Economic Instruments for the Circular Economy in Italy

OPPORTUNITIES FOR REFORM

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Foreword

This report is the final output of the analysis undertaken on economic instruments for the circular economy, conducted as part of the in-country support project 21IT01 “Advanced policy instruments to accelerate the circular economy”. The action was funded by the European Union via the Technical Support Instrument, and implemented by the OECD, in co-operation with the Directorate-General for Structural Reform Support of the European Commission.

The work was structured in two distinct phases. During an initial phase, the OECD developed a report that assessed the current use of economic instruments that support Italy's transition to a circular economy. This assessment included policy recommendations based on a review of international best practices. The findings from Phase 1 are detailed in Chapters 2-6 of this report. During the second phase, the OECD carried out a more in-depth analysis on selected fiscal instruments, as agreed with project partners. These instruments were identified as potentially supporting markets for secondary raw materials: virgin material taxation of construction aggregates, VAT reductions on products with recycled content, and corporate income tax incentives. The analysis and guidance from Phase 2 are presented in Chapters 7-10 of this report.

The work was carried out in close collaboration with the Italian Ministry of Environment and Energy Security. The insights presented in this report were enriched by the discussions held during the workshop titled “The role of fiscal instruments to promote the use of recycled materials as part of the circular economy transition in Italy”, which took place on 30 January 2024 in Rome. The workshop saw high participation and engagement from various sectors of the Italian Government and its technical agencies, including the Ministry of Environment and Energy Security, the Ministry of Enterprises and Made in Italy, the Ministry of Economy and Finance, ENEA, ISPRA, ISTAT, as well as the European Commission and selected experts from academia. The authors express their gratitude for the invaluable engagement and insights provided during and following the workshop.

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Multiple authors contributed to the policy analysis presented in this report. Elena Buzzi (ENV) is the lead author of the report. Giulia Galli (ENV) is the lead author of Chapter 10, and she contributed to several other chapters. Ruben Bibas (ENV) led the scenario modelling exercise for the analysis of the baseline scenario presented in Chapter 2 and the policy scenarios presented in Chapters 7 and 8. Erika Bozzay, Matthieu Cahen and Ludovica Mager (GOV) carried out the analysis on green public procurement presented in Chapters 4 and 5. Oriana Romano and Ander Eizaguirre (CFE) conducted the analysis on multi-level governance, included in Chapters 4, 5 and 6. Verónica Martínez Sánchez, Francisco Navarro and Ignasi Puig Ventosa (ENT Environment & Management) carried out the analysis on virgin material taxation for construction aggregates presented in Chapter 8. The work was carried out under the guidance of Peter Börkey (ENV), who also provided expert input and feedback throughout the preparation of the report.

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Abbreviations and acronyms

ANAC	National Anti-Corruption Authority (Autorità Nazionale Anti-Corruzione)
ANCI	National Association of Italian Municipalities (Associazione Nazionale Comuni Italiani)
ARERA	Italian Regulatory Authority for Energy, Networks and Environment (Autorità di Regolazione per Energia Reti e Ambiente)
BERD	Business enterprise expenditure on R&D
CAM	Criteri Ambientali Minimi
CDW	Construction and Demolition Waste
CGE	Computable General Equilibrium
CIT	Corporate Income Tax
CJEU	Court of Justice of the European Union
CO_{2e}	carbon dioxide equivalent
CONAI	National Packaging Consortium (Consorzio Nazionale Imballaggi)
DG REFORM	Directorate-General for Structural Reform Support
DMC	Domestic Material Consumption
DRS	Deposit refund (or return) system
EEE	Electrical and electronic equipment
EFS	Environmentally Favourable Subsidies
EHS	Environmentally Harmful Subsidies
EMAS	Eco-Management and Audit Scheme
ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development (Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile)
EPR	Extended Producer Responsibility
EU	European Union
EU27	European Union of 27 member states
EUR	euro
GBP	Great British Pound
GCD	Green Claims Directive

GDP	Gross Domestic Product
GHG	Greenhouse gas
GPP	Green Public Procurement
GTAP	Global Trade Analysis Project
GVA	Gross Value Added
ICT	Information and Communications Technology
ISPRA	Italian Institute for Environmental Protection and Research (Istituto Superiore per la Protezione e la Ricerca Ambientale)
ISTAT	Italian National Institute of Statistics (Istituto nazionale di statistica)
MASE	Ministry of Environment and Energy Security (Ministero dell'Ambiente e della Sicurezza Energetica)
MATTM Tutela	Ministry for Environment, Land and Sea Protection (Ministero dell'Ambiente e della del Territorio e del Mare)
MFA	Material Flow Accounts
MIMIT	Ministry of Enterprises and Made in Italy
MiTE	Ministry of Ecological Transition (Ministero della transizione ecologica)
NRRP	National Recovery and Resilience Plan
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-as-you-throw
PET	Polyethylene terephthalate
PINE	Policy Instruments for the Environment
PMC	preliminary market consultation
PPP	Purchasing Power Parities
PPWD	Packaging and Packaging Waste Directive
PRO	Producer Responsibility Organisation
R&D	Research and development
SDG	Sustainable Development Goal
SME	Small and medium enterprises
SUP	Single use plastics
UNI	Italian National Standards Body (Ente Italiano di Normazione)
USD	United States dollar
VAT	Value added tax
VRR	VAT Revenue Ratio
WEEE	Waste from electrical and electronic equipment
WFD	Waste Framework Directive
WTP	Willingness to pay

Executive summary

A circular economy keeps the value of resources in the economy for longer, extends the useful lifespan of products and reduces waste, offering the prospect of reduced environmental and climatic pressures and increased domestic competitiveness. Italy is one of the leading European actors in the transition to a circular economy. It has one of the lowest levels of domestic material consumption per capita in the EU and has already exceeded most EU targets for the recycling of municipal solid waste. However, Italy could progress even further to decouple economic growth from material consumption, as recently evidenced by the vulnerability of the Italian economy in the face of supply chain disruptions and the high prices of virgin raw materials. The adoption of the National Strategy for the Circular Economy in 2022 strengthened the country's policy ambition to quickly transition from linear to circular patterns of production and consumption.

Among the envisioned measures, the national strategy calls for a strengthened use of economic instruments to create a more coherent and effective policy mix aligned with national policy ambitions. Economic instruments are widely used across OECD countries to favour more sustainable practices and penalise harmful behaviour, helping to re-orient consumer and company behaviours towards higher environmental benefits, while limiting economic impacts. Although Italy already employs various economic instruments (such as green public procurement, Extended Producer Responsibility and corporate tax credits), there is potential to further internalise negative externalities and strengthen price signals to align consumer and company behaviour with higher sustainability and circularity.

Developed in the context of a collaboration with the Directorate-General for Structural Reform Support (DG REFORM) of the European Commission, this report identifies opportunities for an improved and innovative use of economic instruments to support the circular economy in Italy, including through reforms, enhanced implementation, and instrument introduction. Part I of this report takes stock of the Italian policy landscape and compares it to international practices. It recognises the large potential to strengthen the use of economic instruments and recommends the following options for further consideration:

1. **The introduction of virgin material taxation of construction aggregates** to strengthen price signals so as to curb primary materials demand and promote the use of secondary materials.
2. **The prioritisation of a reform of the landfill tax characterised by a strong co-ordination between the national and the regional level** to harmonise and progressively increase landfill tax rates across regions, effectively discourage landfilling and further promote recycling.
3. **Continued reforms to remove environmentally harmful subsidies,** including those related to the circular economy and waste, such as the reduced value added tax (VAT) rate that applies indiscriminately to waste storage, management and disposal.
4. **The introduction of an incineration tax that applies to waste-to-energy facilities** to maximise incentives for waste prevention and treatment options that sit higher in the waste hierarchy and prevent potential long-term lock-in effects.
5. **The continued implementation of pay-as-you throw systems** to help further reduce both the generation of residual waste by households and local waste management costs.
6. **Wider support for practices aligned with waste prevention and continued strengthening of Extended Producer Responsibility schemes** to support waste prevention through eco-design requirements and the promotion of reuse and repair practices.
7. **Continued increases in the ambition of public procurement approaches that promote circularity and green innovation**. Innovative strategies may involve a needs assessment, a focus on services and new business models (rather than products), and the adoption of contractual clauses and tender specifications that extend product lifespans.

Part II of this report contains in-depth analysis of a sub-set of instruments that could support the policy goal of reducing demand for virgin materials and shifting to secondary materials. Envisioned environmental benefits include reduced impacts associated with material extraction and lower greenhouse gas (GHG) emissions, in addition to economic benefits to secure the supply of raw materials. As agreed with Italy's Ministry of Environment and Energy Security, this part focuses on three instruments: virgin material taxation on construction aggregates, reduced VAT rates on products with recycled content (for potential introduction), and corporate tax credits (to strengthen existing measures).

Virgin material taxation of construction aggregates. The construction sector plays a key role in the Italian economy, but its high reliance on virgin materials is associated with significant environmental impacts and concerns about security of supply. A virgin material tax on construction aggregates could help internalise the environmental and social costs of quarrying, mitigate virgin material demand, and promote the shift to secondary alternatives (including from end-of-waste processes), especially in the construction sector. A national framework is important for establishing a harmonised approach, while giving regions some flexibility to adapt to local circumstances. This would include the setting and regular update of harmonised minimum tax rates for each material category at the national level. The report recommends tax rates based on a physical metric (*ad quantum*), ideally based on both the surface area affected and the extracted volumes. Given that demand elasticity of supply for construction aggregates tends to be low, virgin material taxes are most effective when combined with policies aimed at increasing the supply of secondary materials as well as effective control systems. This is also substantiated by evidence from the use of such taxes in other countries.

Reduced VAT rates on products with recycled content. Reduced VAT rates are often put forward to encourage the consumption of environmentally friendly goods or labour-intensive repair activities. The application of a preferential VAT rate on products with recycled content (in Italy, from 22% to a 10% reduced rate) could theoretically help to lower prices, potentially incentivising both consumers and producers to prefer them over less circular alternatives. However, issues of limited pass-through to consumer prices, an uncertain consumer response, and risks of rebound effects on primary and secondary material consumption could all diminish the expected environmental benefits of the measure. Moreover, implementation would require legislative changes to the EU VAT Directive, as well as information and certification schemes to clearly identify the eligible goods. Furthermore, reduced VAT rates potentially generate significant losses in fiscal revenues, pose higher costs of monitoring and compliance, and potentially lead to distributional impacts. The cost effectiveness of this measure should therefore be carefully considered against alternative instruments (such as direct subsidies).

Corporate tax credits to promote recycled content. Italy implemented corporate tax credits to support preferred (recycled and compostable) materials in packaging and products as recently as 2021 and has since strengthened or discontinued some of them. Uptake by the industry differed greatly for introduced measures, but the brevity of their use prevents a more detailed assessment. Sustaining measures over multiple years would provide firms a better opportunity to factor them into their long-term investment plans, as well as help enhance data collection and ex-post evaluation. Market studies and industry consultations could inform the design of tax credits, notably, the recycled content threshold and the size of the tax credit, helping to calibrate both in a way that avoids the risk of unintended effects. Progressively tightening requirements over time may also help to ensure that these provide meaningful incentives for firms in the long run. More broadly, as corporate tax credits entail additional costs, their use should be justified by a proven impact on the behaviour of firms and the associated environmental gains.

Based on model simulations, carried out as part of this report, a combination of fiscal incentives (or subsidies) with environmental taxation is recommended to amplify GHG emissions savings and other environmental benefits, while achieving budget neutrality. Taxation can counter potential rebound effects on consumption associated with fiscal incentives or the unintended consequences of material substitution, and overall generate stronger price signals to reduce virgin materials use. Fiscal incentives (such as reduced VAT or corporate tax credits) alone are unlikely to bring about strong economic incentives, but they could serve as "supporting measures" as part of a larger policy mix. Where possible, policies should be based on life cycle metrics to guarantee reductions in environmental impacts.

1 Overview and key messages

This chapter introduces the context and provides an overview of the objectives and structure of the report. It outlines the key findings and conclusions derived from the analysis on opportunities to reform and enhance the use of economics instruments to support the circular economy in Italy.

