of Practice is to **finance the collection and organization of information on supply chains, creating a database on product lifecycles. This would help integrate value chains, where the waste from one could be used as secondary raw materials for another.** As Beatriz Luz summarized at the third Meeting of the Community of Practice, technology,

is only one part of the equation. If technology is not developed with an integrated view of the supply chain, it can be a major challenge to move it from the pilot phase to practical application. Therefore, it is essential to ensure that the entire supply chain is connected, and the buyer market is prepared for these solutions.

DID YOU KNOW

BNDES, in partnership with Embrapii, offers BNDES Funtec, which invests non-reimbursable resources into research and development projects focused on reuse, repair, remanufacturing, or recycling.

When discussing the economic sustainability of MSMEs whose business models are based on Circular Economy principles, it is crucial to consider market demands and the commercial flow of the innovative solution. These factors are key in determining the product's ability to scale. As previously mentioned, it is essential that the development of a technological solution is integrated into the value chain from the outset, ensuring that the innovation anticipates its potential buyers.

One of the standout innovative cases, not only for the solution itself but also for the consumer market that supports its economic sustainability, is the **"BYEPLASTIC"** product line. "ByePlastic" has attracted buyers from around the world. Its products, which have high aesthetic and commercial value, are used in architectural projects. The line of products is produced in partnership with recycling cooperatives that sup-

ply discarded industrial materials, which are then repurposed as secondary raw materials in the manufacturing process.



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BYEPLASTIC's innovative solution, like others mentioned in this document, prompts a critical reflection on the residual value of materials, which must be quantified and considered in decisions related to financing the Circular Economy. In this assessment, it is also worth expanding the boundaries of analysis to take a compre-

hensive look at the two production models and development projects set against each other in the introduction to this section: the Circular Economy and the Linear Economy. To this end, it will be necessary to take into account the use and post-use phases of consumer goods in decision-making processes regarding resource allocation. This will make it possible to account for the negative externalities of the Linear Economy, in terms of waste disposal and pollution as factors that cause climate change. At the same time, it could enhance the Circular Economy by considering the retention of value through activities like repair, remanufacturing, recycling, and redistribution as key circular economic activities. Given this comparative analysis, there is a necessary shift in perspective: treating waste as a resource and viewing cost as an investment.





CASE STUDIES

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Innovation in the Production of ECOPOSTES

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Innovation and Governance for photovoltaic panels

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**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

Electra Pré-moldados:

**Innovation in the Production of
ECOPOSTES**



In Bahia alone, 30,000 power transmission and distribution crossarms and poles are discarded annually. When left unused, these materials become an environmental liability for electricity utilities. Additionally,

manually dismantling these structures can cause risks to human health. In light of this, in 2016, Neoenergia challenged its supplier, Electra Pré-Moldados, to find a solution for the proper disposal of poles and crossbars throughout the state of Bahia. Electra Pré-Moldados, a Bahian company that manufactures structures for electrical distribution, transmission, and lighting (such as crossarms and poles), responded to the challenge by developing specialized equipment for demolishing poles and creating a logistics process for receiving this material. Through the design of this logistics process for receiving discarded poles from Neoenergia, Electra Pré-Moldados developed equipment capable of breaking down the poles and recovering materials such as steel, sand, and gravel. These materials are then reused in other products. The solution was based on three key pillars: development of machinery and processes for grinding and demolishing damaged and/or aged poles; separation and proper treatment of the aggregate materials, including segregating the hardware from sand and gravel to preserve their characteristics for reuse in new products; development of the Ecoposte, a recycled pole made from materials (such as the frame and structure) recovered from unused poles.

The innovation was entirely self-funded by the company and was developed through tests and trials regulated by ABNT standards to ensure the quality and efficiency of the recycled products. To assess the durability and weather resistance of the Ecoposte in continuous sea and coastal conditions, the recycled poles are currently being tested along Salvador's waterfront, with positive results so far.

Thanks to the technology used, 100% of the aggregate material and 70% of the steel is being reused, while the remaining 30% of the steel is being either sold as scrap or sent to processing plants.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

SunR – Photovoltaic Recycling:

Innovation and Governance for photovoltaic panels



The market for photovoltaic products is growing rapidly as a more sustainable alternative for generating electricity. However, there are limited solutions for managing the end of life of this equipment, which can last up to 30 years or even less if prematurely disposed of due to damage. One of the main challenges in recycling photovoltaic panels is the complexity of collecting and transporting these materials. This is primarily due to two factors: the distance of large plants from collection centers and the delicacy of the material, which must be handled, packaged, and transported with care to avoid damage during trans-

portation and storage. As a result, there is a pressing need to develop technologies that address the demands of equipment disposal while minimizing the logistics costs for companies in the industry.

