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Ministerio de Economía, Fomento y Turismo **MINECON**
Corporación de Fomento de la Producción **CORFO**
Agencia de Sustentabilidad y Cambio Climático **ASCC**

ROADMAP FOR A **CIRCULAR CHILE** BY 2040

INDEX

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Designed and coordinated the process.

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Tomás Saieg	Ministry of the Environment
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Strategic Committee

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Circular Change
SITRA - The Finnish Innovation Fund
French Ministry of the Ecological and Solidarity Transition
Dutch Ministry of Infrastructure and Water Management
European Commission
Organization for Economic Co-operation and Development
United Nations Industrial Development Organization
Inter-American Development Bank
World Economic Forum
William McDonough

In addition, more than 100 people participated in 11 thematic groups, and more than 50 actors made comments on the Propuesta de Hoja de Ruta that was released for public consultation in december-january 2020-2021.
The illustrations of the roadmap were drawn by DILO CON MONOS.

This English translation was written by Tomás Saieg.

All the people and organizations that generously contributed to the elaboration of this roadmap are acknowledged and greatly appreciated.

FOREWORD

The world faces an unprecedented crisis. **Climate change is undoubtedly the greatest challenge we have as a generation and facing it with determination and a sense of urgency is an ethical, social, and economic imperative for our government.** This climate phenomenon has not been quarantined by Covid19, so we must move decisively forward in concrete actions.

The Ellen MacArthur Foundation has estimated that renewable energies, where Chile has recognized leadership, could reduce greenhouse gas emissions – responsible for global warming – by 55%. To reduce the remaining 45%, we must modify the way we produce and consume, so it is essential to move from a linear economy to a circular one.

The circular economy paradigm proposes a sustainable and inclusive development agenda that opens enormous opportunities for our country. Chile has strongly joined this agenda: the extended producer responsibility law, the law that prohibits the delivery of plastic bags, and the law that regulates single-use plastics, are all examples of this. Added to this is the support that CORFO, the ASCC and many other organizations have given to the generation of networks, capacities, entrepreneurship and circular innovations

This Roadmap for a Circular Chile to 2040 is the result of a broad and transversal work of all sectors of society. I want to thank each of the people and organizations that generously agreed to think about the future of our country from this new perspective, seeking to achieve a shared vision and define the steps that we must take in the next two decades to move towards a circular model. As in nature, we want that in this circular Chile of the future nothing is wasted and everything is transformed.

If we can carry out this plan and bring the circular vision to the different areas of our society, we will be able to improve the quality of life of the people in their territories, take care of and regenerate the ecosystems of our country and open up multiple new alternatives for green growth.

Let's do it together.

Carolina Schmidt
Minister of the Environment

EXECUTIVE **SUMMARY**

The **circular economy** constitutes a **profound change in the forms of production and consumption**. It raises the need to leave behind the linear take-make-use-waste logic to move towards a model in which waste and pollution are eliminated from the design stage, products and materials that enter the economic cycle stay in it for as long as possible or even indefinitely, and economic processes regenerate natural systems instead of degrading them.

To **accelerate the country's transition towards this model**, in 2019, the MMA, in conjunction with MINECON, CORFO and the ASCC initiated the **elaboration process of a circular economy roadmap for Chile.**

A **Strategic Committee** composed of 33 actors from different spheres of society - the public sector, the private sector, civil society, and academia - actively participated in the development of the roadmap. Also, an International Advisory Committee collaborated through the process, providing technical advice during its development.

The **participatory process** of construction of the roadmap included several phases. In the first, diagnostic phase, which began in 2019, two studies of the potential of the circular economy in the country were commissioned; four regional early participation workshops were held; and a series of interviews with key stakeholders and two online surveys were conducted to complement the analysis. In May 2020, the Strategic Committee began to meet to, first, develop a shared long-term vision, and, later, design the strategy and the action plan to achieve it. In this second phase, **11 thematic tables** were set up, in which more than a hundred people from different spheres participated with the aim of raising ideas and proposals around different topics. Based on this work, a roadmap proposal was written and published in December 2020 for public consultation. And, based on the analysis of more than 500 observations to that proposal received during the public consultation period, the present final version of the roadmap was written.

The vision of this roadmap is that, by 2040, a regenerative circular economy will drive Chile towards a sustainable, fair and participatory development that puts people's well-being at the centre; this, through the care of nature and its living beings, the responsible and efficient management of natural resources, and a society that uses, consumes and produces in a sustainable and conscious way, promoting the creation of green jobs and opportunities for people and organizations throughout the country.

To guide and evaluate progress in the transition, a set of long-term goals has been established for 2040, with intermediate goals for 2030.

INDICATOR	2030 GOAL	2040 GOAL
1st Goal: Generation of green jobs	100.000 new jobs	180.000 new jobs
2nd Goal: Generation of municipal solid waste per capita	Decrease of 10%	Decrease of 25%
3rd Goal: Total waste generation per GDP	Decrease of 15%	Decrease of 30%
4th Goal: Material productivity	Increase of 30%	Increase of 60%
5th Goal: General recycling rate	Increase to 40%	Increase to 75%
6th Goal: Recycling rate of municipal solid waste	Increase to 30%	Increase to 65%
7th Goal: Recover of sites affected by illegal dumping	Recover of 50%	Recover of 90%

To achieve these goals, **27 initiatives are proposed, each of which contains several actions.** These are grouped around four main pillars: circular innovation, circular culture, circular regulation, and circular territories.

The circular innovation pillar focuses on the need to encourage innovation and creativity in the productive sector to be oriented towards the implementation of production systems with lower socio-environmental impacts throughout life cycles. With the initiatives and actions of this pillar, what is sought is more life cycle thinking in the design of products, services, and processes; more circular business models; more recovery of industrial waste; more financing for circular investment projects; and more research, development, and innovation for the circular economy.

The circular culture pillar focuses on the profound changes that must take place throughout society to achieve the vision that has been presented. With the initiatives and actions of this pillar, what is sought is more sustainable lifestyles based on circular habits and practices; an educational system focused on environmental awareness and skills for the circular economy; more transparency and traceability around waste management; and more forward-thinking in monitoring of progress towards sustainable development.

The circular regulation pillar focuses on changes that should be driven primarily from the central level of the state, including ministries and sectoral services. With the initiatives and actions of this pillar, what is sought is more use of economic instruments to promote the circular economy; complement the sanitary approach of waste regulation with a circular economy approach; more incentives for the involvement of citizens in solving problems of the linear economy; and more collaboration and joint work among key actors for the circular economy.

Finally, the **circular territories pillar** focuses on the changes that should be promoted mainly by territorial actors such as regional governments, municipalities, social organizations, and business associations from specific territories. With the initiatives and actions of this pillar, what is sought is more presence of circular economy principles in the regional development trajectories; more distinction of the particularities of each territory in the planning of its transition processes; more participation of citizens in the decisions that affect their local environment; more preference for production techniques that allow caring for and increasing the country's natural capital; and more infrastructure and equipment that enables circular solutions at the territorial level.

ROADMAP TO A CIRCULAR ECONOMY CHILE 2040

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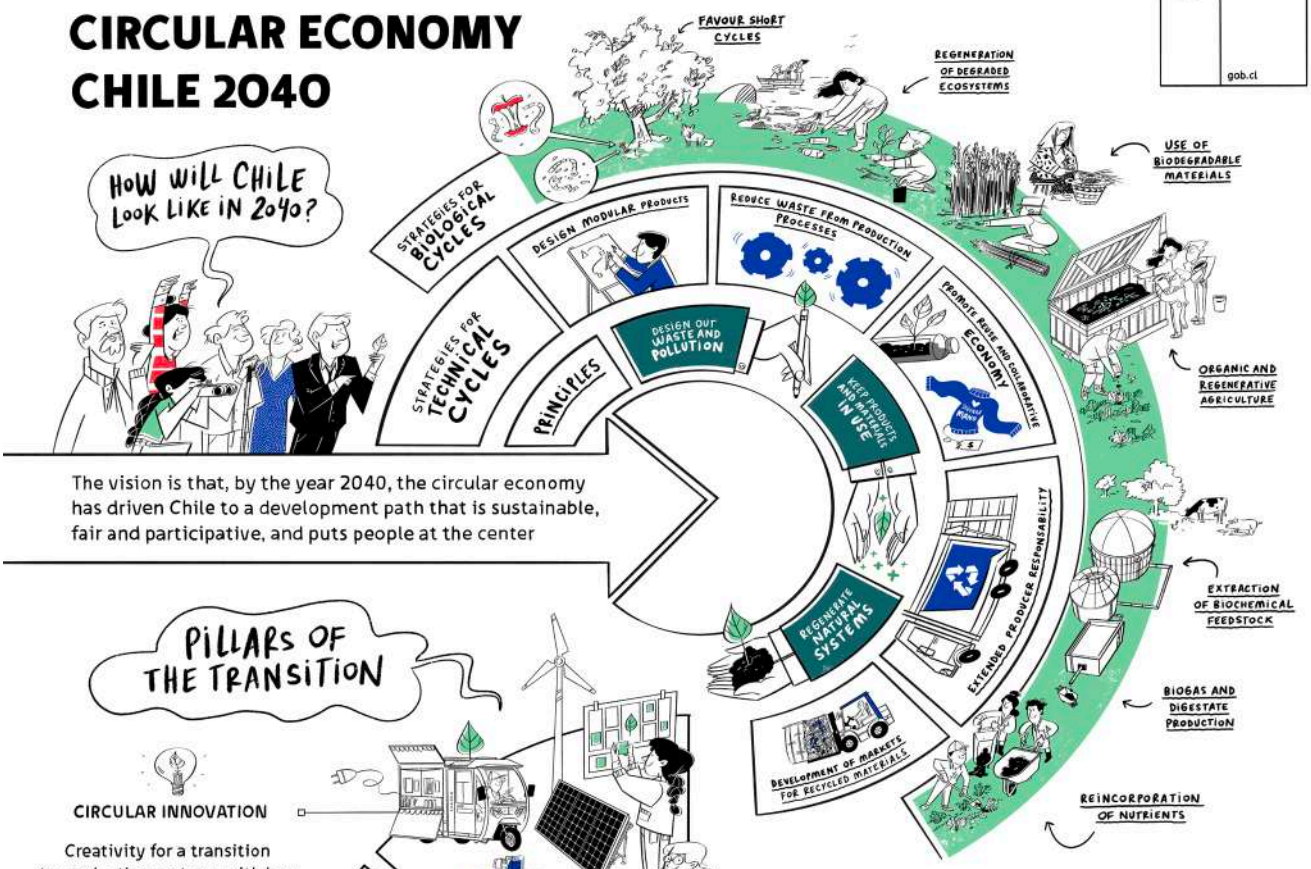
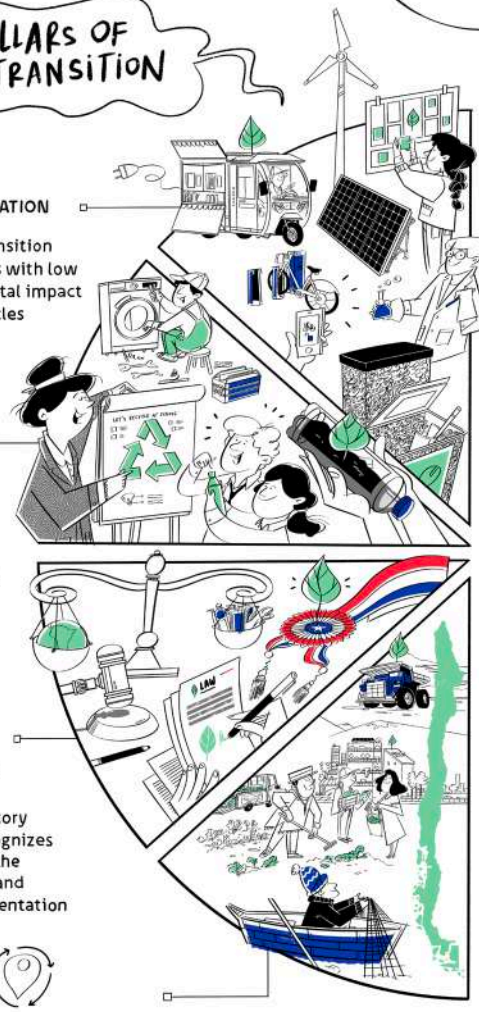


The vision is that, by the year 2040, the circular economy has driven Chile to a development path that is sustainable, fair and participative, and puts people at the center

PILLARS OF THE TRANSITION



CIRCULAR INNOVATION

Creativity for a transition to production systems with low social and environmental impact through life cycles

CIRCULAR CULTURE

Transparent information and integral education for a conscious society that takes care of its environment

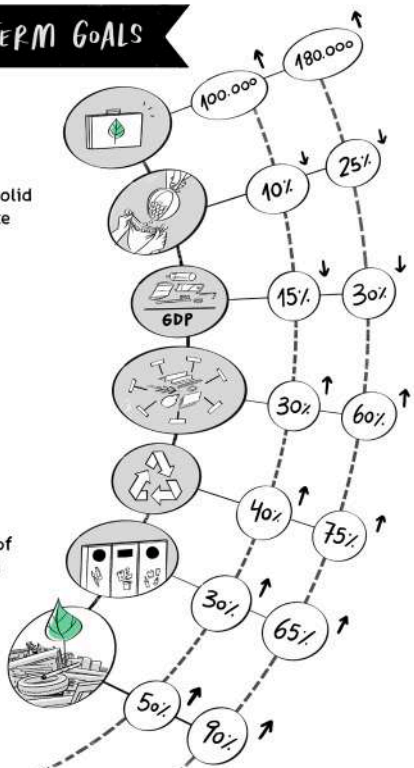
CIRCULAR REGULATION

Towards a regulatory framework that recognizes the potential of the circular economy and facilitates its implementation

CIRCULAR TERRITORIES

Local development that is sustainable and compatible with the visions and vocations of each territory

LONG-TERM GOALS



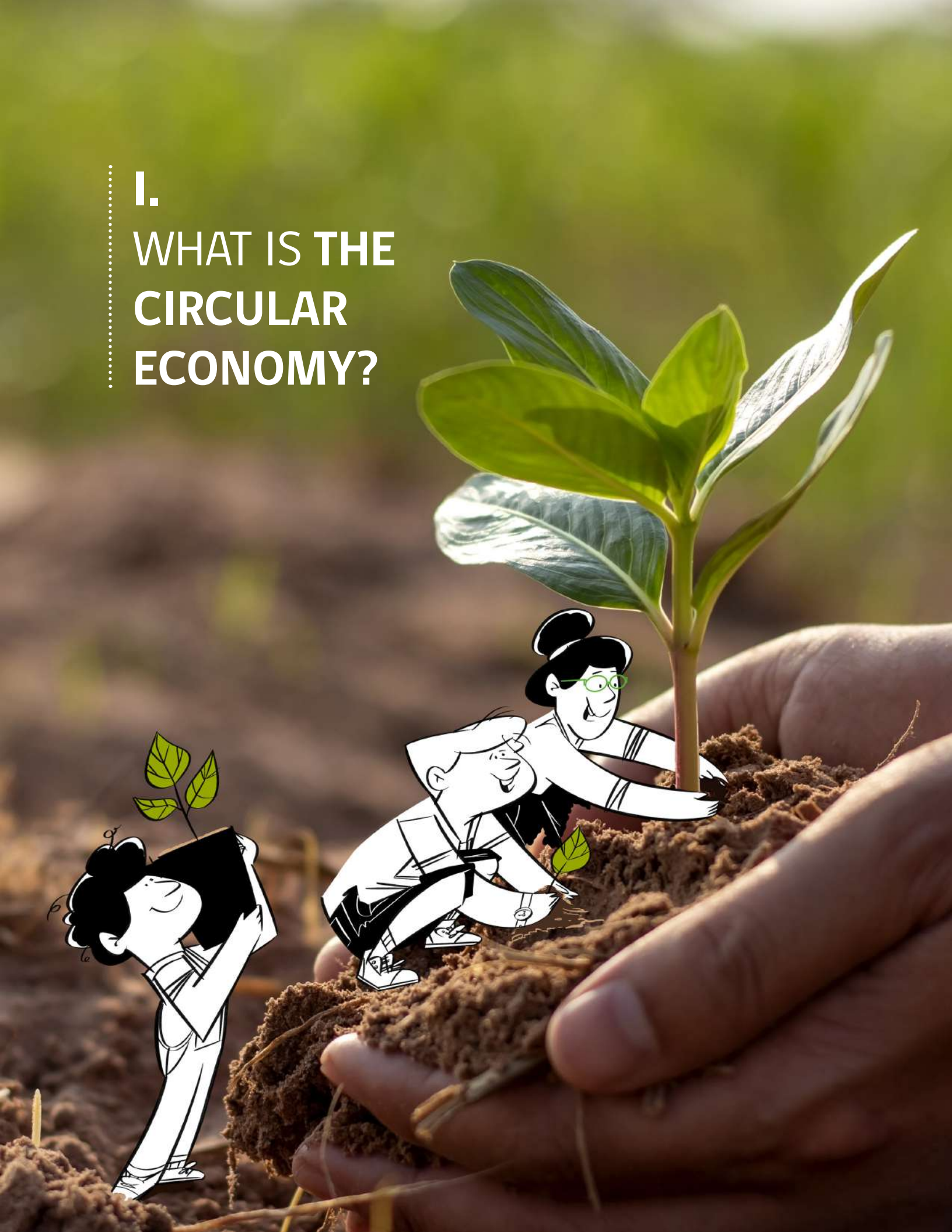
1. Green jobs
2. Generation of solid municipal waste per person
3. Total waste generation per GDP
4. Material productivity
5. General recycling rate
6. Recycling rate of municipal solid waste
7. Recovery of sites affected by illegal dumping

HORIZON

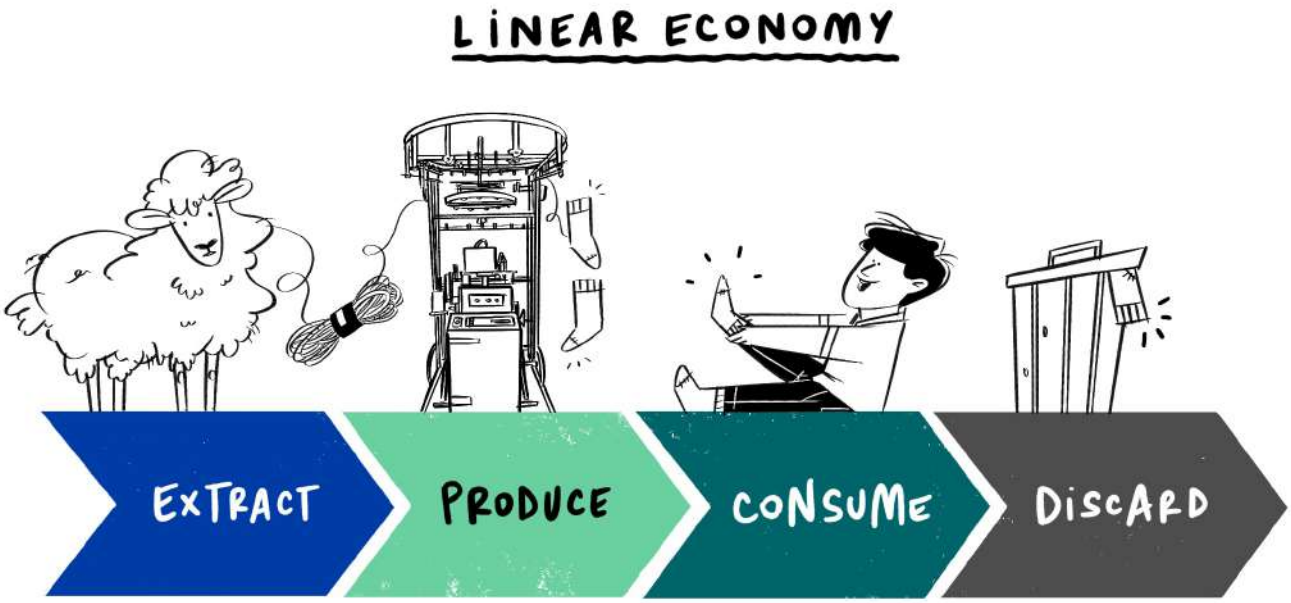
2030

2040

I.
WHAT IS **THE CIRCULAR ECONOMY?**



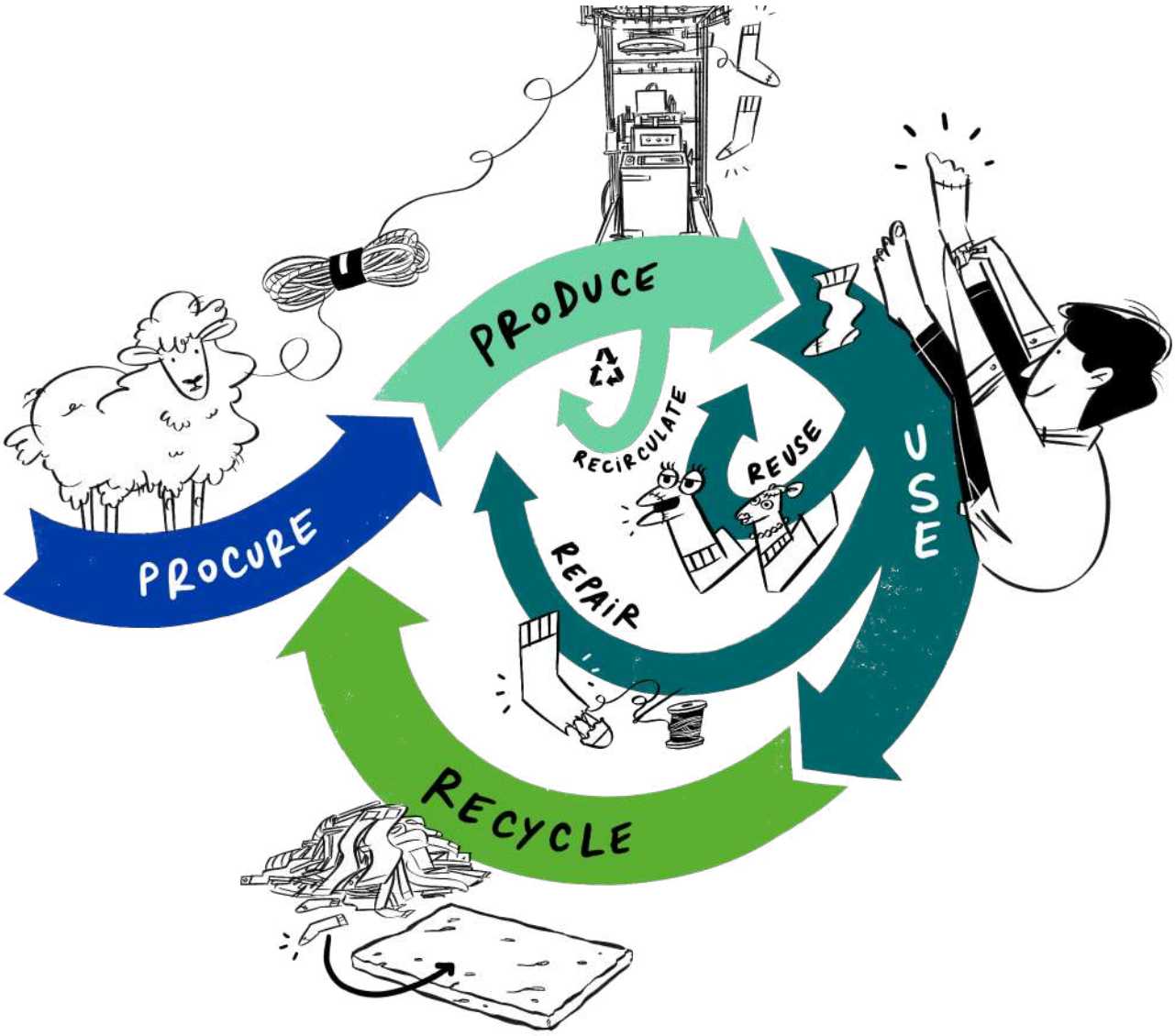
So far, the global economy has been based on a **linear model**, in which resources are extracted from supposedly infinite sources to produce things that, after being used, are thrown away. This **throwaway culture**[1] and model of the economy are problematic since neither natural resources nor the carrying capacity and resilience of ecosystems are infinite[2].



Nature, however, does not work like that. Nature does not know of garbage. All residues that are generated are used by other organisms, in a great network of synergetic relations of exchange of materials and energy. The **circular economy** offers an alternative that seeks to emulate this virtuous model of operation in our economic systems.

