

# CIRCULAR ECONOMY

Sectoral Strategic  
Guidelines



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## THE 10 FIELDS OF ACTION OF CDP 2022-2024 STRATEGIC PLAN



ENERGY  
TRANSITION



CIRCULAR  
ECONOMY



SAFEGUARDING  
LOCAL AREAS



SOCIAL  
INFRASTRUCTURE



CAPITAL  
MARKET



DIGITISATION



TECHNOLOGICAL  
INNOVATION



SUPPORT TO  
STRATEGIC SUPPLY  
CHAINS



INTERNATIONAL  
COOPERATION



TRANSPORT/  
LOGISTICS HUBS

## KEY MESSAGES

- The circular economy envisages a shift from the current linear economic model (production → consumption → waste) to **circular production and consumption models that, on the one hand, extend the life cycle of the products, reducing waste to a minimum**; on the other, **reintroduce recovered materials into the economic cycle** (production → consumption → recycling → reuse). The full circularity of the economy can contribute both **to fighting climate change** and to **managing resources compatible** with global **population growth** and the **progressive scarcity of essential raw materials**.
- The growth areas that emerge from the international framework focus both **upstream** of the entire **life cycle of products**, through the introduction of **measures for a more efficient management of resources**, and **downstream**, through **the reduction of landfilling** and the promotion of more desirable options for all waste that still intrinsically has residual utility.
- Partly to compensate for **the structural scarcity of raw materials, Italy delivers a strong performance in Europe** in terms of materials recovery and resource efficiency. However, there are deficiencies concerning i) **insufficient facilities** for waste treatment, ii) a **poorly developed secondary raw materials market**, and iii) a **low development of innovative recycling techniques**. These deficiencies are acute especially in Italy's Central-Southern regions, where waste-to-energy struggles to take on a suitable size.
- The areas of focus, which direct the priorities for intervention, are as follows:
  - ▶ **increased efficiency in waste management.** It is necessary to promote the **construction of waste-to-energy plants and organic waste treatment facilities** in order to minimise landfilling and maximise the recovery of materials and energy;
  - ▶ **promotion of innovation in the recycling and reuse industry.** Actions must support innovative recycling, materials recovery from strategic waste streams in order to make progress in creating a closed-loop system and incentivise **process and product innovations** for a more efficient use of resources to improve the competitiveness of companies in view of the ecological transition.
- In this context, CDP can intervene, according to **additionality and complementarity criteria, helping to fill the investment gaps** in sectors and territories where market operators fail to mobilise adequate resources, and **providing support to Public Administrations** in the management of authorisation processes, also in order to contribute to their simplification and/or acceleration, in the planning of actions, and in setting projects in motion.
- To ensure **transparency** and accountability of decision-making processes, CDP aims to measure the quality and impact of the supported actions. To this end, CDP uses a **set of KPIs** for monitoring and evaluating each field of action.



# 1. Context

**1.1**  
European objectives  
for the circular  
economy

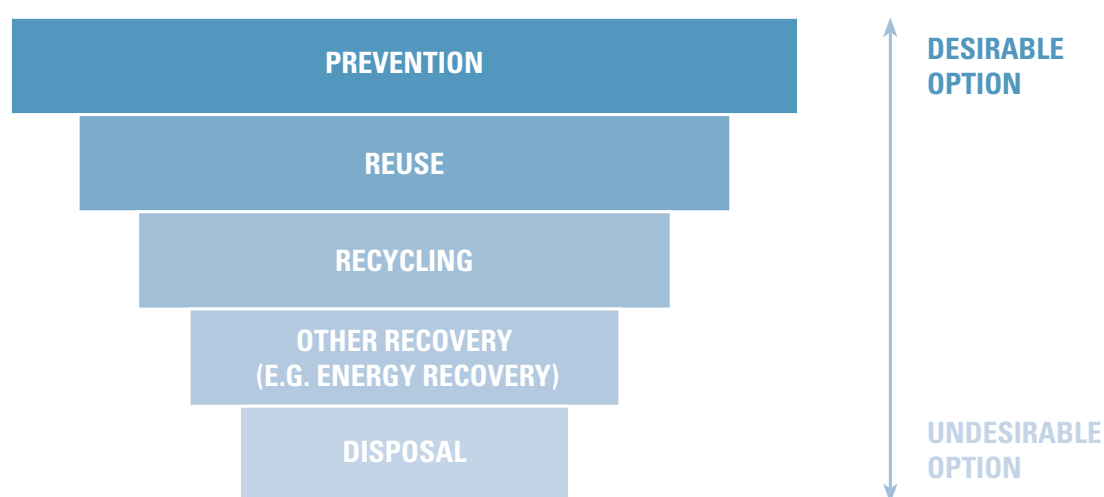
**1.2**  
Positioning of Italy:  
strengths and gaps

## 1. CONTEXT


### 1.1 EUROPEAN OBJECTIVES FOR THE CIRCULAR ECONOMY

-  The **transition to circular production and consumption models**, where the **value of products, materials and resources is maintained for as long as possible and the production of waste is minimised**, is increasingly **necessary** not only for reasons of ecological sustainability, but also for the soundness of economic growth and the competitiveness of businesses.
-  The environmental implications of the linear economy (production → consumption → waste) are not negligible: about **90% of global biodiversity loss and water scarcity** is due to the extraction and processing of materials, fuels and food, contributing about **half of total greenhouse gas emissions**<sup>1</sup>.
-  Therefore, the full circularity of the economy can contribute both **to fighting climate change** and to **managing resources compatible** with global **population growth** and the **progressive scarcity of essential** raw materials.
-  The European Union has a long-standing commitment to **"virtuously closing" the life cycle of products**. The **transformation of the economic paradigm**, from linear to circular, was formalised for the first time in 2015, with the introduction of the **Action Plan for the Circular Economy "Closing the loop – An EU action plan for the Circular economy"**, designed **involving all the stakeholders**, including different levels of government, businesses and citizens. The action was directed both **upstream** and **downstream** of the entire **life cycle of the products**:
  - upstream, by introducing **measures for a more efficient management of resources**, in order to increase productivity in production and consumption processes while reducing waste and maintaining the value of products and materials as much as possible;
  - downstream, by **reducing landfilling** (a last resort solution according to the European strategy) and promoting more desirable options for all the waste that is still inherently useful (figure 1).

**FIG. 1 - CIRCULAR ECONOMY AND WASTE TREATMENT HIERARCHY**



Source: CDP elaboration


-  On the first front, the circular economy action plan reinforced measures such as **eco-design**<sup>2</sup> and **energy labelling**<sup>3</sup> for energy-related products by introducing rules on **minimum material efficiency requirements**, such as availability of spare parts, ease of repair and recycling<sup>4</sup>.