In this context, SunR developed its business model in 2020. The solution focuses on collecting, processing, and disposing of discarded photovoltaic panels for reuse or recycling. The first step involved developing and accessing studies on technologies and regulations for photovoltaic material disposal, achieved through partnerships with universities and companies in the sector, though funded by SunR's own investment.

To extend the useful life of photovoltaic panels, SunR currently promotes the recovery and reuse of materials. The company collects discarded panels — at no cost to the companies that use its services — and processes them by mechanically separating the materials that make up the equipment.

Focusing on economic sustainability, SunR adopted systems thinking methods to design cost-efficient logistics solutions, addressing the challenges of geographically dispersed collection and disposal demands. To this end, the company developed a nationwide logistics

network that reduces costs while ensuring quality and safety in the transportation of panels by utilizing return freight to bring discarded equipment back to its processing plant. Additionally, SunR developed container-based machinery to facilitate mobility and enable on-site processing of panels. This approach provides social, environmental, and economic benefits by creating local jobs in remote areas and keeping valuable materials within the region.

Initially, the separated materials were sent to specialized recycling plants to be reused as second-hand products. Later, SunR expanded its efforts to include the reuse of panels for social initiatives, working in partnership with civil society organizations and business institutes to ensure the safety and quality of the repurposed products. By offering second-hand photovoltaic modules, SunR has also contributed to the socio-economic development of communities and social groups.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

ReUrbi Socioambiental:

a business model based on innovation, governance, and the regulatory environment



With the exponential growth of the digital universe, more than 53 million tons of electronic waste are generated annually, with Brazil contributing with over 2 million tons. While there is an enormous amount of electronic waste that could have its useful life extended, there is also a significant digital exclusion, especially among public school students who lack access to a computer or tablet at home.

To address this issue, ReUrbi Sociambiental offers reverse logistics and manufacturing solutions for

disused IT and telecommunications electronic equipment, transforming them into refurbished equipment under its own Remakker® line. The company also promotes socio-digital inclusion by donating refurbished equipment to social projects supported by the ReUrbi Institute for Socio-digital Inclusion, targeting groups and individuals in situations of socio-economic and educational vulnerability. Through partnerships with other companies, electronic materials that would otherwise be discarded are collected, undergo reverse logistics and manufacturing processes, and are delivered to the social projects run by the Institute. This approach integrates environmental sustainability practices with social responsibility.

All disused equipment collected by the company is tracked, and Remakker® refurbished equipment undergoes a reverse logistics certification process that guarantees compliance with environmental regulations. Transparency is a key focus for ReUrbi Sociambiental, which provides customers and consumers with a report detailing the social impact of the purchased product. This includes information on the materials collected, the environmental and social benefits of the initiative, as well as data

on greenhouse gas emissions and toxic metal reductions.

In its 10 years of operation, ReUrbi Sociambiental has collected, inventoried, and certified more than 1,950 tons of IT and telecommunications equipment, preventing the emission of more than 3,000 tons of greenhouse gases and 22 tons of toxic metals into the atmosphere. The company has reconditioned over 25,000 computers and donated 2,500 Remakker® computers to 170 social projects, reaching 26,000 young people through Instituto ReUrbi initiatives. For its contributions, ReUrbi Sociambiental has been certified as a B Company since 2014, meeting high standards of social and environmental impact. It has been recognized for seven consecutive years as Best for the World, for best practices in Communities, Environment, Changemakers towards a new Economy, and Overall the highest mark for B Certification.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

Isoelectric Brasil:

Technology and Innovation in the Recycling of High Temperature Vulcanized Silicone Rubber (HTV)



Polymeric insulators are devices used in electricity distribution networks to support and separate electrical conductors without allowing current to pass through them. This equipment consists of fittings, fiberglass, and composite silicone, which replaced the ceramic and rubber materials commonly used 20 years ago. The recycling of this equipment is hindered by the presence of silicone compounds. As a result, the material must be sent to industrial landfills, creating environmental liabilities due to the lack of recycling technology for this type of material in Brazil. Given that polymeric insulators have a lifes-

pan of 15 years and are manufactured by thousands every month, the absence of proper disposal technology exacerbates this liability, affecting all parties involved with the material.

