STUDY ON THE RELEVANCE AND IMPACT OF PORTUGAL'S WASTE SECTOR ON THE PERSPECTIVE OF A CIRCULAR ECONOMY

Executive Summary

March 2018

SMART WASTE PORTUGAL
BUSINESS DEVELOPMENT NETWORK

ABOUT THIS STUDY

Title
Study on the Relevance and Impact of Portugal's Waste Sector on the Perspective of a Circular Economy (Executive Summary)

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Imperative of the circular economy

Despite having been responsible for the boost of economic growth in the advanced economies during the last decades, the linear production and consumption model, based on "extracting, transforming, consuming and discarding", now shows **growing symptoms of environmental crisis**. Within this model, the excessive consumption of raw materials is accompanied by a high production of waste: an annual volume of about 11 billion tons of waste is generated worldwide, of which only 25% is recovered and sent to the productive system.

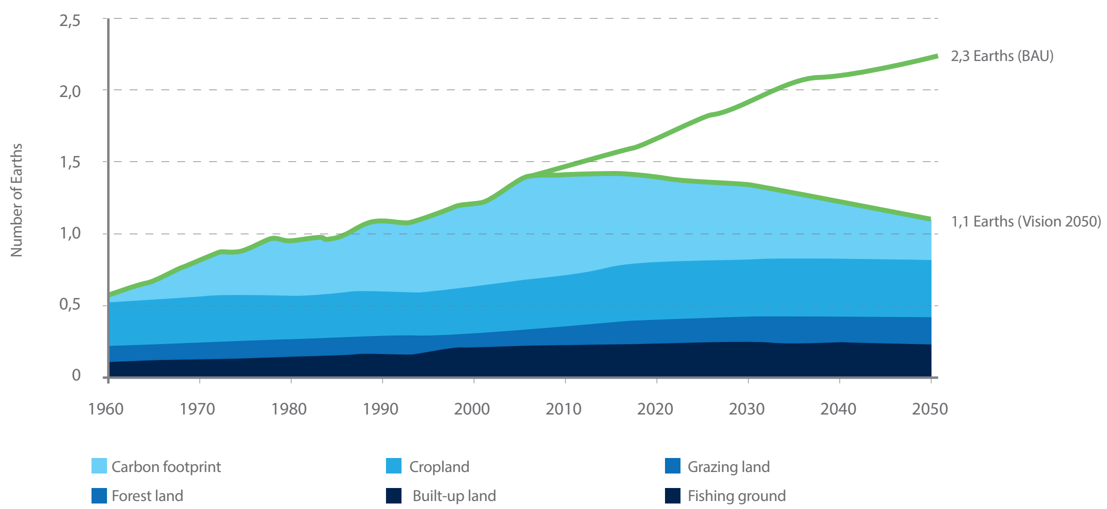
The **transition to the circular economy** balances economic development, by protecting resources and the environment, based on industrial ecology and the three pillars of sustainable development (economic, social and environmental).

The growth of the economy's circularity has many **potential benefits** associated with it, including material cost savings (and corresponding increase in resource productivity), reduction of material price volatility, greater security of resources supply, creation of new jobs (through tertiary sector of the economy, by the increased rental activities and resource-sharing services), as well as reducing the environmental pressure of economic activities.

The evolution to the circular economy will also determine important **widening and deepening processes,** with the appearance of new activities and new business models and the progressive "closing" of many value chains, setting new standards of economic specialization.

… The transition to the circular economy balances the economic development by protecting resources and the environment …

›› VISION 2050 ECOLOGICAL FOOTPRINT



Source: Adapted from WBCSD & BCSD Portugal (2010), Vision 2050 – The New Agenda for Companies

Metabolism and circularity

After many years of stagnation, the resource productivity started to increase in Portugal from 2008 onwards, however there was a drop in 2014. In the past two years, for which statistics are available, the resource productivity has returned to increase, reaching 1.1 € per kg in 2016. In the EU, the trend has been similar, but in absolute terms, the resource productivity is substantially higher than the national one.

According to the official statistics available (whose accuracy is debatable), the national economy generated, in 2016, about 14.8 million tons of **waste**: 4.9 million tons of urban waste and 9.9 of sectoral waste . 71% of that amount, equivalent to 10.6 million tons, were recovered (energy, material, other forms of valorization).

Regarding **sectoral waste**, around 82% of the total Portuguese current production (8.1 million tons) is subject to recovery operations, in contrast with the 60% of production recovered in 2008.