<sup>1</sup> International Resource Panel (IRP), Global Resource Outlook 2019.


<sup>2</sup> Product design, in accordance with the principles of reuse and recycling, that involves using fewer raw materials and resources within the production chain, using materials with a minimal environmental impact, reducing emissions of gas and pollution.


<sup>3</sup> The energy label clearly and immediately states the energy efficiency and other key characteristics of the products at the time of purchase.

<sup>4</sup> European Commission (2019). Report by the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on implementing the Action Plan for the circular economy.

 On the second front, i.e. on **the final stages of the product life cycle**, new **separate collection requirements** have been introduced (organic waste, textile waste and hazardous waste from households<sup>5</sup>) and the existing rules on waste and **landfilling** have been strengthened<sup>6</sup>. In particular, with a view to modernising management systems within the Union and consolidating the European model as one of the most effective in the world, the European legislator defined **binding objectives**:

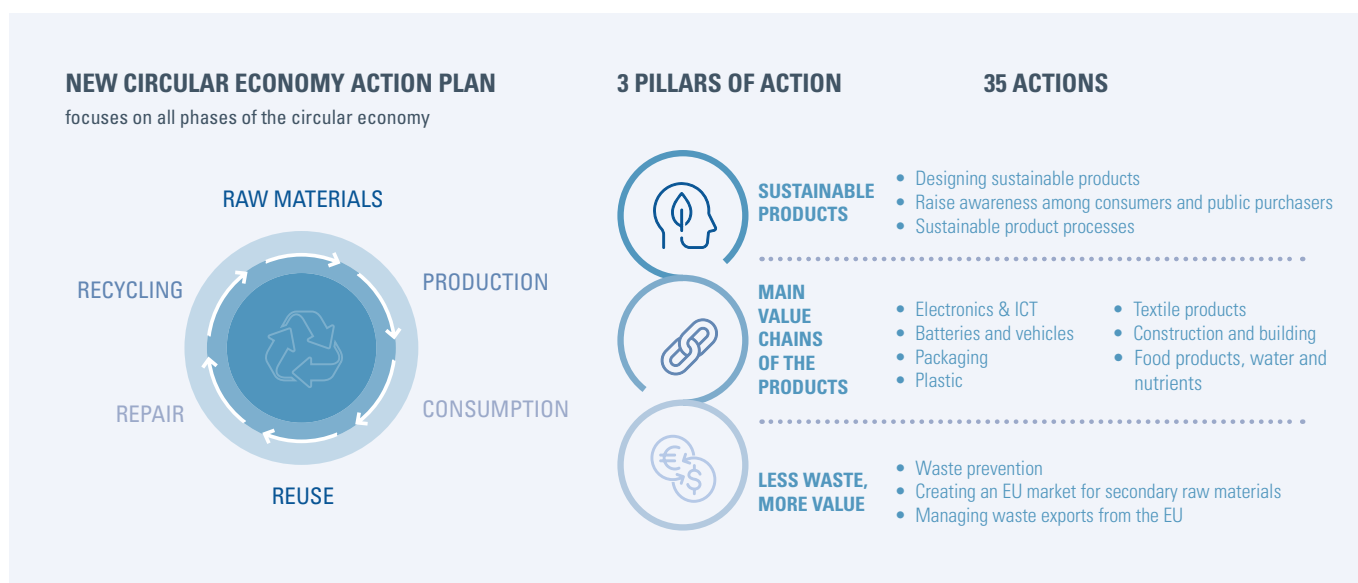
- ▶ **65% of municipal waste to be recycled by 2035** (with intermediate objectives of 55% by 2025 and 60% by 2030, Directive 2018/851);
- ▶ **70% of packaging waste to be recycled by 2030**, with different objectives for each material (30% wood, 55% plastic, 60% aluminium, 75% glass, 80% ferrous metals, 85% paper/cardboard, Directive 2018/852);
- ▶ **less than 10% of municipal waste to be sent to landfill by 2035**, with a landfilling ban for separately collected waste (Directive 2018/850).

 **EU regulation and market incentives** (e.g. pay-as-you-throw) were therefore mainly directed towards **downstream phases** (recycling, waste), while **soft law instruments**, such as environmental awareness campaigns, were directed towards **up-stream phases** such as eco-design.

 In March 2020, the European circular economy strategy was complemented by the "**New Circular Economy Action Plan**", a **new European plan**, adopted as an integral part of the Green Deal, aiming to further **reduce the footprint of EU consumption** and **double the circular material use rate over the next decade**. Unlike the 2015 plan, which mainly emphasises the recyclability of products, the new plan focuses mainly on **preventing waste generation**, in order to foster a context where sustainable products, services and business models are the norm rather than the exception (figure 2).

Through its minimum requirements, the Plan **aims to prevent the entry into the market of environmentally harmful products and to increase resource efficiency**, especially in some **key sectors** (textiles, electronics and food products, vehicles, batteries, construction and plastics)<sup>7</sup>. Therefore, the product **design phase** becomes **crucial** and the scope of application of the Eco-design Directive expands: **eco-design requirements**, not only in terms of energy efficiency, but also circularity, will be established **for the widest possible range of products** and no longer exclusively for those related to energy. The linear consumption model centred on **disposable products or products with a limited use** would thus be abandoned .

**FIG. 2 – NEW EU CIRCULAR PLAN**



Source: CDP elaboration

<sup>5</sup> The recycling obligation is introduced for organic waste by 2023 and for textile waste and hazardous household waste by 2025.

<sup>6</sup> The mentioned revisions refer to the Directives on: the waste framework; landfills; packaging waste; end-of-life vehicles; batteries and accumulators; and waste from electrical and electronic equipment.

<sup>7</sup> In March 2022, the European Commission adopted the first measures outlined in the new circular economy plan relating to: sustainable products (COM(2022) 140 final), Eco-design for sustainable products (COM(2022) 142 final), Eco-design and Energy Labelling Work Plan 2022-2024 (2022/C 182/01), EU Strategy for Sustainable and Circular Textiles (COM(2022) 141 final) and sustainable construction products (COM(2022) 144 final).