1 The notion of a "throwaway culture" is dealt with at length in the encyclical Laudato Si – On the Care of the Common Home (2015), by Pope Francis.

2 For an analysis of the relationship between economic growth, carrying capacity and the environment, see: Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C. S., ... & Pimentel, D. (1995). Economic growth, carrying capacity, and the environment. Ecological economics, 15(2), 91-95. Available at https://www.sciencedirect.com/science/article/abs/pii/0921800995000593

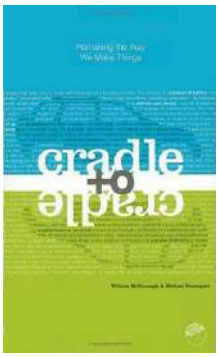


CIRCULAR ECONOMY

Box 1

THE SCHOOLS OF THOUGHT AND ACTION BEHIND THE CIRCULAR ECONOMY

The circular economy is based on several schools of thought and action on sustainability that have emerged in recent decades. In general, these are schools that propose strategies and concrete solutions to some of the greatest challenges and problems facing the linear economy. Among these, the following stand out[3]:

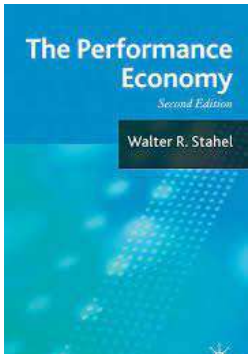


CRADLE TO CRADLE:

It was born from the hand of chemist Michael Braungart and architect Bill McDonough, who developed a design school that promotes products made to facilitate the recovery of parts and materials at the end of their useful life. To find out more, read: *Braungart, M. McDonough, B. (2002) From the Cradle to the Cradle. Redesigning the way we do things.*

THE PERFORMANCE ECONOMY:

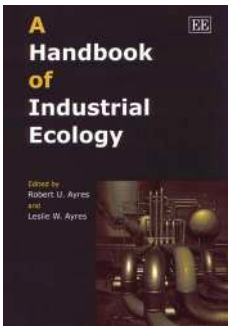
Over several decades, the architect and economist Walter Stahel and his collaborators at the Product Life Institute in Switzerland, have been developing the notion of the performance economy, which aims to leave behind the idea that what should be offered to the market are products and services, and instead promote offering what they call "performance" – that is, value for the end user. The implications of this idea, which among other things has contributed to the circular economy with the "product-as-service" business model, can be explored in the book *Stahel, W. (2006) The Performance Economy.*



BIOMIMICRY:

Biomimicry is an idea that has been popularized by the scientist and writer Janine Benyus, and is based on the idea that nature has already found elegant circular solutions to many of the problems we face today. The goal is then to seek to imitate or adapt these solutions to our problems. The ideas of this school have been applied in the aerodynamic design of efficient transport, the replacement of expanded polystyrene foam by structures produced by fungi, or the design of passive ventilation systems with low or zero energy consumption. For more information, read: *Benyus, J. (2002) Biomimicry.*

[3] Based on: https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail

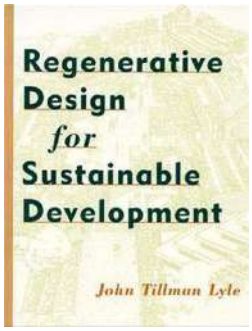


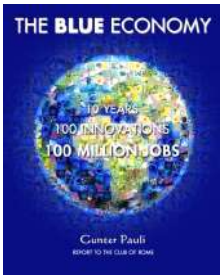
INDUSTRIAL ECOLOGY:

Industrial ecology is an approach to the design of industrial processes that seeks to make better use of the resources that enter them, with the aim of minimizing the use of virgin resources and the emission of polluting waste into the environment. Among other things, this school has contributed to the circular economy with the concept of "industrial symbiosis". For more information, see: *Ayres, R. U., & Ayres, L. W. (1996) Industrial ecology.*

REGENERATIVE DESIGN:

Regenerative design is an area of academic study that focuses on the landscape scale, and seeks to find ways to make the economic activities of human communities regenerate rather than degrade landscapes. For more information, check: *Lyle, J. T. (1996) Regenerative Design for Sustainable Development.*



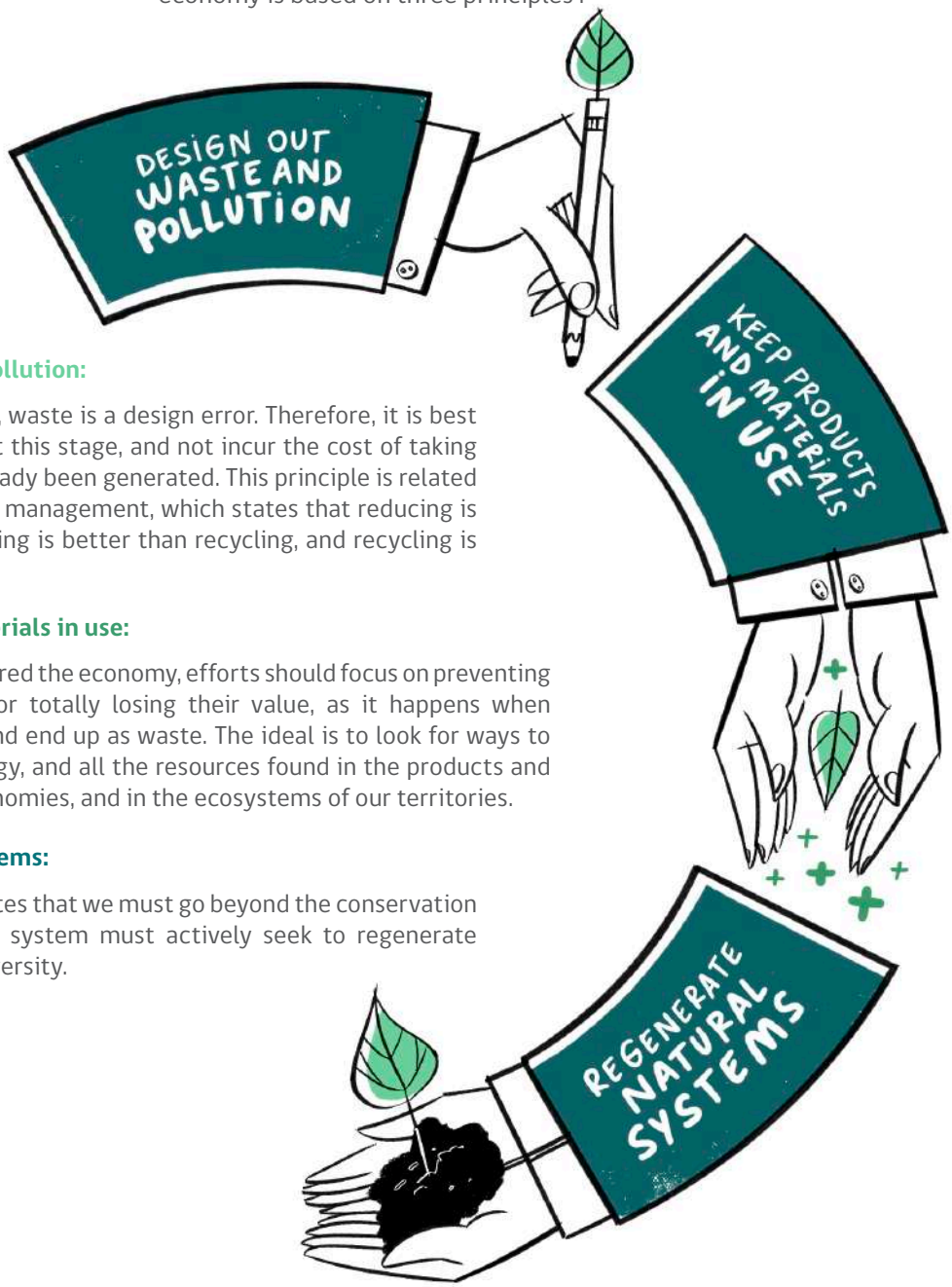


BLUE ECONOMY:

Blue economy is the name that the economist and entrepreneur Gunter Pauli has given to a range of innovative business models studied by him and his collaborators in the Zero Emissions Research and Initiatives network, which pushes the concept forward. The models proposed by the network are characterized by the diversity of ways to create value and sources of income. Blue economy models do not develop by growing, but rather by diversifying and sophisticating their functions, which tends to make them more sustainable. For more information, see: *Pauli, G. A. (2010) The blue economy: 10 years, 100 innovations, 100 million jobs.*

THREE **PRINCIPLES**

According to the Ellen MacArthur Foundation, a global leader in circular economy and member of the International Advisory Committee that participated in the roadmap development process, the circular economy is based on three principles[4]:



Design out waste and pollution:

For the circular economy, waste is a design error. Therefore, it is best to avoid its generation at this stage, and not incur the cost of taking care of it when it has already been generated. This principle is related to the hierarchy in waste management, which states that reducing is better than reusing, reusing is better than recycling, and recycling is better than discarding.

Keep products and materials in use:

Once resources have entered the economy, efforts should focus on preventing them from diminishing or totally losing their value, as it happens when residues are discarded and end up as waste. The ideal is to look for ways to conserve materials, energy, and all the resources found in the products and infrastructure of our economies, and in the ecosystems of our territories.

Regenerate natural systems:

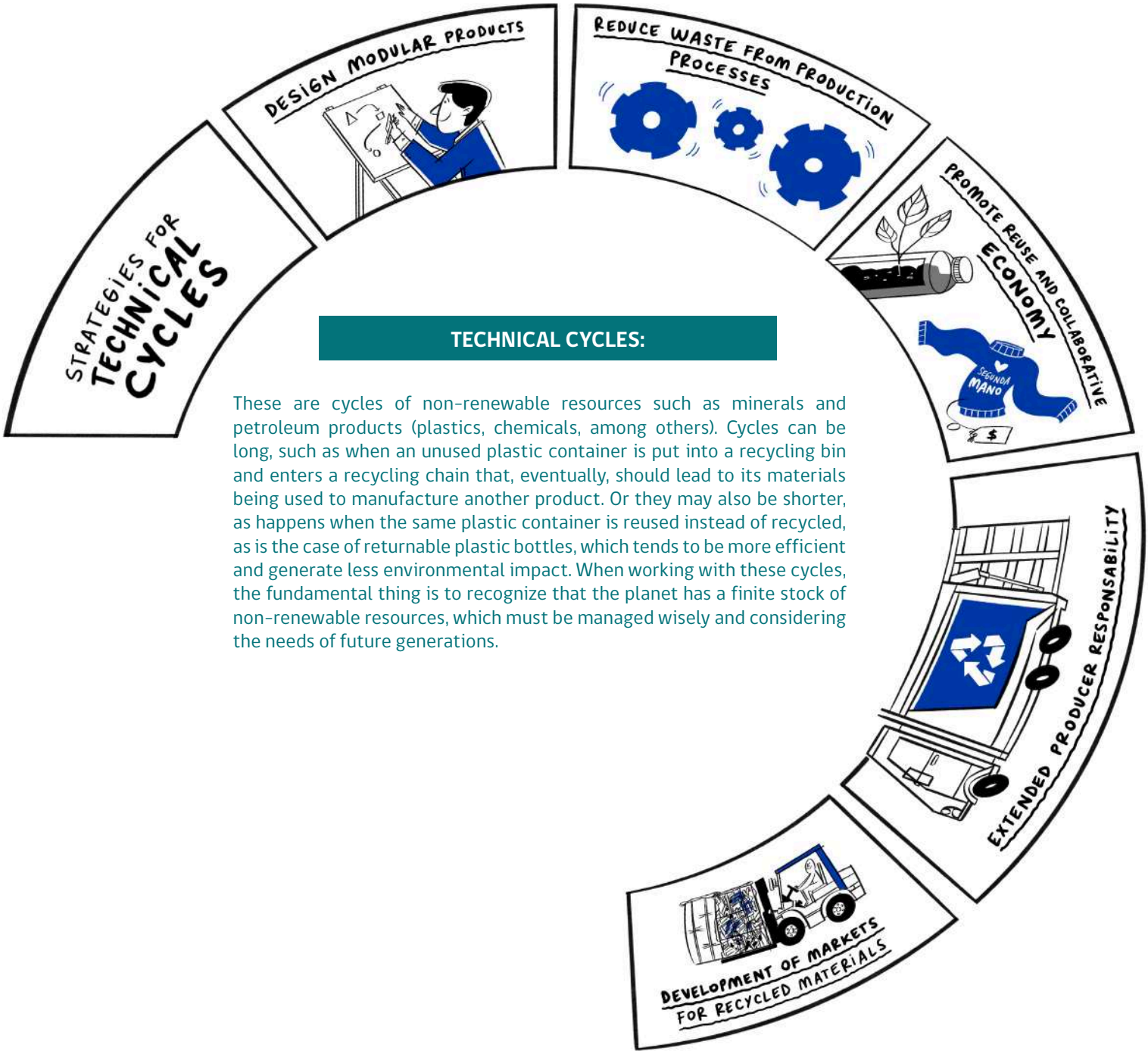
The circular economy states that we must go beyond the conservation approach. The economic system must actively seek to regenerate natural capital and biodiversity.

These principles imply systemic change, leading to a type of economic development that recognizes the natural limits of the planet and our responsibility to care for and regenerate nature, so that future generations can also enjoy its abundance.

[4] See: https://www.ellenmacarthurfoundation.org/es/economia-circular/concepto

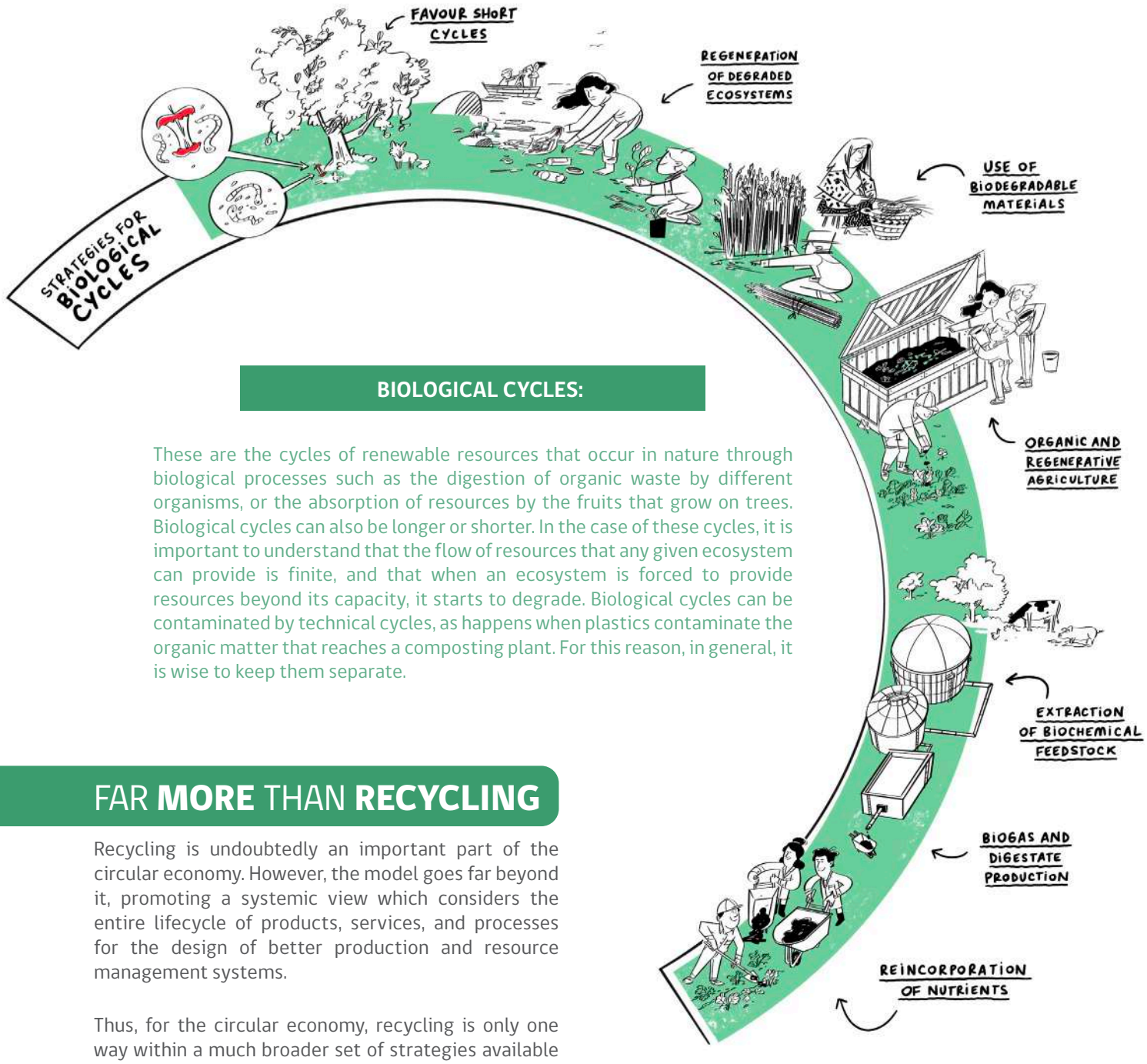
TECHNICAL CYCLES AND **BIOLOGICAL** CYCLES

The circular economy seeks to close the resource cycles that the linear model often leaves open, as happens when potentially recoverable residues end up in landfills. It makes a distinction between short cycles and long cycles, and it observes that, in general, the former tends to be more efficient and have less environmental impact than the latter. To better understand this, it is necessary to distinguish between two types of cycles:



TECHNICAL CYCLES:

These are cycles of non-renewable resources such as minerals and petroleum products (plastics, chemicals, among others). Cycles can be long, such as when an unused plastic container is put into a recycling bin and enters a recycling chain that, eventually, should lead to its materials being used to manufacture another product. Or they may also be shorter, as happens when the same plastic container is reused instead of recycled, as is the case of returnable plastic bottles, which tends to be more efficient and generate less environmental impact. When working with these cycles, the fundamental thing is to recognize that the planet has a finite stock of non-renewable resources, which must be managed wisely and considering the needs of future generations.



BIOLOGICAL CYCLES:

These are the cycles of renewable resources that occur in nature through biological processes such as the digestion of organic waste by different organisms, or the absorption of resources by the fruits that grow on trees. Biological cycles can also be longer or shorter. In the case of these cycles, it is important to understand that the flow of resources that any given ecosystem can provide is finite, and that when an ecosystem is forced to provide resources beyond its capacity, it starts to degrade. Biological cycles can be contaminated by technical cycles, as happens when plastics contaminate the organic matter that reaches a composting plant. For this reason, in general, it is wise to keep them separate.

FAR **MORE** THAN **RECYCLING**

Recycling is undoubtedly an important part of the circular economy. However, the model goes far beyond it, promoting a systemic view which considers the entire lifecycle of products, services, and processes for the design of better production and resource management systems.

Thus, for the circular economy, recycling is only one way within a much broader set of strategies available to overcome the linear economy[5].

[5] For a complete review of more than 40 circular economy strategies, see: Kalmykova, Y., Sadagopan, M., & Rosado, L. (2018). Circular economy – From review of theories and practices to development of implementation tools. Resources, conservation and recycling, 135, 190-201. Available at: https://www.sciencedirect.com/science/article/pii/S0921344917303701

II.
WHY A **CIRCULAR ECONOMY** ROADMAP FOR **CHILE?**

BECAUSE THE **CIRCULAR ECONOMY** ALLOWS US TO FACE THE **GLOBAL CHALLENGES** OF THE **21ST CENTURY**

As is known, not only Chile but the entire world is currently facing a series of **global challenges** that put in check the ways in which we have organized our economic systems. As time goes by, more and more variables alert us of the impacts that human activity is having on nature: **resource scarcity**[6] **; loss of biodiversity, including extinction rates much higher than those observed in any previous historical period**[7] ; and **unprecedented climatic changes** associated, with a great level of certainty, to greenhouse gas emissions from human activity[8]. At the same time, the consequences that inaction could bring for our future are becoming ever clearer[9].

In turn, other global trends associated with the above have changed and will continue to change the global landscape. On the one hand, **environmental regulations are becoming stricter**[10] **and decarbonisation goals more ambitious**[11]; and, on the other hand, people are becoming more and more aware of the environmental impacts of human activity, and, in consequence, are requiring ever higher environmental standards from businesses and the state. At the same time, people **are becoming much more willing to adopt more sustainable lifestyles.**[12]

[6] See: Lange, Glenn-Marie, Quentin Wodon, and Kevin Carey, eds. 2018. The Changing Wealth of Nations 2018: Building a Sustainable Future. Washington, DC: World Bank. doi:10.1596/978-1-4648-1046-6.

[7] See: Kolbert, Elizabeth. (2014) The sixth extinction: an unnatural history.

[8] See: IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)].

[9] See: https://www.oecd.org/environment/circle.htm

[10] See: https://www.oecd.org/environment/how-stringent-are-environmental-policies.htm

[11] See: https://energia.gob.cl/planificacion-energetica-de-largo-plazo-emisiones-del-sector-energetico

[12] The emblematic case, internationally, is that of the activist Greta Thunberg. However, this is a very present reality in Chile as well. This is suggested by the growth of requests for access to public information to the MMA, of the municipalities subscribed to the SCAM, and other indicators. See: https://sinia.mma.gob.cl/iema-2020/

The circular economy has the **potential** to be an enormous contribution to the response that the country must give to these and other associated trends. For example, the Ellen MacArthur Foundation estimated that, **while 55% of greenhouse gas emissions are attributable to energy production, another 45% are attributable to material production,** an area in which the circular economy offers multiple strategies for increasing efficiency. However, so far, **the trend of emissions from material production is increasing.** For example, a study by the International Resource Panel[13] estimated that, between 1995 and 2015, emissions associated with the production of materials as a percentage of total global emissions increased from 15% to 23%[14]. In the same period, total global emissions increased by 51% .[15]

The same study indicates that material efficiency strategies such as those proposed by the circular economy could reduce between 35% and 40% of emissions from the construction, operation and dismantling of buildings in the countries from the group G7; and between 50% and 70% of the emissions from this sector in China and India, where the energy use of buildings is lower and the importance of carbon sequestration in buildings made of wood play a greater role[16]. Globally, the construction sector is one of the highest emitters of greenhouse gases, together with the industrial manufacturing sector, where the potential for increased efficiency in the use of material resources, water and energy, is also enormous. This shows the climate change mitigation potential of the circular economy. In addition, the model also has potential in climate change adaptation, where the regeneration strategies that are promoted for the biological cycles can improve the resilience of ecosystems through actions such as the recovery of degraded soils and the development of green infrastructure for the reduction of the impact of floods and droughts[17].

Notwithstanding the foregoing, the potential of the circular economy is not limited to resource efficiency and mitigation and adaptation to climate change. In this sense, it should be noted that, **of the 17 Sustainable Development Goals[18], at least 10 would be directly and positively impacted by the transition to a circular economy:** zero hunger (SDG 2); clean water and sanitation (SDG 6); affordable and clean energy (SDG 7); decent work and economic growth (SDG 8); industry, innovation and infrastructure (SDG 9); sustainable cities and communities (SDG 11); responsible production and consumption (SDG 12); climate action (SDG 13); life below water (SDG 14); and life on land (SDG 15).

[13] The International Resource Panel is an initiative convened by the United Nations Environment Program. See: https://www.resourcepanel.org/

[14] See: IRP (2020). Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future. Hertwich, E., Lifset, R., Pauliuk, S., Heeren, N. A report of the International Resource Panel. United Nations Environment Programme, Nairobi, Kenya. Available at: https://stg-wedocs.unep.org/handle/20.500.11822/34351

[15] Source: https://ourworldindata.org/co2-emissions

[16] IRP (2020). Op. cit., pp. 19.

[17] See: https://unfccc.int/climate-action/momentum-for-change/planetary-health/composting-waste-treatment-an-ecological-solution-to-poverty-and-climate-change

[18] See: https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/

[19] The Nationally Determined Contributions (NDCs) are an instrument born under the auspices of the United Nations Framework Convention for Climate Change, which sets out the commitments related to climate change that the signatories of the Paris Agreement acquire in front of the international community. NDCs must be updated every five years. The first NDC in Chile dates from 2015. The 2020 update is the first to be carried out. See: https://mma.gob.cl/primer-proceso-de-actualizacion-de-la-contribucion-determinada-a-nivel-nacional-ndc/

BOX 2

CIRCULAR ECONOMY: ONE OF CHILE'S COMMITMENTS TO THE INTERNATIONAL COMMUNITY

Considering its potential, the State of Chile, in its **Nationally Determined Contribution**[19] updated in 2020, established the circular economy as one of the pillars of its contribution to the Paris Agreement. Specifically, Chile made **three commitments:**

To elaborate the present **ROADMAP TO A CIRCULAR CHILE BY 2040**, which was born from a broad participatory process, has a 20-year horizon, and whose objective is to accelerate the transition at the national level. With the publication of the roadmap, the country fulfils this first commitment.