1.1. Introduction

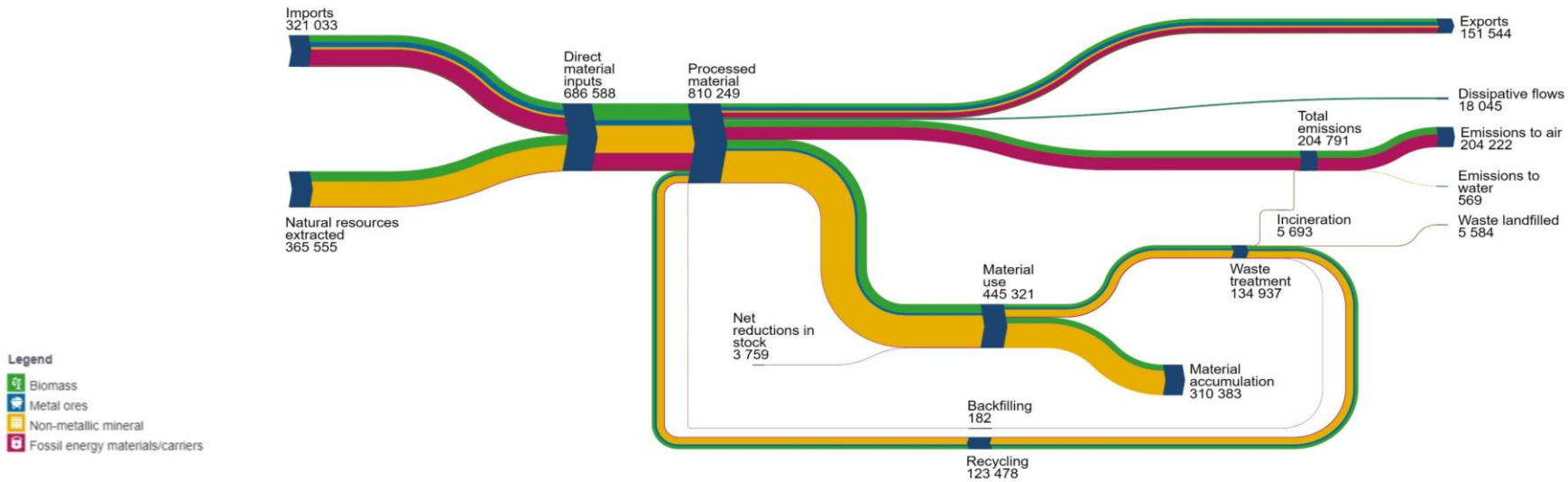
The circular economy has gained increased prominence as a lever to achieve the goals of the United Nations 2030 Agenda for Sustainable Development. Global consumption of raw materials has been steadily rising in recent decades and is projected to double (from 89 to 167 Gigatonnes) by 2060 under a business-as-usual scenario (OECD, 2019[1]). The escalating level of materials extraction, their processing, use and disposal, is a major contributor to emissions of greenhouse gases (GHG) and air pollutants, the loss of ecosystem services, as well as the adverse consequences for human health, well-being and the economy. Transitioning from linear to circular economies (see Box 1.1 for a definition), which retain the value of material resources for longer, could substantially mitigate these pressures and contribute to the preservation of natural resources and the reduction of GHG emissions and air pollution.

The transition to a circular economy can yield environmental, economic and social gains, and support the shift to a low-carbon and nature positive economy. Materials management activities (i.e. those associated with the production, consumption and end-of-life treatment of physical goods in the economy)[1] are linked to more than half of national GHG emissions in OECD countries (OECD, 2012[2]) and are projected to account for two-thirds of global GHG emissions in 2060 (OECD, 2019[1]). The modelling of combined energy and material transitions shows substantial synergies, including in facilitating the shift from primary to secondary materials and extending it to the energy sectors (from fossil fuels to renewables), resulting in the largest gains in materials use and value retention (Bibas, Chateau and Lanzi, 2021[3]). In addition to reduced environmental pressures, transitioning to a circular economy can support economic expansion and job creation, while lowering the risk of shocks in the supply of raw materials. Businesses will play a pivotal role in leading the transition to sustainable and circular economies, as a new policy environment provides them with unprecedented opportunities to improve human well-being and unlock positive contributions for nature and society.

Italy is one of the European Union (EU) countries leading the circular transition. Figure 1.1 illustrates material flows in Italy for the year 2022. The main materials extracted in Italy are non-energy minerals (non-metallic minerals in particular) and biomass, while Italy's economic system is dependent on foreign markets for energy and metal ore resources. The Italian industrial sector has historically developed high efficiency in the use of resources and methods for material recovery, also due to its limited natural resources and reliance on imports. Currently, the country performs better than the OECD average in terms of domestic material consumption (at 8.6 tonnes per capita in 2021, considerably below the OECD average of 17.5 tonnes per capita). The country's circular material use rate is now the fourth highest in Europe: in 2022, 19% of overall materials used were recycled and fed back into the economy, compared to a EU 27 average of 12%.

Figure 1.1. Material flow diagram for Italy

Thousand tonnes, 2022



Source: (Eurostat, 2024[4])

Box 1.1. Definition of the circular economy

The concept of the circular economy may differ across countries, with variations in the scope of policies and sectors and in the policy objectives. The OECD (Forthcoming[5]) has developed a **hierarchy of definitions**[1] for the circular economy, as an economy in which:

- the value of materials in the economy is maximised and maintained for as long as possible
- the input of materials and their consumption is minimised
- waste generation is prevented and negative environmental impacts reduced throughout the life cycle of materials.

Table 1.1. Mechanisms that contribute to a circular economy

Closing resource loops	• Increased product reuse, repair, remanufacture • Increased recycling and use of secondary raw materials (material substitution)	✓ Reduced demand for new products & virgin materials
Slowing resource loops	• Improved product design • Increased use of long-lived products (product substitution • Increased products reuse and repair	✓ New technologies, investment in R&D ✓ Expanded activity sectors: reuse, repair, remanufacture, etc.
Narrowing resource loops	• Increased material productivity/efficiency • Improved use of natural resources • Improved consumer behaviour: functionality & service versus ownership	✓ Expanded sharing and service economies
Activities that drive a CE transition can also drive re-industrialisation, job creation, competitiveness		

Source: (OECD, Forthcoming[5]), adapted from (McCarthy, Dellink and Bibas, 2018[6])

The OECD distinguishes several mechanisms that contribute to a circular economy to varying degrees. A first, well-known mechanism is the **closing of resource loops**, i.e. substituting virgin materials and new products with secondary raw materials and second-hand, repaired or remanufactured products. A second, broader mechanism is the **slowing of resource loops**, that seeks to slow down consumption and demand for virgin materials by extending the life of existing goods, usually thanks to more durable product design. A third mechanism involves **narrowing resource flows** to increase resource efficiency (by decreasing the total amount of resources used per unit of output or by making better economic use of existing capacity) and to achieve a more efficient use of natural resources, materials and products (through the development and diffusion of new production technologies, better utilisation of assets, or shifts in consumption behaviour away from material intensive goods and services).

1. This hierarchy comprises a *headline definition*, which is accompanied by simple *explanatory notes* and references to the mechanisms and strategies underlying a circular economy, as well as details to guide statistical measurement.
Source: (OECD, Forthcoming[5])

Nevertheless, the full potential of the circular economy is yet to materialise. Modelling carried out with the OECD Computable General Equilibrium (CGE) ENV-Linkages model shows that, under business as usual, projected demographic and economic factors in Italy are expected to lead to a stabilisation around current levels of material consumption, which are not aligned with the sustainable future envisioned by the European Green Deal and national policy goals. The scarcity of raw materials and supply-chain disruptions, which occurred in the early phase of economic recovery from the COVID-19 pandemic, shed light on the persistent linearity of the Italian economy.

Italy's National Strategy for the Circular Economy ("Strategia Nazionale per l'Economia Circolare"), adopted in June 2022, recognises the need for urgent action to place the country on a path towards a sustainable and circular economy and to unlock the environmental and climate benefits of the transition. Moreover, the strategy recognises the potential of the circular economy transition to contribute to the policy objectives of securing the supply of raw materials, domestic competitiveness and job creation. Bolstering markets for secondary raw materials, improving eco-design and extending the lifetime of products are among the key objectives outlined in the strategy.

The roadmap for the implementation of the Strategy for the Circular Economy ("Cronoprogramma di attuazione delle misure della Strategia Nazionale per l'Economia Circolare") envisions action on the following key topics:

- Governance of the strategy, including establishing an Observatory on the implementation of the strategy and annual reporting.
- A new system of waste traceability.
- Fiscal incentives to support recycling and secondary raw materials, including proposals for renewed corporate tax credits in support of secondary materials.
- Reform of environmental taxation to promote recycling, including the reform and elimination of relevant environmentally harmful subsidies, measures to support municipalities and regions in waste prevention, reuse and waste sorting, and a possible reform of the landfill tax.
- Right to reuse and repair, including more support offered to reuse centres and promoting reuse through public procurement approaches.
- Extended Producer Responsibility (EPR) schemes, including the introduction of a specific supervisory body and the full implementation of an EPR scheme for textiles.
- Updates to existing legislation in support of the circular economy, including national and regional waste legislation, the development and revision of mandatory minimum environmental criteria in public procurement, and end-of-waste legislation.
- Support to industrial symbiosis projects, including financial support to flagship projects.
- Measures on land use, including remediation and lowering the demand for more land, as well as measures on water, including for waste reuse and reducing consumption.

1.2. Purpose of this report

This report explores opportunities for the reform or the introduction of selected economic instruments to advance the circular economy transition in Italy. Across multiple themes, the Strategy for the Circular Economy, and its roadmap for implementation, emphasises the potential to leverage economic instruments to align price signals with policy objectives. The use of economic instruments for environmental policy has received significant attention in the international and national policy debate in recent decades. By favouring practices that are more sustainable and circular, and penalising those that are more wasteful and harmful to the environment and human health, economic (or market-based) instruments can help to reorient consumer choices and market forces, lowering environmental impacts, while avoiding excessive economic

impacts. Furthermore, environmental taxes (a subset of economic instruments) may generate revenues for public budgets and prompt incentives for green innovation at every stage of the value chain.

Italy's current policy and legislative landscape already includes various economic instruments for the circular economy, such as landfill taxes, pay-as-you-throw (PAYT) household waste tax schemes, fees on extractive activities, EPR schemes and Green Public Procurement (GPP). However, there is still significant room for improvement to leverage their use to align price signals with negative externalities. Indeed, there are opportunities to overcome persistent obstacles in their uptake, especially across regions, and to enhance their effectiveness in delivering the expected environmental outcomes (over revenue-raising), as well as to advance an innovative use of economic instruments and introduce additional fiscal incentives to support circularity.

This report aims to support Italy's ongoing efforts by providing policy analysis and recommendations on the role of economic instruments to promote the circular economy. The report consists of two parts.

1. Part I reviews the current policy landscape and identifies gaps and opportunities to improve the use of economic instruments for the circular economy in Italy.
2. Part II delves into a more thorough analysis of selected economic instruments. After consultation with the Italian Ministry of Environment and Energy Security (MASE), it was decided to focus the analysis on three instruments that could support markets for secondary materials: virgin material taxation on construction aggregates, reduced VAT rates on products with recycled content, and corporate income taxation (CIT) incentives in the form of tax credits.

The report is situated in the context of the project "Advanced policy instruments to accelerate the circular economy", as part of a long-standing collaboration with the Directorate-General for Structural Reform Support (DG REFORM) of the European Commission on country-specific policy reform projects. The reform of economic instruments has long been part of domestic policy discussions in Italy. A previous project, also funded by the European Commission, administered by DG REFORM and carried out in collaboration with the Italian Government, supported the development of a national policy agenda and action plan for environmental fiscal reform in Italy. Previous projects also supported the development of an action plan for policy coherence for sustainable development.

The rest of this chapter summarises key findings from the report.

1.3. Assessment of the current policy landscape and opportunities to improve the use of economic instruments for the circular economy (Part I)

Part I of this report identifies the potential to amplify the use of price-based economic instruments to internalise negative externalities and strengthen incentives to align the behaviour of consumers and firms with higher sustainability and circularity. Upstream in the value chain, the environmental and social impacts of virgin material extraction and use are typically not factored into their price. Hence, the prices of newly manufactured goods made from virgin materials are often more competitive than more sustainable alternatives. At the level of consumption and waste generation, there are also limited incentives to favour options higher up in the value chain, including reuse and waste prevention as well as recycling over landfilling and waste-to-energy. Multiple options are available to policy makers to update the use of economic instruments, including reforms targeted to individual instruments, the removal of environmentally harmful subsidies, and implementation as part of broader environmental fiscal reforms. As detailed in Chapters 5 and 6, the following opportunities for instrument reform and introduction were identified and could be considered:

1. **Explore the relevance of a virgin material taxation applied to construction aggregates** to strengthen price signals against primary materials demand. Existing fees on extractive activities are not designed to provide price signals that would affect the quantities extracted nor incentivise the use of secondary materials. The relevance of virgin material taxation could also be relevant for material groups such as plastics, i.e. through the implementation of the plastics tax to further promote circularity in the plastic packaging sector.
2. **Prioritise a reform of the landfill tax characterised by a strong co-ordination between the national and regional level** to harmonise and increase landfill tax rates across the country. In most regions, landfill taxes are significantly below the European average and are likely too low to discourage landfilling. A reform of the instrument at the national level is required to progressively increase regional tax rates.
3. **Continue to work on reforms to remove identified environmentally harmful subsidies applying to waste disposal operations and consider the introduction of an incineration tax**. This would maximise incentives for waste prevention and treatment options that sit higher in the waste hierarchy, and prevent potential lock-in effects in the long term.
4. **Continue to enhance the implementation of PAYT systems** by which households are charged based on the amount of mixed waste they generate. Extending the coverage of PAYT in all regions could further reduce household residual waste, thereby reducing local waste management costs. Examples of supporting measures include obligations and incentives contained in regional waste management plans ("Piani Regionali di Gestione dei Rifiuti"), the enhanced technical and financial support to municipalities, as well as information and behavioural measures targeted to households.
5. **Widen support for reuse and repair** to render waste prevention more convenient. In the context of EPR schemes, there are opportunities to engage Producer Responsibility Organisations (PROs) in the promotion of repair and reuse practices by allowing them to count these activities towards their targets, which have so far focused on recycling. In addition, Italy could evaluate the relevance of fiscal incentives to promote repair and the sale of refurbished, remanufactured and second-hand products.
6. **Continue to raise the ambition of public procurement approaches** to promote circularity and green innovation even more. Since 2016, all public entities in Italy are obliged to apply minimum environmental criteria ("Criteri Ambientali Minimi", CAM), which so far have been defined for 20 categories of goods and services. Public procurement already promotes circular practices, e.g. through recycled content requirements. Innovative strategies to promote circularity may involve a needs assessment, a focus on services and new business models (rather than products), and the adoption of contractual clauses and tender specifications that extend product lifespans. It might also be beneficial to strengthen strategic relationships with the business sector to raise awareness of market capacity and readiness for green innovation.