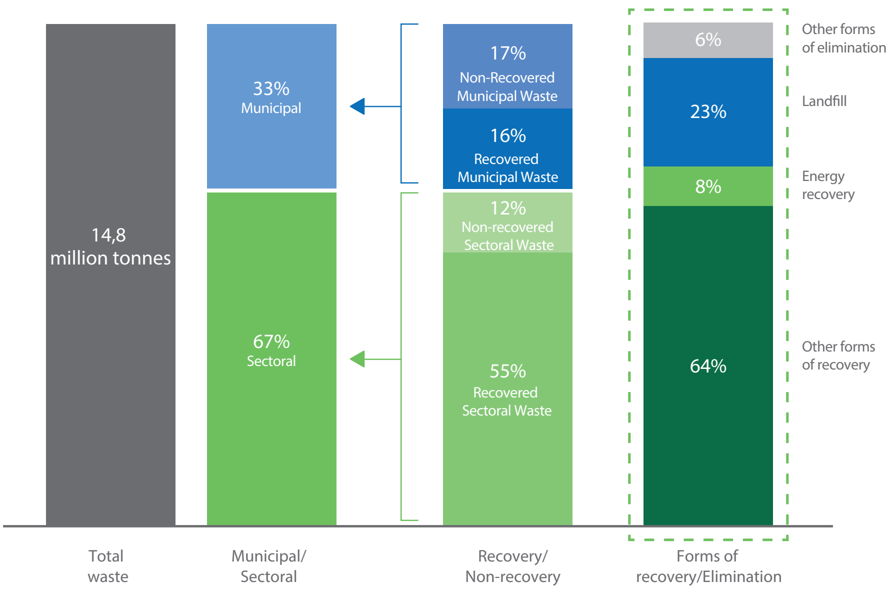
Concerning **urban or similar waste**, only 49% of the total is subject to recovery, although the last decade was characterized by a significant increase in recovery of waste in Portugal (in 2004, only 34.8% of waste was recovered). The selective collection, whether of paper/ paperboard, plastic, metal and glass material or of biodegradable municipal waste, despite having increased significantly during the last decade and a half in Portugal, corresponds to only 15,9% of the total urban waste produced.

With regard to the European context, each Portuguese generated, on average, 474 kg of waste in 2016, while each European produced 481 kg.

In terms of **landfilling**, Portugal had a 32% rate in 2014 against an average rate of 41% in the EU, constituting a massive waste and, at the same time, a huge missed opportunity.

… Regarding sectoral waste, around 82% of the total Portuguese current production (8.1 million tons) is subject to recovery operations, in contrast with the 60% of production recovered in 2008 …

›› RECOVERED WASTE 'VS' NON-RECOVERED WASTE (%) | 2016



Source: EY-AM&A, based on data from Statistics Portugal (INE)

Relevance of the waste sector

In 2016, the waste sector in Portugal was made up of 2,542 entities, which employed around 25 thousand workers and invoiced about €2.5b.

Excluding intermediate consumption, the national waste sector generated an **gross value added (GVA) of €718m**. From the investment point of view, the sector accounted for approximately **€99m of GFCF (gross investment).**

The direct relevance in the waste sector economy is about 0.85% in terms of GVA, 0.73% of turnover, 0.68% of employment and 0.62% in terms of investment.

Regarding indirect and induced effects (after having adjusted the substitution effect promoted by the introduction of by-products in the economy), it is estimated that the activity of the waste sector generated, in 2016, **an additional production in the Portuguese economy of around €3.6b**, corresponding to a GVA of €2b and around 43 thousand jobs, requiring for this purpose an increase in imports of approximately €284m.

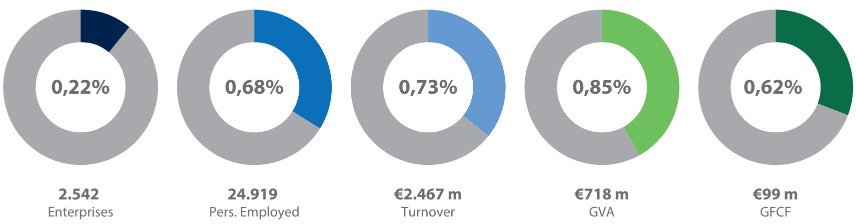
The waste sector thus presents a r**elevant capacity for generating added value and spill-over effects on the economy**.

The **waste collection activity** has long been the most relevant in the national waste sector.

The **commercial balance of the national waste sector is largely in surplus** (€221m in 2016), with the sub-sector of the recovery of materials playing an important role for this achievement (€44m), proving the ability of recovered materials to compete internationally.

… In 2016, the waste sector in Portugal was made up of 2,542 entities, which employed around 25 thousand workers and invoiced about €2.5b …

›› DIRECT RELEVANCE OF THE WASTE SECTOR IN THE PORTUGUESE BUSINESS ECONOMY | 2016



›› WASTE SECTOR'S WIDE RELEVANCE IN PORTUGAL | 2016

	Directs	Indirects	Induced	Total
Production | millions €	2,467.1	2,256.9	1,361.5	**6,085.5**
Gross Value Added | millions €	717.6	1,402.8	629.9	**2,750.3**
Imports | millions €	172.7	184.3	99.9	**456.9**
Tax Revenue | millions €	170.4	155.9	94.0	**420.3**
Persons Employed | thousands of people	24.9	26.1	16.8	**67.8**

Source: EY-AM&A based on data from Statistics Portugal (INE) and Portugal's Water and Waste Services Regulation Authority (ERSAR)