At the national level, the **Ecological Transition Plan**, introduced in October 2021, poses some particularly challenging objectives:

- ▶ **circular material use rate of at least 30%** by 2030, a target that is all the more ambitious when considering that the Italian rate (19%) is already twice that of the EU, which would lead to significant savings in terms of extracted or imported raw materials;
- ▶ **enhancement of the circular bioeconomy**, generating clear productive benefits through the enhancement of waste biomass, urban organic waste, non-food crops and second-harvest crops for energy production;
- ▶ **50% reduction in waste generation by 2040.**




The **National Strategy for the Circular Economy** (figure 3) and the **National Waste Management Programme**, two reforms envisaged by the NRRP (National Recovery and Resilience Plan) and approved in June 2022, outline the programmatic framework for Italy's ecological transition, identifying the actions, objectives and measures to be pursued. Within the National Strategy, considerable space is also given to more efficient use of natural resources, with specific objectives for water (e.g. to encourage the reuse of treated wastewater and possibly widen the application of reclaimed water to industrial or urban use) and the soil (e.g. to promote the rehabilitation of contaminated sites, industrial conversion of reclaimed land and initiatives to reduce soil sealing)<sup>8</sup>. The strategy will specifically measure and track the progress of the transition to the circular economy through circularity indicators.

FIG. 3 – MACRO-OBJECTIVES OF THE NATIONAL STRATEGY FOR THE CIRCULAR ECONOMY AND THE NATIONAL WASTE MANAGEMENT PROGRAMME






Source: CDP calculations

<sup>8</sup> For more information on the topic of wastewater reuse and soil protection, please refer to the Sectoral Strategic Guidelines on Safeguarding local areas.

 At the same time, the National Waste Management Program (PNGR) defines the criteria that the Regions and Autonomous Provinces must comply with when preparing the Waste Management Plans and provides **guidelines to fill the current gaps in facilities and waste management**. Rationalising and optimising the plant system will require: (i) planning based on complete waste traceability and analysis of strategic streams; (ii) reduction of potential environmental impacts to be assessed through the Life Cycle Assessment (LCA) of integrated waste management systems.


## 1.2 ITALY'S POSITIONING: STRENGTHS AND GAPS


 Strengths	 Gaps
<p>High resource efficiency</p> <hr/> <p>Recycling performance above the EU average</p> <hr/> <p>High value added in sectors related to the circular economy</p>	<p>Insufficient and unevenly distributed <b>waste management facilities</b> in the country</p> <hr/> <p>Underdeveloped <b>market for secondary raw materials</b></p> <hr/> <p><b>Low development of innovative recycling techniques</b></p>

 **There is no universal indicator** to track progress in circularity, as a single index or “score” would not adequately capture the complexity and multiple aspects of the transition to a circular economy.

 For this reason, there are multiple indicators that can be adopted, which can be attributed to **four different segments: 1) production and consumption, 2) waste management, 3) secondary raw materials and 4) competitiveness and innovation.**<sup>9 10</sup>

### 1.2.1 Production and consumption

 Overall Italy has proven to be **resource efficient**. In 2020 it was actually among the European countries with the highest economic value generated per unit of consumption of direct material consumed (the so-called productivity of resources<sup>11</sup>, equal to 3.5€/kg), ranking **first** in front of France, Germany, Spain (chart 1), and third among all the EU countries after the Netherlands and Luxembourg<sup>12</sup>. In particular, Spain, Italy and the Netherlands stand out for **higher efficiency gains in production processes**.

 Also in terms of consumption (e.g. waste generation), Italy performs well and produces less municipal waste per capita compared to both the European average and major peers (excluding Spain, chart 2)<sup>13</sup>. However, the objective of reducing the amount of waste produced, a fundamental aspect in a more circular economy, has yet to be achieved and the municipal waste generated per inhabitant has remained substantially unchanged in Italy for years.

 In the public procurement market, which represents a substantial part of demand (14% of GDP in the EU and 10% in Italy), progress can be made in terms of **Green Public Procurement (GPP)**<sup>14</sup>, a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle to ensure a more effective and efficient use of resources.

 However, the degree of **adoption of the parameters of the Green Public Procurement** is still low: less than 10% of the pro-

<sup>9</sup> Secondary raw materials are residual materials which are recycled and re-injected into the economy as new raw materials.

<sup>10</sup> European Commission, Communication by the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the circular economy, 2018.

<sup>11</sup> The indicator is defined as the ratio of Gross Domestic Product (GDP) to Domestic Material Consumption (DMC) and analyses the relationship between economic activities and the consumption of natural resources.

<sup>12</sup> Eurostat, Resource Productivity (euro per kg).

<sup>13</sup> Eurostat, Circular economy indicators: Generation of municipal waste per capita. 2020 data.

<sup>14</sup> In Italy, GPP has been mandatory in public tenders since 2016 which assumes greater importance with the European Green Deal.



vincial capitals interviewed (8 out of 89) systematically applies the Minimum Environmental Criteria (MEC)<sup>15</sup> in the tender procedures and two thirds of the provincial capitals do not monitor compliance with the environmental criteria<sup>16</sup>.

CHART 1 - RESOURCE PRODUCTIVITY (€/KG)

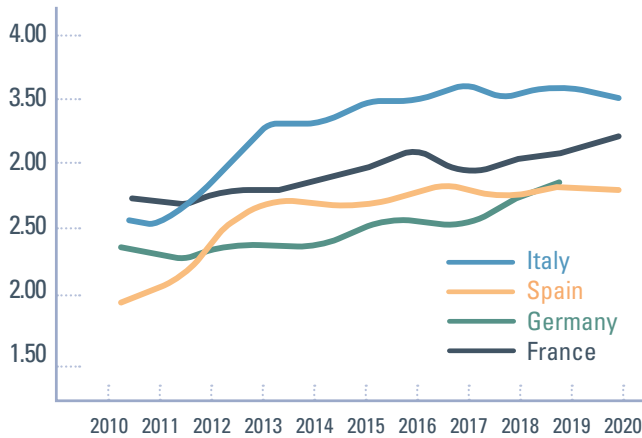
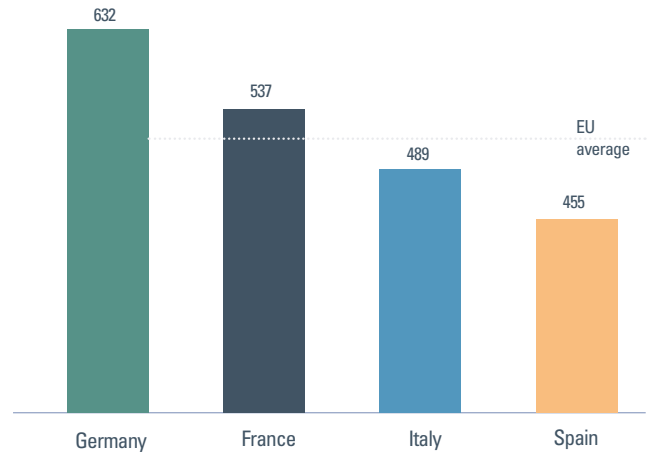


CHART 2 - MUNICIPAL WASTE GENERATED (KG/INHABITANT, 2020)



Source: CDP calculations based on Eurostat and Ispra data

### 1.2.2 Waste management



Within the EU, Italy boasts the **leadership in recycling**, with an incidence of 79.4% of total waste treated, almost double the European average<sup>17</sup>. The recycling performance of special waste contributes to this result, thanks to separating the materials at the origin, while **urban waste**, which has a lower weight on the total waste produced, poses **greater management difficulties, mainly associated with collection systems**<sup>18</sup>. Although the European target for municipal waste by 2025 has been practically achieved in advance (55%), it is necessary to take steps forward to reach the 65% target by 2035.