To elaborate a **NATIONAL STRATEGY FOR ORGANIC RESIDUES**, aimed at increasing the recovery of this type of residues at the municipal level. This commitment was fulfilled with the recent publication of the ENRO[20], which was developed in parallel to this Roadmap.

To generate and implement **CIRCULARITY METRICS AND INDICATORS TO MONITOR THE COUNTRY'S PROGRESS** in this area, identifying its contribution to mitigation and adaptation to climate change. This roadmap proposes goals and initiatives that should be part of the monitoring framework of the transition to the circular economy in Chile.

[20] See: https://economiacircular.mma.gob.cl/residuos-organicos/

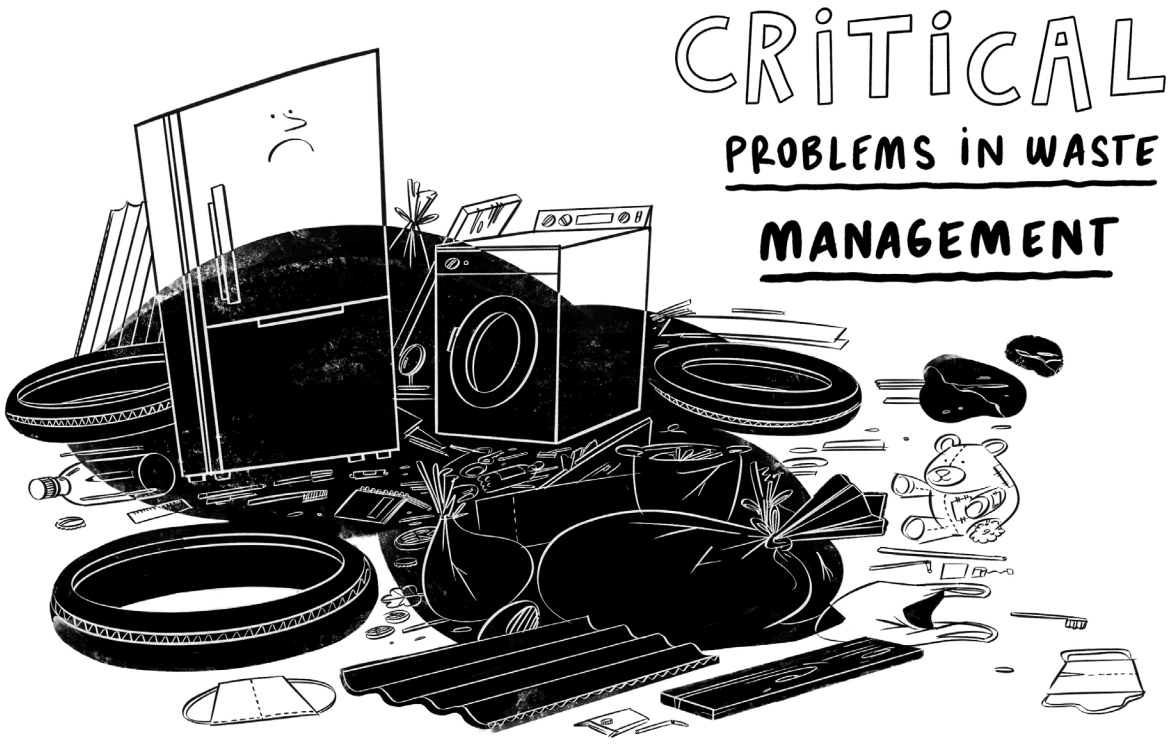
BECAUSE THE **COUNTRY FACES URGENCIES** WITH RESPECT TO **WASTE** MANAGEMENT AND **POLLUTION**

In recent years, the social and **environmental impacts** of the country's waste management gaps have become apparent. The situation of final disposal is particularly worrying: it has been calculated that, **as of 2017, on average, the remaining useful life of the country's sanitary landfills was only 12 years.**[21] This is worrying considering that starting a new landfill is a complex process that may take more than ten years to materialize.

As if this were not enough, an unknown but **visibly important portion of the waste generate is not properly disposed of, and ends up contaminating public and private spaces,** including abandoned sites, streets, streams, estuaries, or the sea. This commonly happens with plastic waste, or with other waste streams that do not always have adequate disposal alternatives, such as construction and demolition waste, used tires, and bulky waste like refrigerators or washing machines. As a result, a recent study has estimated that there are currently **3,735 illegal waste disposal sites in Chile**, of which 3,492 have an area of less than 1 hectare, and 243 have an area greater than 1 hectare[22]. These sites cause serious problems for the environment and the quality of life of the people who live around them.

In addition to the above, the **environmental pressures** behind these problems have been increasing. For example, between 2000 and 2017, the amount of municipal solid waste that each person generates on average **increased from 294 to 439 kilograms per year** – that is, a 49% increase in just 17 years.[23]

At the same time, the country has significant gaps in recycling. For example, by 2018, the overall recycling



[21] See: SUBDERE (2017). Línea Base Diagnóstico y Catastro de RSD año 2017.
[22] See: Ossio, F. Faúndez, J. (2021). Diagnóstico Nacional de Sitios de Disposición Ilegal de Residuos.
[23] According to OECD data. See: https://data.oecd.org/waste/municipal-waste.htm
[24] See: https://www.eea.europa.eu/data-and-maps/indicators/waste-recycling-1/assessment-1

rate in the country was only 22%, and the recycling rate of municipal solid waste did not reach 2%. This, in a scenario where both rates in other countries can exceed 50%.[24]

Therefore, it is necessary to advance in these matters, for which the circular economy offers multiple strategies that allow addressing these urgencies in a comprehensive manner.

BECAUSE THE **CIRCULAR ECONOMY PRESENTS** ENORMOUS **ECONOMIC OPPORTUNITIES**

One of the greatest attractions of the circular economy is that **it offers ways to overcome the dilemma between economic development and environmental protection, allowing for synergies between these two objectives.** The model places emphasis on a type of productivity that is usually ignored but has enormous potential both environmentally and economically: **material productivity**, a measure of the economic value that is generated for each unit of material resources used to generate it.

[25] See: https://data.oecd.org/materials/material-productivity.htm
[26] Plastics not made of recycled materials.
[27] See: ASIPLA (2019). Estudio Sobre el Reciclaje de Plásticos en Chile.

Chile currently has the lowest material productivity of all OECD countries: in 2017, the country generated just US$ 0.56 for every kilogram of material used by the economy, while the OECD average was US$ 2.88 per kilogram, and a leading country such as the Netherlands generated as much as US$ 5.75 per kilogram[25]. This gap in material productivity has concrete manifestations: for example, despite the fact that all the virgin plastic resin[26] used in the country is imported, the vast majority of plastic residues generated in the national territory are not recycled[27]; and, the importation of a large amount of synthetic fertilizers, without taking advantage of the natural fertilizers that could be obtained from the recovery of organic waste.

The magnitude of the **opportunities** associated with an increase in resource efficiency is significant. For example, in 2014, a study sponsored by the World Economic Forum estimated **cost savings of up to 630 billion dollars from advanced implementation of the circular economy in the European capital goods production industry, and up to 700 billion dollars from its implementation in the global consumer goods sector.**[28] Likewise, in 2015, another study estimated that, by 2030, **the circular economy could bring overall benefits of up to 1.8 trillion dollars just for Europe**[29].

But the potential benefits of the circular economy are not limited to cost savings and productivity gains. The transition is also expected to bring numerous **employment opportunities** in various activities. For example, a 2018 study by the International Labour Organization estimated that, globally, the transition to a circular economy could generate 50 million additional jobs in the recycling sector alone, and 45 million additional jobs in support services for the circular economy[30].

[28] See: WEF, EMF (2014). Towards the Circular Economy: Accelerating the scale-up across global supply chains.
[29] See: EMF, SUN, DPF, MCBE (2015). Growth Within: a circular economy vision for a competitive Europe.
[30] See: International Labour Organization (2018). Greening With Jobs.

BECAUSE A **GREEN RECOVERY** REQUIRES A **LONG-TERM VIEW** AND A **SHARED PATH**

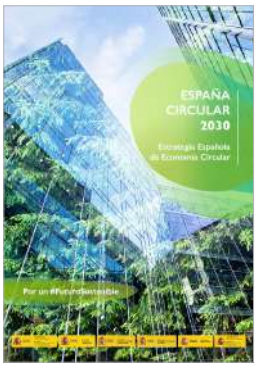
The COVID-19 pandemic has produced an unprecedented global crisis. But **every crisis is also an opportunity.** In this case, it is the opportunity to reactivate our ailing economies with a **great green drive** that ensures a sustainable future.

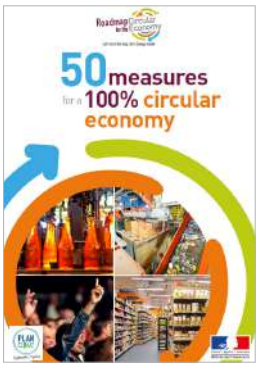
The best way to seize this opportunity is to **bring together a broad coalition of diverse actors,** as the depth of the transformation that is needed demands **the commitment of the whole of society.** It requires **green firms** with sustainable business models; **universities** whose research and development activities are focused on solving the problems of the environments in which they are inserted; a citizenry sensitive to the consequences of the linear economy and a civil **society** empowered in its role as an agent of change; an educational system that integrates the environmental dimension at all levels; visionary local governments that dare to implement innovative solutions in their territories; and also a state with a long-term vision, capable of channelling the energies of these and other actors in a productive way.

This roadmap, which was developed based on a **broad and extensive participatory process,** is an effort to crystallize a long-term vision, plan initiatives and establish the consensus and coordination necessary to **accelerate the transition to a circular economy in Chile.**

BOX 3

WHAT IS A CIRCULAR ECONOMY ROADMAP?



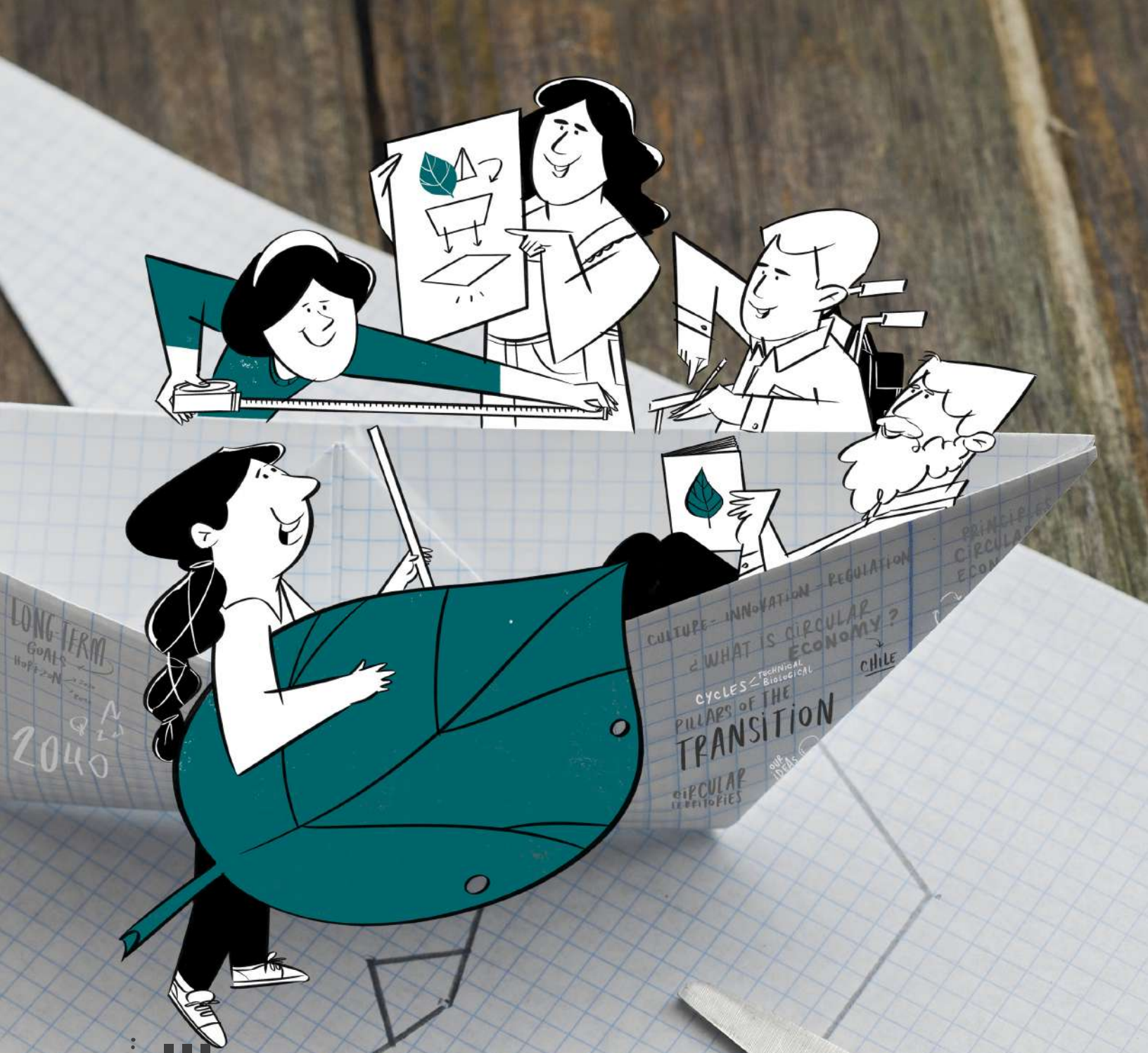


A roadmap is a strategic plan that defines a long-term vision and establishes the main initiatives required to achieve it.

Roadmaps are high-level documents that serve as communication tools and help articulate thinking around common challenges and plans to address them.

The first circular economy roadmap was published in 2016 by SITRA, the Finnish Innovation Fund. Since then, other countries, such as France and the Netherlands, and some sub-national territories, such as the city of Amsterdam, have published circular economy roadmaps.

While circular economy roadmaps are relatively recent, roadmaps in general are nothing new for Chile. National roadmaps, including the *Hoja de Ruta 2050 del Comité Consultivo de Energía 2050 (2015)*, and various others developed under the Transforma programs of CORFO, have served as the basis for significant processes of national economic transformation.



III.
HOW WAS THIS **ROADMAP DEVELOPED?**

THE **GLOBAL CONTEXT**

In recent years, the circular economy has received an enormous drive at the global level. A key component of this drive has been the promotion by governments and international organizations that have put it at the forefront of their green agendas. For example, in 2015, the European Union approved its first **Circular Economy Action Plan,** with ambitious goals and a set of 54 actions to achieve them. According to an analysis published in 2019, the successful implementation of these actions mobilized trillions of dollars in investment and put Europe back on the path of job creation[31]. Given its success, the plan was renewed five years later, with the publication, in 2020, of a new Circular Economy Action Plan, which is a fundamental component of the **European Green Deal**.[32]

In addition to the European Union, many other countries are also strongly driving the transition. In 2020, some of these, including Chile, formed the **Global Alliance for Circular Economy and Resource Efficiency,**[33] which is sponsored by the United Nations Environment Programme and the United Nations Industrial Development Organization, with the participation of a diverse set of countries including Colombia, Peru, Canada, Kenya, Nigeria, Rwanda, South Africa, Morocco, Japan, New Zealand, and Norway – in addition to the countries of the European Union. Also in 2020, the **Circular Economy Coalition for Latin America and the Caribbean**, which seeks to promote the agenda in our region, was established.[34]

The efforts of these and other governmental organizations have been joined by those of important non-governmental organizations such as Circle Economy[35] or the Ellen MacArthur Foundation, which has managed, among other things, to drive the **New Plastics Economy Global Commitment**[36], an initiative that has been able to secure commitments from several governments and major multinational companies with the vision of a world free of plastic pollution.

Likewise, the World Economic Forum has pushed the circular economy transition by creating, in 2018, the **Platform to Accelerate the Circular Economy**[37]; and by launching, in February 2021, a Circular Economy Action Agenda that focuses on the sectors with the greatest transformation potential,i.e. plastics, food, electronics, textiles and capital equipment.[38]

[31] See: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1551871195772&uri=CELEX:52019DC0190 ("The EU Monitoring Framework for the Circular Economy shows that the transition has helped put the EU back on a path of job creation.")
[32] See: https://ec.europa.eu/environment/circular-economy/
[33] See: https://ec.europa.eu/environment/international_issues/gacere.html
[34] See: https://www.coalicioneconomiacircular.com/
[35] See: https://www.circle-economy.com/
[36] See: https://www.newplasticseconomy.org/projects/global-commitment
[37] See: https://pacecircular.org/
[38] See: https://pacecircular.org/action-agenda
[39] The six priority products established in the law are: tires; packaging; lubricant oils; electric and electronic equipment; and batteries (divided in "pilas" and "baterías"). The law itself can be found at: https://www.bcn.cl/leychile/navegar?idNorma=1090894

THE **LOCAL CONTEXT**

With the publication, in 2016, of L**aw No. 20,920 (Framework for Waste Management, Extended Producer Responsibility and Promotion of Recycling – or, for short, the EPR Law),** a process was initiated that promises to take the country to a new level of institutional sophistication in the area of circular economy, especially regarding recycling. At its core, this Law establishes that the producers of **prioritized products**[39] are obliged to organize and finance the management of the waste generated from these products (through waste management systems), and to meet collection and recycling goals established for each by decree.

The impetus given by this Law to the circular economy in Chile, together with other factors such as the growing environmental awareness of society, have activated several organizations that are driving the transformation with great strength.

The **Ministry of the Environment of Chile** is one of the key actors that has strongly been pushing forward the transition to this model. In order to capture this focus in its institutional framework, and boost the agenda, in 2018 the **Circular Economy Office** was created, as a successor to the former Waste Office. In addition, the MMA has worked on several pieces of legislation that complement the **EPR Law (Law 20.920), including the Law that prohibits giving free plastic bags in retail commerce**[40]**, and the more recent Law that prohibits giving free single-use plastics in hotels, restaurants, and similar establishments**.[41]

Moreover, since 2018 **CORFO** has vigorously promoted the circular economy through the articulation of networks, the development of training programs, and through millions of dollars in subsidies to firms

which are channelled through more than a dozen calls for projects of different sizes and natures, including technology transfer, technological prototyping, validation of business models, etc. Each of these calls give from a dozen thousand dollars up to ten million dollars in the case of the call for a Centre for Circular Economy in the Northern Macro-Zone. In addition, the **ASCC** has strongly been promoting Clean Production Agreements with a circular economy focus, with more than 12 agreements to date, and several more to come.

At the territorial level, the protagonists of the circular economy have been the municipalities that have dared to implement innovative solutions to the challenges they face in their area of competence. Among them are the **Municipality of La Pintana** and the **Municipality of Santa Juana,** pioneers in the implementation of source-segregated waste collection (organic, inorganic recyclable, and discard fractions); and the

[40] Available at: https://www.bcn.cl/leychile/navegar?idNorma=1121380

[41] Available at: https://www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=12641-12

[42] Environmental, social, and economic.

[43] To look at a picture taken in 2018, see: RUBIK (2018). Consultoría para Mapeo de Actores e Impacto Potencial de la Economía Circular en Chile. Available at: https://sinia.mma.gob.cl/

Municipality of Providencia, which has implemented the Providencia Circular Program to support green innovation and entrepreneurship, and has run a source-segregated waste collection pilot. These, among other municipalities, along with municipal associations such as AMUSA and MSUR, and local governments have strongly promoted the transition of their territories.

The business push for the circular economy has also been fundamental. A significant base of **local start-ups** focused on implementing innovative circular business models has emerged, many of them **triple impact firms**[42], in several different sectors such as recycling, manufacturing, agricultural production, logistics or environmental education. In addition, many **large firms** and **business associations** are driving transitions to circular operation and initiatives within their realms[43]. Notable initiatives are the **Scale 360 program** led by SOFOFA; the development of **Circular Economy Strategy for the Construction Sector** led by CChC; the **electrical and electronic devices clean production agreement** led by the CCS; the **zero-waste clean production agreement** led by Acción Empresas; the growing number of firms that have joined ANIR; or Chile's **Plastics Pact**, led by Fundación Chile (FCH) and the Ministry of Environment, signatory to the EMF Global Commitment.

Also, several **higher education institutions** have been diving into the issue, and already some universities have circular economy continuing education programs (i.e. diplomados). Soon, postgraduate courses and research programs with local impact will follow. Higher education institutions offering vocational training already teach some of the skills needed for a circular economy, such as skills related to repairing things like cars and electronics. But all of this will need to grow, and not only in size but also in complexity, as the adoption of circular systems, technologies, business models and other circular economy drivers demand the learning of new (and sometimes old) skills.

Finally, **civil society** actors such as Fundación Avina, Fundación Basura, AdC Circular, ODECU, ANARCH and others have actively been driving the transition, and the **Alianza Basura Cero** has emerged, which defines itself as a network of organizations that promote a zero-waste lifestyle.

THE **PROCESS**

In this context of global and local effervescence around the circular economy, and noting its enormous long-term transformational potential, the Ministry of Environment, **Ministry of Economy, CORFO and the ASCC** initiated in 2019 the process that led to the development of this roadmap.

The first step of the process was the constitution, in 2019, of an **Executive Committee** to drive forward the process that would eventually lead to the development of the roadmap[44]. Then, a **study to map key actors and initiatives, and assess the state of progress** of the circular economy in the country was completed[45], and a diagnostic study financed by the CTCN was initiated. At the same time, an International Advisory Committee was constituted, composed of referent organizations and individuals. Soon after, **four early participation workshops** were held in the Antofagasta, Valparaíso, Biobío and Los Lagos regions.

In March 2020, a **Strategic Committee** was established. This committee, composed of 33 representatives from the public sphere, the private sector, civil society, and academia, met officially 11 times between May and November 2020, providing relevant knowledge and experience from different areas, and participating in several workshops to develop a vision for a circular Chile, decide on the long-term goals, and co-design the initiatives needed to achieve them.

In July 2020, **11 thematic groups**[46] began working to develop proposals to be included in the roadmap. Each group met at least six times between July and August 2020. In total, more than 100 people participated, in addition to the Executive and Strategic committees. The issues addressed in these groups were regulatory barriers; the development of markets for secondary materials; ecodesign; education and culture; the scaling of circular economy innovations; incentives and disincentives for the private sector; incentives and disincentives for citizens; prevention; reuse and repair; circular territories and local economies; and energy recovery.

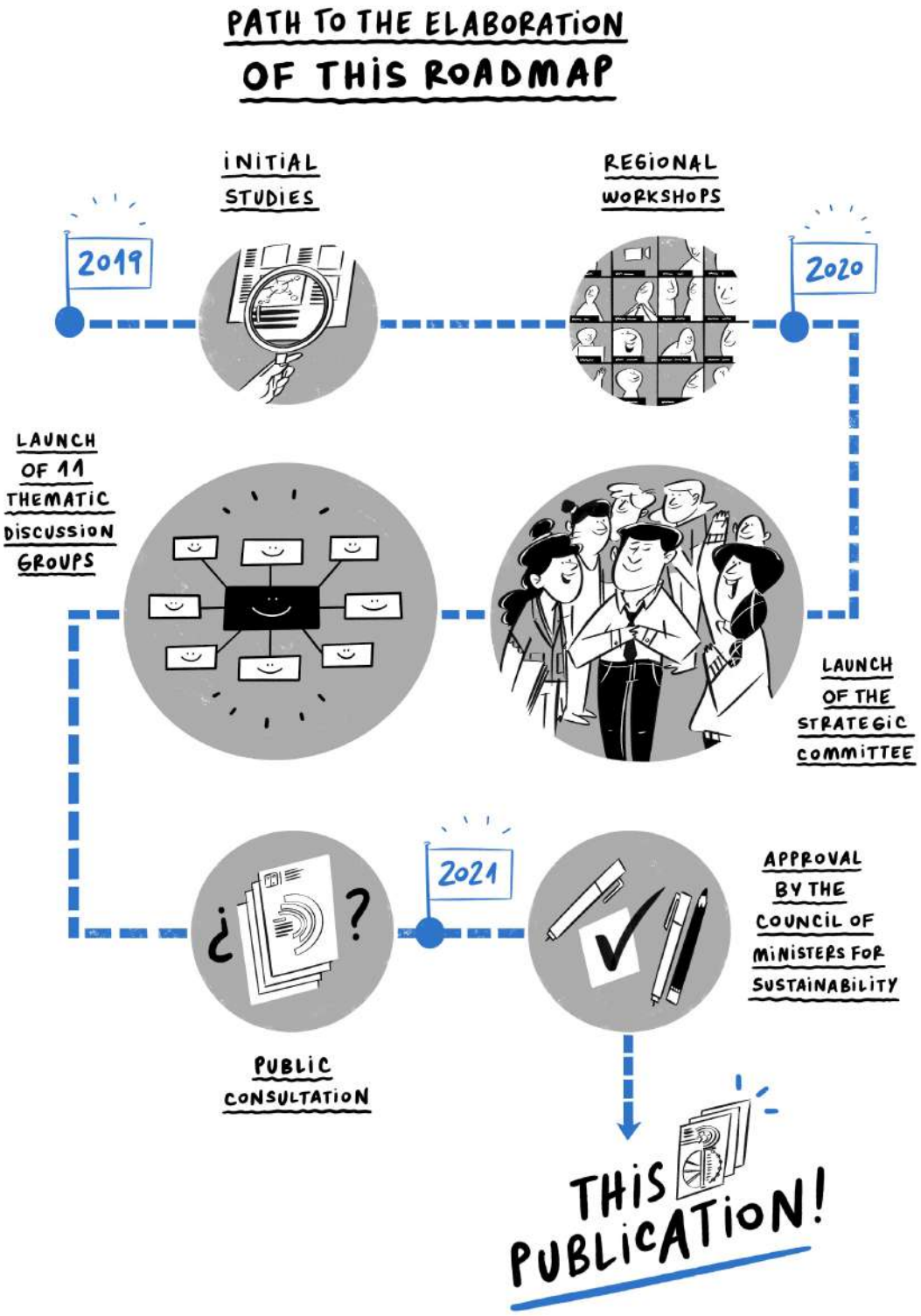
In December 2020, a roadmap proposal was published for **public consultation**. In the process, more than 500 observations were submitted by more than 50 different actors.