The report also identifies a number of cross-cutting factors to consider.

- A mix of diverse, well-co-ordinated instruments is critical to the successful implementation of economic instruments and to achieve environmental policy objectives efficiently. Chapter 6 presents economic instruments proposed for reform or introduction in Italy and discusses the principal, related supporting measures.
- Environmental taxes should generally be prioritised over ad hoc incentives through the tax code because of the clearer price signals generated and the lower administrative costs in general. Public acceptance of tax reforms could be improved by conducting adequate stakeholder consultations, committing to credible policy and predictable tax rates, implementing a gradual phasing in, and ensuring clarity on the use of revenues (especially at the sub-national level) (see Section 6.7.1).

- Regular policy evaluation is critical to maintain the effectiveness of economic instruments in the long term. Better access to data on instrument uptake, environmental outcomes, and economic and administrative costs at all levels of government can improve the quality and effectiveness of interventions. The regular update of the Catalogue of Environmentally Harmful and Favourable Subsidies provides an excellent evidence base to inform reform efforts (see Section 6.7.2).
- Continued improvements in multi-level governance and strengthened capacity-building can support implementation at the sub-national level. Current mechanisms can enhance co-ordination across local, regional and national levels of government for the reform and implementation of economic instruments and to help share good practices and lessons learned (see Section 6.7.3).

1.4. Deeper analysis on selected instruments to reduce primary material demand and support secondary materials (Part II)

Part II of this report develops practical guidance on the use of economic and fiscal instruments. After consultation with MASE and based on the findings of the analysis contained in Part I of this report, it was decided to focus the analysis on three instruments that could accelerate reductions in the extraction and use of virgin (primary) materials and support markets for recycled and other recovered (secondary) materials. These are virgin material taxation on construction aggregates, reduced VAT rates on products with recycled content, and corporate income tax credits for the use of recycled content.

The choice of focus is aligned with one of the priorities set out in the National Strategy for the Circular Economy, that is, to accelerate the shift away from primary materials. In recent years, Italy has introduced an increasing number of measures to support recycled and other recovered materials, such as recycled content requirements in public procurement criteria and corporate tax credits to support preferred materials. However, direct disincentives against virgin material extraction and use remain limited. As virgin material taxation on construction aggregates is a relatively well-known measure, which is already in place in some OECD countries, the analysis in this report aims to offer practical guidance for future legislative efforts in this area. At the same time, the analysis in this report also offers guidance on efforts to strengthen and extend fiscal incentives for recovered materials, as emphasised by Italy's Strategy for the Circular Economy.

To explore the expected environmental outcomes and economic impacts of selected instruments, as well as the possible synergies across measures, simulations were performed using the OECD ENV-Linkages model. This is a Computable General Equilibrium (CGE) model that links detailed projections of economic activity to material demand and environmental impacts, in this case, to produce projections for Italy to 2040. It was used to model a fiscal reform scenario for materials that combines subsidies to support secondary materials and taxes on primary materials, using tax revenues to finance subsidies.

1.4.1. Virgin material taxation on construction aggregates

Italy extracts around 86 million cubic metres of virgin construction aggregates every year. The construction sector is a strategic sector for the circular transition, mainly due to its raw material demand and significant contribution to waste generation. The sector's dependency on virgin materials raises concerns over security of supply, potentially impacting the competitiveness of the Italian economy. Currently, most Italian regions impose fees on the extraction of materials, such as sand, gravel and rock, with wide differences across the national territory in the fee rates imposed. Due to their design, existing fees do not alter behaviour in terms of material extraction and sourcing.

A tax on the extraction of virgin construction aggregates could discourage primary materials extraction and encourage a shift towards secondary materials use (including from end-of-waste processes). Sub-national levels of government would be responsible for the design and implementation of a tax on construction

aggregates, but an established national legislative framework would help to harmonise its implementation, while allowing regions to adapt to local circumstances.

Key guidance on the design and implementation of a virgin material tax in Italy includes:

- **Taxable event and tax base**: it is recommended that the tax applies to the extraction of quarried non-energy minerals and that it covers all material categories.
- **Tax rate**: *ad quantum* taxes are preferred and, ideally, should combine both a measure of the areas affected (e.g. extraction surface areas) and the extracted quantities (by weight or volume). In the Italian context, minimum tax rates could be established at the national level for each category of extracted materials, and be updated regularly.
- **Earmarking of revenues** is generally not advised, although it can be helpful in specific circumstances to increase acceptance of the tax by stakeholders, in particular, by responding to concerns for competitiveness impacts for businesses or for the sake of affordability among households. Sub-national governments are best placed to allocate revenues based on local circumstances. National legislation could establish minimum requirements to be included in regional plans on extractive activities, e.g. obligations to be included in environmental permits and provisions for quarry restoration following closure, as well as provisions to support municipalities affected by the quarrying activities.

The estimated economic and environmental outcomes of the proposed tax on the extracted construction aggregates appear relatively modest due to the generally low demand elasticity. This will likely have a modest impact both in terms of costs (to those subject to the tax) and in terms of environmental benefits. Evidence from international experience suggests that virgin material taxes on construction aggregates are most effective when implemented alongside other policies aimed at increasing the demand for and supply of recycled materials to provide alternatives to the use of virgin materials (e.g. landfill taxes, minimum recycled content requirements, support for selective demolition and improved quality standards for construction and demolition waste (CDW), end-of-waste criteria for CDW and classification of industrial by-products) and enhanced monitoring of waste and control systems.

1.4.2. Fiscal incentives to promote secondary materials

A large number of policy instruments are available to support demand for secondary materials, including both direct regulation and indirect recycled content requirements. Italy has introduced minimum recycled content requirements for several product groups and materials. They primarily employ indirect approaches through public procurement (e.g. CAM for public construction works, award criteria for textile products) and corporate tax credits to support recycled content (and compostable materials) in products and packaging. MASE expressed a particular interest in practical guidance on two instruments: reduced VAT rates on products with recycled content (for its potential introduction nationally) and corporate tax credits (to strengthen recently introduced measures).

Reduced VAT rates

A value added tax (VAT) is a broad-based tax levied on the final consumption of goods and services by households. Most EU Member States apply one or two reduced rates (five Member States also apply a super-reduced rate) generally to alleviate the potentially regressive nature of consumption taxes and to encourage the consumption of goods and services that bear positive externalities, or to boost selected economic sectors. Insights from empirical evidence suggest that reduced VAT rates are generally an inefficient means to achieve these policy objectives as they may face issues of limited pass-through to prices or windfall gains. They may also increase administrative and compliance costs, distort household spending patterns, as well as result in distributional impacts on households. Tax policy tends to favour a uniform VAT rate to ensure stable revenues and enhance economic efficiency.

In Italy, VAT revenues represent 24% of general government revenues and 6.8% of Italy's gross domestic product (GDP). The standard rate is set at 22%, with two reduced rates of 10% and 5% that apply to a range of goods and services, as well as a super-reduced rate of 4% applied to a list of essential goods. Currently, the VAT system is being revised to align with recent changes made to the EU VAT Directive aimed at harmonising rules across the European Union, but also to restrict the introduction of additional preferential VAT rates.

Tax relief applied on products with recycled content could hypothetically be applied by dropping the standard rate (22%) to the reduced rate of 10%. The preferential VAT rate could lower their prices relative to products that do not contain recycled content. A shift in consumer preferences, influenced by lower prices, could increase demand for recycled materials higher up in the value chain and potentially reduce the use of virgin materials.

This report highlights several challenges and uncertainties that could diminish the effectiveness of reduced VAT rates in achieving the sought-after environmental outcomes, as highlighted below.

- **Legal and implementation challenges.** Consideration of this measure would require legislative changes and tools to support implementation. Currently, products containing recycled content are not listed in the categories of products eligible for reduced VAT rates in Annex III of the EU VAT Directive. Differences in VAT rates between similar products may give rise to administrative and legal conflicts about the classification of specific goods. There could also be practical difficulties as regards identifying the eligible products, as information and certification schemes for recycled content are not available for most products and materials.
- **Uncertainty about environmental outcomes.** As evidenced by scenario simulations performed with the OECD's ENV-Linkages model (see Chapter 7), introducing stand-alone measures to support secondary materials could effectively support a shift from primary to secondary materials, but it could also result in considerable rebound effects on consumption, potentially worsening environmental outcomes compared to not introducing the measures. Secondly, empirical evidence suggests a limited effectiveness of reduced VAT rates in changing consumption patterns. This may be because retailers could pocket a share of the VAT reduction or because the reduction in the product price is so negligible that it does not provide an incentive. As the tax relief only applies to finished products, it is uncertain to what extent the measure would generate changes in behaviour upstream in the value chain or a reduction in the use of virgin materials.
- **Fiscal impacts and the efficient use of resources**. Reduced VAT rates could result in significant losses in fiscal revenue. For instance, a reduced VAT rate on textile products with recycled content could lead to losses in public revenues of EUR 520-769 million in the first year of implementation alone (corresponding to 0.4-0.6% of total VAT revenues in 2022). While short-term revenue losses may be justified by the long-term benefits for the environment and economic growth, it remains uncertain whether VAT reductions can offer benefits compared to alternative instruments, such as targeted direct subsidies for the production of secondary materials. New reduced VAT rates may add to the complexity of the VAT system, increasing the costs of monitoring and compliance, and creating greater incentives for misclassification and non-compliance. Furthermore, there are also important distributional concerns associated with the introduction of reduced VAT rates, as high- and low-income households display very different expenditure patterns.

Overall, the introduction of reduced VAT rates would need to be carefully evaluated on a case-by-case basis. The extent of environmental benefits expected from this measure could differ greatly depending on the product groups to which it is applied and the targeted materials. Product groups such as textiles, for which certification schemes for recycled content are already in place, would be better suited to early introduction compared to those without certification schemes.

The modelling performed suggests that the combination of incentive measures for recycled materials with parallel taxation of primary materials is generally preferred to amplify the benefits of the policies and

achieve budget neutrality. The promise of environmental benefits from higher circularity rests on the assumption that demand for primary materials is reduced, for instance, because they are displaced by secondary materials or because of improved resource efficiency in the production processes. Taxation can counter potential rebound effects on consumption associated with subsidies (or tax incentives) or the unintended consequences linked to material substitution, thereby generating stronger price signals to reduce virgin materials use. By using tax revenues to finance subsidies, for instance, targeted at increasing the supply and quality of secondary materials, the overall policy mix may achieve a bigger impact on GHG emissions, as well as other environmental impacts. Other ways of achieving budget neutrality include increases in other environmental taxes or the reform and removal of preferential VAT rates that have been classified as environmentally harmful.

Corporate Income Tax (CIT) incentives in the form of tax credits

Over the last 5 years, Italy has increased the number of fiscal incentives to promote circularity-aligned behaviours among firms, including through i) corporate tax credits that apply to the purchase of products made from recycled plastics, biodegradable and compostable packaging or packaging containing recycled paper, plastics or aluminium, and ii) corporate tax credits for the purchase of intermediary and final products composed of materials from the recycling of waste or of scrap materials, and high-quality compost. The available information indicates a high uptake for the first measure among firms, which led to a renewal for 2023/2024. Conversely, the second measure was less popular, possibly due to the small size of the incentive and the difficulty of meeting the requirements (the measure was not renewed). However, the short implementation period of these measures prevents a thorough assessment at this time.