Recycling alone is not enough to **close the loop of product life cycle** and the only alternative to landfilling for residual municipal waste is **energy recovery**. In Europe, the countries that have almost succeeded in achieving zero waste to landfill, such as Germany and Belgium, have focused on waste-to-energy, while other countries, such as Spain and Portugal, where this process is scarcely used, have high amounts of municipal waste sent to landfill sites (chart 3).

CHART 3 - BENCHMARKING PERFORMANCE OF MUNICIPAL WASTE TREATMENT, 2020

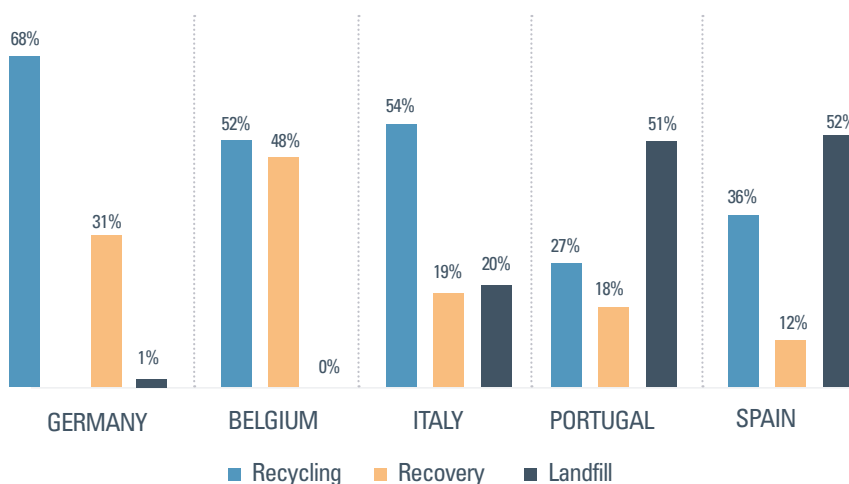


FIG. 4 - WASTE-TO-ENERGY PLANTS, 2020



Source: CDP calculations based on Eurostat and Ispra data


The percentages in to chart 3 are calculated relative to the waste generated. If a share of the waste generated is exported abroad (and not treated within national borders), the sum of the different types of treatment could be less than 100%.

<sup>15</sup> The Minimum Environmental Criteria represent "the measures aimed at integrating the needs of environmental sustainability in the procedures to purchase goods and services of competent administrations" (art. 1, paragraph 1126, Law no. 296/2006) and, to date, they have been adopted for 18 products and service categories, defined as "priority" based on the maturity of the relevant sector, the volume of public spending and the potential in terms of reducing environmental impacts.

<sup>16</sup> Osservatorio Appalti Verdi, I numeri del Public Procurement in Italia, 2021. Procurement data awarded in 2020.


<sup>17</sup> Eurostat, Waste treatment by type of recovery and disposal (% share of total). Data for 2018, including filling operations.

<sup>18</sup> 82.1% of the special waste generated and 54.4% of the urban waste produced (year 2020) are subject to material recovery. Source: Ispra.

 Italy is among the **best performers** in recycling of packaging waste. In 2020, 73% of packaging materials on the market were recycled, **exceeding the 2025 objective of 65% by as much as 8 percentage points and the 2030 objective by 3 percentage points**<sup>19</sup>.

 However, key challenges remain to be overcome:


- ▶ **weaknesses in separate collection**<sup>20</sup>, often with significant territorial differences, for some waste streams such as electrical and electronic equipment (WEEE, in the last three years collection was equal to about 40% of the materials placed on the market vs. 65% target<sup>21</sup>) and organic waste (mandatory collection for all municipalities only from January 2022);
- ▶ **energy recovery from waste**, whether municipal or not, **struggles to take on a suitable size, especially in Italy's Central-Southern regions** (figure 4);
- ▶ **landfilling continues to be too widespread**, with a rate 30 times higher than the average of European best performers in 2020<sup>22</sup>.


 To minimise landfilling and close the waste cycle, it is necessary to overcome the current **gap in waste treatment facilities**, in particular with regard to **energy recovery** and the **treatment of the organic waste**. This would require over **4 billion euros**, about a quarter of the annual expenditure in Italy for environmentally harmful<sup>23</sup> subsidies related to fossil fuels<sup>24</sup>.

### 1.2.3 Secondary raw materials

 The contribution of recycled materials to overall materials demand is represented by the **circular material use rate**, which in 2020 was 21.6% for Italy, almost **twice the EU average** (12.8%, chart 4)<sup>25</sup>.

 However, in competing with virgin raw materials, secondary raw materials face a number of difficulties related not only to their safety, but also to their performance, availability and cost. For this reason, both at European and national level, the objective is to **create the conditions for a more competitive market for secondary raw materials**, by intervening on the criteria for removing the waste status of such products ("End of Waste")<sup>26</sup>.

 In a circular economy, secondary raw materials, once generated, are marketed in the same way as raw materials from extraction activities (figure 5). **Exports of recyclable raw materials in Italy to non-EU countries is almost three times higher than imports.**

 This surplus **could signal an unmet potential for re-entry of materials into internal production processes**, which, if reduced, could instead increase the rate of efficient use of materials in our production models and reduce environmental costs for transport both for imports and exports.

<sup>19</sup>With the exception of plastics, all packaging materials have already largely met the objectives set for 2025 and 2030 by European Directive 2018/852/EU.

<sup>20</sup>Though growing in recent years, separate collection still does not reach the 65% objective, or the national objective that should have been reached by 2012.

<sup>21</sup>Fluttero, A. (2022). On preparing for WEEE reuse, Italy lags behind Europe. We are missing an opportunity! La rubrica del Presidente, Erion Wee.

<sup>22</sup>The European House – Ambrosetti, "Da NIMBY a PIMBY. Economia circolare come volano della transizione ecologica e sostenibile del Paese e dei suoi territori", 2021.

<sup>23</sup>The Ministry of Ecological Transition defines a "Catalogue of environmentally harmful subsidies and environmentally favourable subsidies" on an annual basis (art. 68 of Law 221/2015). Subsidies in the Catalogue include incentives, benefits, subsidised loans and exemptions.