Stimulated by the debates and discussions related to the sustainability agenda promoted by the Project, Isoelectric Brasil decided to revisit its products to address reverse logistics issues, focusing on environmental management and the safe disposal of segregated materials. The company, which manufactures polymeric insulators and other products, had already implemented the 5 Rs of sustainability⁶ policy in its environmental management and identified silicone compounds as a challenge.

Thus, concerned about the disposal of compound silicone, the company began research aimed at developing technologies within the scope of an internal project called "Recycling High Temperature Vulcanized Silicone Rubber ("HTV")" to find ways of adapting to the reverse logistics of thermal insulators. The research consists of freezing and grinding silicone using cryogenics and reusing it in the company's electrical insulator

manufacturing process. The solution is currently at the stage of hypothesis testing for the ideal grain size and proportion of materials for co-processing. The financial scope of the research is being discussed internally, with different possibilities for funding, whether from the company's own resources, via partners, and/or through public notices. In this regard, the project has identified challenges, such as the high logistical cost of correctly disposing of the material; the restricted and regulated supply of nitrogen (one of the inputs in the process), in addition to its high acquisition cost; and the lack of specific regulations for vulcanized silicone rubber waste.

It is hoped that the development of electrical insulators using recycled materials will reduce the pressure on natural resources through the reuse of high-performance silicones and that the solution found will initiate the development of new products using recycled silicone.

6 Reduce, Reuse, Recycle, Rethink, and Refuse.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

Já fui Mandioca:

Cassava Starch Bio-Packaging



Single-use plastic packaging accounts for around half of all plastic production each year. Highly used, plastic packaging is everywhere, since the most simple goods come wrapped in plastic packaging that is usually instantly discarded after consumption.

How can a product used for less than 10 minutes remain as waste for more than 100 years? This question instigated the creation of *Já Fui Mandioca* in 2019. This concern over the lifecycle of single-use products, such as plastic packaging, inspired the development of biodegradable and compostable bio-packaging made from cassava starch. The goal was to replace plastic wrappings with an alternative based on the “from the earth to the earth” principle, much like the peel that wraps fruit and can serve as fertilizer, helping to initiate a new production cycle.

The idea, first conceived in 2002, was developed into products and prototypes over time, undergoing tests until 2008. Cassava starch bio-packaging can be used for hot, cold, and frozen foods due to its thermal properties, which are similar to styrofoam. These packages are designed to decompose within 90 days, and when decomposed, they become nutrient-rich fertilizer.

This 100% Brazilian solution is made from cassava, an abundant local raw material often grown by small producers and family farms. As a result, the proliferation of cassava starch bio-packaging can contribute not only to preventing the en-

vironmental degradation caused by traditional single-use plastic packaging but also to the socio-economic development of smallholder and family farms.

According to information provided by the company, the manufacturing process for cassava starch bio-packaging uses approximately 100 times less water than plastic and 480 times less water than paper. Additionally, it has a negative carbon footprint, as it removes carbon from the atmosphere. Moreover, *Já Fui Mandioca* bio-packaging offers benefits throughout its lifecycle. According to a calculator available at the company's website, replacing the monthly personal use of 100 plastic containers has the potential to save 0.43 thousand liters of water, prevent the generation of 0.024 kg of waste when composted, and removes CO₂ by planting 0.7 trees.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

Morada da Floresta:

Professional and on-site HumiBox Compost Bin for companies and organizations



In Brazil, around 50% of waste is organic and often ends up in landfills or dumps. When organic waste is sent to landfills, it gets mixed with other materials, creating various environmental liabilities.

Aiming to reduce waste disposal and encourage positive environmental impact, Morada da Floresta has been operating in São Paulo since 2009, offering var-

ious solutions to reduce waste, including the HumiBox local composting system.

The HumiBox is a professional thermophilic composting system designed for companies and large generators of organic waste, such as canteens, schools, condominiums, or hotels. The system is easy to install and operate, suitable for both indoor and outdoor use, and can be placed on any type of floor without requiring construction work. To develop the equipment, Morada da Floresta spent two years working on a solution to compost large volumes of organic waste without needing to drain the percolated liquid. The solution was an automatic liquid fertilizer feedback system, which works through a level sensor powered by a hydraulic pump connected to a photovoltaic panel. This system returns nutrients and bacteria to the compost, improving fertilizer quality, speeding up the composting process, and reducing the frequency of watering. The company also provides team training and employee awareness programs at the installation site, along with ongoing technical advisory visits, remote support, and impact reporting.