Sustaining measures over multiple years could increase the impact of tax incentives, though this would come at additional fiscal costs. Ensuring the timely implementation and consistency of corporate tax credits would help send clear price signals and provide better long-term visibility to economic actors, allowing firms to factor them into their long-term investment plans. This is particularly relevant for incentives that aim to structurally modify a firm's production processes over the long term. Longer implementation periods would also enhance data availability and opportunities for adequate ex-post evaluation and the eventual reform of introduced measures.

The design of the measures is key to delivering environmental outcomes efficiently and ensuring additionality of the measure (i.e. that additional investments are achieved, above the level of investments reached without the incentive), as well as limiting the fiscal costs. Specifically, the instrument design involves such strategic choices as eligibility requirements (i.e. the recycled content threshold) and the size of the incentive. Market studies and industry consultations could help calibrate both decisions in a way that generates meaningful price signals to elicit behavioural changes by firms, while also minimising risks of unintended effects associated with supply chain disruptions or material substitutions. A progressive tightening of recycled content thresholds may help to ensure that these continue to provide meaningful incentives in the long run, in line with long-term policy ambitions expressed in the National Strategy for the Circular Economy. Overall, a clear objective, careful targeting, clear eligibility, systematic ex-post monitoring and evaluation are all critical components for the successful use of corporate tax credits.

Nevertheless, there are uncertainties as to whether corporate tax credits (and tax incentives in general) offer a cost-effective means to stimulate desired changes in firm behaviour and achieve environmental gains, over alternative policy instruments. The literature suggests that expenditure-based CIT incentives may effectively stimulate R&D investments by firms, however the rationale for their use in support of environmental policy objectives is less clear and ascertaining positive environmental impacts via this route is difficult. Tax incentives generally target environmental externalities poorly, and have drawbacks that include fiscal costs, risks of windfall gains and potentially substantial administrative and compliance costs. At the same time, corporate tax credits offer the advantage of being deployable and adjustable rather quickly and, in some contexts, may face fewer political economy challenges than environmental taxes.

Given the associated costs and limited empirical evidence on their effectiveness as a tool for environmental policy, corporate tax credits may be best considered as supporting measures within a broader policy mix. While pricing is, generally, to be prioritised over ad-hoc fiscal incentives, corporate tax credits can have a role to play as long as they target specific barriers not addressed by other instruments in the policy mix and enhance overall policy efficiency in the promotion of more sustainable and circular production practices. Furthermore, well-targeted tax incentives could help to generate buy-in for broader policy reforms to support the circular economy. To minimise the risks of windfall gains, corporate tax credits should be carefully designed based on a clear policy objective, closely monitored and evaluated, and eventually reformed in light of emerging empirical evidence.

Additional complementary policies could include measures aimed at increasing the availability of recovered materials from waste, such as enhanced separate waste collection, the development of domestic reprocessing capacity, and the removal of regulatory barriers, notably, to facilitate the use of by-products and other recovered materials in processes of industrial symbiosis.

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Note

[1] Examples of categories of activities not associated with materials management include commercial energy use, residential energy use and passenger transportation (OECD, 2012[2]).

Part I Assessment of the current policy landscape and recommendations

2 Business-as-usual projections

This chapter provides insights into current trends in key indicators related to the circular economy in Italy, including resource use, waste generation and treatment, sustainable production and consumption, and circular innovation. The chapter also presents projections for materials use to 2050 under business-as-usual, including for primary and secondary materials.
The chapter concludes by providing the rationale for transitioning to a circular economy in Italy. Italy is one of the European Union countries leading the circular transition. The Italian industrial sector has historically developed high efficiency in the use of resources and methods for material recovery. However, Italy could progress even further to decouple economic growth from material consumption.

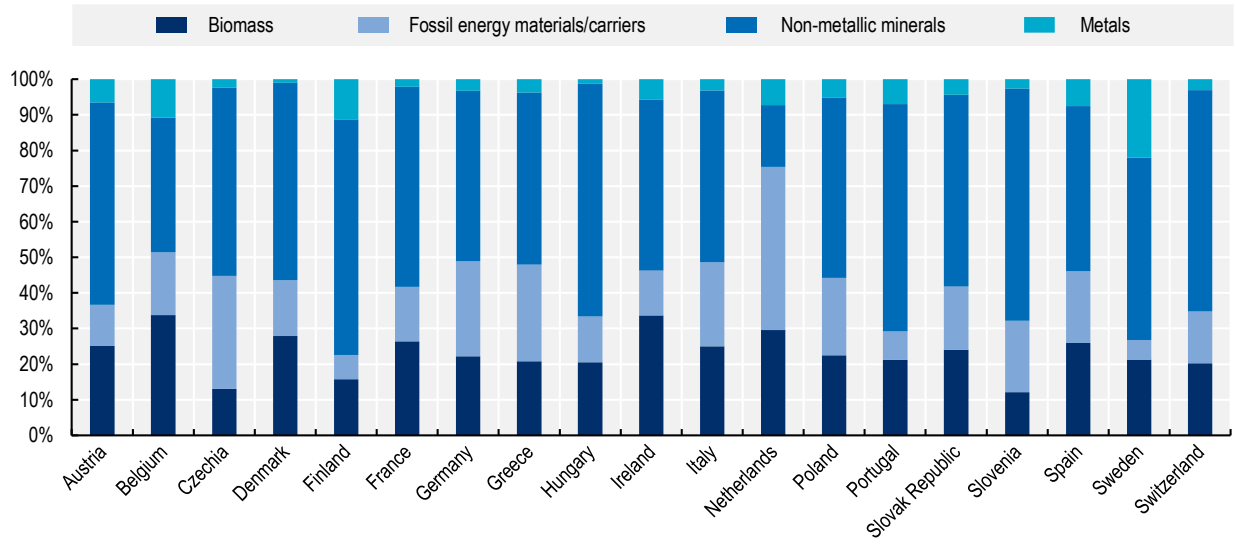
2.1. Introduction and current trends

2.1.1. Materials life cycle and the value chain

Italy performs considerably better than the European average in the area of resource productivity and the circularity of material flows. Domestic material consumption (DMC)[1], at 8.6 tonnes per capita in 2021, is one of the lowest in Europe and far below the OECD (17.5 tonnes per capita) and OECD Europe average (13.2 tonnes per capita). Non-metallic minerals account for almost half of domestic material consumption (48%), followed by biomass (25%), fossil materials (24%) and metal ores (3%) (Figure 2.1).

Figure 2.1. Domestic Material Consumption mix in selected OECD countries

Shares per material category (percentages of total), 2022

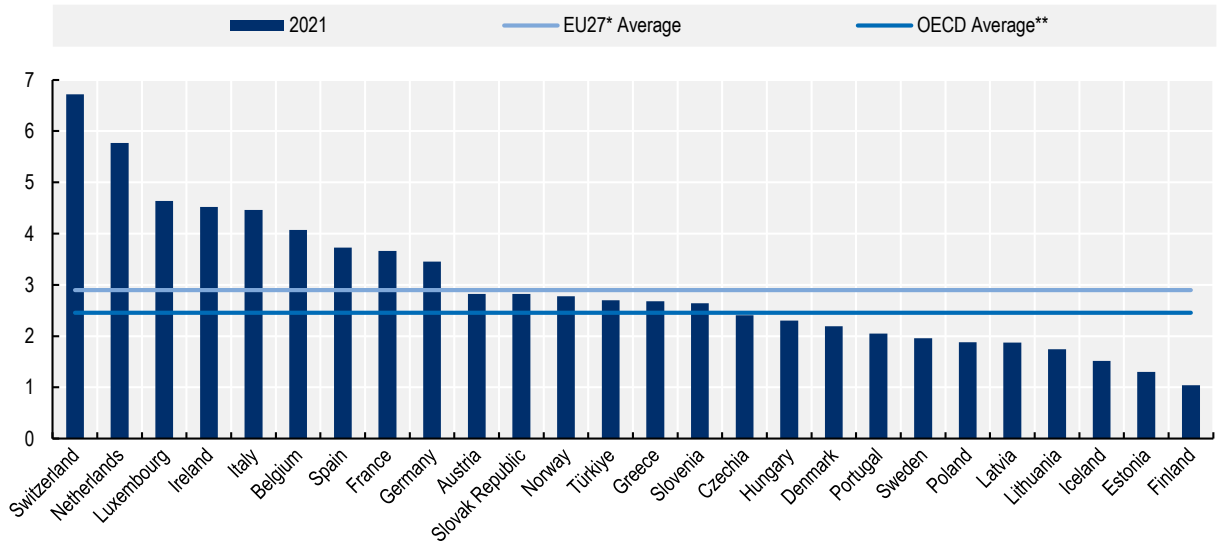


Source: OECD, "Material resources: Material resources", OECD Environment Statistics (database), https://doi.org/10.1787/data-00695-en.

Italy's material productivity, expressed in gross domestic product (GDP) in purchasing power standards (PPS) over DMC, was at 4.53 USD/kg in 2021 (OECD, 2017[1]). This is well above the OECD average (2.45 USD/kg) and the EU27 average (2.9 USD/kg) (Figure 2.2). The country's circular material use rate is now the fourth-highest in Europe: in 2022, 19% of overall materials used were recycled and fed back into the economy, compared to the EU27 average of 12% (Eurostat, 2024[2]).

Figure 2.2. Material productivity in selected OECD countries

Gross domestic product per domestic material consumption (2015 PPP), USD per kilogram, 2021 data



* Data for EU27 is for 2020.
** Data for the OECD average is for 2019.
Source: OECD, "Material resources: Material resources", OECD Environment Statistics (database), https://doi.org/10.1787/data-00695-en.

Recent trends show a decline and stabilisation in the generation of municipal solid waste (i.e. "rifiuti urbani"), with signs of some decoupling from economic activity. Municipal waste generation amounted to 29 million tonnes (Mt) in 2020, 3% below 2019 levels, mainly as a consequence of the COVID-19 pandemic and the related restriction measures (ISPRA, 2023[3]). This compares to about 32 Mt of municipal solid waste generated in 2010. While municipal waste generation was expected to bounce back to pre-COVID levels, in fact, it increased slightly in 2021 to 30 Mt but then decreased again in 2022 to 29 Mt, despite a concurrent increase in GDP and household expenditure (ISPRA, 2023[3]).

As illustrated in Figure 2.3, annual per capita municipal waste generation (487 kg) was below both the averages for OECD Europe (501 kg per capita) and for OECD member countries (534 kg per capita) in 2020. Recent trends show stable amounts of per capita municipal waste generation, with values below 500 kg only in 2020 (due to the COVID-19 pandemic) and 2022 (494 kg per capita) (ISPRA, 2023[3]).

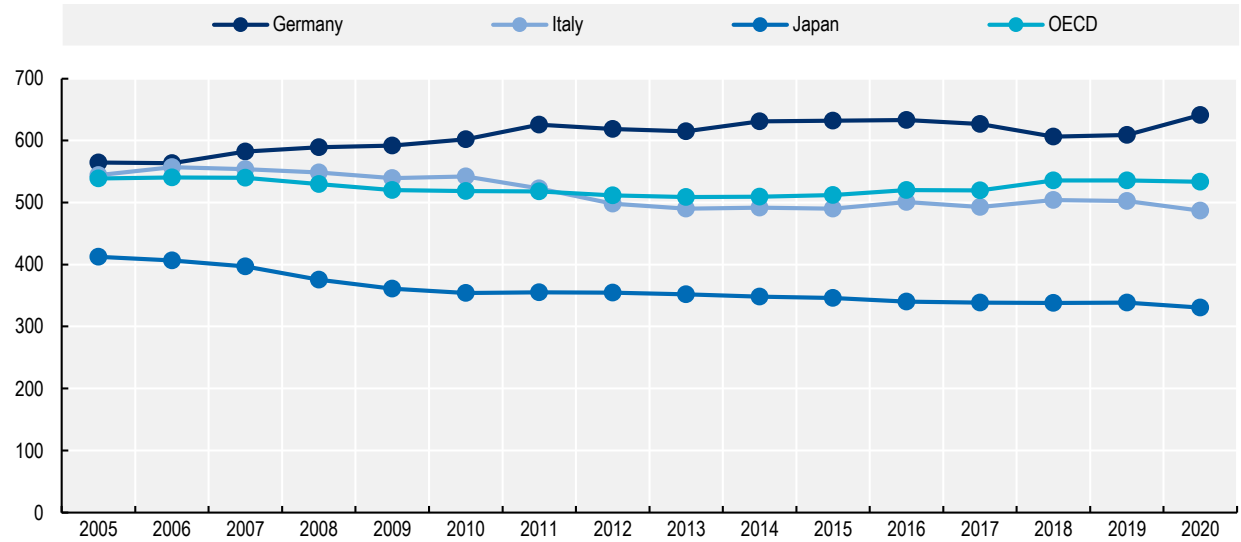
Non-municipal waste generation has seen an upward trend, reaching 165 Mt in 2021 (ISPRA, 2023[4]). Although non-municipal waste generation declined to 147 Mt in 2020 (by 5% compared to 2019) as a consequence of COVID-19 related restriction measures (ISPRA, 2023[5]), it bounced back in the following years. This was particularly the case for non-hazardous construction and demolition waste (CDW) generation, which declined by 6% (from 70 Mt in 2019 to 66 Mt in 2020), but then increased by 18% in 2021 (to 78 Mt). This was also a consequence of interventions foreseen by Italy's National Recovery and Resilience Plan (NRRP) and the "Ecobonus" and "Superbonus" tax deductions that apply to costs of home renovations to improve energy efficiency and reduce seismic risks (ISPRA, 2023[4]).