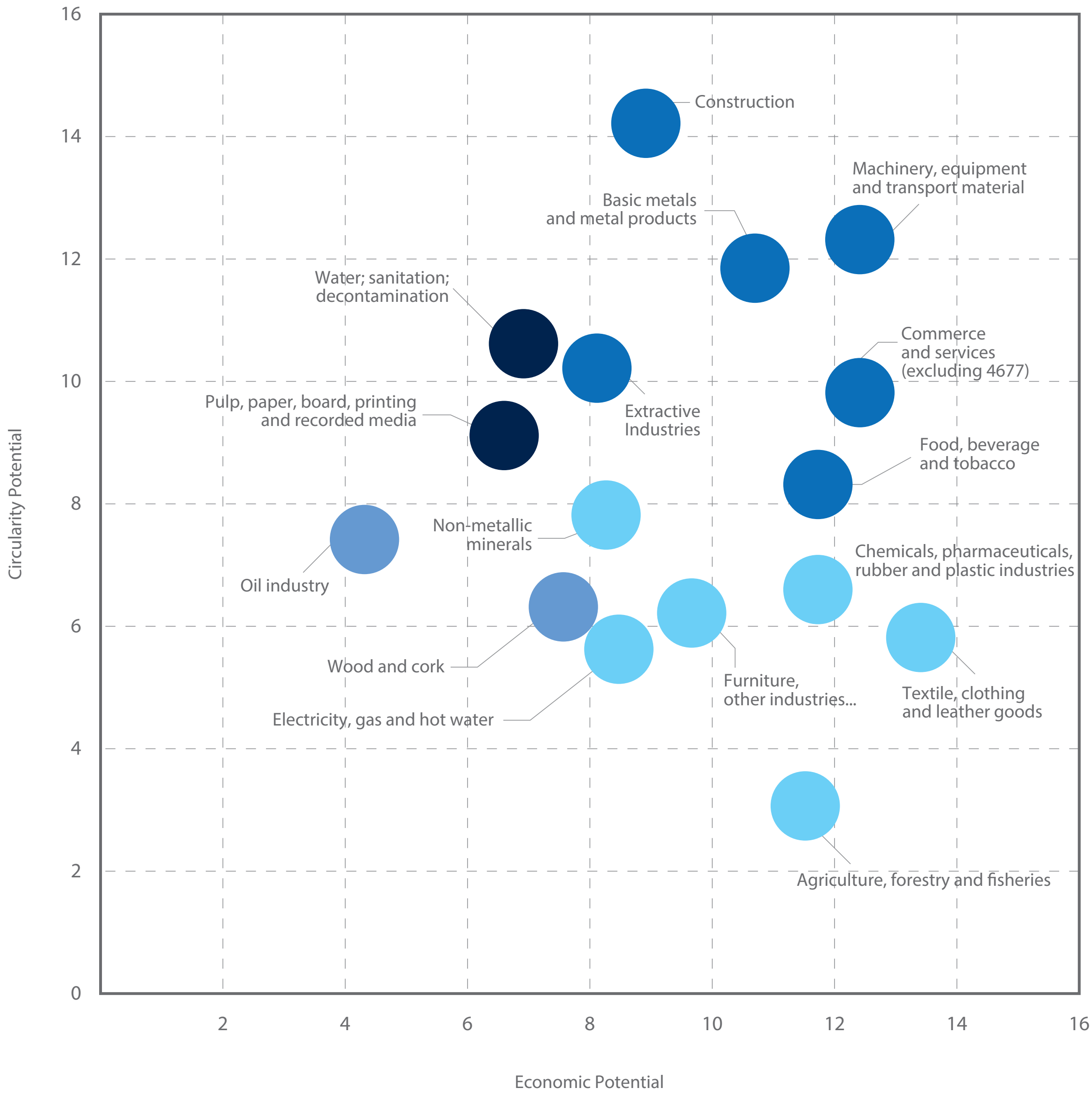
Circularity opportunities

R&D and innovation play a very important role in closing the material cycle and in promoting the logic of circular economy. Data from the last Community Innovation Survey (CIS) shows that there is some awareness among Portuguese companies to the introduction of innovations with environmental benefits, mainly in some industrial activities. However, these motivations are very focused on reducing the energy costs, water and materials, which indicates a reduced recognition and entrepreneurial motivation for the subject of circularity as a whole. In addition to the above mentioned, the waste sector has a **low entrepreneurial R&D expenditure intensity** (0.7%, i.e. less than half the national average). Insufficient infrastructure sharing between urban waste management systems and good practices among industry stakeholders is also one of the weaknesses identified in the PERSU2020, a finding that can be extended to the entire waste sector where there is not yet sufficient dynamics of cooperation.