The present, final version of this roadmap was prepared after the analysis of the observations received during the public consultation process.

[44] Initially, the Executive Committee was made up of representatives of the Ministry of the Environment, the Ministry of Economy, the Corporation for the Promotion of Production and the Agency for Sustainability and Climate Change. Later, representatives of the EuroChile Foundation and the Consensus Building Institute joined. These last two organizations were hired to support the process in the role of consultants.

[45] See: RUBIK (2018). Consultoría para Mapeo de Actores e Impacto Potencial de la Economía Circular en Chile. Available at: https://sinia.mma.gob.cl/

[46] See the Annex.


PATH TO THE ELABORATION
OF THIS ROADMAP
INITIAL STUDIES
REGIONAL WORKSHOPS
2019
2020
LAUNCH OF 11 THEMATIC DISCUSSION GROUPS
LAUNCH OF THE STRATEGIC COMMITTEE
2021
APPROVAL BY THE COUNCIL OF MINISTERS FOR SUSTAINABILITY
PUBLIC CONSULTATION
THIS PUBLICATION!

BOX 4

THIS ROADMAP: A KEY PIECE IN A NETWORK OF STRATEGIC INSTRUMENTS

This roadmap is part of a broader set of strategic planning instruments that are important to mention since they provide relevant information and help define its scope. Developing the roadmap, the effort has focused on issues that these other instruments do not necessarily address with detail. Conversely, issues related to the circular economy, but which are addressed in great detail in other instruments, such as renewable energies, are not addressed in this roadmap.

In the area of the environment and economic development, an important contribution was the **National Strategy for Green Growth** *(Estrategia Nacional de Crecimiento Verde),* published in 2013 by the Ministry of the Environment and the Ministry of Finance. In this strategy, the implementation of a series of environmental management instruments was proposed, alongside initiatives to promote the market for environmental goods and services. Some of these instruments, such as extended producer responsibility, are already being implemented.

In the field of energy – key to a circular economy, which is based on renewable energies and promotes energy efficiency – a relevant contribution was the process that led to the publication, in 2015, of **Energy 2050 – Energy Policy for Chile *(Energía 2050 – Política Energética de Chile)***, which is currently being updated, and initiated a profound transformation of Chile's energy matrix that is still in full development. Also relevant was the publication, in 2017, of the **National Strategy for Electromobility *(Estrategia Nacional de Electromovilidad),*** also in the process of updating, and which achieved a consensus around the desirability of a migration from transport based on fossil fuels to electromobility, and initiated changes in that direction. The work that led to the publication, in 2020, of the **National Strategy for Green Hydrogen *(Estrategia Nacional de Hidrógeno Verde)***, which opens up new prospects for sustainable energy development for the country. And the **Energy Efficiency Law *(Ley de Eficiencia Energética),*** approved in February 2021, which contains initiatives expected to lead, by 2030, to a reduction of 10% in the energy intensity of the country, savings of around 15 billion dollars, and a reduction of 28,6 million tons of CO2eq.

Regarding the hydrological cycle – to which the circular economy has much to contribute – among important contributions are the publication by the Ministry of Public Works of the **National Strategy for Hydric Resources *(Estrategia Nacional de Recursos Hídricos)*** in 2013; the publication by the Ministry of the Interior and Public Security of the **National Policy for Hydric Resources *(Política Nacional para los Recursos Hídricos)*** in 2015; and the participatory process of the **Hydric Scenarios 2030 *(Escenarios Hídricos 2030)*,** which has generated several relevant publications.

In the area of territorial planning – in which a series of issues such as waste management, city development, and rural development converge and are embodied – the publication of the **National Policy for Urban Development *(Política Nacional de Desarrollo Urbano)*** in 2014 was a significant contribution, which filled an important gap as there was no previous strategic planning instrument to guide urban development in the country. Also important was the publication of the **National Policy for Rural Development *(Política Nacional de Desarrollo Rural)*** in 2020, which seeks to promote the integral development of the population living in rural territories. And the publication of the National Policy for Land Use Planning (Política Nacional de Ordenamiento Territorial) in 2021, the first integral land use planning instrument of the country.

In the area of sustainability, to which the circular economy is a tributary, an important contribution was the 2016 publication of the **National Program for Sustainable Consumption and Production *(Programa Nacional de Consumo y Producción Sustentables)***, which defined 12 lines of action and an action plan to materialize them. And the 2020 publication of Chile's Nationally Determined Contribution (NDC) update, where the country made several commitments to contribute to the Paris Agreement and help fight climate change.

In the area of waste management and other areas of key importance for the circular economy, a relevant instrument was the **National Policy for the Inclusion of Waste Pickers 2016–2020 *(Política de Inclusión de Recicladores de Base 2016–2020)***, which recognized the work of the communities dedicated to this trade, but also their vulnerable situation, highlighting the importance of valuing their contribution and promoting their formalization. Also important was the 2019 publication of the **Chilean Plastics Pact Roadmap *(Hoja de Ruta del Pacto Chileno de los Plásticos)***, which dives into the issue of plastic pollution and establishes initiatives to tackle it, with goals for 2025; the publication of the **Circular Economy Roadmap in Construction 2035 *(Hoja de Ruta RCD Economía Circular en Construcción***

2035) in 2020, which deals with a sector that generates a significant portion of the country's waste; the publication of the **National Strategy for Organic Residues *(Estrategia Nacional de Residuos Orgánicos)*** in 2021, which delves into the future of municipal organic waste management, proposing a vision for 2040 and the strategy to achieve it; and the **National Strategy for Marine Waste and Microplastics *(Estrategia Nacional sobre Residuos Marinos y Microplásticos),*** which is still under development.

Finally, this Roadmap built on the work of two strategic planning processes that generated relevant background for this instrument: the construction process of the **National Residues Policy *(Política Nacional de Residuos)*** that was carried out in 2016-2017, and the elaboration process of the **National Plan for Ecodesign and Ecolabelling *(Plan Nacional de Ecodiseño y Etiquetado),* which took place in 2017-2018.**

IV.
HOW WILL A **CIRCULAR CHILE LOOK LIKE BY 2040**?

VISION

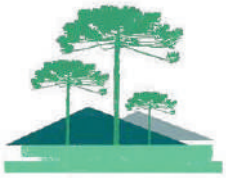

A COUNTRY WHERE
NOTHING GETS WASTED
AND EVERYTHING
IS
TRANSFORMED
FOR THE CARE OF LIFE

THE VISION OF THIS ROADMAP IS THAT...

By 2040, a regenerative circular economy drives Chile to a sustainable, fair and participatory development path that puts people at the centre; *this, through the care of nature and its living beings, the responsible and efficient management of our natural resources, and a society that uses, consumes, and produces in a sustainable and conscious way, promoting the creation of green jobs and opportunities for people and organizations through the country.*

Achieving this vision demands a future where:

The circular economy has been embedded in the culture of the country, generating sustainable production and consumption patterns in all levels of society. People and organizations are fully aware of the problems presented by the linear economy and incorporate this awareness into their decisions and actions. And all this has been possible thanks to the incorporation of the principles of the circular economy in the spheres of education and communication, the wide availability and dissemination of information, and the learning of the various types of skills that the transition requires.



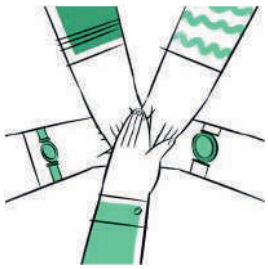
Circular practices have driven the regeneration of nature, positively and sustainably impacting the lives of people and the environment. People and organizations pay special attention to the care of soils, waters and ecosystems that host biodiversity, avoiding the use of problematic substances, the inappropriate disposal of waste, and other types of pollution. Territorial planning instruments incorporate a regenerative outlook. And all this has increased the resilience, biodiversity, and natural wealth of the country, promoting the health and well-being of people.

The innovation potential of the circular economy has been fully tapped into, igniting the creativity of people for the design and implementation of more efficient and sustainable production systems. Organizations conducting research have focused on generating relevant information to solve the problems of the linear economy, and circular entrepreneurship has become common. Circular business models, low-impact design standards, and clean technologies that started out as great innovations have become the norm. And all this has allowed the country to position itself as a global leader in innovation for the circular economy.

The circular economy has reached all regions of the country, promoting sustainable local development compatible with the visions and vocations of each place. The transition to the circular economy has recognized the enormous geographic diversity of the country. Local economies of all regions have strengthened based on the sustainable use of their natural wealth. And all of this has contributed to the resilience of the territories, the diversification of their productive activities, and the respect for the multicultural identity of the communities that inhabit them.

The circular economy has become a generous source of opportunities, enabling a fair transition. Numerous new jobs have been created in occupations as diverse as product design, management of materials, repair and remanufacturing, logistic services and distribution, regeneration of natural systems, among other activities, many of them novel. Attention has been put into identifying vulnerable groups and facilitating skills training, and assuring that the opportunities that are generated are open to them, ensuring justice in the transition process.

The profound changes brought about by the transition have been the result of the collaborative and participatory work of a diverse set of actors. People from different sectors – civil society, academia, private sector, public sector – have managed to work together on the common challenges that need to be faced, generating synergies, and leveraging resources from different sources. And there has been a sensible, coherent, gradual, and balanced articulation among the initiatives promoted by all these actors, which has given strength to the transition process towards the circular economy.



LONG-TERM **GOALS** TO ENSURE **PROGRESS** IN THE **RIGHT DIRECTION**

To assess progress towards this vision, **seven long-term goals** have been agreed. Each of these goals is set to a 2040 **horizon**, with an **intermediate goal set to a 2030 horizon.**

INDICATOR	2030 GOAL	2040 GOAL
1st Goal: Generation of green jobs	100.000 new jobs	180.000 new jobs
2nd Goal: Generation of municipal solid waste per capita	Decrease of 10%	Decrease of 25%
3rd Goal: Total waste generation per GDP	Decrease of 15%	Decrease of 30%
4th Goal: Material productivity	Increase of 30%	Increase of 60%
5th Goal: General recycling rate	Increase to 40%	Increase to 75%
6th Goal: Recycling rate of municipal solid waste	Increase to 30%	Increase to 65%
7th Goal: Recovery of sites affected by illegal dumping	Recover of 50%	Recover of 90%

1ST GOAL:
GENERATION OF GREEN JOBS

For a fair transition to the circular economy, it is essential to ensure that it contributes strongly to the generation of **green jobs**, recognizing that this should not be taken for granted[47] and that it is everyone's job to assure inclusiveness and equity throughout the process. Jobs must not only be green, but also decent jobs, as defined by the International Labour Organization: productive, remunerated with fair wages, secure, with social protection, and opening opportunities for personal development and social integration.[48]

The transition is expected to increase the proportion of various types of jobs. With the deployment of EPR in Chile, employment in **waste management and recycling** will increase rapidly. Employment in activities related to the **repair and maintenance** of products and infrastructure is also expected to increase significantly. There are also prospects for an increase in employment in the so-called **social economy**[49], which in Chile includes the historical figure of cooperatives and the most recent social enterprises. Increases are also expected in specialized activities such as ecodesign, materials science, bioprocesses design, or even ecological consultancy[50]. And, surely, **new types of jobs will be created that we are not yet able to imagine.**

Several studies have analysed the jobs potential of the circular economy. In a 2015 study, the Club of Rome estimated that, by 2030, the circular economy could generate more than 300,000 new jobs in France, more than 200,000 new jobs in Spain, and more than 50,000 new jobs in Finland[51]. Likewise, in a 2018 publication, the International Labour Organization estimates that the transition could generate, globally, by 2030, more than 50 million new jobs in global services, and more than 45 million new jobs in waste management[52]. Although indirectly[53], these studies allow an estimate of the employment potential of the circular economy in Chile.[54]

Based on the above, the first long-term goal of this roadmap is:

1. THAT, BY 2040,

THE CIRCULAR ECONOMY HAS GENERATED AT LEAST

180.000

GREEN JOBS,

AND THAT BY 2030 THESE HAVE ALREADY REACHED 100.000.

[47] See: Laubinger, F., E. Lanzi and J. Chateau (2020). Labour market consequences of a transition to a circular economy: A review paper. OECD Environment Working Papers, No. 162, OECD Publishing, Paris. Available at: https://doi.org/10.1787/e57a300a-en

[48] See: http://www.oit.org/global/topics/decent-work/lang--es/index.htm

[49] See: Circle Economy (2020). The Social Economy: A Means for Inclusive & Decent Work in the Circular Economy. Available at: https://www.circle-economy.com/resources/the-social-economy-a-means-for-inclusive-decent-work-in-the-circular-economy

[50] See: Burger, M., Stavropoulos, S., Ramkumar, S., Dufourmont, J., & van Oort, F. (2019). The heterogeneous skill-base of circular economy employment. Research Policy, 48(1), 248-261. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0048733318302026

[51] See: Club of Rome (2015). The Circular Economy and Benefits for Society.

2ND GOAL:
DECREASE IN THE GENERATION OF MUNICIPAL SOLID WASTE PER CAPITA

The generation of municipal solid waste (hereinafter, MSW) is a notable effect of the linear economy. In the case of Chile, this waste stream corresponds to around **42% of the total residues reported**.[55] Reducing MSW largely depends on the production and distribution decisions of the firms that design, produce and market products, which decide how much effort to make sure that the products they put on the market are durable, or what kind of packaging is used to sell them, among many other things. But it also depends crucially on the lifestyle choices and consumption decisions of citizens, who must constantly decide how to spend their resources, and can integrate the environmental dimension into their purchasing decisions.

In the last 17 years, the generation of MSW per capita has been on the rise. While in 2000, the country's inhabitants generated 295 kg/capita/year on average; by 2018 this had risen to 440 kg/capita/year. Although this still places Chile below the OECD average of 535 kg/capita/year, its trend is contrary to that of the block: **while, between 2000 and 2018, Chile recorded an increase of 49% in MSW/capita/year, in the same period the OECD block registered a decrease of 6%.** These decreases were driven by notable cases such as Spain (27% reduction between 2000 and 2018), Japan (22% reduction in the same period), and the Netherlands (14% reduction). The case of Japan, which reached 336 kg/capita/year in 2018, is remarkable as it shows how a relatively low MSW generation rate is compatible with a high level of economic development.[56]

For the country to move towards a circular economy, it must aim for a sharp decrease in the generation of MSW, promoting ecodesign and circular distribution systems, sustainable lifestyles and consumption patterns, and a decrease of food loss and waste.

For these reasons, the second long-term goal of this roadmap is:

2. THAT, BY 2040,

THE GENERATION OF MUNICIPAL SOLID WASTE PER CAPITA

HAS BEEN REDUCED BY 25%,

AND THAT BY 2030 THE REDUCTION HAS ALREADY REACHED 10%.

[52] See: International Labor Organization (2018). Greening With Jobs.

[53] To make more direct estimates, it will be relevant to consult the study Monitoreo de Empleos Verdes en Chile, commissioned by the MMA from CDT In-Data (public tender ID 608897-57-LE19) and published in 2020 (available at: https://sinia.mma.gob.cl/ through the search engine). While this study is valuable, it is a retrospective study which estimates the number of green jobs in dates prior to the study; and not a prospective study which makes a projection of the number of green jobs that the circular economy could generate.

[54] An additional antecedent that allows to understand the potential for generating green jobs of major economic transformations such as the transition to the circular economy in the Chilean context, is the study Cuantificación del encadenamiento industrial y laboral para el desarrollo del H2 en Chile, published in 2020 by GIZ and commissioned by the Ministry of Energy. In this report, it is estimated that the development of green hydrogen in Chile has the potential to generate at least 22 thousand jobs by 2030, 87,000 by 2040, and 94 thousand by 2050. See: https://www.4echile.cl/publicaciones/quantification-of-the-industrial-and-labor-chain-for-the-development-of-hydrogen-in-chile/

[55] Information for the year 2018. See: MMA, 2020. Informe del Estado del Medio Ambiente. Available at: https://sinia.mma.gob.cl/iema-2020/

[56] See: https://data.oecd.org/waste/municipal-waste.htm

3RD GOAL:
DECREASE IN TOTAL WASTE GENERATION PER GDP

At the same time, it is essential to decouple economic growth from waste generation. The achievement of this objective should translate into a decrease in the total generation of waste in the country for each unit of gross domestic product generated (i.e. total waste/GDP).

In this regard, since 2013 Chile has data from the National Waste Declaration System (SINADER, for its Spanish acronym). Although it has limitations[57], the data from this system show a rising trend in total waste/GDP, with an increase of 6,3% between 2015 and 2017. **It is essential to reverse this trend,** following the example of countries such as Spain, Poland, Slovenia or the United Kingdom, which achieved, between 2006 and 2016, reductions of 23%, 17%, 16% and 15%, respectively.

Thus, **the third long-term goal** of this roadmap is:

3. THAT, BY 2040,

WASTE/GDP HAS BEEN
REDUCED BY 30%,

AND THAT BY 2030 THIS REDUCTION HAS ALREADY REACHED 15% .

[57] For different reasons, an important part of the residues generated in the country is not declared. For example, it has been estimated that only 7% of construction and demolition residues are reported in SINADER. See: MMA, 2020. Informe del Estado del Medio Ambiente. Available at: https://sinia.mma.gob.cl/iema-2020/

[58] Based on the industrial residues reported in the National Waste Declaration System (SINADER). The baseline of this goal should be revised as SINADER manages to cover a greater part of the residues generated in the country.

4TH GOAL:
INCREASE IN MATERIAL PRODUCTIVITY

A second way to measure the decoupling between economic development and resource use is to observe the evolution of the value generation indicators such as GDP in relation to the evolution of the resource use indicators such as domestic material consumption (DMC), which represents the amount of materials consumed by an economy[59].

By dividing GDP by DMC, the **material productivity** of a country can be calculated. This indicator serves to understand the value that an economy generates for each unit of material used. As of 2017, Chile's material productivity had reached US$ 0.56/kg, an increase of 22% compared to 1997. Although this trend is positive, Chile is the OECD country with the lowest material productivity of all, well below the average for the bloc of US$ 2.88/kg in the same year. In addition, countries with a productive structure comparable to that of Chile[60], such as Canada or Australia, achieved even greater increases in material productivity in the same period (36% and 56%, respectively)[61].

The economic gains that a more rational use of resources can bring, and the strong expansion of services for a circular economy that the transition entails, are opportunities to greatly speed up the increase of the material productivity of the country's economy.

Considering this, the **fourth long-term goal** of this roadmap is:

4. THAT, BY 2040,

THE MATERIAL PRODUCTIVITY OF THE COUNTRY HAS

INCREASED BY 60%,

AND THAT BY 2030 THIS INCREASE HAS ALREADY REACHED 30%.

[59] manages to cover a greater part of the residues generated in the country.
[60] See more at: https://sdg.tracking-progress.org/indicator/12-2-2-domestic-material-consumption-all-raw-materials-tonnes-per-capita/
[61] With a large presence of the primary sector in the economy.

5TH GOAL:
INCREASE IN THE GENERAL RECYCLING RATE

While reducing the waste generation is essential, it is also important to **ensure that the residues generated are kept in the economy for as long as possible.** The recycling rates[62] of a country are a fundamental indicator to measure progress in this area.

According to information from SINADER, in Chile, **in 2018, the general recycling rate was approximately 13%**[63]. This places the country far from the international threshold in this area: in 2016, the countries from the European Union reached, on average, a general recycling rate of 56%; and in the same period, countries such as the Netherlands, Belgium or Slovenia reached rates of 72%, 78% and 80%, respectively[64].

There are several reasons to expect an **accelerated development of the recycling sector in the country.** On the one hand, the implementation of the EPR Law, and its possible future extension to other products[65], will trigger a significant investment wave. Added to this is the drive that will be given through the implementation of the initiatives of this roadmap and other instruments such as the Estrategia Nacional de Residuos Orgánicos and the Hoja de Ruta RCD - Economía Circular en Construcción. Finally, as technological development for a more circular economy continues, new technologies in fields such as materials science or chemical recycling[66] will move the frontier of what is possible today.

Based on this, **the fifth long-term goal** of the **roadmap is:**

5. THAT, BY 2040,

THE GENERAL RECYCLING RATE OF THE COUNTRY HAS REACHED 75%,

AND THAT BY 2030 THIS RATE HAS ALREADY REACHED 40%.

[62] Acá se considera que el reciclaje incluye tanto a los ciclos técnicos (reciclaje de plásticos, metales, papel y cartón, etc.) como a los ciclos biológicos (compostaje, digestión anaeróbica, etc.).

[63] Ver: https://sinia.mma.gob.cl/residuos-iema2020/

[64] Ver: https://ec.europa.eu/eurostat/statistics-explained/index.php/Waste_management_indicators#Recycling

[65] Muchos países que han implementado la responsabilidad extendida del productor han ampliado gradualmente la lista de productos sujetas a esta. En esta hoja de ruta, una de las iniciativas propuestas apunta en este sentido.

[66] Ver: Rahimi, A., García, J. Chemical recycling of waste plastics for new materials production. Nat Rev Chem 1, 0046 (2017). Disponible en: https://doi.org/10.1038/s41570-017-0046

6TH GOAL:
INCREASE IN THE RECYCLING RATE OF MUNICIPAL SOLID WASTE

Recycling[67] of MSW faces different challenges when compared to recycling of other types of residues. The cause of this distinction is the distribution of its generation: in small quantities throughout all human settlements, as opposed to industrial residues, in which generation points are less dispersed, and the generation is in larger quantities. This makes the recycling of MSW particularly difficult and expensive, as it depends on the coordinated action of a large numbers of actors, including citizens who must actively participate by separating residues at their source and in coordination with their local recycling systems.

In Chile, the recycling rate of MSW barely reaches 2%[68]. However, international experience shows that **high MSW recycling rates can be achieved.** For example, for 2016, the European Union bloc reached an average rate of 46%, while countries such as Germany or Slovenia reached rates of 66% and 58%[69], respectively. The case of Slovenia is of special interest: over a 14-years period, between 2002 and 2016, its MSW recycling rate increased from 20% to 58% .

The recycling of MSW in the country will receive a huge boost from the implementation of EPR, particularly EPR of packaging, where progressive and mandatory collection and recovery targets have already been established: by 2035, 70% recycling of paper and cardboard, 65% for glass, 60% for tetrapak, 55% for metals, and 45% for plastics.[70] And also, from the implementation of the Estrategia Nacional de Residuos Orgánicos, whose goal is to achieve a recycling rate of 66% of organic MSW by 2040. A strong action can lead Chile to achieve ambitions goals in these areas, where action has already begun.

Hence, the **sixth long-term** goal of this roadmap is: 6.That, by 2040, the recycling rate of municipal solid waste has reached 65%, and that by 2030 this rate has already reached 30%.