As shown in Figure 2.4, Italy recycled 30% and composted 26% of municipal waste in 2021, well above the OECD average (24% and 11%, respectively) and also above the EU27 average (30% and 19%, respectively). Although the share of municipal waste sent to landfills has seen a downward trend in recent years, it remains an important disposal option in selected regions, and further efforts are required to reach the EU target of a maximum of 10% of municipal waste landfilled by 2035. Figures for 2022 show that 18% (5.2 Mt) of municipal waste generated was landfilled, i.e. 8% less than 2021 and 20% less than 2018 (ISPRA, 2023[3]). Although this was below the European average (Eurostat, 2024[6]), other countries like

Belgium, Denmark, Finland, Germany and the Netherlands already landfilled 7% or less of their municipal waste in 2020 (Figure 2.4). Almost one-fifth (18%) of municipal waste generated in 2022 was incinerated for energy recovery, showing a slight decline over the previous 5 years (ISPRA, 2023[3]). For non-municipal waste, more than two-thirds (72%, 128 Mt) of the generated waste was disposed through material recovery options in 2021, while 6% (10 Mt) was landfilled and less than 1% was incinerated (ISPRA, 2023[7]).

Figure 2.3. Municipal waste generation in selected OECD countries

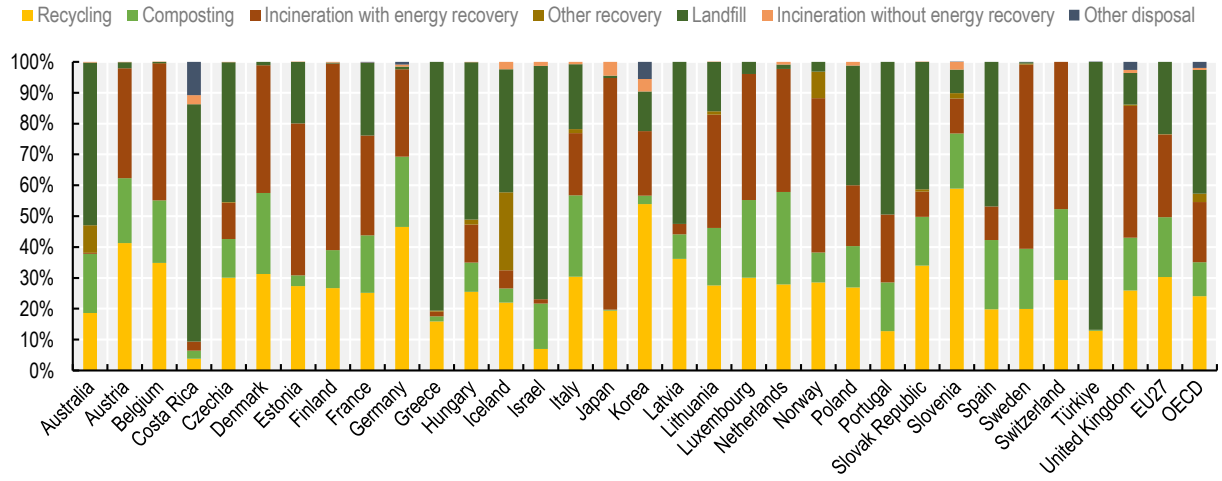
Kilograms per capita, 2005-2020



Source: OECD, "Municipal waste: generation and treatment", OECD Environment Statistics (database), https://doi.org/10.1787/data-00674-en.

Figure 2.4. Municipal waste by treatment operation

Percentage of total treatment, 2021



Source: OECD, "Municipal waste: generation and treatment", OECD Environment Statistics (database), https://doi.org/10.1787/data-00674-en.
Notes: Recovery includes recycling, composting (biological recovery), incineration with energy recovery and other types of recovery (e.g. reuse). Disposal operations include landfill, incineration without energy recovery, and other types of disposal. The categorisation of waste disposal varies by country, as explained in the country notes present in the database documentation.

In 2022, almost two-thirds of municipal waste generated (65%) in Italy was separately collected. However, substantial disparities persist across regions, especially in areas of separate municipal waste collection and waste disposal. While regions in the North separately collect 72% of their municipal waste, this value falls to 62% in the Centre and 58% in the South (ISPRA, 2023[3]). The best performers are Veneto and Sardegna (76%), Trentino-Alto Adige/Südtirol (75%), Emilia-Romagna (74%), Lombardia (73%) and Marche (72%). Among the worst performers are Sicilia (52%, up from 48% in 2021 and 30% in 2018), Lazio and Calabria (55%), Campania (56%), Liguria (58%), Molise (58%) and Puglia (59%). It should be noted that regions with high rates of separate municipal waste collection usually landfill a small percentage of their municipal waste (e.g. 4% in Lombardia, 5% in Friuli-Venezia Giulia) (ISPRA, 2023[3]). Bridging gaps across regions will constitute a crucial step to achieving more virtuous performances along the value chain.

Insufficient infrastructure is a major barrier to improved waste management and material recovery, and is often a key driver of landfilling of municipal waste or its transport to other regions for disposal. Whereas regions such as Emilia-Romagna and Lombardia present examples of efficient waste management (the latter receiving an extra 0.9 Mt of unsorted municipal waste and 0.4 Mt of organic waste per year from other regions), Sicilia landfills 52% of its waste, whereas Campania and Lazio largely resort to inter-regional trade[2] (ISPRA, 2023[3]; REF Ricerche, 2021[8]). Substantial infrastructural investments (e.g. for recycling and organic waste recovery) will be required to achieve the 2030 targets on recycling and landfilling. In the absence of strong and co-ordinated interventions, regions that are already lagging behind risk falling into a vicious cycle of cost-inefficiency in waste management. This would present a higher financial burden on households due to higher waste taxes, inadequate environmental protection (e.g. adverse environmental impacts of landfilling, GHG emissions of long-distance transport of waste) and poor materials recovery. The National Waste Management Plan (MiTE, 2022[9]), adopted in June 2022, takes stock of existing infrastructural gaps and provides a guiding tool for improved governance on waste policy at the sub-national level.

2.1.2. Innovation, circular production and consumption patterns

Compared to the EU average, Italy's performance is less advanced in the areas of research and development (R&D) and green innovation relevant for the circular economy. The EU Eco-Innovation Index, which shows how well EU member countries perform in the different dimensions of eco-innovation, ranks Italy as eighth among the EU27 countries (Al-Ajlani et al., 2022[10]). Among the index components, Italy performs very well in the resource efficiency outcomes component (European Commission, 2022[11]). However, the country ranks below the EU average in the eco-innovation input dimension, i.e. the set of investments to incentivise eco-innovation activities (European Commission, 2022[11]). For instance, the country's gross domestic spending on R&D, as a share of total GDP, stood at 1.5% in 2021, well below both the OECD average (2.7%) and the EU27 average (2.2%), despite a gradual growth in recent years (OECD, 2017[12]). Italy also scores below the EU average for the eco-innovation output component (i.e. the outputs of eco-innovation activities in terms of patents, academic literature and media contributions), which is generally correlated to the level of public investments in R&D in environmental and energy topics (European Commission, 2022[11]).

Italy makes an important use of existing EU Eco-Management and Audit Scheme (EMAS) and Ecolabel certifications, which can constitute important tools to promote eco-innovation. The country has one of the EU's highest number of Ecolabel licences (18% of total licences awarded) and products (16% of licences awarded) (European Commission, 2023[13]). Italy has also been expanding registration rates to EMAS and now has 28% of total EMAS registered organisations and 36% of EMAS registered sites (European Commission, 2023[14]).

Italian consumers are generally conscious about environmental protection and about the impacts generated by their consumption habits, although this does not always translate to more virtuous purchasing and consumption choices. According to a recent Eurobarometer survey, environmental protection is

important to 94% of Italian citizens, in line with the EU27 average (94%), with climate change and the mounting levels of waste and air pollution considered as the three most pressing environmental issues (European Commission, 2020[15]). Almost two-thirds of respondents (60%, in line with the EU27 average of 66%) claimed to be separating their waste, and 37% (below the EU27 average of 45%) indicated they avoided single-use plastic goods. However, only one in eight Italian citizens (13%, compared to 22% in EU27) buy products marked with an environmental label, and even less (9%, compared to the 19% EU27 average) bought second-hand products in place of new ones in the preceding six months.

2.2. Baseline projections of key indicators related to materials use to 2050

A modelling exercise has been carried out to project key indicators related to (primary and secondary) materials use under a business-as-usual "Baseline" scenario (hereafter, "baseline"). The results are leveraged in later parts of the report to assess the implications of alternative policies, including subsidies and fiscal reform for materials scenario, in contrast to the baseline.

2.2.1. Details on the methodology employed

Baseline projections are derived by employing the OECD ENV-Linkages model, which is a dynamic Computable General Equilibrium (CGE) model based on the Global Trade Analysis Project (GTAP) national accounting database (Chateau, Dellink and Lanzi, 2014[16]). CGE models can serve as an effective tool for quantifying the macroeconomic consequences of transforming the economy in line with higher resource efficiency and the transition to a circular economy by taking into account both direct and indirect effects of the policies (e.g. changes in trade and production structure). The ENV-Linkages model has been used extensively in the past to assess the consequences of environmental policies. For instance, this work builds on the global analysis of resource policies presented in Bibas, Chateau and Lanzi (2021[17]), with a focused analysis of the impacts on labour markets (Chateau and Mavroeidi, 2020[18]) and international trade (Dellink, 2020[19]). The model is built on a consistent set of data describing the behaviour of production sectors and consumers in the different regions, with a focus on the energy sector and international trade. One key strength is that it is a multisectoral, multi-regional model that links economic activity to environmental pressures (e.g. GHG emissions, air pollutants). Hence, it sheds light on the medium- and long-term impact of environmental policies.

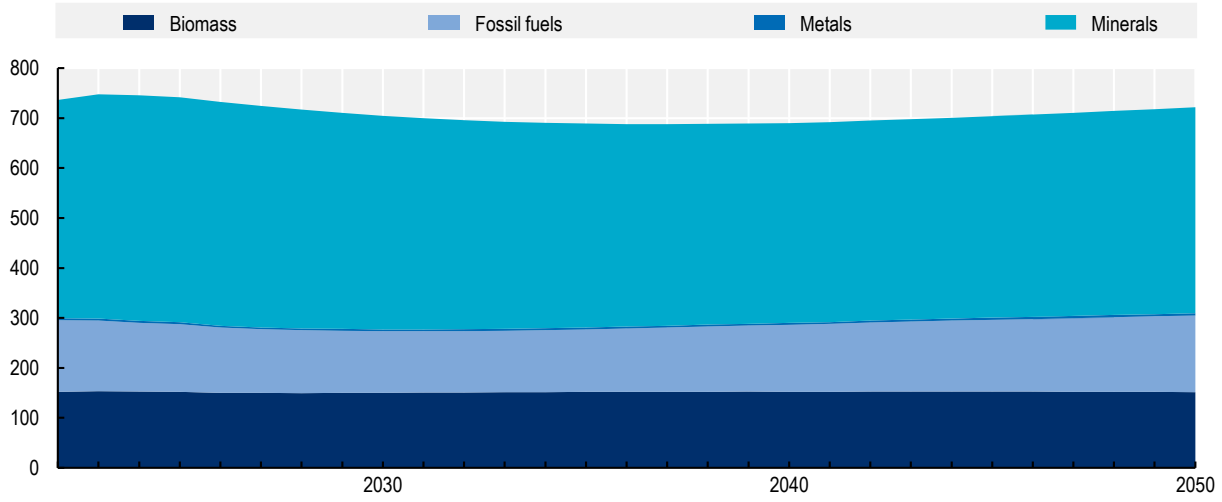
ENV-Linkages is used as the basis to estimate the economic activities that drove materials use in 2019. Compared with previous modelling work, for this report, the ENV-Linkages model has been enhanced to include materials use projections and to disaggregate Italy. In ENV-Linkages, materials projections follow economic projections and, more precisely, the evolution of the production and consumption of goods in the different sectors and regions. Material flows are linked to the economic flows at the detailed sectoral level. The global United Nations Environment Programme (UNEP) dataset on physical material flows (UNEP IRP, 2018[20]) is used as the basis for the projection of primary material extraction.[3] The detailed regional and material coverage of this dataset, for all GTAP regions, as well as for 60 materials, allows the physical material flows to be linked to the economic flows in the ENV-Linkages model. The basic principle for linking them is because each physical flow (materials use in tonnes) is attached to the corresponding economic flow (materials demand in dollars). A coefficient of physical use per dollar of demand is calculated and used to project materials use to 2050.