This reality occurs in a context in which there are **relevant opportunities** that benefit from a moment favorable to the promotion of the circular model in the advanced economies and particularly in the Portuguese economy, namely in the commitment to circular models and the growing development of models based on the use of goods (product-as-a-service), in the life extension of the product in closed cycle, in economic activities related to an extended product life (maintenance, repair, rental), in the design of products with the purpose of reconceiving them, in the adoption of eco-design principles, the development of new markets for secondary raw materials, innovation in intelligent logistics infrastructures, digital sharing platforms, the existing potential for urban waste recovery, collaborative strategies among stakeholders in the processes of circularity, in the use of the good capacity of the SCT (System for Science and Technology) and the recent dynamics of scientific and technological developments, the medium-term trend towards increased volatility of raw materials markets, the recognition of waste management as a priority for environmental policy and in the package of policies to encourage the transition to greater circularity in the economy.

The sectors of Machinery, equipment and transport equipment, Construction, Basic metal and metal products, Trade and services, Food, beverages and tobacco and Mining and quarrying are considered to be priority targets of action to promote circularity in Portugal.

›› SECTORS WITH THE GREATEST POTENTIAL CONTRIBUTION TO CIRCULARITY



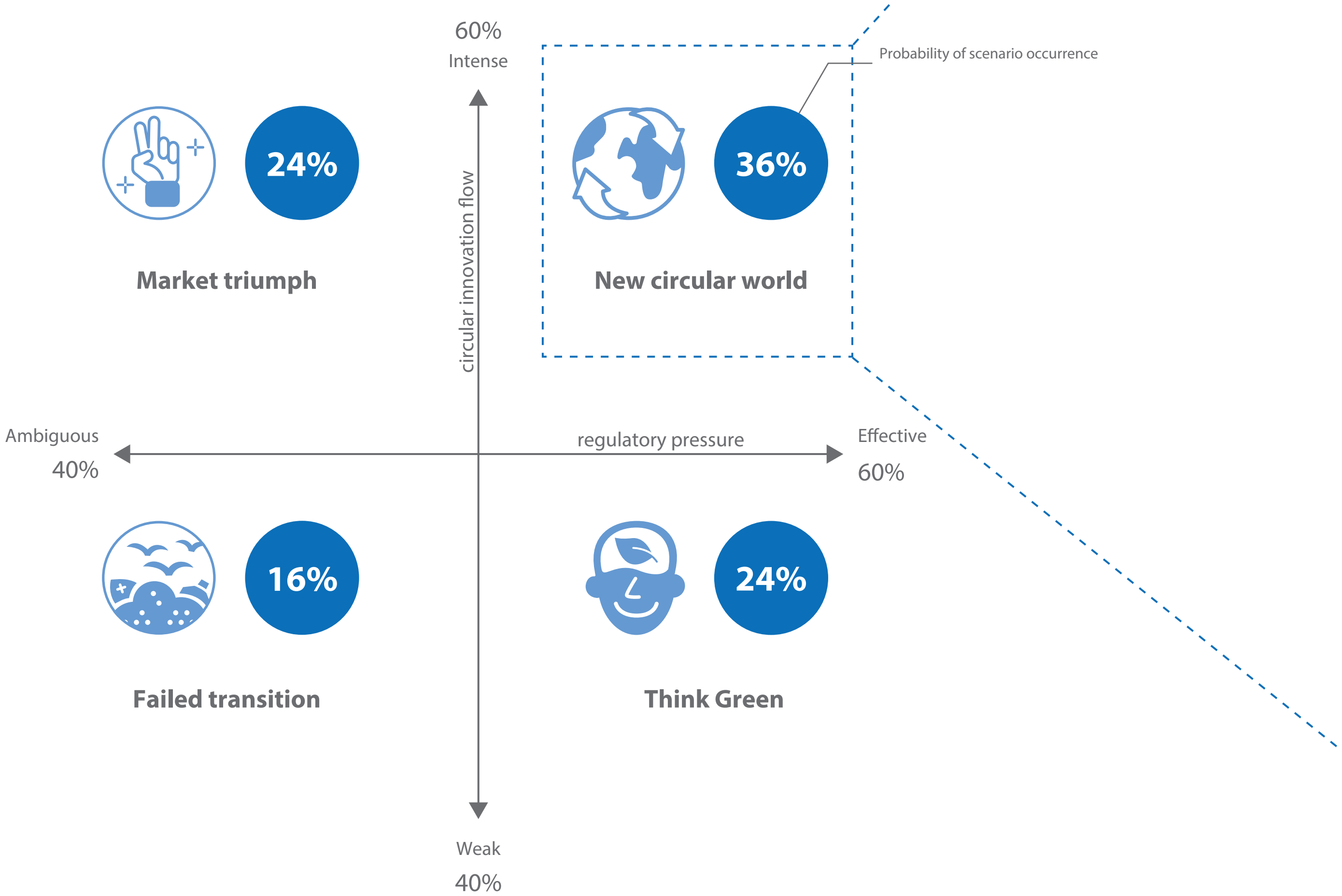
Source: EY-AM&A, based on data from Statistics Portugal (INE)

Future: between the "imposed" circularity and the proactivity of private initiative

In this study, the **five trends** considered most important for the construction of future scenarios were the risks of supplying nonrenewable natural resources, price risks (volatility and rising trend), alternative business models based on new forms of transaction of goods and services, more effective regulation and the technological breakthroughs that can be applied to an increasingly circular economy.