<sup>24</sup>See note 22. This estimate is consistent with that made by Utilitalia: in order to achieve European objectives and fill the infrastructure gap, a total investment of 4.1 billion euro would be required to build anaerobic digestion and incineration plants (see Utilitalia, Rifiuti urbani: i fabbisogni impiantistici attuali e al 2035, October 2020).

<sup>25</sup>Eurostat, Circular material use rate. The Circular Material Use Rate (CMUR) measures the contribution of reused materials to the overall material use, at economy-wide level and by resource category (biomass, metallic minerals, non-metallic minerals, fossil fuels). Therefore, the indicator represents the percentage of secondary raw material used in production processes.

<sup>26</sup>European Commission, Action Plan for the Circular Economy; Ministry of Ecological Transition, National Strategy for the Circular Economy.

CHART 4 - CIRCULAR MATERIAL USE RATE

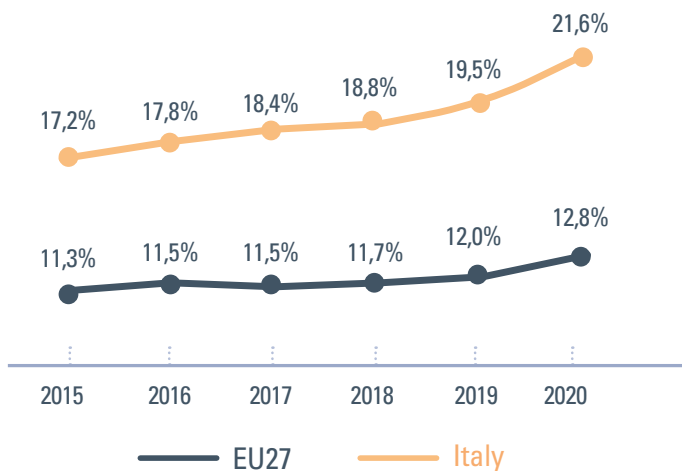


FIG. 5 - NON-EU TRADE IN SECONDARY RAW MATERIALS


**0.7** MT IMPORT OF SECONDARY RAW MATERIALS FROM NON-EU COUNTRIES


**2.1** MT EXPORT OF SECONDARY RAW MATERIALS TO NON-EU COUNTRIES


**8%** SHARE OF ITALIAN EXPORTS ON TOTAL EXPORTS EU 27

Source: CDP calculations based on Eurostat and Ispra data

### 1.2.4 Competitiveness and innovation

 **Waste recycling, repair and reuse** are some of the most typical activities of a circular economy. Italy is **in first place among the main EU economies for value added** generated by the sum of these three sectors relative to GDP, although not far from the other European economies<sup>27</sup>.

 Overall, in 2018 Italy ranked **second in terms of both the number of employees and gross investments in tangible assets** in the sectors relating to the circular economy, surpassed only by Germany<sup>28</sup>.

 **Innovation plays a key role** in the transition to a circular economy, creating new technologies, processes, services and business models. Using statistics on **patents** related to recycling and secondary raw materials, **Italy is behind** Germany, with less than half of patents, and France<sup>29</sup>.

<sup>27</sup> Eurostat, Circular economy indicator, Competitiveness and innovation: Private investment, jobs and gross value added related to circular economy sectors.

<sup>28</sup> See note 27.

<sup>29</sup> Eurostat, Circular economy indicator, Competitiveness and innovation: Patents related to recycling and secondary raw materials.



## 2. Areas of focus and strategic priorities

2.1  
Increased efficiency in  
waste management

2.2  
Innovation in the reuse  
and recycling industry

## 2. AREAS OF FOCUS AND STRATEGIC PRIORITIES

1



**INCREASED EFFICIENCY IN WASTE MANAGEMENT: PROMOTE THE CONSTRUCTION OF PLANTS TO RECOVER ENERGY AND PROCESS ORGANIC WASTE IN ORDER TO MINIMISE LANDFILLING**

2



**PROMOTION OF INNOVATION IN THE RECYCLING AND REUSE INDUSTRY: BOOSTING RECYCLING FOR SOME STRATEGIC WASTE STREAMS, SUPPORTING INNOVATIVE RECYCLING AND PROCESS AND PRODUCT INNOVATIONS ENHANCING RESOURCE EFFICIENCY**

- The pandemic and the conflict in Ukraine, which contributed to the **rethinking of global supply chains and the rise in raw materials prices**, accelerated the transition toward a circular economy. In Italy - and more generally Europe – which depends on raw materials largely located in a limited number of countries, the transition to a circular paradigm and the development of a secondary raw materials market could contribute to increasing strategic autonomy and security of supply.
- Considering the European objectives of the new Action Plan for the Circular Economy, **Italy, despite its good positioning in multiple circularity indicators, has not yet achieved the decoupling between GDP and material consumption that would indicate a truly efficient use of resources**. Therefore, the aim of securing the country through the intelligent use of resources (materials and energy recovery) available on the national territory remains far off.
- To speed up the ecological transition, there are **two strategic lines of action** that, if correctly implemented, can strengthen the already virtuous circularity performance, with not only environmental, but also economic benefits for citizens, companies and the entire country's economy. In particular, it is essential to act on:
  - increased **efficiency in waste management**;
  - **innovation** in the **reuse and recycling chains**.

### 2.1 INCREASED EFFICIENCY IN WASTE MANAGEMENT

- In Italy, the main obstacle to a more efficient integrated waste management lies in **the high landfilling rate**, in 2019 still equals to 21% of the municipal waste generated. This value is particularly high not only compared to the best performing countries – Scandinavia, Germany, Belgium and the Netherlands, which are below 4.5% – but also with respect to the European target to be reached by 2035 (less than 10%).
- The national average also hides **very significant territorial differences in landfilling**, more common where there is a deficient and poorly diversified waste management infrastructure. This is the case in Sicily, where municipal waste sent to in landfill still accounts for 58% of the total. On the contrary, in Northern Italy, where the plant fleet is much more developed, some regions have already achieved (or are in the process of achieving) the European objectives (in Lombardy landfilling is equal to 4% of the waste generated, in Friuli-Venezia Giulia to 8%, in Trentino-Alto Adige to 11% and in Veneto to 14%)<sup>30</sup>.

<sup>30</sup> Ministry of Ecological Transition, National Waste Management Programme.