2.2.2. Aggregate projections of materials use

In the coming decades, annual materials use in Italy is projected to remain stable at current levels, as shown in Figure 2.5. Projected socio-economic trends are the main drivers of materials use, comprising the size of the economy, its population and the technologies that are in place, and which may affect materials intensity of the economy (OECD, 2019[21]). A declining population and slow economic growth imply limited overall changes in materials use (as detailed in Box 2.1). Despite a small initial decline up to the late 2030s, materials use is projected to return to a growing trend due to the projected increase in income and the consequent increase in consumption. As a result, the projections show similar levels of materials use in 2050 compared to today, both in aggregate terms and in the relative contributions of different material types.

Figure 2.5. Materials use projections for Italy

Materials use in million tonnes (Mt)



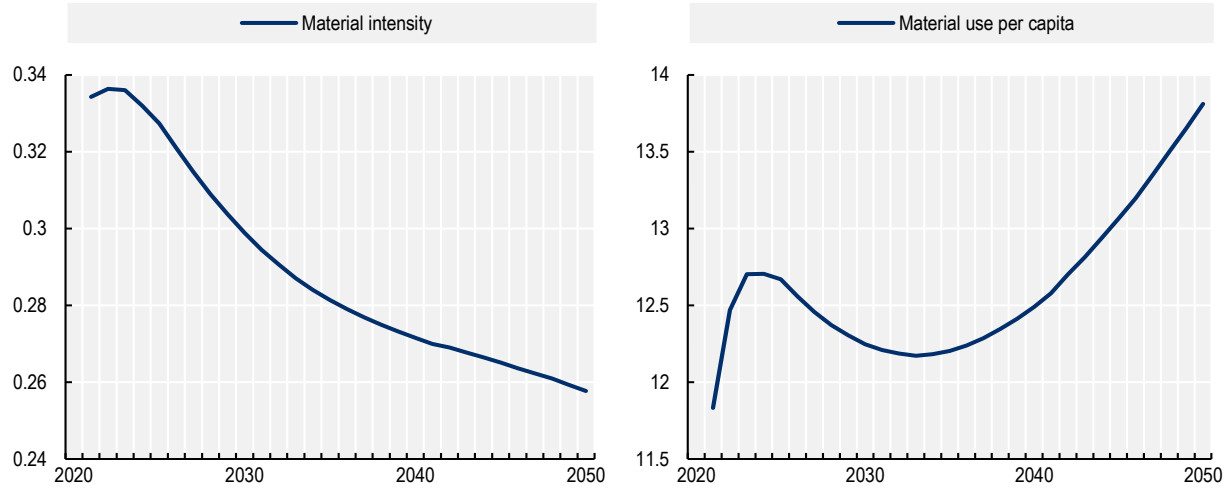
Source: OECD ENV-Linkages model.

Figure 2.6 shows projections for material intensity and per capita materials use, which are broadly in line with projected trends in other OECD countries (OECD, 2019[21]):

- Stable levels of materials use combined with a slow but marked growth of the Italian economy lead to a continued decrease in material intensity. Material intensity is projected to decrease from 0.34 tonnes/USD to 0.26 tonnes/USD between 2021 and 2050 (left panel).
- In contrast, materials use per capita is projected to increase, despite a minor dip around 2030, as the population declines (from 59 million in 2021 to 52 million in 2050).

Figure 2.6. Material intensity and use per capita projections for Italy

Material intensity in tonnes/USD and materials use per capita in tonnes/cap



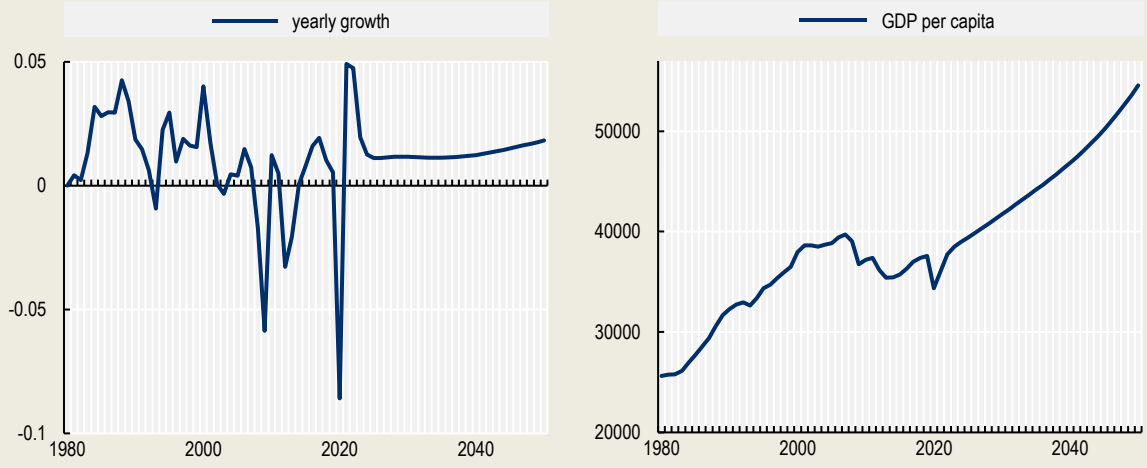
Source: OECD ENV-Linkages model.

Box 2.1. Socio-economic projections for Italy

After the negative effect of the COVID-19 pandemic on the economy (-8.9% GDP growth in 2020) and the positive post-COVID growth (+4.5% GDP growth in 2021 and +4.4% in 2022), the Italian economy is projected to stabilise on a positive, albeit low, growth pattern, with a yearly GDP growth rate of 0.8%. Meanwhile, current and projected demographic trends suggest that the population is projected to fall to 1970 levels by 2060. Income (GDP per capita) is projected to substantially increase (see Figure 2.7).

Figure 2.7. Historical and projected average income for Italy

Yearly growth (left panel) and GDP per capita in 2014 USD, PPP (right panel)



Source: OECD ENV-Linkages model, based on long-run projections (https://doi.org/10.1787/eo-data-en), in line with (OECD, 2017[22]).

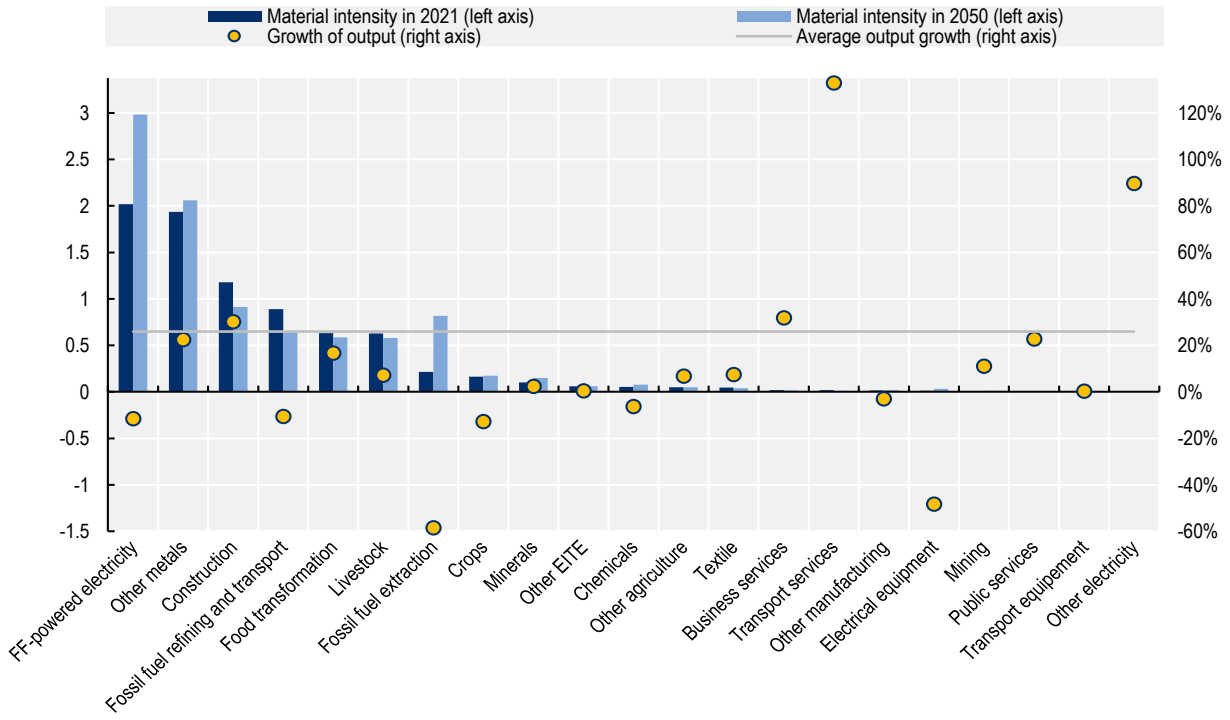
2.2.3. Detailed projections of materials use

In the coming decades, changes in sectoral output and technologies will drive changes in materials use, as illustrated in Figure 2.8. From the current date to 2050, the Italian economy is projected to "green" its energy production sector, relying less on fossil fuels and more on electricity produced from renewable sources. In line with a general trend towards services-based economies in OECD countries, output is projected to decrease in many resource-intensive industrial sectors, such as the metal industry and textile sector (fibre and yarn production), and to increase in the services sectors, which are less materials intensive. However, output is projected to increase in some materials-intensive sectors, such as construction, food transformation and agriculture, driving up overall materials use. Furthermore, material intensity in other materials-intensive sectors, such as fossil fuel-powered electricity, fossil fuel extraction and metal production, is projected to remain constant or increase. Overall, materials-intensive sectors have a below-average growth (mostly driven by services), which explains the general decrease in material intensity (seen in Figure 2.6).

Projected changes in sectorial materials use and material intensity also lead to changes in the use of different materials, as shown in Figure 2.9. The use of metals is projected to increase, whereas the use of (non-metallic) minerals is expected to remain stable. The bulk of minerals is used in construction: while the output of construction is expected to increase, the material intensity of the sector is projected to decrease, with the net effect of a stable use of minerals in 2050 compared to 2021. The greening of the energy sector implies an increase in the use of gas and a decrease in the use of oil. As output increases in the food transformation sector, the use of vegetables and crops in this sector is projected to grow.

Figure 2.8. Projections of sectoral intensity and output growth for Italy

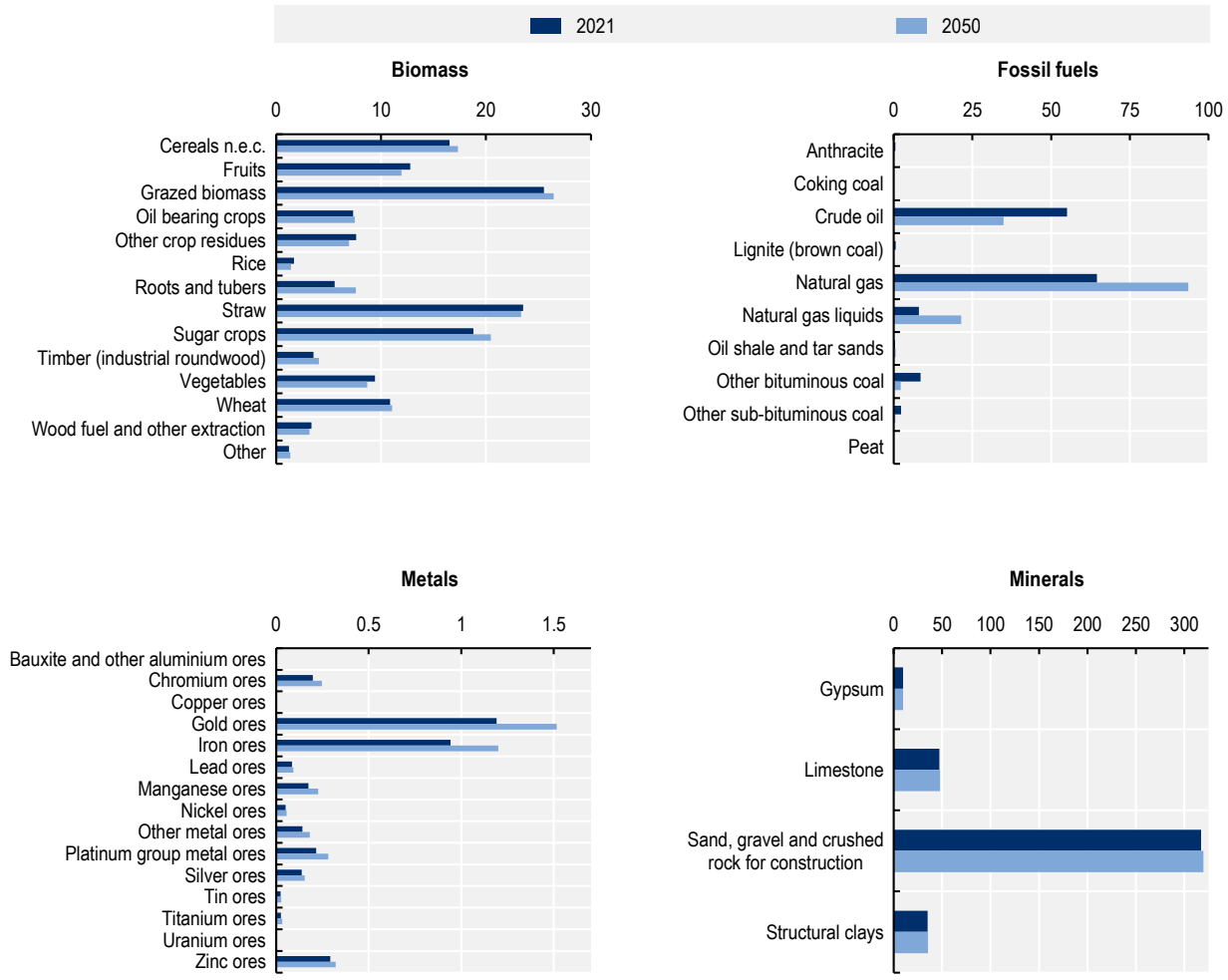
Material intensity in tonnes/USD and output growth in %



Notes: EITE stands for Energy-intensive Trade-Exposed industry. FF stands for fossil fuel.
Source: OECD ENV-Linkages model.