Considering global trends and key uncertainties, **4 alternative scenarios** were built, polarized by the strong intensity of the circular innovation flow and the effectiveness of the regulatory pressure for circularity: "New Circular World"; "Market Dominance"; "Think Green"; "Failed Transition

›› SCENARIOS FOR CIRCULARITY 'VS' WASTE SECTOR



Source: EY-AM&A

Global Macroeconomics

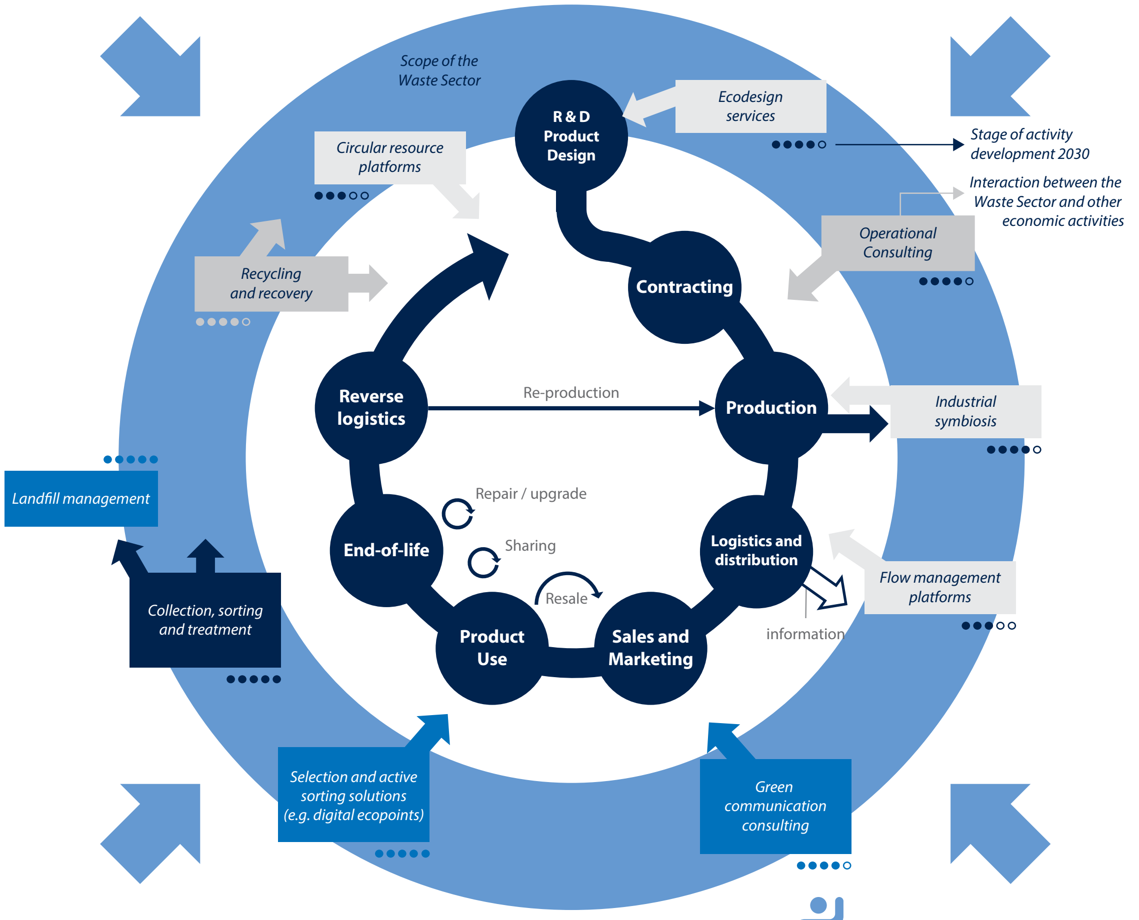
- Emerging countries slow down the growth rate, with economies based on linear models
- The level of decoupling between the economy and the consumption of resources is already relevant, but far below the potential of a circular economy
- International trade has maintained a growth trajectory since the crisis of 2008 and the green taxation is not limited to international transactions (not very demanding)
- Most people live in cities

Business Environment

- The appearance of unicorn companies, with sustainable business models and products, has increased over the last decade
- The reindustrialisation of advanced economies gains strength and is supported by the economic advantages of the circular model (e.g. higher material productivity)
- The traceability of intermediate and final products is high

Technological Developments

- The digital economy spreads through the economic activities and the Internet of Things and the Industrial Internet experience remarkable progress
- Eco-design is becoming widespread due to an increase in the capacity of productive technologies in using recycled materials (e.g. multilayer and multi-material)
- Development of new, more sustainable materials evolves at a high speed



Waste/Resources Market

- Price increase trend of major virgin goods has slowed down recently, but price volatility marks the last decade
- Failures in the supply of important raw materials create constraints in the consumption markets of the advanced economies
- Markets for recycled and/or recovered products are starting to emerge more frequently and the volume of transactions is increasing, but it is not a widespread practice and does not cover a very significant number of materials