- In order to give greater credibility to the objectives of reducing landfilling, **it is necessary to overcome the gap in waste management infrastructure**, without which the only alternative remains landfilling. Given the considerable uneven distribution of facilities, action must above all be directed towards specific types of plant and, where possible, towards the regions that lack them the most. To this end, **two strategic priorities** are identified:
  - ▶ support **the construction of waste-to-energy plants, in particular for the optimised management of residual waste and the treatment of sewage sludge**<sup>31</sup>. Though less desirable than recycling, waste-to-energy is to be preferred to landfilling as it saves fossil sources to produce energy and heat (for example for district heating). Several European countries, which have already exceeded the EU landfill target, increased recycling and simultaneously relied on energy recovery at significantly higher levels than in Italy<sup>32</sup>. Nationally, this also happens in Northern Italy, where there is a low landfilling rate and very high energy recovery from residual urban waste (93%)<sup>33</sup>. In order to achieve the European objectives, it is estimated that an **additional 3.1 million tonnes** of municipal waste will have to be allocated for energy recovery<sup>34</sup>. Action is needed in both the Northern and Central- Southern regions, which host only 30% of the existing plants. To date six regions (Valle D’Aosta, Liguria, Umbria, Marche, Abruzzo and Sicily) do not exploit municipal waste as an energy source, due to the total absence of plants<sup>35</sup>;
  - ▶ support **the construction of plants able to treat the organic fraction** (e.g. composting, composting/digestion and digestion plants). According to recent estimates, to reach European recycling targets, Italy will in fact need to process **3.2 million tonnes of organic waste** in addition to the volumes managed by currently active plants<sup>36</sup>. To do so, new aerobic and anaerobic digestion plants that allow the combined recovery of materials, through compost, and energy, through biogas, are needed. An additional **630 thousand tonnes of compost and 253 million cubic metres of biomethane would be generated from the treatment of the additional organic waste**<sup>37</sup>. Enhancing biogas production deserves special emphasis as green gases are an important component for long-term decarbonisation<sup>38</sup>. Among these gases, biomethane, thanks to its high production potential, could play a leading role already in the short term, especially in the transport sector.

In particular, priority should be given to building these plants in Italy’s Central-Southern regions are not self-sufficient in recycling their own waste, which is exported, even in large quantities, to areas that are at times very far away from those of production. For example, over 500 thousand tonnes of organic waste are collected in Lazio, of which only 155 thousand are locally processed<sup>39</sup>.

## 2.2 INNOVATION IN THE RECYCLING AND REUSE INDUSTRY

- Now that **raw materials are becoming increasingly scarce and more expensive**, promoting a more responsible use of these materials while **increasing their recycling relieves pressure** on manufacturing systems.
- **Partly to compensate for structural scarcity of raw materials, over the years Italy has developed a relative advantage** in terms of resource efficiency. One only needs to consider that the contribution of recycled metals to overall demand in Italy (almost total dependence on imports for metal ores<sup>40</sup>) is more than double the European average, and even higher than in major peers<sup>41</sup>.
- The same virtuous dynamics must be undertaken to recycle critical raw materials<sup>42</sup> that are essential for **the ecological transition, such as lithium, cobalt and rare earths**, used in batteries, electric vehicles, wind turbines and whose production is totally absent in Italy<sup>43</sup>. Indeed, the decarbonisation and climate neutrality objectives<sup>44</sup> will increasingly require the spread of green technologies, and therefore the use of these minerals and metals, whose demand is expected to grow substantially in the coming years.
- Improved recycling of these materials would make it possible to **reduce dependence on third countries**, often a source of tension in the in-

<sup>31</sup> Sewage sludge, which is the main residue of waste water treatment, is subject to legislation on waste, where applicable.

<sup>32</sup> See note 22.

<sup>33</sup> Utilitatis (2022), Green Book 2022.

<sup>34</sup> See note 22.

<sup>35</sup> See note 22.

<sup>36</sup> See note 22.

<sup>37</sup> See note 22.

<sup>38</sup> For further information on new energy carriers, such as hydrogen and biofuels, refer to the Strategic Guidelines – Energy Transition.

<sup>39</sup> See note 22.

<sup>40</sup> ISPRA, Material streams and resource productivity, calculations based on Eurostat data. Data for 2020 are provisional.

<sup>41</sup> Circular Economy Network, 4° Rapporto sull’economia circolare in Italia, edition 2022.

<sup>42</sup> Raw materials of strategic economic importance for Europe and characterised by a high supply risk. The European Commission’s Action Plan on Critical Raw Materials (2020) focuses on three strategic lines: (i) diversifying supply from third countries, (ii) strengthening internal supply, and (iii) reducing dependence through the circular use of resources.

<sup>43</sup> World Mining Congress, World Mining Data 2022.

<sup>44</sup> For further information, please refer to the Sectoral Strategic Guidelines on Energy Transition.

ternational geopolitical arena. In this sense, a **significant contribution comes from the recycling of technological products** through modern hydro- and bio-metallurgy techniques, which have a recycling potential close to 98%<sup>45</sup>.

- The circular economy necessarily entails rethinking not only the productive system, but also the entire life cycle of goods and services to create by mid-century a sustainable model of economic growth that adds and does not subtract resources, so as to considerably prevent the production of waste. Making production activities circular implies **designing sustainable, durable and repairable products, with reusable materials** for further purposes, and strengthening recycling, especially in highly polluting sectors (e.g. some segments of agriculture, fashion industry).
- In order for this to be achieved, priority must be given to:
  - ▶ **strengthening recycling for some strategic waste streams**, which have been classified as such in the National Waste Management Programme due to greater disposal difficulties or significant recycling potential. In particular, it is necessary to promote high-quality management and technological standard for:
    - the recycling of **waste from electrical and electronic equipment (WEEE)** that has great potential in terms of recovery of raw materials<sup>46</sup>, including rare earths, with a key role for ecological transition technologies. The **recovery of critical raw materials (CRMs) contained in WEEE** provides a viable alternative to the low availability of this type of material. So far, however, the collection rate is still a long way off the 65% target, a necessary, albeit not sufficient, condition to improve recycling performance. Recycling rates are actually close to zero due to poor economic viability, which is linked, on the one hand, to the huge capital required in developing technologies and, on the other, to the low and volatile prices of CRMs<sup>47</sup>. Nevertheless, the recovery potential of critical raw materials is high: about 7.6 thousand tonnes provided Italy reaches the collection rate of European best performers (70-75%)<sup>48</sup>.
    - the **recovery of construction and demolition waste**, which constitutes almost half of the waste generated in a year in Italy. Even though official statistics record recovery rates above the European target of 70% (equal to a potential of (re)use of about 50 million tonnes/year), sector estimates indicate that the actual use of recycled aggregates does not exceed 20%<sup>49</sup>. Actual recycling is still deterred by high transport and treatment costs, affecting the competitiveness of recycled aggregates compared to virgin materials. Recycling is often hampered by the excessive heterogeneity of input materials, therefore separation and sorting through "strip out" operations (or selective demolition<sup>50</sup>) can avoid improper mixing of different materials, facilitating recovery (up to 99% of materials recovered from the selective demolitions of buildings<sup>51</sup>).
  - ▶ **support innovative recycling technologies**, both to achieve European objectives and to improve competitiveness in view of the ecological transition, also through technology transfer<sup>52</sup>. In particular, it is necessary to develop and enhance the technologies needed for:
    - the **recovery of phosphorus**, a chemical element listed among critical raw materials, essential for food production and agriculture, but with very low percentages of recycling from end-of-life products<sup>53</sup>. To limit Italy's dependence on imports, more than 20 solutions have been identified between management technologies (currently available and under development) and good practices for phosphorus recovery<sup>54</sup>. The most promising sectors for recovery are: sewage sludge and ash, organic fraction of municipal solid waste (OFMSW), livestock manure and agro-industrial digestates, slaughterhouse waste and batteries;
    - the **recycling of photovoltaic panels**, destined to play an increasing role in future energy production. Given the estimated growth in waste volumes of photovoltaic panels, it is necessary to ensure their efficient end-of-life management. There are two challenges to recycling these devices: (1) efficiently separating solar cells from the glass plate and (2) recovering the critical and precious metals from the solar cells<sup>55</sup>;
    - **chemical recycling processes for plastic fractions that are not mechanically recyclable and therefore destined for landfills or**