6. THAT, BY 2040,

THE RECYCLING RATE OF MUNICIPAL SOLID WASTE HAS

REACHED 65%,

AND THAT BY 2030 THIS RATE HAS ALREADY REACHED 30%

[67] Here again both the recycling of organic and inorganic waste is included.

[68] Although the information reported by the municipalities through SINADER (https://sinia.mma.gob.cl/residuos-iema2020/) indicates that the MSW recycling rate in Chile does not exceed 1%, this data is indirect and it does not have the robustness of the MSW recycling rate that can be calculated from the Análisis General de Impacto Económico y Social del Anteproyecto de Decreto Supremo que Establece Metas de Recolección y Valorización y otras Obligaciones Asociadas a Envases y Embalajes (AGIES EyE) published in 2019 by the MMA and which is available in the file of this priority product. In this, it is estimated, based on more robust data, that, in 2018, 156,993 tons of household packaging were recycled, which would represent 1.92% of the 8,177,448 tons of municipal non-hazardous waste that was generated that year.

[69] See: https://www.eea.europa.eu/airs/2018/resource-efficiency-and-low-carbon-economy/recycling-of-municipal-waste

[70] See: Decreto 12, de 2020, del MMA que Establece Metas de Recolección y Valorización y Otras Obligaciones Asociadas de Envases y Embalajes. Available at: https://www.bcn.cl/leychile/navegar?idNorma=1157019

7TH GOAL:
RECOVER OF SITES AFFECTED BY ILLEGAL WASTE DISPOSAL

According to a recent study based on the compilation of information available in the country's municipalities, in Chile **there are at least 3,735 sites affected by the illegal disposal of waste**, of which 243 correspond to garbage dumps larger than 1 hectare (known in Chile by the acronym of VIRS: *Vertederos Ilegales de Residuos Sólidos*) and 3,492 to garbage dumps smaller than 1 hectare (known as *microbasurales*). **At least 54% of these garbage dumps are on public land,** at least 11% on private lands, and for the remaining 35% there is no information. Its total area is 1,444 hectares, which, according to the study, is roughly equivalent to the area of the municipality of Providencia .[71]

Communities affected by nearby garbage dumps are generally the most vulnerable. People living near these sites face a series of negative effects on their health and quality of life: air pollution, water pollution, proliferation of disease vectors, and loss of property value, among other multidimensional effects[72]. However, improper waste disposal affects not only people, but the entire environment: it has been calculated that one hectare of landfill means losses of 525 kg of fertile soil and 15,000 tons of groundwater each year.[73]

A fundamental step towards a circular Chile is to ensure that people are no longer affected by improperly disposed waste in their daily lives. To do this, **all the residues that are generated and that still cannot be recovered, must at least be disposed of properly.** And the areas that have been degraded by illegal disposal of waste must be recovered.

Thus, the **seventh long-term goal** of this roadmap is:

7. THAT, BY 2040,

90% OF THE AREA,

OCCUPIED BY ILLEGAL GARBAGE DUMPS HAS BEEN RECOVERED, AND THAT BY 2030 THIS RECOVERY HAS ALREADY REACHED 50%.

[71] See: Ossio, F. Faúndez, R. (2021). Diagnóstico Nacional de Sitios de Disposición Ilegal de Residuos. Available at: https://www.researchgate.net/publication/348443724_Diagnostico_Nacional_de_Sitios_de_Disposicion_Ilegal_de_Residuos

[72] See: MMA, 2020. Informe del Estado del Medio Ambiente. Available at: https://sinia.mma.gob.cl/iema-2020/

[73] See: Ossio, F. Faúndez, R. (2021). op. cit.

V.
HOW DO WE MAKE THIS HAPPEN?

FOUR PILLARS
OF THE TRANSITION

This chapter presents the **initiatives and actions** that were proposed, selected, and in some cases began to be implemented through the roadmap development process; in order to achieve the vision and the long-term goals presented in the previous chapters.

The initiatives and their actions are grouped in f**our pillars of the transition:** circular innovation, circular culture, circular regulation, and circular territories. The first pillar focuses on the need to focus the creativity and innovation capabilities of the productive sector on the design and deployment of production systems with less socio-environmental impacts through lifecycles. The second pillar focuses on the cultural changes that need to take place to achieve the vision that has been presented. The third emphasizes initiatives that should be driven from the central level of the state, including sectoral ministries and services. And the fourth and last one focuses on initiatives that should be promoted by local actors such as regional governments, municipalities, social organizations, and business associations acting in their localities.

BOX 5

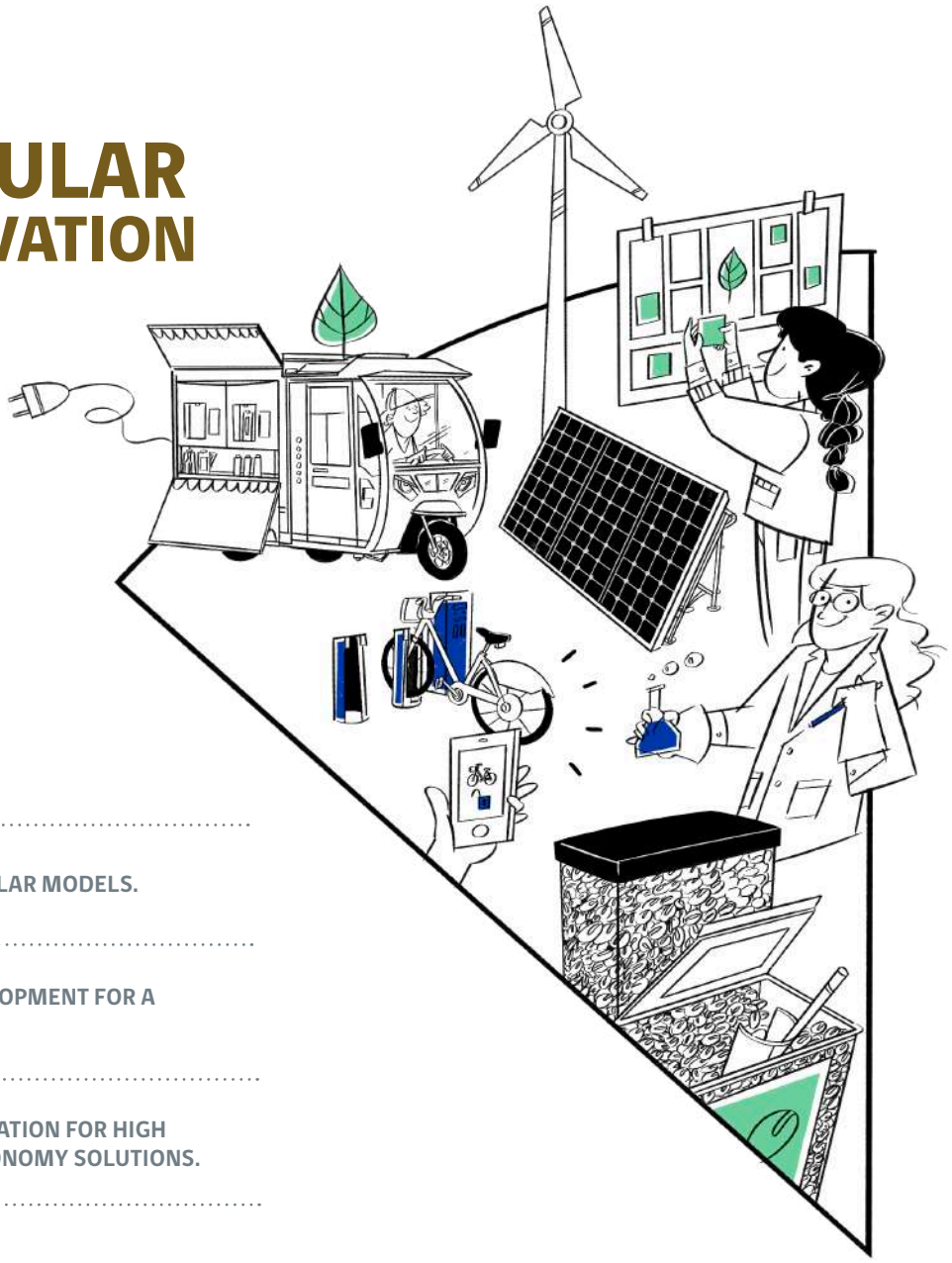
ABOUT THE PRESENTATION OF THE INITIATIVES AND ACTIONS

Through the participatory process that led to the roadmap, several actors, starting with the Strategic Committee, declared themselves available to lead one or more of the initiatives and/or actions. These actors have been identified in the **"Leads"** and **"+Leads"** columns. In addition, the key actors have been identified in the respective columns **"Key Actors"** and **"+Key Actors"**. If an actor is "leads" or is a "key actor" of an initiative, it must be understood that it also leads or is a key actor of its actions. The leads and key actors identified in this document should not be deemed as an exclusive group. Rather, the aim is to convene the widest possible range of actors – i.e. all the people and organizations that feel called upon – to work on accelerating the transition to a circular economy.

INITIATIVE X		Key	LP	LEADS	KEY ACTORS
Title of the initiative. Description of the initiative.				Leader of the initiative	Key actor for the initiative
ACTIONS	**ST**	**MT**	**LT**	**+ LEADS**	**+ KEY ACTORS**
a. Description of the first action of the initiative.				Additional leaders of this specific action.	Additional key actors of this specific action.
a. Description of the second action of the initiative.				Additional leaders of this specific action.	Additional key actors of this specific action.
a. Description of the third action of the initiative.				Additional leaders of this specific action.	Additional key actors of this specific action.

The actions of the roadmap have been timed in three horizons: short-term (ST), medium-term (MT) and long-term (LT). For this roadmap, a short-term horizon indicates that the action is expected to be completed before the end of 2022. A medium-term horizon, that it will be materialized before the end of 2026. And a long-term horizon, that its implementation will be completed before the end of 2030. While the horizon of this roadmap is the year 2040, initiatives and actions beyond 2030 are not included. This is because the roadmap should be updated in a period of no more than 10 years, at which time the initiatives and actions for the new decade ought to be defined.

CIRCULAR INNOVATION



1. ZERO WASTE FIRMS.
2. PROMOTION OF CIRCULAR MODELS.
3. RESEARCH AND DEVELOPMENT FOR A CIRCULAR ECONOMY.
4. STRATEGIC COLLABORATION FOR HIGH IMPACT CIRCULAR ECONOMY SOLUTIONS.
5. SCALE-UP OF HIGH POTENTIAL CIRCULAR SOLUTIONS.
6. INFORMATION SYSTEMS FOR MODELLING THE LOCAL ENVIRONMENTAL IMPACT OF GOODS AND SERVICES.
7. TECHNICAL STANDARDS FOR THE CIRCULAR ECONOMY.
8. CIRCULAR PUBLIC PROCUREMENT.

Overcoming the linear economy presents a series of **major challenges that will demand great creativity** from a wide range of actors from different productive systems in the country. As many stakeholders as possible should be involved; starting with those that use a large amount of resources or generate a large amount of waste and other negative impacts, in their operations.

Innovation is necessary in many different areas: designing and implementing more efficient **productive processes** that use less material resources, water, and energy; implementing new **business models** that deliver the same or more value with less material and impacts along value chains; and also, creating **better products,** that is, eco-designed and more circular than those currently available; among other areas.

Furthermore, **innovation must take place at different levels of organization of productive systems.** Firms must individually move to a more circular operation, according to their contexts and realities. Work should also be done at the sectoral level, where the different business associations that operate in the country are key actors. And some issues need to be addressed by looking at entire systems and value chains, as in the case of the food system which needs to be addressed as a whole.

Also, the circular economy opens up new avenues for **research and development**. If R&D is aimed at increasing knowledge about linear economy problems, and expanding the universe of possible solutions, this can have a large impact on the speed and direction of the transition.

Funding for the circular economy should come from different sources. The financial sector should expand its offer of green financing for circular projects and firms, which will require mechanisms to identify and certify such projects and firms. And the state should keep playing its key role in this area, expanding the range of mechanisms to channel public funding towards circular initiatives.

It will also be **essential to ensure that innovation for the circular economy favours a lifecycle approach**, so that the environmental benefits obtained from an intervention are not offset by the generation of new environmental impacts in other areas, as is often the case.

The following initiatives seek to promote the development of a robust **national innovation system**[74] **for the circular economy in Chile**, which addresses challenges at different scales and provides all kinds of circular solutions to specific problems of the linear economy:

[74] See: Freeman, C. (2002). Continental, national and sub-national innovation systems—complementarity and economic growth. Research policy, 31(2), 191-211. Disponible en: https://www.sciencedirect.com/science/article/abs/pii/S0048733301001366

INITIATIVE 1				Leads	Key Actors
				ASCC, Acción Emp., CChC, AVINA	Sector privado
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Establish a definitive recognition for productive facilities subject to declaration in SINADER, using criteria of continuous improvement in the field of circular economy, based on the evaluation of the experience generated by the APL Cero Residuos a Eliminación.[76]				MMA	
b. Promote the development and use of tools for the diagnosis and measurement of circularity at the organizational level[77], which consider process indicators (existence of information systems, enabling organizational structures, etc.) and results indicators (reduction of the use of resources, reduction of waste generation, increase in recovery rates, etc.), and that enable the identification of priority areas for improvement.[78]				SOFOFA Hub, CCS	

ZERO WASTE FIRMS.
Promote the transition of firms towards the circular economy model, especially those that work with large flows of physical resources and generate high amounts of waste.[75]

[75] These include all those firms that are obliged to declare in the National Waste Declaration System (SINADER).

[76] For this, sectorial experiences such as the "S Seal" of SERNATUR should be consulted. See: https://www.sernatur.cl/sello-sustentabilidad/

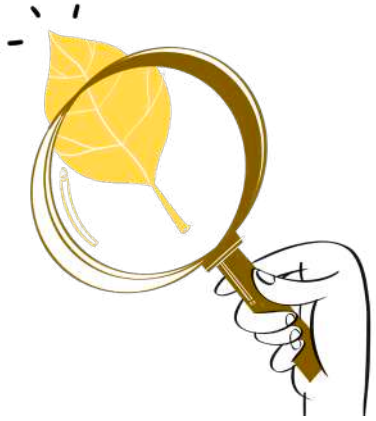
[77] Of which some already exist. See, for example: https://www.ellenmacarthurfoundation.org/resources/apply/circulytics-measuring-circularity o https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Circular-transition-indicators

[78] It is important to consider that, currently, the availability of standards that define what requirements a project, product, service, process, company, etc. must meet to be considered "circular" is scarce, being far behind other areas of sustainable development such as, for example, the calculation of greenhouse gas emissions, where for many years there have been international standards tested in real life experiences. However, this is changing rapidly. For example, in 2018, the ISO/TC323 Committee was constituted, which is developing a set of six standards for the circular economy, which are expected to be published in 2022. One of these standards (ISO / WD 59020.2 Circular economy - Measuring circularity framework) refers to a framework for measuring circularity. For more information, see: https://www.iso.org/news/ref2402.html and https://www.iso.org/standard/80650.html

INITIATIVE 2				Leads	Key Actors
 **PROMOTION OF CIRCULAR MODELS.** Promote, through grants and other mechanisms, the development of a broad base of SMEs operating under the logic of the circular economy, that is , that adopt circular strategies and business models[79] to offer products with less socio-environmental impacts than the alternatives available in the market, and services that support the transition.				CORFO, SERCOTEC, ASCC, CChC, MMA	Sector privado, Academia, Sociedad Civil
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Implement a program of circular economy business rounds that generate direct connections and collaborations among different actors of the local circular innovation ecosystem under development.				FcH	InnovaChile, Negocios con Impacto, Sistema B
b. Implement an open innovation challenges program in order to support companies and public organizations in identifying and formulating their challenges in the face of the transition to the circular economy, providing support to bring these challenges to entrepreneurs and innovators who are capable of proposing effective solutions, and jointly generating pilots and validation instances in real conditions.				FcH CCS	MINCIENCIA, InnovaChile, FIA
c. Promote the development of a community of practice around the theme of ecodesign in Chile, which facilitates learning about life cycle analysis, eco-design methodologies and practices, and their application to the local context[80]; provide access to specialists in the area, and highlights local advances in the field through the visibility and dissemination of the most notable projects.					Red Chilena de Análisis de Ciclo de Vida
d. Promote the development of reverse and collaborative logistics systems that enable the circulation of reusable containers and packaging for the transport of products, for example, retail products that are acquired through mobile applications.					Comercio mayorista y minorista, Plataformas digitales de comercio, logística y distribución
e. Disseminate widely, through different platforms, successful local cases of circular economy, narrating its genesis and development trajectories, and characterizing its business models and positive impacts, in order to generate a demonstration effect that encourages others.					ASECH, Proyecta circular, ODEPA, SERCOTEC, FOSIS

[79] In an academic review, a total of 45 different circular economy strategies were identified and analysed, including "servitization", "life cycle analysis", "material substitution", "resource sharing", and "virtualization", among many others. See: Kalmykova, Y., Sadagopan, M., & Rosado, L. (2018). Circular economy–From review of theories and practices to development of implementation tools. Resources, conservation and recycling, 135, 190-201. Available at: https://www.sciencedirect.com/science/article/pii/S0921344917303701

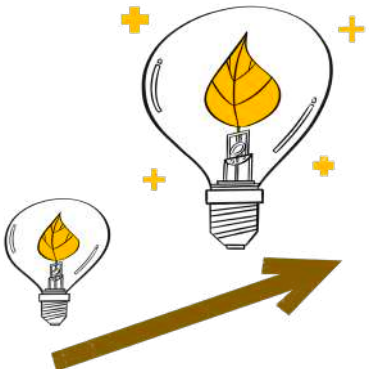
[80] In this regard, it is relevant the technical standard NCh-ISO 14006:2020 - Directrices para incorporar el ecodiseño. Available at: https://www.inn.cl/

INITIATIVE 3				Leads	Key Actors
 **RESEARCH AND DEVELOPMENT FOR A CIRCULAR ECONOMY.** Promote the creation of lines of research, development, and applied innovation (R&D+i) with potential to accelerate the transition to the circular economy in the country.				ANID, CORFO	Instituciones de Educación Superior, Sector privado
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Promote the development of a line of R&D+i projects for the generation of by-products from organic residues from the food system.				CNPDA	Facultades de agricultura e ingeniería en alimentos, Gremios agroindustriales, ODEPA
b. Promote the development of a line of R&D+I projects that open the field of nature-based solutions [81]					Facultades de ecología y medioambiente, arquitectura, urbanismo y construcción
c. Promote the development of a line of R&D+i projects that increase knowledge about the design of goods and services with low environmental impact.					Facultades de diseño (industrial, de textiles, etc.)
d. Promote the development of a line of R&D+i projects on the use of digital and advanced manufacturing technologies for circular economy applications.					Centro de Economía Circular de la Macrozona Norte

[81] The "nature-based solutions" contemplate a series of alternative approaches for solving socio-environmental problems. It includes solutions such as the development of vegetation to control landslides, or the use of wetlands for water purification, among others. Nature-based solutions are also known as "green infrastructure", as opposed to so-called "grey infrastructure", which includes the construction of levees, bridges, roads, and other more traditional types of public infrastructure. For more information, see: IUCN (2017). Nature-based solutions to address global societal challenges. Available at https://portals.iucn.org/library/node/46191

INITIATIVE 4				Leads	Key Actors
 **STRATEGIC COLLABORATION FOR HIGH IMPACT CIRCULAR ECONOMY SOLUTIONS.** Articulate actors from the main production systems, value chains and industrial areas of the country, for the development and implementation of joint circular economy interventions, that overcome information and coordination failures that limit the scope of action; and that aim to achieve high-impact and systemic changes.				SOFOFA, ASCC, CORFO	Sector privado, Sociedad civil Instituciones de Educación Superior
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Develop characterization and diagnosis studies of the potential for transition to circular economy for different production systems, value chains and areas of high industrial concentration.[82]				SOFOFA Hub, Acción Emp., ACERA, ODEPA	DR de CORFO, Gremios y asoc. emp.
b. Promote investment in the implementation of collaborative circular economy pilot projects, scaling up the most successful results and disseminating learnings.				SOFOFA Hub, Acción Emp., ACERA	DR de CORFO, ODEPA, Gremios y asoc. emp.
c. Promote the development of interactive platforms for the development of markets for secondary materials, which enable the generation of permanent links between actors that generate potentially valuable waste and those that could use them; taking advantage of the latest technologies to generate timely and effective links, and starting with flows of high potential waste, such as those from construction and agriculture.				ANIR, Acción Emp.	Sector privado, Recylink, MOP, ODEPA, MINSAL
d. Promote the evolution of industrial parks and other areas of high concentration of productive activity towards the model of industrial symbiosis .				Fund. Chile, SOFOFA Hub	Principales empresas de zonas de alta concentración industrial

[82] In this regard, it is relevant to pay attention to the work of the ISO TC/323 Committee, which is preparing the standard ISO / WD 59010 - Circular economy - Guidelines on business models and value chains. For more information, see: https://www.iso.org/news/ref2402.html and https://www.iso.org/standard/80649.html

INITIATIVE 5				Leads	Key Actors
 **SCALE-UP OF HIGH POTENTIAL CIRCULAR SOLUTIONS.** Widen the range of possibilities available to scale-up high potential circular economy solutions, facilitating access of companies and ventures to new markets and national and international funding.				CORFO, MINECON, Banco Estado	Sector financiero
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Identify national firms offering circular products and services, and promote their export and internationalization.				ProChile	
b. Channel international impact investing funds towards national projects of circular economy with high potential and scale-up financing needs.				InvestChile, ProChile	
c. Provide technical support to local banks for the identification of circular economy projects and the characterization of their environmental benefits, risks, and business models, etc.; and the definition of funding priorities in the topic.				MMA, ASCC	BancoEstado Doble Impacto

INITIATIVE 6				Leads	Key Actors
 **INFORMATION SYSTEMS FOR MODELLING THE LOCAL ENVIRONMENTAL IMPACT OF GOODS AND SERVICES.** Create broad and easily accessible national information systems that allow quantifying the environmental impacts of goods and services through their lifecycles, ensuring that have permanent support and resources to ensure their continued development and update in time.				MMA, MINENERGÍA, PUCV, CIS-UNAB	Academia, Red Chilena de Análisis de Ciclo de Vida, CYCLO
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Gather available data on indicators of environmental relevance (e.g., use of material resources, water and energy, carbon footprint, generation of waste, etc.) and use the information to accelerate progress in the areas of the ecodesign and ecolabelling.				SOFOFA	Agencia de Sostenibilidad Energética, Gremios sectoriales, SERNATUR
b. Develop national databases of life cycle inventory that serve as open repositories of information on the total impacts of energy and resource use, waste generation and emissions, expressed in multiple categories of impacts (e.g., climate change, ozone layer depletion, human toxicity, acidification, land use, among others); to enable manufacturers, designers and developers of products, services, and processes to make design decisions based on life-cycle impact considerations.[84]					

[84] In this regard, it is relevant the technical standard NCh-ISO14044:2020 Gestión ambiental - Análisis del ciclo de vida - Requisitos y directrices. Available at: https://www.inn.cl/

INITIATIVE 7				Leads	Key Actors
 **TECHNICAL STANDARDS FOR THE CIRCULAR ECONOMY.** Develop a series of technical standards to specify and establish minimum requirements for different circular economy applications.				MMA	INN
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Elaborate a technical standard with specifications and minimum requirements for compostable plastics.[85]				MMA	Pacto por los Plásticos
b. Elaborate a technical standard with specifications and minimum requirements for conducting building demolitions under a circular economy approach.[86]				MINVU, MMA	Construye2025
c. Elaborate a set of technical standards to facilitate the reuse of recycled rubber granule in different applications.[87]				MOP, MINVU	IC, CDT
d. Elaborate a technical standard with quality specifications and minimum requirements for the generation of alternative liquid fuels produced from used lubricant oils.				MINENERGÍA	Lubricanting oil recovery companies
e. Elaborate a technical standard with quality specifications and minimum requirements for the generation of alternative fuels produced from tires out of use.				MINENERGÍA	End-of-life tire recovery companies
f. Elaborate technical standards to facilitate the reuse of construction materials such as recycled aggregates.					Construye2025

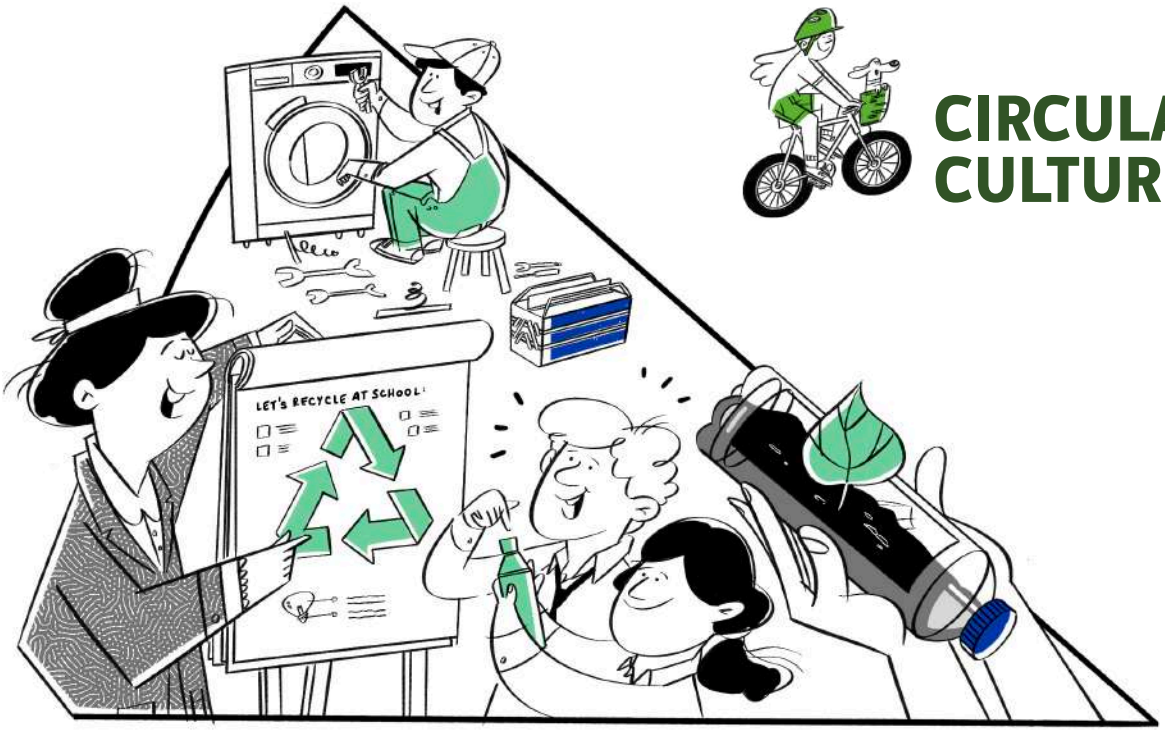
[85] The Chilean standard project prNCh3726 Gestión de residuos - Requisitos para plásticos diseñados para ser compostados en composteras domésticas, which is already underway, will give rise to this standard. It will complement the existing NCh3398:2016 Requisitos para plásticos diseñados para ser compostados aeróbicamente en plantas de compostaje municipales o industriales. See: https://www.inn.cl/

[86] The Chilean standard project prNCh3727 Gestión de residuos - Consideraciones para el manejo racional de residuos de demolición y auditorías de pre-demolición, which is also underway, will give rise to this standard.