Consumer Mentality

- The middle class expands and the average purchasing power of the population increases
- Motivated by the effective communication around circular practices and green taxation, the consumer takes a proactive attitude on the acquisition of sustainable goods and services and on the selection of the waste produced (e.g., digital and intelligent ecopoints)
- A large part of the housing stock in developed countries is equipped with household appliances and other appliances which are interconnected and leased to manufacturers/distributors

Political/Regulatory Orientation

- The developed world, particularly Europe, has a quite uniform and coherent legislative package that can effectively promote a more circular economy
- There is a strong diversity of effective measures, including consumer (dis)incentives, advanced EPR mechanisms or material traceability information platforms
- The public funding for circular innovation has already been higher, but it focuses on all relevant activities to promote circularity

Vision and strategies for the waste sector

- A waste sector **that moves to a resource sector**, increasing the capacity of the Portuguese economy to establish and lead domestic supply chains with a reduced associated environmental impact, where waste is regarded as resources and are traded in functional markets that are little dependent on aid mechanisms.

- A waste sector inserted in a national context that is **prepared to meet the demands of transformation based on the pillars of the knowledge society**, in which companies and the national scientific and technological system act as driving forces of innovation, seeking to minimize the production of waste through more efficient processes that promote the competitiveness of domestic industry and new applications for waste produced that feed effective markets for secondary raw materials.

- An waste sector integrated **in a country where the State and public policies provide a key boost to circularity**, ensuring consistent, transparent and stable regulation and (dis)incentives, effectively correcting market distortions (e.g. negative externalities) and ensuring the support for eco-innovation.

- A waste sector **surrounded by more demanding citizens and consumers**, who seek and engender change in (re)manufacturing processes and supply chains, opting for products with less impact throughout their life cycle, valuing circular entrepreneurship and the most environmentally responsible companies.

Taking into account the scenarios identified above, four **possible paths** are expected to be ahead of the future evolution of the waste sector in Portugal: two associated to a context mainly pressured by regulation and two associated to a context mainly pressed by the flow of circular innovation:

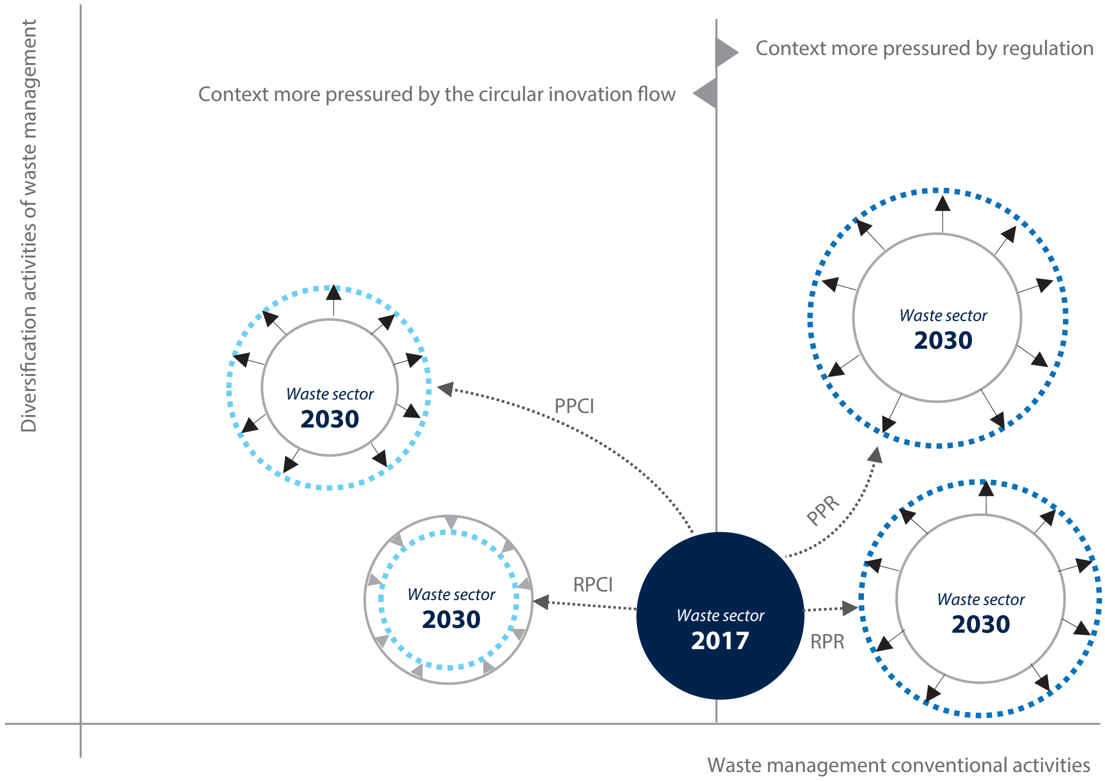
- A reactive trajectory to circular innovation (RTCI), predictably entering a phase of contraction, given the progressive reduction of waste in the economy and the need for waste management services;