<sup>45</sup> Erion, Approvvigionamento delle materie prime strategiche: una questione di sicurezza nazionale, 7 July 2021.

<sup>46</sup> In particular, WEEE contains simple materials such as iron, aluminium, copper and plastic but also more critical materials such as rare earths, cobalt, palladium and lithium.

<sup>47</sup> According to a report in April 2021, recycling was not economically attractive for CRMs other than palladium and, to some extent, cobalt and antimony (see CEWASTE (2021), A contribution to future Critical Raw Materials Recycling, CEWASTE Project Final Report).

<sup>48</sup> The European House – Ambrosetti, Gli scenari evolutivi delle materie prime critiche e il riciclo dei prodotti tecnologici come leva strategica per ridurre i rischi di approvvigionamento per l'Italia, June 2022.

<sup>49</sup> Research Ref., Riciclare i rifiuti da costruzione e demolizione. L'economia circolare alla prova dei fatti, June 2022.

<sup>50</sup> Preventive removal of all the unrelated elements from the building structures that need to be handled in a differentiated manner.

<sup>51</sup> Legambiente, Quarry Report (Rapporto Cave) 2021 – La transizione dell'economia circolare nel settore delle costruzioni, 2021.

<sup>52</sup> For further information on the subject of technology transfer, please refer to the Sectoral Strategic Guidelines on Technological Innovation.

<sup>53</sup> National Phosphorus Platform, <https://www.piattaformaitalianafosforo.it/>

<sup>54</sup> ENEA, Materie prime critiche: da ENEA tecnologie innovative e buone pratiche per il recupero del fosforo, 9 January 2020.

<https://www.enea.it/it/Stampa/news/materie-prime-critiche-da-enea-tecnologie-innovative-e-buone-pratiche-per-il-recupero-del-fosforo>

<sup>55</sup> Photorama, Why Photorama? <https://www.photorama-project.eu/why-photorama/>

**waste-to-energy** (the so-called plasmix). Chemical recycling could be a complementary solution to mechanical recycling where the latter proves unsuitable for recovering plastic because it is too degraded, contaminated or too complex<sup>56</sup>. At European level, investments in chemical recycling **of 2.6 billion euros are expected by 2025 and 7.2 billion euros by 2030**<sup>57</sup>.

- ▶ **support process and product innovations in resource efficiency and waste treatment and transformation.** In the last twenty-five years, medium and large companies have focused on the environmental qualification of their processes and products, placing Italy among the best performers in terms of number of environmental process certifications and promotion of the products' environmental footprint<sup>58</sup>. In parallel, Italian startups and SMEs have flourished and are continuing to develop, bringing innovation to the sector, mainly along 4 lines:
  - reduction in the use of resources through the efficiency of production processes or the implementation of new business and consumption models;
  - reuse of resources (e.g. resources used by the consumer or used materials and industrial processing waste);
  - creation of new and more efficient products, such as new materials and B2B (business-to-business) and B2C (business-to-consumer) products with higher standards in terms of performance, durability, disposal;
  - increase in competition and innovation, thanks to the entry of new players that promote innovation and re-focus on efficiency, dynamism and technology.

In order for businesses to remain competitive in the future, it is necessary to promote:

- **the adoption of solutions and technologies to monitor the life cycle of products** (life cycle assessment LCA), an essential prerequisite for eco-design. This type of analysis allows to understand and manage the complexity of the supply chain, upstream and downstream of the production process, and identify critical issues in order to hypothesise solutions aimed at saving and recovering energy and materials;
- **the introduction of the so-called industrial symbiosis**, i.e. models of synergy between industries located within a specific area according to which waste or by-products of an industry become the raw materials for another. It represents a strategy to close the loop of product life cycle and optimise the use of resources through the collaboration between different enterprises based on the possibilities offered by the geographical and economic proximity. Numerous benefits are generated: lower consumption of resources, avoided environmental impacts and local enhancement of resources;
- **regeneration or remanufacturing technologies**, a process that allows a product to return to its original performance with an equivalent or better guarantee than that of the newly manufactured product<sup>59</sup>. This extends the life of the components and represents an important opportunity in terms of both efficiency gains and competitiveness for companies;
- **the introduction of "product as a service" business models** to promote circular value chains. As a matter of fact, as companies maintain ownership of the product, they are more incentivised to **produce goods that suffer the least number of failures possible** to avoid maintenance or replacement services at their own expense, thus putting an end to planned obsolescence. For example, there are already cases where appliances are available for rental rather than purchase. In this way, the products can be used by multiple customers during their life cycle, with a quality guarantee linked to a continuous replacement of malfunctioning components. On the other hand, parts that can no longer be used are reused as secondary raw materials, ideally again within the company's production processes.

<sup>56</sup> Zero waste Europe (2019), El Dorado of Chemical Recycling: State of Play and policy challenges.

<sup>57</sup> Plastics Europe (2022), The Circular Economy for Plastics – A European Overview.

<sup>58</sup> Ministry of Ecological Transition (2021), Strategia nazionale per l'economia circolare – Linee programmatiche per l'aggiornamento.

<sup>59</sup> This takes place by disassembling a product into its individual components, which are refurbished and reassembled, giving it a new lease of life.