Since 2016, more than 500 new HumiBox systems have been installed across Brazil. The use of HumiBox not only prevents

the environmental liabilities mentioned earlier but also reduces greenhouse gas emissions. In 2019 alone, over 1,200 tons of CO₂ were avoided through the installed equipment. The nutrients from the compost produced can be used to fertilize gardens, flowerbeds, or even prepare soil for agriculture and reforestation.

**CASE STUDY:
INNOVATIVE
CIRCULAR
ECONOMY
SOLUTION**

Ratoroi:

**from discarded plastic to a
high-value product**



Ratoroi is a company founded with the mission of developing products that have a positive socio-environmental impact. For over ten years, the company has been using business to address social and environmental challenges by creating products and materials with high sustainability value, designed to be kept in use for longer periods. Ratoroi collaborates with its value chain, working with transparency and traceability through partnerships with cooperatives and recyclers. The company promotes the responsible recovery of materials, treating "waste" as a

valuable resource. As a result of these efforts, Ratoroi has been certified as a B Company. One of its most innovative projects is ByePlastic, a material developed in collaboration with recycling cooperatives and industry, aimed at revaluating waste in Brazil.

ByePlastic is a high-quality, value-added material made from post-industrial waste and post-consumer plastics discarded from urban solid waste. This versatile material can be used in a variety of applications, including architectural projects, visual merchandising, and public spaces. Designed with consideration of the principles of, ByePlastic is durable, reusable, 100% recycled and recyclable, economically viable, and has positive socio-environmental impacts. Additionally, a QR code and blockchain traceability system has been co-developed, offering transparency throughout the entire process. This system allows for the tracking of social and environmental impacts from the point of recovery to sale, providing evidence of the actors involved in the value chain and enabling consumers to return the material when the product is discarded.

By increasing the scale of production for product lines, it will be possible to

close plastic leakage paths, enhance recycling, improve sorting at the source, and reduce the demand for virgin plastic. This will promote circularity-based design, aimed at minimizing the need for virgin raw materials, extending the useful life of materials, and making recycling easier. Between January 2020 and November 2022, the production of ByePlastic has already led to the recycling of 2 tons of plastic, saving 8,800 kW of energy and 39 m³ of landfill space. By 2026, Ratoroi estimates that 255 tons of plastic, which would have otherwise been discarded, will be recycled – equivalent to more than 50,000 plastic packaging weighing up to 5g each – along with the saving of 6,375 m³ of landfill space.



4

CONCLUSION

The purpose of this publication was to examine the elements that can promote the Circular Economy within Brazilian value chains by identifying challenges, bottlenecks, opportunities, and facilitators across various sectors, with a particular focus on the energy and telecommunications industries.

This research is especially relevant in today's context, where growing environmental and social challenges threaten planetary boundaries and underscore the urgency of transitioning from the still-dominant linear economic model to a more circular one. The Circular Economy aims to maximize the use of resources already extracted from nature, thus reducing the pressure on finite resources through circular flows.

To lay the groundwork for this research, **CHAPTER 1** explored the principles of the Circular Economy, providing context on the importance of this model as an alternative to the prevailing linear system and highlighting the urgent need to rethink production and consumption. It also introduced global initiatives and networks that promote the Circular Economy in different regions, along with a brief overview of the regulatory framework in Brazil. Globally, the Circular Economy is gaining visibility and importance. Notable examples include the international collaboration that led to the creation of the ISO 59000 series of standards, which offer definitions, actions, and tools to support circular practices; the European Union's *Circular Economy*

Action Plan, launched in 2015 and updated in 2020; and the Netherlands, which has been a pioneer in developing initiatives and policies for 40 years aimed at fostering the Circular Economy. In Latin America, progress has also been made. The launch of the Circular Economy Coalition for Latin America and the Caribbean in 2021 marked a significant step towards creating a Latin American vision for transitioning to a more circular economic model. Chile’s Roadmap for a Circular Chile by 2040, introduced in 2021, is another important development. Like the Netherlands, Chile’s case highlights the strategic role of collaboration in successfully transitioning to circularity.