[87] Some are already available, among them, the Chilean standard NCh3659:2020 Palmetas de caucho reciclado - Requisitos; the NCh3614:2019 Caracterización de partículas de caucho vulcanizado reciclado provenientes de neumáticos fuera de uso y del proceso de recauchaje de neumáticos; and NCh3258:2012 Mezclas asfálticas - Polvo de caucho proveniente de neumáticos fuera de uso - Requisitos. Available at: https://www.inn.cl/

INITIATIVE 8				Leads	Key Actors
 **CIRCULAR PUBLIC PROCUREMENT.** Use the purchasing power of the state to encourage the development of the circular economy, incorporating the environmental dimension in the purchase decisions of products and services, giving priority to circular strategies and business models, and giving preference to suppliers that can demonstrate excellence in the sustainability dimension.				MMA	Servicios públicos
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Propose the modification of the legislation on administrative contracts for the supply and provision of services (Law 19.886) in order to: a) enable the possibility of transferring or selling underused assets owned by the state; and b) ena-ble sharing the use of assets among different state agencies.				MINHACIENDA	
b. In coordination with the Estado Verde program, provide support for the development of pilot tenders that incorporate circularity considerations for products, services, and suppliers, allocating resources for the analysis of results and the dissemination of learning [88]					Institución licitante
c. Promote the celebration of framework agreements (convenios marco) with sustainability considerations.				ChileCompra	
d. Incorporate circularity requirements and criteria in public infrastructure and social housing financed by the state, for example, the requirement to incorporate a minimum amount of secondary materials.				MOP	MINVU SERVIUs

[88] For this, the following previous work should be consulted: Directiva 25 - Recomendaciones para la contratación de bienes y servicios Incorporando criterios ambientales y de eficiencia energética (ChileCompra, 2016), Directiva 33 - Recomendaciones para la innovación en las compras públicas (ChileCompra, 2018), Instructivo de Aplicación de Criterios Sustentables (MMA, 2019), and NCh-ISO 20400:2017NCh-ISO20400:2017 Compras sostenibles - Directrices (INN, 2017). See, respectively: https://www.chilecompra.cl/2016/11/directiva-n25/, https://www.chilecompra.cl/2018/12/19864/, https://ccps.mma.gob.cl/wp-content/uploads/2019/06/Instructivo-de-Compras-P%C3%BAblicas-Sustentables.pdf, and https://www.inn.cl/.



CIRCULAR CULTURE

9. DISSEMINATION OF CIRCULAR HABITS AND PRACTICES.

10. CIRCULAR ECONOMY IN THE SCHOOL COMMUNITY.

11. SKILLS FOR A CIRCULAR ECONOMY.

12. ECOLABELLING SYSTEM FOR CHILE.

13. TRANSPARENCY AND TRACEABILITY FOR THE CIRCULAR ECONOMY.

14.MONITORING PROGRESS TOWARDS A CIRCULAR ECONOMY.

The transition to the circular economy will not take place unless more and more people become aware of the risks and impacts of the linear economy and adopt more circular lifestyles. It is essential to leave behind the throwaway culture and ensure that more circular habits, practices, patterns of use and consumption, and waste management models become the norm.

To do this, it will be essential to **develop integral systems of environmental education** that, considering the different contexts of people, promote the development of a conscious attitude towards the environment and prepare people to face the challenges and seize the opportunities presented by the transition.

BOX 6

THE CULTURAL BARRIER: KEY FOR THE TRANSITION TO A CIRCULAR ECONOMY IN CHILE

As part of the roadmap development process, an online survey was conducted where people were asked what were the main barriers to progress towards the circular economy in the sectors in which they worked, differentiating between four types of barriers.[89]

	% OF RESPONSES BY TYPE OF BARRIER				
SECTORS	Cultural	Barreras de Mercado	Barreras Regulatorias	Barreras Tecnológicas	# de respuestas
Agriculture, forestry, and fishing	39%	30%	14%	17%	127
Manufacturing	36%	33%	13%	18%	125
Electricity, gas, steam, and air conditioning supply	20%	30%	27%	23%	30
Water supply; sewerage, waste management and remediation activities	27%	35%	25%	13%	125
Construction	39%	20%	24%	16%	49
Wholesale and retail trade; repair activities.	32%	31%	11%	26%	84
Transport and storage	33%	26%	23%	19%	43
Information and communication	41%	35%	12%	12%	17
Professional activities	38%	31%	16%	15%	87
Education	44%	30%	14%	13%	64
Arts	50%	27%	10%	13%	30
Others	43%	21%	17%	19%	86

Source: own elaboration based on the results of the survey

As can be seen, the results suggest that **the most important barrier is the cultural one.** The circular economy requires a change of mindset of all actors in society: a new "common sense" that redefines what are now considered "normal" patterns of production and consumption.

[89] Due to the limitations of online open surveys such as this one, its results should be understood as exploratory rather than conclusive.

At the same time, **the transition to the circular economy will require the dissemination of different sets of skills,** some of a general nature, and others more specific. On the general side, it is required, above all, to firmly install systemic thinking, that is, a thinking that complements reasoning based on causes and effects with reasoning based on patterns and relationships between the components of the complex system of society. And on the specific side, it will be especially important to infuse disciplines such as design, architecture, agricultural sciences, engineering, and many others, with the principles of the circular economy.

To enable the development of more circular lifestyles and use/consumption patterns, it will be important to ensure a wide **availability and dissemination of adequate and transparent information,** so that it is possible to know which options have less environmental impact. Therefore, it will be crucial to invest heavily in the development of information and traceability systems with greater coverage than the current ones, which will be relevant information for decision-making[90].

Finally, **the circular economy requires rethinking what progress means,** integrating issues such as the conservation of natural capital, ecosystem services, and biodiversity into its definition.

The following initiatives seek to promote the development of a circular culture in the country:

[90] As already mentioned, the availability of standards for the circular economy is currently scarce. However, as also mentioned, this is in process of being solved. See: https://www.iso.org/news/ref2402.html

INITIATIVE 9				Leads	Key Actors
 **DISSEMINATION OF CIRCULAR HABITS AND PRACTICES.** Encourage the development of a culture that highlights efforts to avoid the impacts of the linear economy and raises awareness about different ways to avoid them, promoting the dissemination of circular habits, and practices and more sustainable lifestyles.				MMA, AdC Circular, MSUR	Civi societyl, MINCULTURA
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Develop a communication campaign to raise awareness about food loss and waste, and promote different strategies to avoid them.				CNPDA, PUCV, AdC. Circular, Fund. Basura	ACHIGA
b. Develop a communication campaign to promote diets with high nutritional value and low environmental impact.[91]				WWF	CNPDA, MINSAL, MINEDUC, ACHIGA, Elije Vivir Sano
c. Develop a communication campaign to raise awareness about the impacts of fast fashion.[92]					
d. Develop a communication campaign to promote the repair and reconditioning of home appliances.					Reparalab
e. Develop a communication campaign to raise awareness about the impacts of marine pollution.					

[91] In this sense, for some years now, the international NGO World Wildlife Fund (WWF) has been promoting the concept of nature-based diets. For more information about them, and access to an interactive tool to assess the nutritional value and environmental impact of different types of diets in different parts of the world, see: https://planetbaseddiets.panda.org/

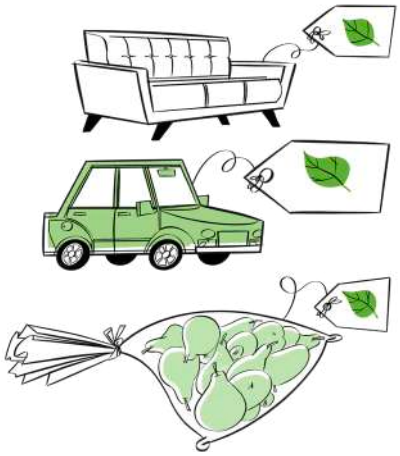
[92] "Fast fashion" refers to the practice of bringing new clothing collections to market at a high rate, generating significant environmental impacts, such as the generation of high volumes of textile waste. For more information on the impacts of this practice, see Zamani, B., Sandin, G., & Peters, G. M. (2017). Life cycle assessment of clothing libraries: can collaborative consumption reduce the environmental impact of fast fashion?. Journal of cleaner production, 162, 1368-1375. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0959652617312982

INITIATIVE 10				Leads	Key Actors
 **CIRCULAR ECONOMY IN THE SCHOOL COMMUNITY.** Spread knowledge about circular economy and circular habits and practices in the school community.				MMA	MINEDUC, Establecimientos de educación escolar
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Promote the reuse of school supplies such as books, uniforms, and others with the potential to extend their useful life in educational establishments.					Comunidades escolares
b. Promote the implementation of science, technology, and innovation contest and activities on circular economy, where groups of students develop applied projects on the subject and practical learning is enabled.					Programa Explora
c. Promote the use of free hours of educational establish-ments for the implementation of participatory activities on circular economy issues, for example, workshops on repairing things, development of school gardens, or the implementation of recycling and composting systems.					Kyklos
d. Publish content and pedagogical resources on topics related to the circular economy in different channels and platforms.[93]					Portal EducarChile
e. Include circular economy contents in different curricular instruments and disseminate them in educational communities.					
f. Support the implementation of circular economy principles in educational establishments through the Sistema Nacional de Certificación Ambiental de Establecimientos Educacionales (SNCAE).					

[93] For example, https://formacionciudadana.mineduc.cl/ and https://www.educarchile.cl/, among others.

INITIATIVE 11				Leads	Key Actors
 **SKILLS FOR A CIRCULAR ECONOMY.** Promote the learning of skills that will be key to accelerate the transition[94], increasing the offer of technical, professional, and postgraduate courses on these subjects throughout the higher and continuing education systems, including technical training bodies, technical training centres, professional institutes, and universities.				MMA, PUCV	MINEDUC, MINCIENCIA, Establecimientos de educación superior, IPs, CFTs
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Develop programs to raise awareness on the costs and impacts of linear practices and provide mentoring for the implementation of circular alternatives, tailor-made for different sectors and organizational roles.				CORFO, ODEPA CCS, CChC	SERCOTEC, Consultoras especializadas
b. Increase the offer and quality of technical and continuing education courses on specific circular economy topics, such as, life cycle analysis, ecodesign, circular business models, or repair and remanufacturing.					Vertebral (Consejo de IP y CFT)
c. Include the fundamentals of the circular economy in the curricula of different careers, through introductory courses for undergraduate and professional degree, and specialized courses, where appropriate.					Consejos de competencias
d. Create profiles of labour competencies in order to recognize the value of artisanal skills and knowledge for the circular economy, such as, repairing things or artisanal production based on recycled inputs.					ChileValora, SENCE
e. Include the circular economy within the priority areas of ANID's Programa de Formación de Capital Humano Avanzado.				ANID	

[94] The transition to the circular economy will require promoting a heterogeneous mix of skills, which include basic skills, complex problem-solving skills, resource management skills, social skills, systemic and technical skills, to work in occupations as diverse as repairing things, collection and treatment of waste, and sciences such as materials and conservation science, among many others. For a detailed analysis, see Burger, M., Stavropoulos, S., Ramkumar, S., Dufourmont, J., & van Oort, F. (2019). The heterogeneous skill-base of circular economy employment. Research Policy, 48 (1), 248-261. Available at https://www.sciencedirect.com/science/article/abs/pii/S0048733318302026

INITIATIVE 12				Leads	Key Actors
				MMA, ODEPA, Fund. Basura, SOFOFA, ANIR	Gremios de los principales sectores productivos
ECOLABELLING SYSTEM FOR CHILE. Launch an integrated voluntary eco-labelling system[95] that structures, facilitates and ensures a minimum standard for the development of eco-labelling initiatives for products and services, based on objective and comprehensive criteria of environmental impact.					
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Elaborate and publish the certification and labelling regulation established in Article 48 ter of Law N° 19,300 (regulatory modification introduced by Law N° 20,920).				CORFO, ODEPA CCS, CChC	SERCOTEC, Consultoras especializadas
b. Integrate the existing voluntary eco-labelling initiatives into the new system.					Vertebral (Consejo de IP y CFT)
c. Implement new eco-labels for different categories of products and services within the framework of the new system.					Consejos de competencias

[95] The foregoing does not exclude the possibility of mandatory environmental labels. These, in fact, already exist in Chile. An example of this are the energy efficiency seals found today in many electrical and electronic devices, which are mandatory (see: https://www.bcn.cl/leychile/navegar?idNorma=1100461). And another example is the labelling of dangerous substances, recently regulated by the Ministry of Health (see: https://www.bcn.cl/leychile/navegar?idNorma=1155752).

INITIATIVE 13				Leads	Key Actors
 **TRANSPARENCY AND TRACEABILITY FOR THE CIRCULAR ECONOMY** Strengthen information and traceability systems for waste flows generated in the country.[96]				MMA	Sectores productivos
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Establish mechanisms and incentives to increase the percentage of residues declared on the Sistema Nacional de Declaración de Residuos, especially waste flows that are known to be under-declared, such as construction and demolition residues.[97]					MINVU, MOP, Municipalidades, Gobiernos Regionales, CChC
b. Promote the collection of data on food loss from the different crops grown in the country.[98]					CNPDA
c. Strengthen the generation of information on food waste in distribution chains and households.[99]				CNPDA	PUCV, AdC. Circular, Fund. Basura, CAV+S, Municipalidades

[95] The foregoing does not exclude the possibility of mandatory environmental labels. These, in fact, already exist in Chile. An example of this are the energy efficiency seals found today in many electrical and electronic devices, which are mandatory (see: https://www.bcn.cl/leychile/navegar?idNorma=1100461). And another example is the labelling of dangerous substances, recently regulated by the Ministry of Health (see: https://www.bcn.cl/leychile/navegar?idNorma=1155752).

[96] Regarding this issue, during 2020 an important update of SINADER was carried out, incorporating traceability mechanisms for residues that were previously not available. See: https://mma.gob.cl/actividades/sistema-nacional-de-declaracion-de-residuos-solidos-nuevo-sinader/

[97] According to an estimation contained in the State of the Environment Report (MMA, 2020), the construction sector declares only 7% of the residues it generates. See: https://sinia.mma.gob.cl/residuos-iema2020/ (section 2.6).

[98] Avoiding food waste is part of SDG target 12.3. To measure progress in this area, FAO has developed the so-called "food loss index", with a detailed methodology for its measurement (http://www.fao.org/platform-food-loss-waste/food-loss/food-loss-measurement/en/). In addition, it has made available to the public a platform to explore the data for different countries. Unfortunately, due to the scant information that has been collected in Chile in this regard, the food loss index is not available for the country, which has only two sectoral data points on the platform. See: http://www.fao.org/platform-food-loss-waste/flw-data/en/

[99] Like food loss (which occurs in production), food waste (which occurs in distribution and consumption) is also part of target 12.3 of the SDGs. In this case, an index has also been developed to measure progress in the matter, the so-called "food waste index". Although the most recent report on this index, the Food Waste Index Report - 2021 (UNEP), presents an estimate for Chile, the same report clarifies that this estimate is of very low reliability. See: https://www.unep.org/resources/report/unep-food-waste-index-report-2021

INITIATIVE 14				Leads	Key Actors
 **MONITORING PROGRESS TOWARDS A CIRCULAR ECONOMY.** Develop tools that make visible the progress towards a circular and sustainable economy in the long term.[100]				MMA	
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Implement a permanent monitoring system of the country's progress in the transition to the circular economy, which distinguishes between process and results indicators, and is capable of accounting for progress in the implementation of initiatives and progress in the fulfilment of the long-term goals of this roadmap.[101]	■				CORFO
b. Establish the methodological and institutional basis for the systematic measurement of the amount of green jobs in the economy.[102]	■	■			INE, MINTRABAJO, MINENERGÍA
c. Incorporate the accounting of natural capital and ecosystem services into the monitoring system of the circular economy and other relevant information systems.[103, 104]	■	■	■		INE

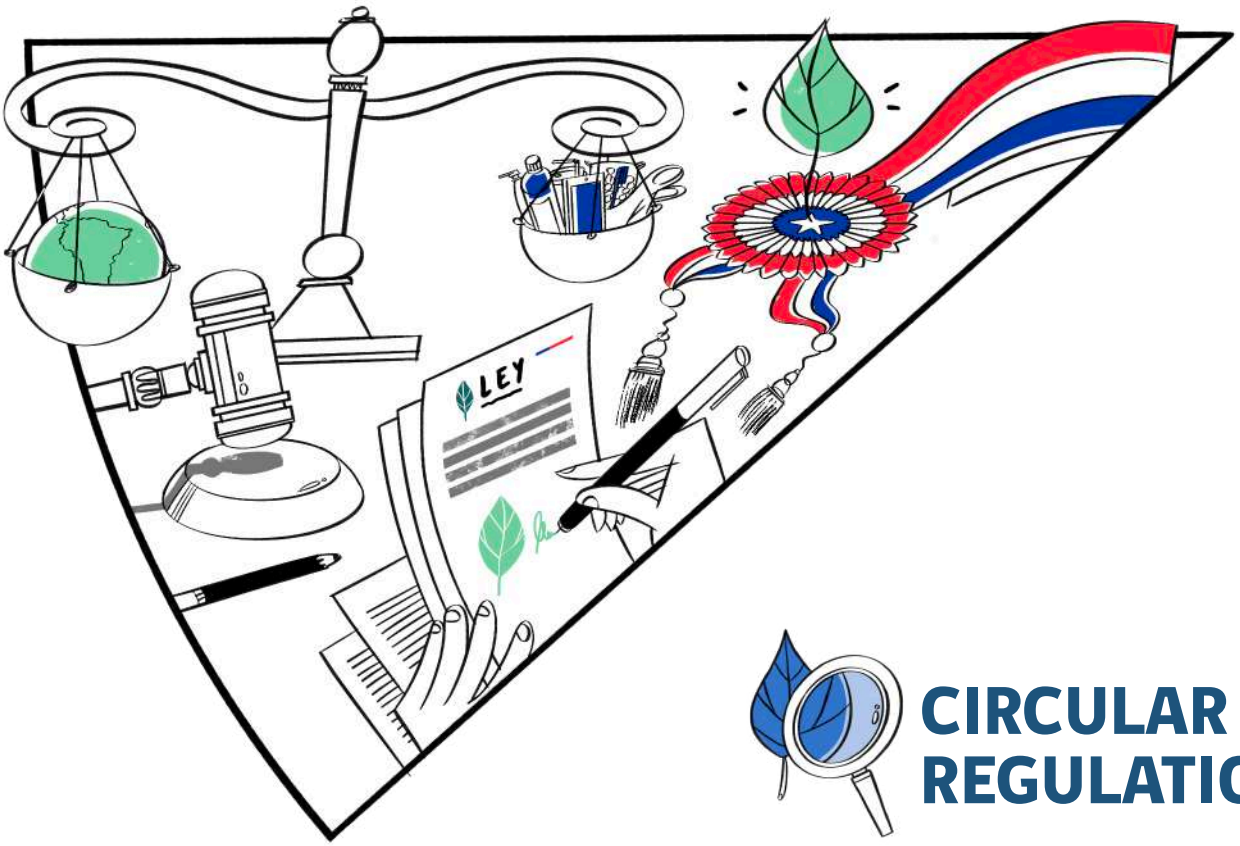
[100] The limitations of the predominant ways of measuring the progress of countries are well known. In this respect, see: Stiglitz, J. E., Sen, A., & Fitoussi, J. P. (2009). Report by the commission on the measurement of economic performance and social progress. For more proposals, see: Raworth, K. (2017). Doughnut economics: seven ways to think like a 21st-century economist. Chelsea Green Publishing.

[101] With this action, the third commitment acquired by Chile in the Circular Economy pillar of its 2020 Nationally Determined Contribution will be fulfilled, namely, "to establish and implement, metrics and indicators on circularity to monitor the country's progress in circular economy and identify its contribution to climate change mitigation and adaptation.". See: https://mma.gob.cl/primer-proceso-de-actualizacion-de-la-contribucion-determinada-a-nivel-nacional-ndc/

[102] For a national starting point, see the study "Monitoreo de Empleos Verdes en Chile", commissioned by the MMA from CDT In-Data (public tender ID 608897-57-LE19) and published in 2020 (available at: https://sinia.mma.gob.cl/ through the search engine). For international experiences, see: https://www.ilo.org/global/topics/green-jobs/publications/assessments/lang--en/index.htm

[103] Since 2017, the United Nations, in conjunction with the European Union and the Convention on Biodiversity, have carried out the initiative "Natural Capital Accounting and Valuation of Ecosystem Services", which assists Brazil, China, India, Mexico and South Africa in the implementation of national accounting systems for natural capital. The project, which ends in 2021, will generate highly relevant information for other countries that will also seek to incorporate the environmental dimension into their national accounting systems. See: https://seea.un.org/home/Natural-Capital-Accounting-Project

[104] Also, in early 2021, Indian economist Partha Dasgupta published a study commissioned by the UK government, entitled The Economics of Biodiversity: The Dasgupta Review. This important report offers a synthesis of the advances in the field of economic sciences that allows to delineate concrete ways in which to advance for the incorporation of the accounting of assets and ecosystem services in the country. See: https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review



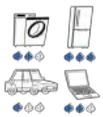
CIRCULAR REGULATION

15. EXPAND THE RANGE OF PRODUCTS SUBJECT TO EXTENDED PRODUCER RESPONSIBILITY.

16. UPDATE THE REGULATORY FRAMEWORK FOR WASTE MANAGEMENT TO FACILITATE REUSE AND RECOVERY.

17. INCENTIVES AND INFORMATION FOR THE SEPARATION OF WASTE AT SOURCE.

18. SOLIDARITY FEE FOR MUNICIPAL SOLID WASTE MANAGEMENT SERVICES.



19. PRODUCT STANDARDS IN THE CIRCULAR ECONOMY.

20. STRENGTHENING THE INSPECTION OF INADEQUATE WASTE DISPOSAL.

21. DRIVING THE CIRCULAR ECONOMY AT THE INTERNATIONAL LEVEL.

Inadequate waste management generates a series of negative externalities for the environment and people, especially those most directly exposed to its consequences - such as, people living nearby garbage dumps. In the case of the latter, the impacts have health, social and economic dimensions, making the problem multidimensional.