## **3. Enabling factors and CDP's role**

**3.1  
Enabling factors**

**3.2  
CDP's role**

## 3. ENABLING FACTORS AND CDP'S ROLE

### 3.1. ENABLING FACTORS

- The effective pursuit of the strategic priorities outlined above is linked to at least six enabling factors:
  - ▶ **Harmonisation of governance in the waste sector by overcoming the fragmentation** of management responsibilities and skills and pursuing a **unified and integrated vision for the development of optimal waste management**. In addition, there is a need to promote **greater stability in waste management**, which is instead characterised by short-term concession or procurement contracts (contrary to the provisions of national legislation<sup>60</sup>), which, in the absence of strong local governance and long-term planning, negatively affect the quality of services and the prospects for improvement. In this regard, the National Waste Management Programme could contribute to improving management planning by regions and provinces.
  - ▶ **Streamlining and accelerating authorisation processes** to build new waste management plants. The design and authorisation phases, with an average duration of 2.9 years, affect the construction time of new plants by more than 60%<sup>61</sup>. Red tape is especially burdensome, with long periods of time elapsing between the different phases due to ancillary, administrative and bureaucratic activities.
  - ▶ **Timely and certain recognition of when waste ceases to be waste**, so that it becomes a product and therefore a valuable resource. The rapid evolution of technologies and recycling possibilities requires an equally rapid and constant regulatory evolution.
  - ▶ **Promotion of a tax system favourable to the transition toward a circular economy**, by i) strengthening the instruments that embody the EU principle "the polluter pays", such as pay-as-you-throw schemes – i.e. a pricing model where the variable fee is also partly proportionate to the waste delivered – and the landfill tax<sup>62</sup>, and ii) positive forms of incentive to reduce, reuse, recycle and material recovery.
  - ▶ **Transversal and widespread cultural change by Public Administrations, companies and citizens** to achieve a more efficient economic model in using resources. **Lack of social consensus** on building waste treatment plants<sup>63</sup>, albeit improving, continues to represent a strong obstacle to making investments in the sector, further slowing down the launch time of projects.
  - ▶ **Promotion of public-private partnerships (PPPs)**, which remain less widespread in Italy than in other major European economies. In the 2015-2019 five-year period, the volume of PPPs in Italy stood at 3.6 billion euros, down from 5.7 billion euros in the Netherlands and 12.5 billion euros in France<sup>64</sup>. Public-private partnerships are tools not only for speeding up the implementation of projects and ensuring their execution on time and on budget, in order to respond in a timely manner to the needs of local areas, but also for promoting the maintenance and enhancement of works over time and the innovative and efficient management of services.

### 3.2 CDP'S ROLE

- In this context, CDP can contribute to bridging the gaps highlighted, intervening additionally and complementarily with the market, taking into account the critical issues that characterise investments in the circular economy, such as:
  - ▶ the **presence of positive external effects**, which **limit the ability to fully capture the benefits generated by investments** (e.g. actions to recycle raw materials that positively affect biodiversity) and **negative external effects**, which limit the costs associated with unsustainable choices and behaviour (e.g. polluting emissions linked to inefficient production processes);
  - ▶ the existence of information barriers on the risks and opportunities of investing in circular productive processes, linked to the lack of data and empirical evidence with respect to costs, return and socio-economic impact, which hinder attracting private capital;
  - ▶ **sub-optimal investment rates** due to the need for **high initial contributions of resources** that limit the availability of projects

<sup>60</sup> The sector legislation envisages long-term concessions, lasting no less than 15 years.

<sup>61</sup> See note 22. This estimate is exclusively based on works on plants carried out through public funding. Where the project is a private initiative, it is reasonable to expect a reduction in the design time and a greater relevance of the authorisation time.

<sup>62</sup> A landfill tax (Law no. 549/1995) aimed at discouraging disposal of waste in landfills

<sup>63</sup> Phenomena of this type are: NIMBY (Not In My Back Yard) and NIMTO (Not In My Term of Office).

<sup>64</sup> CDP calculations on EPEC data. The data refer only to projects with a value of 10 million euro or more that have reached financial close and are financed through project financing.

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with an attractive risk-return profile for market operators. The growing role of sustainable finance can be an important opportunity for the sector, which already features sustainability objectives.



- In particular, CDP may intervene in order to:
  - ▶ **contribute to bridging investment gaps** in sectors and local areas where market players are unable to mobilise adequate resources, in terms of both volumes and growth rates, including through the use of **blended finance** instruments. In this context, action in the ecosystem of Italian startups is crucial, through direct investments in innovative firms and indirect investments in Venture Capital (VC) market operators, to encourage the creation and growth of virtuous enterprises;
  - ▶ **promote investments** in areas that require a **long-term commitment**, acting as a catalyst for private resources;
  - ▶ **promote investment initiatives and projects** cooperating with other **National Promotional Banks and Institutions (NPBI)**, to enhance synergies and complementarities, in areas of intervention where joint action can yield greater value;
  - ▶ **provide support to General Government** in the management of authorisation processes, also in order to contribute to their simplification and/or acceleration.
- To specifically assess the relevance, priority and strategic coherence of actions in the areas of focus identified, CDP identifies the most appropriate operational instruments based on the characteristics of the counterparties (type, geographical location, etc.) and the characteristics of the sector (e.g. degree of maturity, profitability).

The background of the slide is a close-up photograph of denim fabric, showing various shades of blue and white stitching. Two solid blue rectangular boxes are overlaid on the image. The first box, on the left, contains the text '4. Recommendations'. The second box, on the right, is empty.

## 4. Recommendations

## 4. RECOMMENDATIONS

For each of the areas of focus, **specific strategic guidelines** are summarised below for **prioritising** (although not exhaustively) CDP actions in **the Circular Economy**.

AREAS OF FOCUS		<b>INCREASED EFFICIENCY IN WASTE MANAGEMENT</b>
	STRATEGIC PRIORITIES	<p><b>A.1</b> Promote the construction of <b>waste-to-energy plants, especially in Central and Southern Italy</b>, to optimise the management of residual waste and treat sewage sludge</p> <p><b>A.2</b> Support the construction of <b>organic waste treatment facilities in particular in Central-Southern Italy</b></p>
AREAS OF FOCUS		<b>PROMOTION OF INNOVATION IN THE RECYCLING AND REUSE INDUSTRY</b>
STRATEGIC PRIORITIES	<p><b>B.1</b> Support <b>recycling for some strategic waste streams</b>, developing technologies to recover critical raw materials contained in WEEE and promoting selective demolition measures for construction and demolition waste</p> <p><b>B.2</b> Support <b>innovative recycling technologies</b>, in particular, for the recovery of phosphorus, the recycling of solar panels and chemical recycling processes for plastics that is not mechanically recyclable</p> <p><b>B.3</b> <b>Process and product innovation</b> enhancing resource efficiency and stimulating to the creation and growth of new virtuous enterprises</p>	

cdp 