Figure 2.9. Materials use growth projections for Italy

Values in Mt



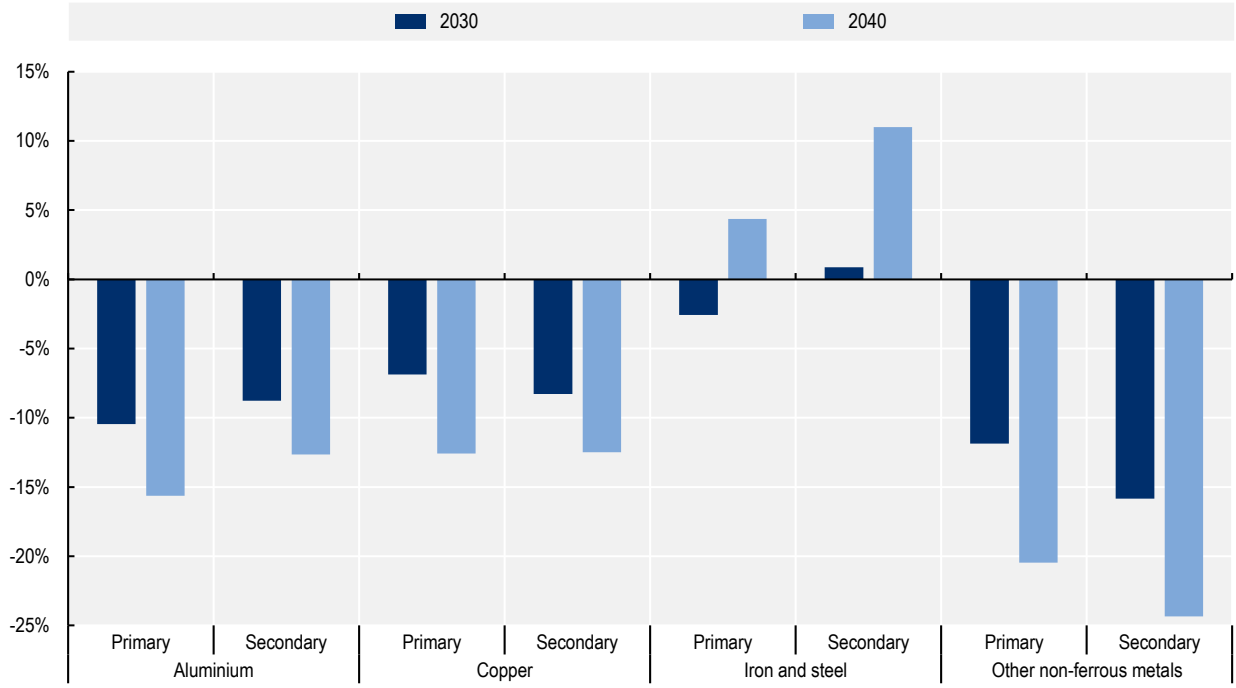
Note: there may be inconsistencies in the data reported here for 2021 and data in ISTAT databases (especially for the category "sand gravel and crushed rock for construction") due to the different methodologies employed to produce these datasets. The base year data presented here comes from the Global Material Flows Database (UNEP IRP, 2018[20]). According to the Technical Annex (UNEP IRP, 2021[23]), data on the extraction of non-metallic minerals is under-reported in several countries.
Source: OECD ENV-Linkages model.

2.2.4. Primary and secondary materials

The share of secondary metals is projected to remain similar by 2040 in the baseline. The baseline scenario does not include new policies aimed at increasing material circularity, but it does embed the changes observed in current trends based on new economic developments and past policies. As shown in Figure 2.10, the changes in outputs of the sectors are minor, leading to similar levels of output (not shown in the chart). Only iron and steel are projected to increase over the period, whereas the outputs of all other sectors are projected to decrease. For iron and steel, this increase is greater for the recycled (secondary) materials than for the virgin (primary) materials. Conversely, for aluminium and copper, the decrease is lower for the secondary materials, translating in a larger share of secondary materials in the total.

Figure 2.10. Evolution of the primary and secondary metals sectors

Evolution in value (USD), Baseline scenario, percentage change compared to 2021



Source: OECD ENV-Linkages model.

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Notes

[1] DMC refers to the amount (in weight) of materials used in an economy, i.e. materials extracted or harvested in the country, plus imported materials and products, minus exported materials and products.

[2] Italian legislation requires that regions are self-sufficient in the management of municipal waste generated within their territory, whereas non-municipal waste can be traded freely to facilitate waste management and recovery.

[3] The ISTAT database (leveraged in Chapters 5 and 8 of this report) and the UNEP database (2021[23]) employ different methodologies. In particular, flows of non-metallic minerals are estimated based on cement used for concrete, bitumen used for road construction, and the production of bricks and tiles, following the methodology detailed in (UNEP IRP, 2021[23]).

3 Policy and legislative review

This chapter reviews the policy landscape related to the circular economy in Italy. It details the policy framework in the European Union, including quantitative targets related to waste and the circular economy. Then, it outlines the national policy and legislative framework and provides key information on the National Strategy for the Circular Economy and the National Waste Management Plan, both adopted in 2022. The chapter also details responsibilities on the design, implementation and enforcement of economic instruments across various levels of government, providing a basis for the policy recommendations developed in the following chapters.

3.1. Introduction

Principles of resource efficiency and the circular economy have received increased attention from the highest levels of government of many OECD countries. The 2030 Agenda for Sustainable Development includes references to resource efficiency, notably SDG 12: Ensure sustainable consumption and production patterns. Italy has played a central role in the promotion of circular economy concepts at the international level, including with the adoption of the G7 Bologna Roadmap in 2017[1] and the G20 Environment Communiqué signed in Naples in 2021 (G7 Alliance on Resource Efficiency, 2017[1]; G20 Leaders, 2021[2]).

More recently, the issue of plastic pollution has gained prominence as a policy priority at the domestic and international level. The United Nations Environment Assembly (UNEA) Resolution 5/14 entitled End plastic pollution: Towards an international legally binding instrument, adopted in March 2022, mandated the development of an international, legally binding instrument on plastic pollution based on a comprehensive approach that addresses the full life cycle of plastics. Previous international commitments include the G20 Osaka Blue Ocean Vision (Ministry of Foreign Affairs, Japan, 2019[3]) and the G20 Rome Leaders' Declaration (G20 Leaders, 2021[2]).

3.2. EU policy framework

The European Union has made the transition to a circular economy one of its priority policy areas. The first Circular Economy Action Plan was adopted in 2015 (European Commission, 2015[4]) and the second in 2020 (European Commission, 2020[5]). The New Circular Economy Action Plan of 2020 is considered a key means to deliver on the European Green Deal and achieve carbon neutrality. Among the priorities are sustainable production, interventions to empower consumers and public buyers to make greener choices, measures implemented in resource-intensive sectors with high potential for circularity (electronics and information and communications technologies, batteries and vehicles, packaging, plastics, textiles, construction and food), improvements in the waste management sector, greener efforts at the international level, and an update of the circular economy monitoring framework.

The Waste Framework Directive (WFD)[2] is the main regulation on waste in Europe. It establishes a common legal framework for treating waste that is designed to protect the environment and human health. It emphasises the principle of the waste hierarchy: to prioritise waste prevention, followed by its reuse, recycling and composting, and energy recovery, with landfilling only as the last resort. The WFD has set a target of 55% for the preparation of municipal waste for reuse and recycling by 2025, 60% by 2030 and 65% by 2035. It also establishes the basic requirements for Extended Producer Responsibility (EPR).

In addition, the Packaging and Packaging Waste Directive (PPWD) lays down measures to prevent the production of packaging waste, and to promote the reuse of packaging and recycling, and other forms of recovering packaging waste. The PPWD sets qualitative and quantitative targets that all packaging placed on the EU market must meet, as well as objectives for the use of economic incentives. Expected revisions to the PPWD (provisionally agreed by the Parliament and Council on 4 March 2024) aim to reinforce requirements for all packaging to be reusable and recyclable by 2030, including through mandatory reuse and refill targets in certain sectors, and to boost the uptake of recycled content and further promote packaging waste prevention.

Table 3.1 presents key EU targets and restrictions related to waste prevention and management.

Table 3.1. Summary of EU targets in the area of waste management

Area	Target	Relevant EU Directive
Municipal waste management	Preparing for reuse and recycling rate of municipal waste: At least 55% by 2025, 50% by 2030 and 65% by 2035 (by weight)	Waste Framework Directive
	Mandatory separate collection of textiles and household hazardous waste (by January 2025)[1]	
	Mandatory separate collection (or recycling at source) of bio-waste	
Landfilling of waste	Share of municipal waste that is landfilled: maximum 10% by 2035	Landfill Directive
	Ban on the landfilling of waste suitable for recycling or other materials or energy recovery (from 2030)	
Packaging waste	Recycling rate for packaging waste, all materials: 65% by 2025 (70% by 2030) Paper and cardboard: 75% by 2025 (85% by 2030) Ferrous metals: 70% (80%); Aluminum: 50% (60%) Glass: 70% (75%) Plastic: 50% (55%) Wood: 25% (30%)	Packaging and Packaging Waste Directive
	Mandatory producer responsibility schemes for all packaging	
	The revised PPWD would bring changes that include: Reuse and refill targets to 2030 and 2040 Mandatory deposit return systems (DRS) to ensure the separate collection of at least 90% of single-use plastic bottles and metal beverage containers, by 2029 (possibility of exemption for countries who still achieve the 90% separate collection target)	
End-of-life vehicles	Reuse, recovery and recycling targets Minimum of 95% of reuse and recovery (by weight, per vehicle) by 2015 Minimum of 85% of recycling (by weight, per vehicle) by 2015	End-of-Life Vehicles Directive
Batteries and accumulators	Minimum rate of separate collection: 45% by 2016	Batteries Directive
Electrical and electronic equipment (EEE)	Minimum rate of separate collection: 65% of the average weight of EEE placed on the market in the 3 preceding years in the member state, or 85% of WEEE generated on the territory of the member state	Waste Electrical and Electronic Equipment Directive

1. Italy mandated the establishment of separate collection systems for household textiles as of January 2022 (Leg. Decree 2020/116).
Sources: Directive EU 2018/851 amending Directive 2008/98/EC on waste, Directive (EU) 2018/850 amending Directive 1999/31/EC on the landfill of waste, Directive (EU) 2018/852 amending Directive 94/62/EC on packaging and packaging waste, Directive (EU) 2018/849 amending Directive 2000/53/EC on end-of-life vehicles, Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, Directive 2012/19/EU on waste from electrical and electronic equipment (WEEE).