For an economy to be circular, **it is essential that the regulatory framework does not allow these consequences to be paid by society and the environment.** On the contrary, regulation should ensure that waste generators bear the cost of the measures that must be taken to ensure proper waste management.[105] This is what is known as the polluter pays principle, which is established in Law 20,920. The principle affirms that waste generators are responsible for the waste they generate, as well as for internalizing the costs and negative externalities associated with its proper management . Although, in Chile, Law 20,920 is the first to explicitly recognize this principle, the national legislation on waste management, which implicitly incorporates it, dates back to earlier times. Since the publication of the Health Code in 1968, a series of laws and decrees have regulated or improved the regulation of matters such as the operation of landfills[106], the treatment of hazardous waste[107], the registry of the transfer of pollutants[108], or the environmental evaluation of projects that include waste management projects[109] - among others. But, despite these advances, it is still common for waste generators to externalize the costs of their activities[110].

However**, the circular economy is not limited to the polluter pays principle:** it builds on this and others principles. And, as the Ellen MacArthur foundation puts it, invites to add additional ones such as: **eliminate waste from design,** which is a recognition of the fact that, in the first place, the best way to save on waste management is to prevent waste from being generated; **keep products and materials in use for as long as possible,** which is an invitation to stop seeing the residues as a problem, and start seeing them as an opportunity; and **regenerate natural systems**, which is a recognition of the fact that we are part of the ecosystems that we inhabit, and that, therefore, caring for and regenerating them is essential for our own well-being.

If we are far from saying that the polluter pays principle is fully reflected and respected in our waste management systems, we are even farther from saying this for these three other principles. **A regulatory framework for the circular economy should encourage the kind of solutions found at the highest levels of the waste hierarchy,**[111] without neglecting the challenge of ensuring the provision of adequate final disposal sites for residues that cannot yet be recycled or reused.

The following initiatives seek to advance towards a regulatory framework for the circular economy in the country:

[105] Ley Nº 20.920 - *Establece Marco para la Gestión de Residuos, la Responsabilidad Extendida del Productor y Fomento al Reciclaje.*

[106] D.S. Nº 189 de 2009 - *Reglamento de Rellenos Sanitarios (MINSAL).*

[107] D.S. Nº 148 de 2004 - *Reglamento de Residuos Peligrosos (MINSAL).*

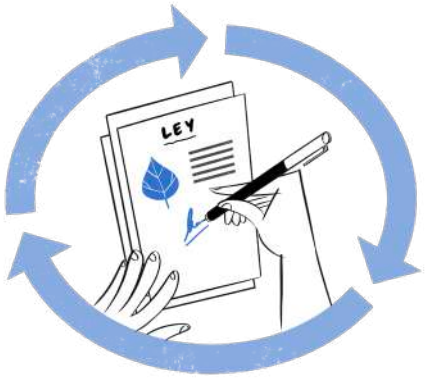
[108] D.S. Nº 1 de 2013 - *Reglamento del Registro de Emisiones y Transferencias de Contaminantes (MMA).*

[109] D.S. Nº 40 de 2013 - *Aprueba Reglamento del Sistema de Evaluación de Impacto Ambiental (MMA).*

[110] This is reflected in the low cost of final waste disposal in Chile: on average, nationwide, sanitary landfills charge around 10,000 pesos for the entry of one ton of waste. See: SUBDERE (2017). Línea Base Diagnóstico y Catastro de RSD año 2017.

[111] According to Law No. 20,920, the hierarchy in waste management is a management preference order, which considers as the first alternative prevention in the generation of waste, then reuse, then recycling, and then the total or partial recovery of energy, leaving final disposal as the last alternative, in accordance with the development of relevant legal, regulatory, and economic instruments.

INITIATIVE 15				Leads	Key Actors
	**EXPAND THE RANGE OF PRODUCTS SUBJECT TO EXTENDED PRODUCER RESPONSIBILITY.** Expand the range of products subject to the Extended Producer Responsibility Law (Law No. 20,920), so that new priority products are gradually included.			MMA, ANIR	Academia, Sector privado, Sociedad civil
ACTIONS		ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Conduct comparative feasibility and potential studies in order to evaluate candidates for new priority products; this, for example, for fishing and aquaculture gear, expired medicines, expired pesticides, furniture, cigarettes, or textiles.						MINAGRI, MINSAL, SUBPESCA
b. Select, based on these studies, which will be the next priority products, and prepare and issue the respective decrees that establish the goals (decretos de metas) for each of them.						

INITIATIVE 16				Leads	Key Actors
 **UPDATE THE REGULATORY FRAMEWORK FOR WASTE MANAGEMENT TO FACILITATE REUSE AND RECOVERY.** Adjust the regulatory framework to promote the reuse of products and the recovery of residues under conditions that protect people's health and the environment.				MMA	Empresas de gest. y val. de res., Empresas generadoras de residuos, Sociedad civil
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Simplify and standardize, at the national level, the processes of sanitary authorization of recovery projects.				MINSAL	Sistemas de gestión REP
b. Prepare and issue a sanitary regulation on the management of composting plants[112].				MINSAL	
c. Prepare and issue a sanitary regulation on the management of residues from construction and demolition activities, which addresses the stages of transfer, recovery, and final disposal.				MINSAL	SUBDERE,MINVU, MOP, CChC, Construye2025
d. Prepare and issue a regulation to establish the sanitary conditions to be met by grey water reuse systems, as is established in Law N° 21,075.				MINSAL	MOP
e. Prepare regulations to enable the recovery of non-hazardous industrial waste, establishing clear procedures and conditions under which certain residues can be recovered.				MMA, MINSAL	SOFOFA, Sistemas de gestión REP
f. Update the regulations and procedures of the Environmental Impact Assessment System in order to establish specific criteria for recovery facilities, in accordance with their real potential environmental impacts.[113]				SEA	
g. Update customs and tax regulations to facilitate the transport of waste from customs-free zones (zonas francas).					MINHACIENDA, ADUANAS
h. Regulate the use of recycled material in packaging in contact with food.				MINSAL	INN, CENEM, AB Chile
i. Enable, by regulatory means, the sale of different types of bulk products, such as, food, personal hygiene products, and household hygiene products.				MINSAL	ISP
j. Update the Emission Standard for Incineration, Co-incineration, and Co-processing (D.S. N° 29/2013, MMA), in order to raise the minimum emission standards for air pollutants for these applications.				MMA	MINENERGÍA

[112] In this regard, the following technical standard is relevant: NCh3382:2016 Gestión de residuos - Plantas de compostaje - Consideraciones para el diseño y operación, available at: https://www.inn.cl/

[113] Currently, the SEIA regulation (DS40/2013 MMA) does not distinguish between recovery plants and final disposal sites, leaving them in the same evaluation categories (numeral o.5. In the case of municipal waste, and numeral o.8. in the case of industrial waste) and establishing that both must be submitted to environmental evaluation as long as their size is greater than established thresholds. In the same way, the sanitary code talks of "garbage and waste treatment plants" to refer to facilities as diverse as a large sanitary landfill and a small municipal composting plant.

INITIATIVE 17				Leads	Key Actors
 **INCENTIVES AND INFORMATION FOR THE SEPARATION OF WASTE AT SOURCE.** Establish incentives for waste separation at source through different mechanisms, as the territorial coverage of recycling infrastructure and door-to-door collection systems for packaging increases.				MMA	MINSAL, Municipalidades, Asoc. de munic., Sistemas de gestión REP
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Prepare a standard municipal ordinance to support municipalities in establishing the obligation to separate waste at source.				MSUR, AMUSA, ANIR	Sociedad civil
b. Design and implement a definitive recycling seal, based on the experience gained in the Clean Production Agreement for Eco-Labelling of Packaging.				ASCC	
c. Gradually ban the sending of specific waste streams to landfills, such as those that are already collected selectively and could easily be recovered, for example, urban gardens and trees pruning waste.					MINSAL
d. Evaluate the (mechanisms and) impact of charging specific fees for the final disposal of specific flows of residues, such as construction and demolition[114] or organic residues, considering the macroeconomic and social situation of the country.					MINHACIENDA
e. Incorporate in the regulations for the construction of residential, commercial, and public buildings, minimum standards for the provision of infrastructure and equipment for the separation and storage of waste, for example, spaces for the collection of recyclables, equipment for the composting of organic residues, or differentiated containers for recycling.					MINVU, Sociedad civil

[114] In addition to encouraging the recycling of recoverable residues, this rate could finance the establishment of services for the final disposal of residue streams, such as construction and demolition residues, that currently do not have adequate coverage of final disposal alternatives throughout the entire territory.

INITIATIVE 18				Leads	Key Actors
	**SOLIDARITY FEE FOR MUNICIPAL SOLID WASTE MANAGEMENT SERVICES.** Evaluate the impact of: i. Charging a fee for municipal waste management services that is correlated with the level of non-recyclables[115] generation ; ii. Progressively reduce the base of properties exempt from paying for municipal waste management services, taking into consideration the ability to pay[116] ; and iii. Designing an efficient and effective payment collection mechanism[117] to ensure the timely arrival of the funds collected to the municipalities. This evaluation should take into special consideration the macroeconomic and social situation of the country.			MMA, SUBDERE	Asociaciones de Municipalidades, Sociedad civil
ACTIONS		ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Evaluate improvements in the application of rates in order to increase efficiency (i.e. to ensure that the cost of collecting payments is only a small fraction of revenue) and effectiveness (i.e., to ensure that a high percentage of properties pay the rate)[118].				■	MININTERIOR	
b. As the EPR's integrated packaging management systems reach the different municipalities of the country, evaluate the impact and feasibility of implementing rate schemes correlated with the level of non-recyclable waste generation[119].				■		Municipalidades
c. Evaluate the economic and social impact and the technical and regulatory feasibility of reducing, progressively and in solidarity, the base of properties with discounts or exempt from paying for municipal waste management services[120].				■		MININTERIOR, MDS

[115] These non-recyclables are the residues that end up in landfills, that is, organic and inorganic residues that are not recycled. The sense of associating the value of the rate with the size of this fraction is to discourage waste generation and encourage recycling. To achieve the above, there are multiple formulas, for example, associating the rate to the weight of the residues, the number of garbage bags removed, the number of containers removed, the frequency of collection, the number of inhabitants in the home, among others. In Chile, the cases of municipalities that associate the value of the rate to factors such as those mentioned are exceptional. One of them is the Municipality of Punta Arenas, which associates the rate with the frequency of collection. See: Estrategia Nacional de Residuos Orgánicos - Chile 2040 (MMA, 2020); and Análisis sobre el esquema tarifario establecido en la recolección municipal de residuos (MMA, 2020).

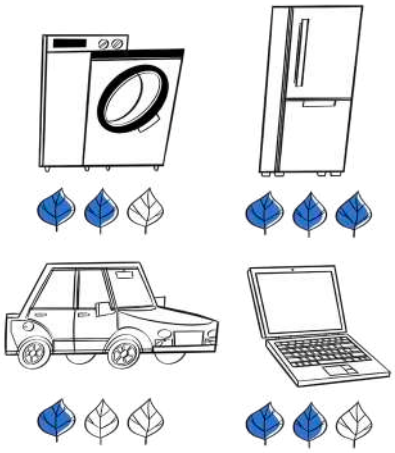
[116] In Chile, 27% of the housing units are exempt by law from paying for waste management services. Currently, this fee is charged together with the contributions, of which 77% of the housing units are, in turn, exempt. In addition, many municipalities establish additional exemptions based on socioeconomic criteria. Due to the above, only a minority of housing units of the country currently pay a fee for waste management services.

[117] It has been calculated that only 29 of the 345 municipalities in the country generate more income from waste management services fees than the costs they incur to run the service. See: Estrategia Nacional de Residuos Orgánicos - Chile 2040 (MMA, 2020).

[118] In this sense, an interesting experience to review is that of Colombia, which implemented a payment collection system through already established service payment systems for other basic services. The implementation of a similar scheme in the country would free the municipalities from the cost of collecting the fee, which many of them today do not collect because of the costs of collection. See: Estrategia Nacional de Residuos Orgánicos - Chile 2040 (MMA, 2020).

[119] Article 6 of DS 2385 (on Municipal Revenues) establishes a framework of possibilities for municipalities to associate the cleaning fee with the amount of residues in the discarded fraction. However, the decree also establishes that the fee is charged annually, which could be a limitation. This regulation will need to be modified in order to overcome this and other possible limitations.

[120] The foregoing also requires a modification to Decree 2385 (on Municipal Revenues), which, in its article 7, establishes the exemption of the cleaning fee for all housing units valued in 225 UTM or less.

INITIATIVE 19				Leads	Key Actors
 **PRODUCT STANDARDS IN THE CIRCULAR ECONOMY.** Increase the quality and durability standard of the products sold in the national market.				MINECON, MMA	Sociedad civil, Academia, Sector privado
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Establish, by regulatory means, and based on international experience, a label or other mechanism that allows people to better evaluate the useful life of products before purchasing them,[121] and that leads producers and distributors to increase their quality and durability and facilitate their repair .[122]				ASCC, AdC. Circular, ODECU	SERNAC
b. Evaluate the establishment of minimum standards for the importation of second-hand products and waste for recovery to avoid the generation of negative environmental impacts.					
c. Review and evaluate the expansion of the range of products subject to the mandatory safety and quality standards established by the consumer protection rights law, in order to limit the risk of contamination by dangerous substances .[123]					MINSAL

[121] In this regard, the most relevant international experience is that of France, which, in 2019, approved its Law Against Waste for a Circular Economy (La loi anti-gaspillage pour une économie circulaire). Among other things, the Law establishes the creation of a repairability seal that is calculated based on: the availability of information, the ease of disassembly, the availability of spare parts, the price of spare parts and a specific criterion for each product category. This seal established by the Law starts out being mandatory for six categories of products: frontal clothes washers, smartphones, laptops, TV monitors and electric lawn mowers. It is also established that, from 2024, the seal must evolve towards a more general index, which incorporates new criteria such as the robustness and reliability of the products. Detailed information on this experience can be found at https://www.ecologie.gouv.fr/indice-reparabilite. And detailed information on the entirety of this law can be consulted at https://www.ecologie.gouv.fr/loi-anti-gaspillage-economie-circulaire-1.

[122] For more information, see: https://repair.eu/

[123] To date, in Chile, there are mandatory safety and quality standards for 14 products only. These are available at: https://www.sernac.cl/portal/619/w3-propertyvalue-22022.html

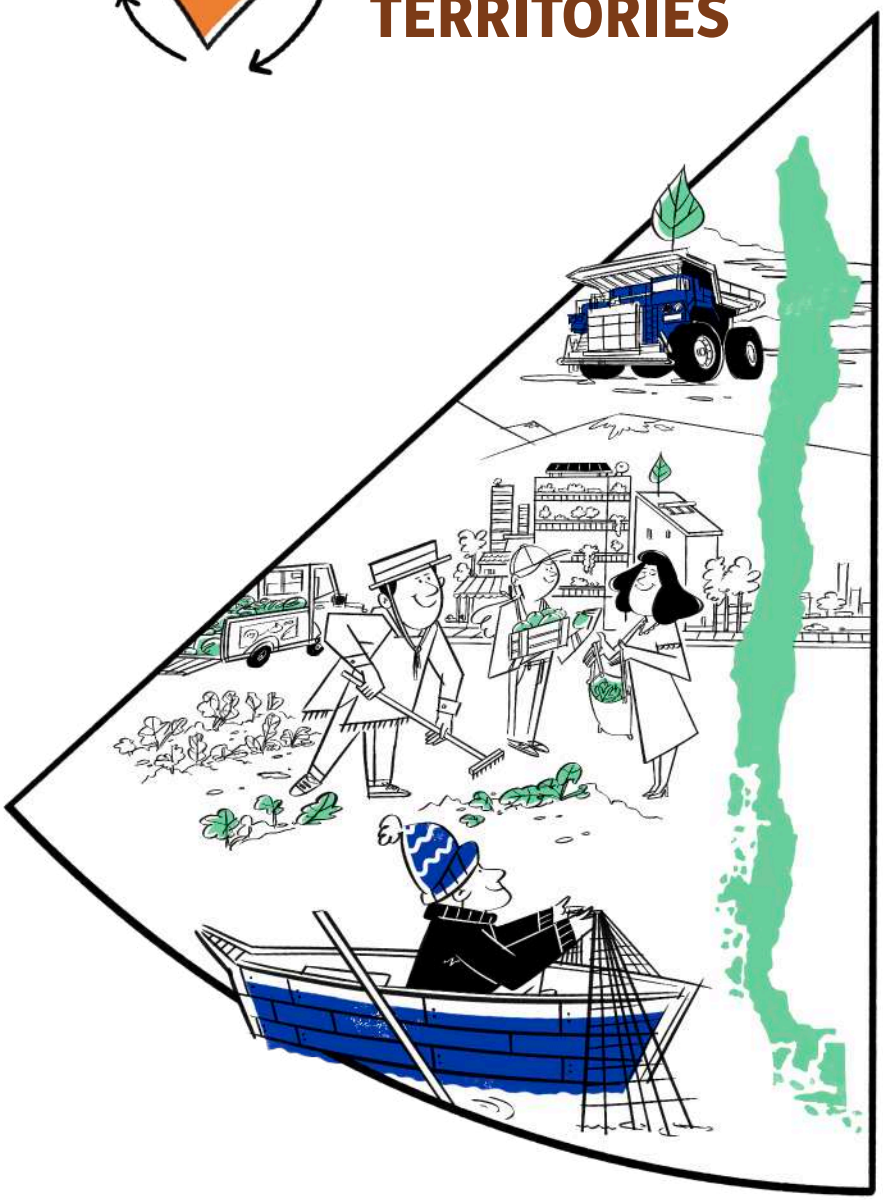
INITIATIVE 20				Leads	Key Actors
 **STRENGTHENING THE INSPECTION OF INADEQUATE WASTE DISPOSAL.** Strengthen the institutional framework and capacities of the country in the regulatory enforcement of the adequate disposal of waste, considering environmental and sanitary dimensions, and taking advantage of the availability of technologies with the potential to greatly increase efficiency and effectiveness.				MMA, MINSAL, SUBDERE	GOREs, Municipalidades, MOP
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Strengthen the enforcement of Law N° 20,879, which penalizes the transport of residues to illegal disposal sites.[124]					Juzgados de Policía Local, Ministerio Público
b. Develop platforms or specific mechanisms to better involve people in environmental monitoring, for example, generating distributed, georeferenced, and real-time data on environmental problems such as illegal waste dumps.				Fund. Basura	Comunidad Basura Cero, Sociedad civil, SMA
c. Use data science and remote monitoring technologies to strengthen the regulatory compliance of projects subject to Resolución de Calificación Ambiental and other permits established in the Sistema de Evaluación de Impacto Ambiental.				SMA	
d. Develop a program to strengthen the resources, skills, and capabilities of municipal environmental control, with a territorial approach and a systemic outlook that seeks synergies with other key actors.				MSUR, AMUSA	Asoc. de munic.

[124] According to a report by the National Productivity Commission, various Local Police Courts inhibited themselves from hearing the matter because they consider it to be the competence of the Public Ministry, given the ambiguity of the law when referring to the "Public Ministry or the competent courts." See: https://www.comisiondeproductividad.cl/estudios/hallazgos-recomendaciones/construccion/

INITIATIVE 21				Leads	Key Actors
 **HELP DRIVE THE CIRCULAR ECONOMY AT THE INTERNATIONAL LEVEL.** Ensure the active participation of Chile in international initiatives to promote the circular economy, gathering information and exchanging experiences, with special emphasis on South-South cooperation and with the Latin American and Caribbean region.				MMA, MINREL	Sociedad civil, Academia, Sector privado
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Ensure the materialization of the vision embodied in the New Plastics Economy Global Commitment.					
b. Actively participate in the Platform to Accelerate the Circular Economy (PACE).[125]					
c. Actively participate and collaborate with the Global Alliance for Circular Economy and Resource Efficiency (GACERE).[126]					
d. Actively participate in the implementation of the marine litter agenda promoted by APEC.[127]					SUBPESCA
e. Promote the implementation of the Hoja de Ruta hacia una Gestión Sostenible de Plásticos and the marine waste agenda promoted by the Pacific Alliance.[128]					
f. Actively collaborate with the Coalición de Economía Circular para América Latina y el Caribe.[129]					

[125] See: https://pacecircular.org/
[126] See: https://ec.europa.eu/environment/international_issues/gacere.html
[127] See: https://www.apec.org/meeting-papers/annual-ministerial-meetings/2019/2019_amm/annex-b
[128] See: https://alianzapacifico.net/en/download/hoja-de-ruta-hacia-una-gestion-sostenible-de-plasticos/
[129] See: https://www.coalicioneconomiacircular.com/

CIRCULAR TERRITORIES



22. CIRCULAR ECONOMY FOR THE REACTIVATION OF TERRITORIES.

23. PROVISION OF MEETING AND PARTICIPATION SPACES AND CHANNELS FOR THE TRANSITION.

24. RECOGNITION AND INCLUSION OF WASTE PICKERS.

25. REGENERATIVE PRODUCTION SYSTEMS.

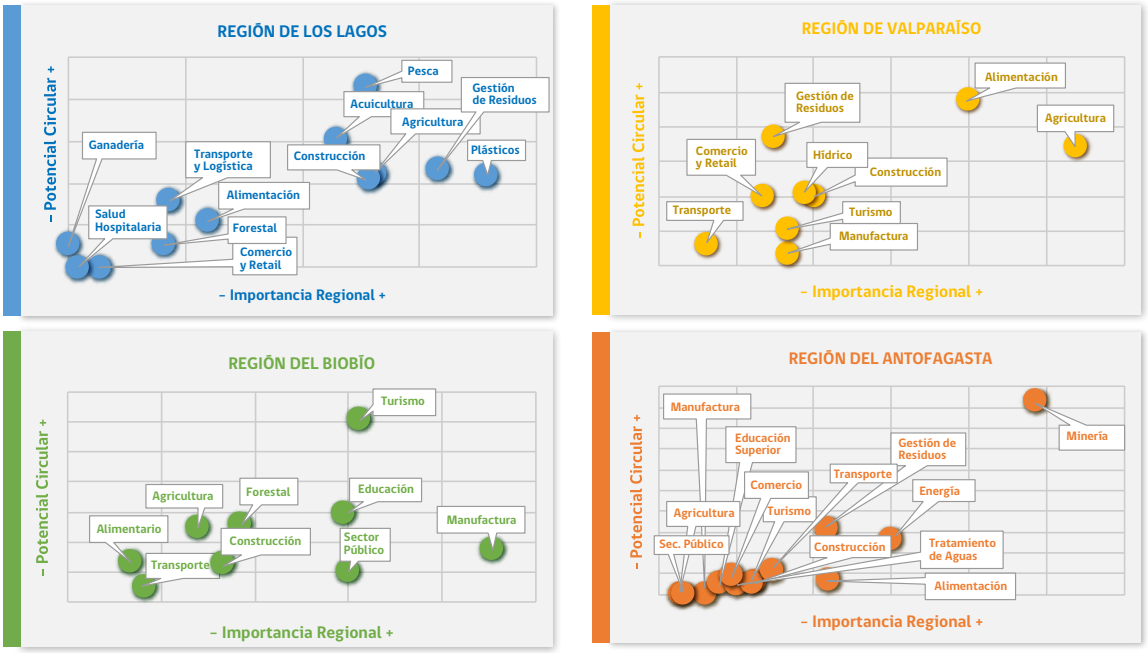
26. LOCAL INFRASTRUCTURE AND EQUIPMENT FOR THE CIRCULAR ECONOMY.

27. INCORPORATION OF A CIRCULARITY FOCUS ON THE PLANNING OF REGIONAL AND COMMUNAL DEVELOPMENT.

To make Chile circular by 2040, **it is necessary for the country's regions to be able to address their challenges in accordance with their local realities, attending to their specificities and leveraging their potentialities.** Achieving a more harmonious relationship with the territories requires that the people who live in them have a greater impact on their development trajectories. In this way, a sustainable and regenerative use of natural resources will be facilitated, generating well-being for all.

There are at least two key **gaps** that affect virtually every region in the country and will need to be addressed in the transition process. The first of these is the absence of infrastructure and key resources for the circular economy in the different regions. A reflection of this is that, as shown by the Catastro nacional de instalaciones de recepción y almacenamiento, e instalaciones de valorización de residuos en Chile published in 2018[130], the national infrastructure for recycling is strongly concentrated in the Metropolitan[131]

BOX | 07 REGIONAL PRIORITIES



At the end of 2019, at an early stage of the process that led to this roadmap, four regional workshops were held where priority sectors for the regional transition to the circular economy were identified based on two criteria: circular potential and regional importance.