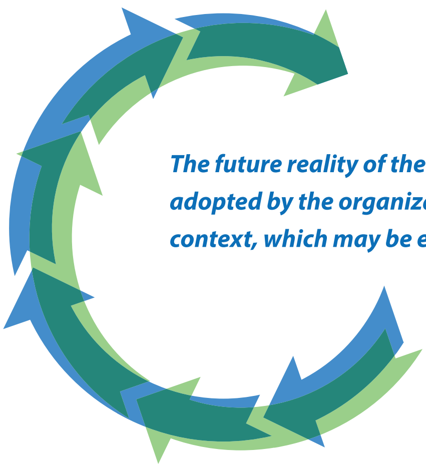
- A reactive path to regulation (RPR) mainly focused on the customization of its conventional activities of waste management to the new and more intense regulatory requirements;

- A proactive approach to circular innovation (PACI), enhancing its progress through an active diversification of activities related to conventional waste management, but clearly inserted in the circular innovation flow of the economy as a whole;

- A proactive path to regulation (PPR) that, besides being focused on customizing its conventional waste management activities to the requirements of regulation, actively invests in diversification for related activities, but in the scope of circular innovation.

›› ALTERNATIVE PATHS FOR THE FUTURE OF THE WASTE SECTOR





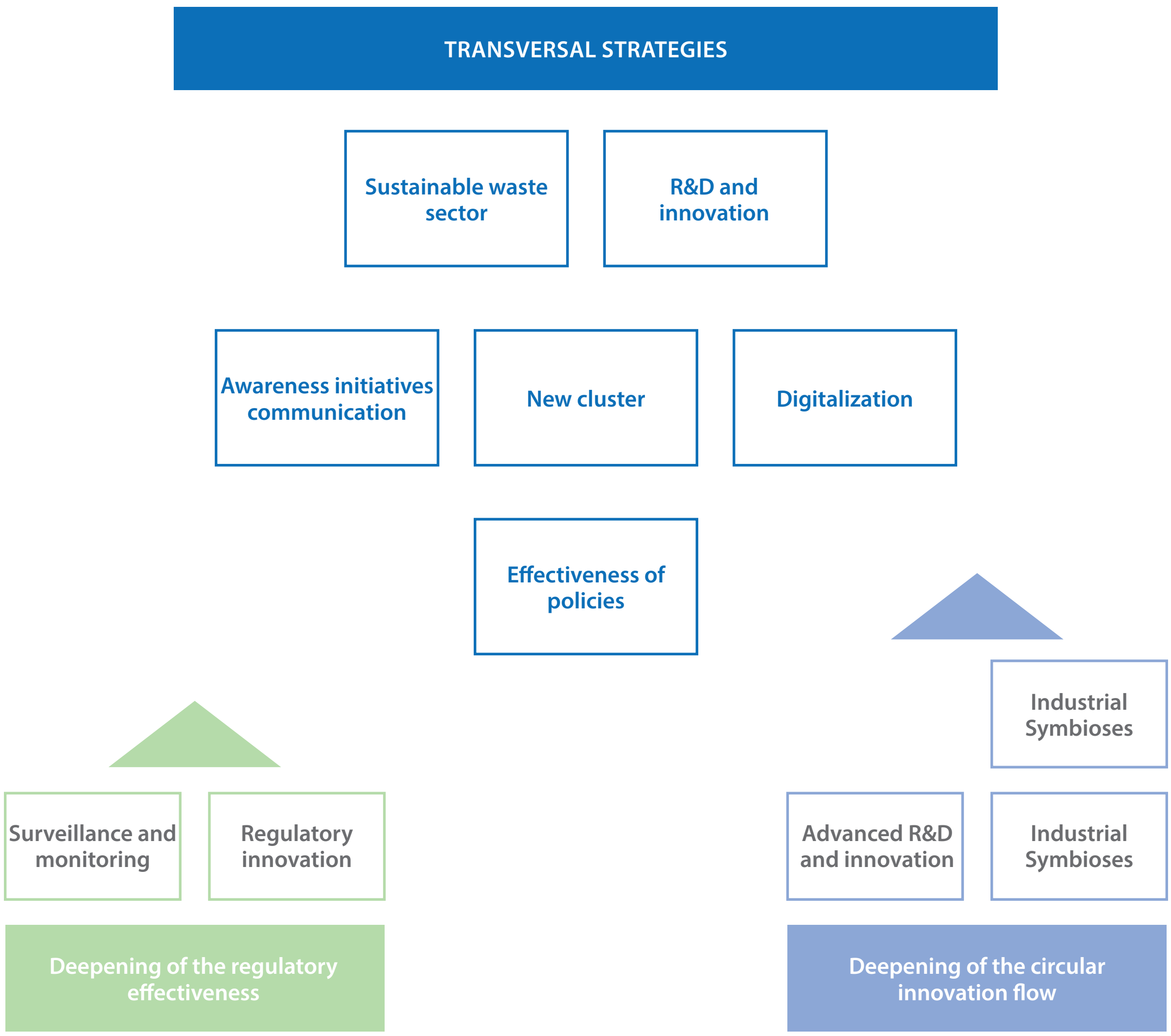
The future reality of the waste sector in Portugal will also depend on the positioning adopted by the organizations composing it, with regard to the evolution of the context, which may be essentially reactive or proactive in nature.