Turning to the national landscape, Brazil has been making significant strides towards adopting the Circular Economy. One of the most notable developments is the recent approval of the National Circular Economy Strategy (ENEC), which, among other initiatives, led to the creation of a National Circular Economy Forum. This Forum, established in September 2024, brings together a wide range of stakeholders to collaboratively discuss the agenda’s implementation – a crucial step that aligns with the systemic approach that Circular Economy requires. Other recent actions in the country include the regulation of the

law to encourage the recycling industry, commonly known as the “Rouanet Recycling Law,” and ongoing discussions around the proposed National Circular Economy Policy. Despite these advances, there is still a significant challenge in ensuring the effective implementation and practical application of these instruments by all players in the ecosystem. This requires alignment, engagement, and coordinated action among all parties, while considering the regional and local specificities in which they operate.

Building on this context, Chapters 2 and 3 of this publication sought to explore the Circular Economy agenda in greater detail, particularly within two key sectors: energy and telecommunications, as these were the focus of the Project. To do this, the publication presented and analyzed the data, information, and lessons learned from three key activities: the Sustainability Diagnosis of thirty companies within these two value chains, the Community of Practice: Circular Economy in Brazil, and the identification of reference cases in Circular Economy.

In order to better understand the Circular Economy in the energy and telecommunications sectors, **CHAPTER 2** examined the data from the Sustainability Diagno-



sis from three perspectives: level of maturity in the Circular Economy; Indicator 28 (specific to Circular Economy); and an analysis of the cross-cutting indicators for Circular Economy.

Regarding the self-declared level of maturity in Circular Economy among the thirty companies, most of them identified themselves at the initial stages, still seeking information or having learned about the topic through client interactions. This suggests an opportunity for further theoretical and practical exploration of the topic. The second point covered in Chapter 2 was the group's performance in Indicator 28 – Circular Economy, which measured the practices adopted within the agenda. The results revealed that the group, on average, implemented 32% of the practices that make up this indicator, making it the eighth lowest-performing indicator out of sixty-two indicators in the Diagnosis. The primary opportunity highlighted by Indicator 28 is for MSMEs to structure and formalize their Circular Economy agendas by integrating existing programs. For anchor companies, the opportunity lies in leveraging their influence across their value chains – both upstream and downstream – to promote Circular Economy practices. The final

point in the chapter examined the companies' performance across a selection of twenty cross-cutting indicators for the Circular Economy. Here, differences in performance were evident between anchor companies and MSMEs. Anchor companies exhibited more advanced performance, with formalized commitments and structured programs, compared to MSMEs in their value chains. However, despite their progress, anchor companies still face challenges in creating a cascade effect to more broadly promote Circular Economy practices. For MSMEs, key challenges include the lack of conservation practices and failure to assess negative impacts related to biodiversity. Another challenge is understanding the potential impacts of climate change on their operations, as well as the effects their business activities have on the climate. For anchor companies, the challenges are centered around material efficiency, traceability, and the origin of raw materials, pointing to opportunities to implement material efficiency programs.

In **CHAPTER 3**, the analysis expanded beyond the two sectors focused on by the Project to consider the broader challenges and opportunities for advancing the Circular Economy agenda across var-

ious sectors and stakeholders in Brazil. Thus, the chapter organized the knowledge generated by the Community of Practice and the Project's identification of reference cases.

The lessons learned from these efforts revealed several bottlenecks, which largely align with the broader challenges of promoting the Circular Economy in Brazilian value chains. These include: (i) the difficulty MSMEs face in accessing financing due to conditions that are incompatible with their size and reality, such as the requirement to provide a counterpart in order to obtain credit lines; (ii) financing that tends to focus more on products and outcomes rather than on processes like research and development; and (iii) regulatory barriers, coupled with a lack of regulations for new products, equipment, or processes, which hampers the introduction of innovations into the market.

On the other hand, discussions in the Community of Practice and the identification of reference cases also highlighted ways to address and overcome these challenges. One key opportunity is fostering a change in mindset towards circular thinking, which involves adopting a systemic view to maximize the use of resources already extracted from nature.

To achieve this, it is crucial to promote circular governance by fostering partnerships and integrating solutions. This can be done through regulatory frameworks, such as the development of technical standards tailored to sector-specific needs, and by encouraging reverse supply chains that take a comprehensive view of product lifecycles and their integration into various value chains. Finally, it is evident that there is an opportunity to create, expand, and publicize financing lines for circularity that are adapted to the realities of MSMEs. Large companies also play an important role in redistributing financing within their value chains to smaller companies. However, to make this possible, it is necessary to consider products in both the use and post-use phases, taking into account the differences between linear and circular economic models. This approach ensures that all relevant factors are considered when making decisions about resource allocation. On the one hand, waste can be seen as a cost; on the other hand, it can be understood as a resource or raw material, and in this case, an investment.



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