The results, available for the four regions in the figures, show how different the priorities of the different regions are, according to their productive vocation.

Certainly, for the transition to the circular economy to be balanced, this significant diversity must be considered.

[130] See: http://www.subdere.gov.cl/content/l%C3%ADnea-base-diagnóstico-y-catastro-de-rsd-año-2017

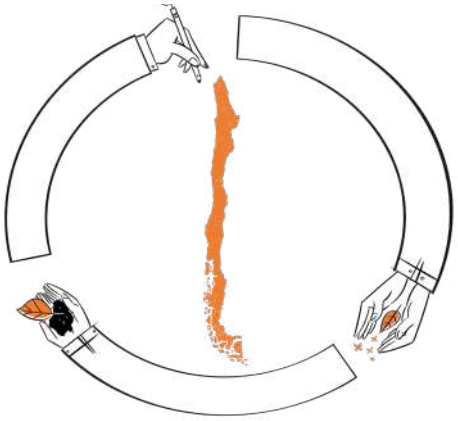
[131] See: Encuesta Nacional de Innovación en Empresas (MINECON, 2015-2016). Available at: https://www.economia.gob.cl/2018/02/22/decima-encuesta-de-innovacion-en-empresas-2015-2016.html

Region, and in six regions of the country there are no recycling plants operating locally. And a second gap is the fact that national investment in R&D+i is also strongly concentrated in a few regions and mainly in the Metropolitan .

Beyond these common challenges, the key is to understand that the circular economy cannot mean the same for all regions. The diversity of Chile's territories is enormous, and this diversity must find its correlation in the transition. Therefore, it will be essential for each region to define its priorities according to its needs and potential.

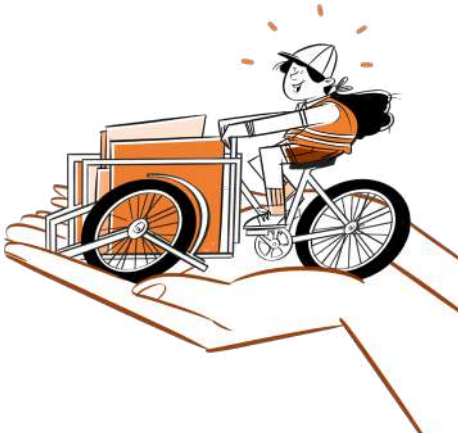
Just as there are gaps and challenges, there are also great opportunities. The changes brought by Law No. 21,074 ***(Fortalecimiento de la Regionalización del País)***, which increases the functions and attributions and provides greater autonomy to Regional Governments, will be key to support the regional transitions. Among other things, this law mandates the creation of Productive Development and Industry divisions within the different regional governments, which can work on the promotion of local innovation for the circular economy; empowers the Regional Governments to approve the Regional Plans of Territorial Organization, which will be binding, and in which decisions are taken that directly impact the possibilities of regeneration of the territories and the possibilities of investment in infrastructure for the transition; and transfer to the Regional Governments the responsibility of elaborating regional policies on science, technology and innovation for development, which should be oriented towards sustainable development. Incorporating a circular economy vision within these instruments will be a powerful way to ensure that each region can find the path to circularity that makes the most local sense.

The following initiatives seek to promote the development of circular territories with resilient local economies throughout the country:

INITIATIVE 22				Leads	Key Actors
 **CIRCULAR ECONOMY FOR THE REACTIVATION OF TERRITORIES.** Channel investment and productive development efforts – within the framework of economic reactivation – towards regional circular economy projects with triple impact and high potential.				MINECON, MMA	DRs de CORFO, Sector privado, GOREs, Instituciones de educación superior
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Design programs that allow progress in the development of secondary markets, with a focus on productive sectors and priority material flows for each region; and apply them for public financing funds (for example, FNDR funds)..				ASCC, CORFO	SEREMIs MMA, Empresas y asoc. de empresas, Gestores de Residuos
b. Promote the development and implementation of circular economy strategies, roadmaps or action plans for specific sectors and territories.				CORFO	ODEPA, CDT Asociaciones de empresas sectoriales-territoriales
c. Articulate and activate regional innovation ecosystems and their different actors through the generation of meeting and exchange instances such as conferences, entrepreneurs' meetings, social innovation festivals, and others, with a focus on the circular economy.				Fund. Avina	SERCOTEC, DRs de CORFO, SEREMIs MINCIENCIA, ANID, Programa Araucanía Circular 2025
d. Promote the development of supplier development programs that encourage larger companies, in the largest sectors of the country, to increase the demand for goods and services with low environmental impact and produced locally, through mechanisms such as the articulation of networks of specialized companies and technical collaboration with the latter.				ASCC	CPC, Gremios y asoc. emp, regionales, Empresas de mayor tamaño, Programa Araucanía Circular 2025
e. Collect and disseminate information on circular economy projects and initiatives that can be replicated in different territories and with potential for job creation.				CORFO	

INITIATIVE 23				Leads	Key Actors
 **PROVISION OF MEETING AND PARTICIPATION SPACES AND CHANNELS FOR THE TRANSITION.** Promote, facilitate, and enable the management and implementation of community programs and projects that, with the participation of neighbours, stimulate the development of a social, collaborative, and circular economy on a neighbourhood scale.				AMUSA, MSUR, MMA	Municipalidades, Asoc. de munic., Sociedad civil, SUBDERE
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Promote the provision of permanent meeting spaces for the exchange of knowledge, mutual services, and second-hand goods, where activities such as flea markets or training sessions in repair skills can be carried out.					Establecimientos educacionales, Reparalab
b. Promote the development of urban agriculture and community composting projects that generate community bonds, produce food, and enrich food culture.					Juntas de vecinas y vecinos, FOSIS
c. Encourage the development of solidarity economy initiatives, such as food banks and microbanks that receive and donate unsold food products suitable for human consumption[132].				CNPDA	Red de Alimentos, Asociaciones de ferias libres, Asociaciones de supermercados
d. Implement a national program for the recovery of public spaces turned into garbage dumps.				SUBDERE	MBN
e. Provide communities with greater and better channels of citizen participation to influence the development of their territorial environment, strengthening their? role and municipal resources in the matter, and taking advantage of tools such as participatory budgets in order to achieve substantive influence.					Juntas de vecinas y vecinos

[132] To date, a bill that regulates the distribution of food suitable for human consumption is in the second constitutional process, which was approved unanimously in the chamber of origin. The project, among other things, establishes the prohibition of destroying food suitable for human consumption. If approved, it will be a great legal boost for the development of initiatives such as the Food Network (https://www.redalimentos.cl/), whose solidarity economy model has proven its success in real conditions. For more information, see https://www.camara.cl/legislacion/ProyectosDeLey/tramitacion.aspx?prmID=10618

INITIATIVE 24				Leads	Key Actors
 **RECOGNITION AND INCLUSION OF WASTE PICKERS.** Recognize the work of waste pickers throughout the country and ensure their inclusion in the transition to a circular economy through a wide range of opportunities for decent work and participation.				MMA	ANARCH, Municipalidades, Sistemas de gestión REP
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Implement the *Plan de Acción para la Inclusión de Recicladores de Base 2020-2021*, and promote their self-organization in order to facilitate dialogue with key actors for the future of their activity, such as municipalities and REP management systems.				CORFO, MINECON, SUBDERE, MINSAL, Fund. Avina	MINTRABAJO, SERCOTEC, FOSIS, ChileValora, Fund. Reciclaje Inclusivo, Municipalidades, Asoc. de munic.
b. Provide technical and professional training opportunities to waste pickers.				SOFOFA	SENCE
c. Facilitate access for waste pickers access to finance equipment and storage facilities to carry out their activities.					GOREs, SEREMIs MMA

INITIATIVE 25				Leads	Key Actors
				ODEPA, MMA, MINECON	Academia
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Give continuity to the Sistema de Incentivos para la Recuperación de Suelos Degradados established by Law No. 20,412, strengthening its agri-environmental component.					SAG, INDAP
b. Promote the articulation between key actors linked to the gastronomic and tourism sector in order to spread the use of local ingredients, products and preparations produced with sustainable practices.					Asoc. gremiales de turismo, SERCOTEC
c. Encourage the development of forestry systems and techniques with the capacity to regenerate ecosystems and promote the biodiversity in the environments in which they are inserted, and discourage techniques with greater environmental impact.					INDAP, FIA, CORFO, Sector silvoagropecuario

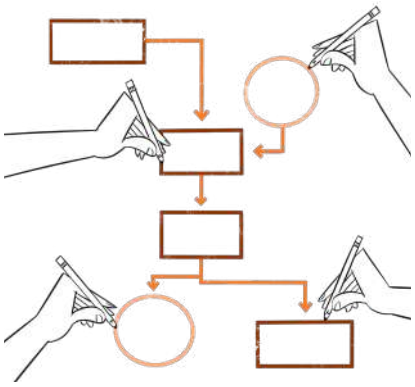
REGENERATIVE PRODUCTION SYSTEMS.

Generate knowledge, educate and promote the development of resilient rural production systems that promote biodiversity, ensure the provision of ecosystem services, and contribute to the increase of the natural capital of the country.

INITIATIVE 26				Leads	Key Actors
				MMA, SUBDERE, MSUR	Sector privado, Empresas de gest. y val. de res.
LOCAL INFRASTRUCTURE AND EQUIPMENT FOR THE CIRCULAR ECONOMY. Provide municipalities cities and regions with infrastructure, equipment and services for proper management and recovery of residues, including reception points, collection centres, distribution centres, recycling plants, composting plants, material banks, sanitary landfills, etc., leveraging public and private financing with innovative business models.					
ACTIONS	ST	MT	LT	+ Leads	+ Key Actors
a. Launch a program to support municipalities and regional governments in the implementation of organic waste management and recovery systems at different scales, in order to achieve the goal of recovering two thirds of municipal organic waste established in the National Strategy for Organic Waste.					Municipalidades, Asoc. de munic. GOREs,
b. Ensure the availability of infrastructure, equipment, and services for the disposal of construction and demolition waste[133] and bulky residues[134] and promote the development of facilities for the recovery of these types of waste.					Municipalidades, Asoc. de munic. Empresas del rubro de la construcción
c. Ensure adequate availability of refrigerant gas regeneration centers.					Unidad de Ozono del MMA
d. Use mechanisms such as the *Ley de Financiamiento Urbano Compartido y la Ley de Concesiones* to generate investment, under public-private models, in waste management and recovery infrastructure.					Municipalidades, Asoc. de munic., MOP, MINVU,
e. Ensure the availability of infrastructure for the collection and recovery of residues from prioritized products subject to the Extended Producer Responsibility.					Sistemas de Gestión REP

[133] According to a recently published study, 7 of the country's 16 regions do not currently have legal final disposal sites for construction and demolition residues. See: Ossio, F. Faúndez, J. (2021). Diagnóstico Nacional de Sitios de Disposición Ilegal de Residuos.

[134] These services could be financed by specific fees or contributions for the final disposal of these types of waste, as proposed in one of the initiatives of the regulation pillar.

INITIATIVE 27				Leads	Key Actors
 **INCORPORATION OF A CIRCULARITY FOCUS ON THE PLANNING OF REGIONAL AND COMMUNAL DEVELOPMENT.** Incorporate knowledge about circular economy strategies in the design and implementation of local development activities and different instruments of territorial strategic planning, seeking to promote specific lines of action that address the local context, challenges, and opportunities.				MMA, SUBDERE	GOREs, Academia, Sociedad civil, Sector privado
ACTIONS	ST	MT	LT	**+ Leads**	**+ Key Actors**
a. Carry out diagnoses and potential studies that identify the specific opportunities presented by the transition to the circular economy for the different regions or localities of the country, that include detailed analysis of the flows of materials available in the territories, and that consider the economic, social and environmental dimensions.					Universidades regionales
b. Activate the Secretarías Ejecutivas Regionales de Residuos, which will be renamed *Secretarías Ejecutivas Regionales de Economía Circular y Residuos*.[135]					SEREMIs MMA
c. Promote the incorporation of the principles of the circular economy in the *Estrategias Regionales de Desarrollo and the Políticas Regionales de Ciencia, Tecnología e Innovación para el Desarrollo* that must be prepared – or updated – based on the provisions of Law No. 21,074.					SEREMIs MMA, SEREMIs MINCIENCIA.
d. Ensure that the *Planes Regionales de Ordenamiento Territorial* include conditions for the location of recycling facilities differentiated by level of impact, in order to speed up the process of obtaining operating permits.					SEREMIs MMA.
e. Promote the incorporation of circular economy principles in the *Planes de Desarrollo Comunales* of the different municipalities of the country.					SEREMIs MMA, Municipalidades
f. Promote the incorporation of circular economy principles and strategies in action plans and development of *Zonas de Interés Turístico* declared according to Law No. 20,423 of the Institutional System for Tourism Development.					SUBSECRETARÍA DE TURISMO, SERNATUR
g. Develop specific training programs in circular economy for public sector workers that focus on reaching key profiles and roles for the transition, that have a practical approach and that ensure a balanced participation from all regions.					Municipalidades, Gobiernos regionales, SERCOTEC
h. Articulate the formalization of Programming Agreements – i.e. instruments of fiscal decentralization covered by Law No. 19,175 – that promote investment in green infrastructure to increase the resilience of the territories and ensure the provision of ecosystem services.					
i. Launch a system of territorial circularity indicators, which allows permanent and participatory monitoring of the gaps and progress in different territories, in the transition to the circular economy.				AMUSA	Municipalidades, Asoc. de munic.

[135] For more details, see: *Estrategia Nacional de Residuos Orgánicos* – Chile 2040.

BOX 8

¿WHICH INITIATIVES CONTRIBUTE DIRECTLY TO WHICH GOALS?

INITIATIVES / GOALS	1ST GOAL: GENERATION OF GREEN JOBS	2ND GOAL: GENERATION OF MUNICIPAL SOLID WASTE PER CAPITA	3RD GOAL: TOTAL GENERATION OF WASTE PER PIB	4TH GOAL: MATERIAL PRODUCTIVITY	5TH GOAL GENERAL RECYCLING RATE	6TH GOAL: RECYCLING RATE OF MUNICIPAL SOLID WASTE	7TH GOAL: RECOVER OF SITES AFFECTED BY ILLEGAL DUMPING
1 - Zero Waste Firms							
2 -Promotion of Circular Models							
3 - R&D for a Circular Economy							
4 - Strategic Collaboration for High Impact...							
5 - Scale-up of High Potential Circular Solutions							
6 -Information Systems for Modelling the Local...							
7 - Technical Standards for the Circular Economy							
8 - Circular Public Procurement							
9 - Dissemination of Circular Habits...							
10 -Circular Economy in the School Community							
11 - Skills for a Circular Economy							
12 - Ecolabelling System for Chile							
13 - Transparency and Traceability for the...							
14 - Monitoring Progress towards a Circular...							
15 - Expand the Range of Products Subject to EPR							
16 -Update the Regulatory Framework for Waste...							
17 -Incentives and Information for Separation...							
18 - Solidarity Fee for Municipal Solid Waste...							
19 - Product Standards in the Circular Economy ...							
20 - Strengthening the Inspection of Inadequate...							
21 - Driving the Circular Economy at the Int...							
22 - Circular Economy for the Reactivation of...							
23 - Provision of Meeting and Participation...							
24 - Recognition and Inclusion of Waste Pickers							
25 - Regenerative Production Systems							
26 - Local Infrastructure and Equipment for the...							
27 - Incorporation of a Circularity Focus in the...							

GLOSSARY

- **Alternative fuels:** Fuel generated from residues such as spent oil or end of life tires, which are treated to be used as fuel.
- **Biodigestion:** Biological process where anaerobic or aerobic microorganisms transform organic residues (household waste, manure, industrial effluents, crop residues, etc.) into biofertilizer and biogas.
- **Carbon footprint:** It is defined as the set of GHG emissions produced, directly or indirectly, by people, organizations, products, events, or geographical regions, in terms of CO2 equivalents. Serves as a useful management tool to know the behaviours or actions that are contributing to increase emissions.
- **Climate change:** Climate change attributed directly or indirectly to human activity that alters the composition of the global atmosphere and adds to the natural variability of the climate observed over comparable periods of time.
- **Co-incineration:** Incineration of residues as complementary fuels in facilities that use primary fuels to obtain energy.
- **Co-processing:** Use of suitable waste in industrial processes, with the purpose of obtaining energy and/or recovering mineral resources, with the resulting reduction in the use of conventional fuels and/or raw materials, through substitution.
- **Decent Work:** Employment that is carried out with respect for fundamental labour principles and rights; allows a fair income proportional to the effort made, without discrimination of any kind; with social protection and including social dialogue
- **Eco-design:** Process of design that integrates the environmental aspects of the life cycle of systems, products, services, and other economic outcomes, to reduce their negative impacts or achieve regenerative results.
- **Ecolabelling:** Type of labelling that refers to the environmental performance of a product or service, with different levels of ecolabelling, depending on whether the information transmitted is a self-declaration, is based on regulations or is certified by a recognized organization.
- **Final disposal of residues:** Process of isolating and confining residues in specially selected/designed and duly authorized places, to avoid contamination to the environment and damage to human health.
- **Garbage dump:** Accumulation of waste in an unauthorized site that implies a source of contamination and sanitary risk.
- **Greenhouse effect:** Natural phenomenon whereby certain gases present in the atmosphere retain part of the energy that reach the earth from the sun, after this is reflected by the earth's surface.
- **Greenhouse Gas (GHG):** Gases present in the atmosphere that can absorb radiation and emit it in the infrared range. The main greenhouse gases present in the atmosphere are carbon dioxide (CO2), water (H2O), nitrous oxide (N2O), methane (CH4) and ozone (O3).
- **Green Jobs:** Jobs that contribute to the provision of environmental goods and services such as environmental protection or the sustainable use of resources, meet standards of decent work set by the ILO, and meet national labour legislation.

- **Grey water:** Wastewater from bathtubs, showers, sinks, lavatories, and others, excluding the so-called black water.
- **Illegal landfill:** Final disposal site that does not comply with sanitary landfill regulation nor has an authorization to operate.
- **Industrial Symbiosis:** It is a form of association between companies, with the purpose of making better use of resources and reducing environmental impacts, facilitating the exchange of energy, materials, water, and derived products, in order to close material and energetic cycles and diminish emissions.
- **Landfill:** Site of final waste disposal that was planned for that use, but that does not comply with the regulations established for the operation of sanitary landfills (D.S. Nº 189/2008 MINSAL).
- **Life cycle:** Progression of a product or service through different stages, from the procurement of raw materials to the end of its life, passing through production and use, and considering all processes, sub-processes, and inputs and outputs of matter and energy.
- **Linear model:** Production model in which raw materials are extracted, processed, and then used to produce products that are meant to be discarded at the end of their life, thus losing all of their value, and generating environmental liabilities.
- **Marine Residues:** any solid, persistent, manufactured, or processed material that is discharged, evacuated, or abandoned in the marine and coastal environment. Marine waste consists of articles that have been manufactured or used by people and that are disposed of in rivers, seas, and beaches; indirectly swept through rivers, dirty waters, torrential waters, or winds; lost, including material lost at sea due to bad weather (fishing gear, cargo) or deliberately left by people on beaches and coasts.
- **Micro garbage dump:** Garbage dump of less than one hectare.
- **Nationally Determined Contributions (NDC):** Instruments through which countries communicate, every five years, the commitments and plans that they will implement to advance towards meeting the objectives of the Paris Agreement.
- **Recovery:** Set of actions aimed at recovering part or all of the value of a residue. Includes preparation for reuse, recycling, and energy recovery.
- **Regeneration of natural systems:** Go beyond merely protecting the natural environment to develop closed loop systems that actively regenerate biodiversity and ecosystem services.
- **Remanufacturing:** Process of restoration of worn-out products or components (damaged, obsolete, etc.) to a level of performance and quality similar to that of a new product.
- **Servitization:** It consists of transforming the business model of a company or organization, going from the sale of products to delivering a service that satisfies the same need of the client. An excellent example is the leasing of printers to companies, which have ceased to be sold to be leased to customers, ensuring the ink stock and maintenance, while the printer remains the property of whoever provides the service.
- **Reverse logistics:** Process of planning, implementation, and efficient control of reusable products (often packaging) to systematically and regularly recover their value and put it back into the economy, thus avoiding final disposal.
- **Sanitary landfill:** Solid waste disposal facility in which residues are disposed of, which is designed, built and operated to minimize inconvenience and risks to the health and damage to the environment, under safety conditions for the population (in Chile, regulated by D.S. Nº 189/2008 MINSAL).

- **Secondary materials:** Materials obtained from recycling processes. Their quality can be similar to that of virgin raw materials, but they differ in their origin since the latter are obtained from nature through extraction processes and the former are obtained from waste recovery processes.

- **Sustainable development:** Type of development that meets present needs without compromising the ability of future generations to meet theirs. It is based on the balance of its three pillars which are economic, social, and environmental.

- **Value chains:** Model by which the activities and relationships in the creation of value of a product or an organization are described and visualized.

- **Waste pickers:** A natural person who, through the use of artisanal and semi-industrial techniques, is directly and regularly engaged in the selective collection of residues and the management of reception and storage facilities for these, including their classification and pre-treatment. Notwithstanding the foregoing, legal entities that are exclusively composed of natural persons registered as waste pickers in accordance with article 37 of Law No. 20,920 shall also be considered as waste pickers.

ABBREVIATIONS (SPANISH ACRONYMS)

ACV	Análisis de Ciclo de Vida
ANID	Agencia Nacional de Investigación y Desarrollo
ANIR	Asociación Nacional de Industriales para el Reciclaje
ANRB	Asociación Nacional de Recicladores de Base
ASCC	Agencia de Sustentabilidad y Cambio Climático
ASIPLA	Asociación Gremial de Industriales del Plástico
CChC	Cámara Chilena de la Construcción
CCS	Cámara de Comercio de Santiago
CENEM	Centro de Envases y Embalajes
CFT	Centro de Formación Técnica
CONAF	Corporación Nacional Forestal
CORFO	Corporación de Fomento de la Producción
CTCI	Ciencia, Tecnología, Conocimiento e Innovación
FIA	Fondo de Innovación Agraria
FOSIS	Fondo de Solidaridad e Inversión Social
GEI	Gas de Efecto Invernadero
GORE	Gobierno Regional
I+D+i	Investigación, desarrollo e innovación
INDAP	Instituto de Desarrollo Agropecuario
INN	Instituto Nacional de Normalización
IP	Instituto Profesional
MINAGRI	Ministerio de Agricultura
MINCYT	Ministerio de Ciencia y Tecnología
MINECON	Ministerio de Economía
MINEDUC	Ministerio de Educación
MINENERGIA	Ministerio de Energía
MINHACIENDA	Ministerio de Hacienda
MININTERIOR	Ministerio del Interior
MINSAL	Ministerio de Salud
MINTRABAJO	Ministerio del Trabajo
MINVU	Ministerio de Viviendas y Urbanismo
MMA	Ministerio de Medio Ambiente
MOP	Ministerio de Obras Públicas
NDC	Contribución Determinada a Nivel Nacional (por sus siglas en inglés)
OCDE	Organización para la Cooperación y el Desarrollo Económico
ODECU	Organización de Consumidores y Usuarios
ODEPA	Oficina de Estudios y Políticas Agrarias
ODS	Objetivos de Desarrollo Sostenible
PIB	Producto Interno Bruto
PUCV	Pontificia Universidad Católica de Valparaíso
RCA	Resolución de Calificación Ambiental
REP	Responsabilidad Extendida del Productor
RSM	Residuos Sólidos Municipales
SEA	Servicio de Evaluación Ambiental
SENCE	Servicio Nacional de Capacitación y Empleo
SERCOTEC	Servicio de Cooperación Técnica
SEREMI	Secretaría Regional Ministerial
SERNAC	Servicio Nacional del Consumidor
SERNATUR	Servicio Nacional de Turismo
SMA	Superintendencia de Medio Ambiente
SUBDERE	Subsecretaría de Desarrollo Regional y Administrativo

Gobierno de Chile

gob.cl

Ministerio del Medio Ambiente **MMA**
Ministerio de Economía, Fomento y Turismo **MINECON**
Corporación de Fomento de la Producción **CORFO**
Agencia de Sustentabilidad y Cambio Climático **ASCC**

ROADMAP FOR A **CIRCULAR CHILE** BY **2040**