Indicative roadmap of the waste sector for 2030

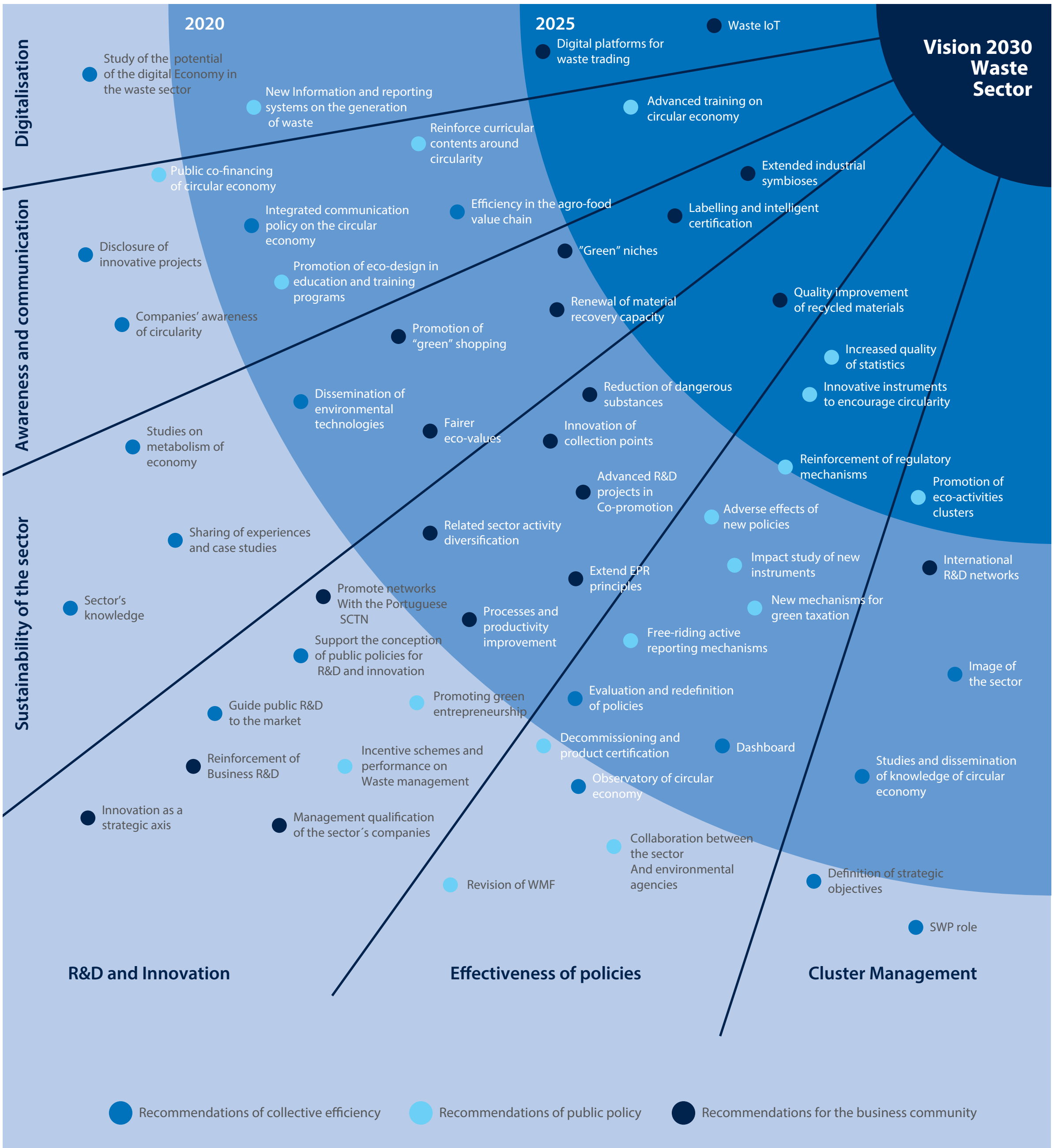
The global strategy proposed for the waste sector has a strong ambition (its reinvention) and is divided into a set of specific **cross-cutting strategies** and a number of **contingent strategies** geared towards deepening regulatory effectiveness or deepening the circular innovation flow.

The strategies are equipped with a set of short, medium and long term recommendations targeted for the deepening of collective efficiency in the waste sector, for the public policy addressed to the waste sector and the circularity, and for the waste sector itself (business and non-business sector. These recommendations are prioritized in an indicative roadmap for the 2030 horizon.

›› STRATEGIES FOR THE PORTUGUESE WASTE SECTOR



›› INDICATIVE ROADMAP FOR THE WASTE SECTOR 2018-2030



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