Table 3.2. EU quantitative targets for plastics

Area	Targets	Time frame
Separate waste collection of plastic bottles	Separately collect 77% (90%) of plastic bottles placed on the market in a given year (by weight).	By 2025 (by 2029)
Secondary raw materials use	Incorporate 25% of recycled plastic in the manufacture of PET beverage bottles from 2025, and 30% in *all* plastic beverage bottles as from 2030	By 2025, 2030

Source: Single-Use Plastics Directive

The Directive on Single-Use Plastics (SUP Directive)[3] aims to reduce the volume of single-use plastic products, as well as their impacts on the environment and human health. Applications targeted by the SUP Directive are single-use plastic bags, food and beverage containers, cutlery, plates and straws, cotton bud sticks and cigarette butts. The SUP bans single-use plastic products where sustainable alternatives are available and affordable (e.g. cutlery, cotton bud sticks). In other cases, design requirements, awareness-raising measures, labelling requirements, and waste management and clean-up obligations for producers

shall contribute to consumption reductions. Additionally, the SUP Directive sets targets for minimum recycled content in PET bottles and the separate collection of plastic bottles (Table 3.2). Additionally, a "plastics own resource" entered into force in January 2021 in the form of contributions to the EU budget. Member states shall contribute EUR 0.80 per kilogram of plastic packaging that is not recycled at end of life.

On 30 March 2022, the European Commission presented a package of Green Deal proposals to make sustainable products the norm in the EU. Among these, the proposed Ecodesign for Sustainable Products Regulation will establish a framework to set eco-design requirements for selected product groups to improve their circularity, sustainability and energy performance. The proposal builds on the existing Ecodesign Directive,[4] but it extends the scope to include the broadest possible range of products and eco-design requirements, including on product durability, reusability, upgradability and reparability, the presence of substances that inhibit circularity, energy efficiency, recycled content, recyclability, carbon and environmental footprints, and information requirements (including a Digital Product Passport).

Targeted sectorial initiatives promote the transition in select priority sectors, such as the EU Strategy for Sustainable and Circular Textiles (European Commission, 2022[6]), EU rules on packaging and packaging waste (European Commission, 2023[7]), and the revision of regulations on Construction Products[5] and Batteries.[6] Furthermore, a series of economic incentives for sustainable production and consumption are being updated, including green public procurement (GPP) criteria.

The deployment of sustainable products is supported by a series of other initiatives and tools. The EU Ecolabel[7] is the EU's voluntary environmental labelling scheme assigned to products that respect a set of environmental criteria that promote lower waste generation and greenhouse gas (GHG) emissions. The proposed Sustainable Products Regulation aims to extend the Ecolabel to additional products and services, and to render it less costly and bureaucratic. The new regulation would introduce mandatory labelling to indicate relevant environmental parameters for a wide range of products. Additionally, the proposed Green Claims Directive[8] would require companies to substantiate the voluntary green claims they make in business-to-consumer commercial practices, that is, to prevent "greenwashing". To support companies in reducing the environmental impacts of their practices, the EU has created tools, such as the EU Product Environmental Footprint (PEF) method, which provides a harmonised methodology to measure the environmental impacts of the life cycle of products and services,[9] and the Eco-Management and Audit Scheme (EMAS), which is the environmental management instrument developed for companies and other organisations to evaluate, report and improve their environmental performance.

The recovery from the COVID-19 pandemic has offered unprecedented opportunities to accelerate green investments. The Recovery Plan for Europe, established by the Multiannual Financial Framework 2021-2027 and the NextGenerationEU Fund, is the largest stimulus package ever financed in Europe. It reinforces the direction outlined in the European Green Deal, with 20% of funds dedicated to natural resources and the environment, and 30% to climate. To benefit from recovery funds, EU Member States have submitted national Recovery and Resilience Plans (RRPs) consistent with European objectives: at least 37% of spending should fund investments and reforms that support climate objectives, while the rest should respect the principle of "do-no-significant harm". In addition, the Taxonomy Regulation,[10] approved in June 2020, established the basis for the "EU taxonomy", which sets out the overarching conditions that determine whether an economic activity can qualify as environmentally sustainable. The EU taxonomy can play a pivotal role in directing investments towards projects and activities that are sustainable and that contribute to increasing resilience against climate and environmental shocks.

3.3. National policy and legislative framework

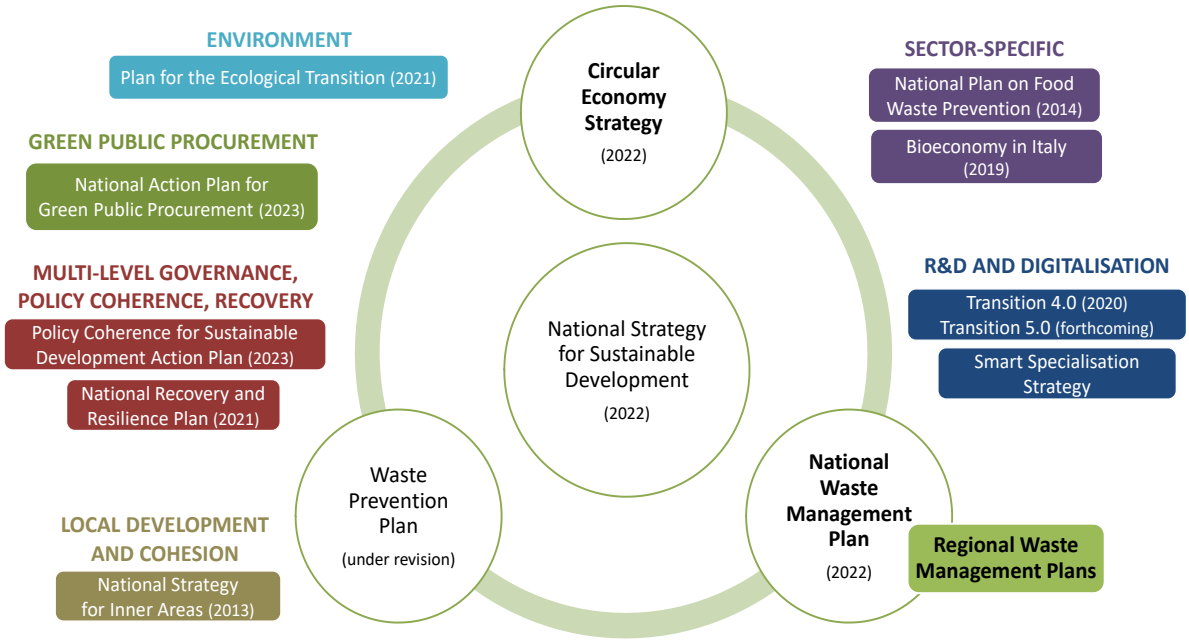
In recent years, Italy has consolidated its national policy framework around resource efficiency and the circular economy. The National Strategy for the Circular Economy, adopted in June 2022, sets out the long-term ambition for the transition to a circular economy and defines precise objectives to accomplish it. The strategy recognises the essential role that transitioning to a circular economy could play in helping the

country achieve the transition to a sustainable and low-carbon economy. It envisions reductions in GHG emissions, improved management of natural resources, and a reduction in the overall use of non-renewable resources. It also recognises the economic and social benefits that the transition could deliver, including less dependence on the imports of raw materials, greater competitiveness of the Italian manufacturing sector and the Italian economy as a whole, and a positive effect on employment.

Also in June 2022, Italy adopted the National Waste Management Plan (Programma Nazionale per la Gestione dei Rifiuti), as envisaged by the WFD and Italy's National Recovery and Resilience Plan (NRRP, see Box 3.1). The National Waste Management Plan defines the medium- and long-term objectives, criteria and strategic guidelines for the development of regional waste management plans ("Piani Regionali di Gestione dei Rifiuti") to ensure that waste management policies are aligned with EU Directives and across all levels of government. The actions outlined primarily aim to bridge infrastructural and planning gaps that exist across various regions in the area of waste management and recycling (in line with sustainability, efficiency and cost-effectiveness criteria, and with the principles of self-sufficiency and proximity), to guarantee the achievement of targets on waste prevention, to prepare for reuse, recycling and recovery, and to ensure traceability of waste. The document also includes a national plan for communication and awareness-raising on waste and the circular economy.

As illustrated in Figure 3.1, the National Strategy for Sustainable Development sets out the overall framework, vision and objectives for public policies in the area of environment and local development, in line with the implementation of the 2030 Agenda for Sustainable Development.

Figure 3.1. Overview of the Italian policy framework related to the circular economy



Note: Text in brackets indicate the year of last update or information on the current status.
Source: Authors' own elaboration.

The National Strategy for the Circular Economy envisions action on a comprehensive set of themes related to the circular economy, which are summarised in Table 3.3. The strategy highlights the need to strengthen markets for secondary raw materials and other recovered materials to render them competitive in terms of availability, performance and cost compared to virgin raw materials (MiTE, 2022[8]). To achieve this, the strategy aims to bolster measures to support the use of recycled and recovered materials, including defining end-of-waste criteria, a greater use of EPR and green public procurement (GPP) strategies, and an overall strengthening of fiscal incentives.

Table 3.3. Key themes in the Italian Circular Economy Strategy

Eco-design	Reuse and repair	End-of-waste	Critical raw materials, markets for secondary raw materials	Green public procurement	Strategic value chains	Industrial symbiosis	Extended producer responsibility	Digitalisation	Measures in support of the circular economy

Source: Adapted from (MiTE, 2022[8]).

Italy's Strategy for the Circular Economy outlines a roadmap of horizontal initiatives and actions to support the circular economy that includes an emphasis on economic and fiscal instruments, as well as foreseen improvements in the legislative framework related to the circular economy and interventions to influence consumer behaviour. The roadmap for the implementation of the Strategy ("Cronoprogramma di attuazione delle misure della Strategia Nazionale per l'Economia Circolare"), also adopted in 2022, sets out a roadmap of implementation measures for the period 2022-2025. Among other measures, the roadmap foresees:

- The removal of environmentally harmful subsidies related to waste and a reform of the landfill tax.
- Renewed tax credits in support of recycled (and other recovered) materials.
- New financial instruments that promote and reward sustainability and circularity.
- Greater progress in the use of GPP, including the definition of additional GPP criteria, support for reuse and repair, and improved uptake and monitoring.
- Strengthening the principle of EPR, including its extension to sectors such as textiles and non-packaging plastics, and the introduction of a supervisory body for producer responsibility organisations.
- Support for industrial symbiosis projects, including financial support and the removal of regulatory barriers.

Box 3.1. The contribution of Italy's Recovery and Resilience Plan to the circular economy

Italy's National Recovery and Resilience Plan (NRRP) envisioned a number of interventions to support the circular economy. These include the definition of a National Strategy for the Circular Economy and a National Waste Management Plan, both adopted in June 2022, as well as better technical support for local entities to develop the waste management infrastructure and an Action Plan to support the broader uptake of GPP criteria by public entities.

The NRRP allocated EUR 2.1 billion to investments related to the circular economy (corresponding to 3% of total funds). The majority (EUR 1.5 billion) was earmarked for the construction and modernisation of waste treatment and recycling infrastructure that would bridge the infrastructural gaps between regions. The remainder (EUR 600 million) was earmarked for flagship projects focused on the recycling of specific material flows, such as waste from electrical and electronic equipment, plastics, paper and textiles. The NRRP also called for additional technical support for local public entities to overcome opposition to waste treatment and recycling infrastructure, as well as easier authorization of new waste recycling infrastructure. The so-called "Semplificazioni" Decree sets forth regulatory changes to simplify procedures authorising new infrastructure, including the reduction of environmental impact assessments of NRPP projects to 130 days and simplified administrative procedures.

Source: (Italian Government, 2021[9]).

Italy has a comprehensive legislative framework related to waste and the circular economy.[11] In recent years, it has been updated multiple times to align with EU Directives and to gradually introduce measures related to the circular economy.[12] Beyond the adoption of EU objectives and targets, the transposition of

the WFD and the Landfill Directive led to substantial changes to the regulatory framework around waste and packaging. Italy's legislative framework also includes measures against the illegal dumping of waste and littering.[13]

An important recent change is the establishment of a National Electronic Registry for Waste Traceability (RENTRi) to replace the previous waste tracking system. RENTRi will provide the digitalization of all the documents relating to the handling and transport of waste. The traceability system will support the control authorities in preventing and combating illegal waste management, while addressing the needs of businesses (e.g. for simplification, streamlining of procedures, clarity and predictability of rules).

The legislation on EPR schemes was also revised multiple times, including to introduce minimum requirements for national EPR schemes, facilitate administrative procedures for the establishment of EPR schemes for additional product groups, and establish the National Register of Producers to help monitor compliance with EPR obligations. Italy's legislation also foresees labelling requirements for certain types of packaging to facilitate collection, sorting and recycling.

In recent years, specific attention has been paid to overcoming long-standing regulatory barriers that hinder initiatives geared towards the achievement of a circular economy, including the definition of end-of-waste (EoW) criteria. According to the WFD, waste ceases to be classified as waste and becomes secondary raw materials, but only when they comply with specific technical requirements set out by EoW criteria. The definition of EoW criteria is the responsibility of the European Union or, in the absence of common criteria for specific waste streams, individual Member States[14]. While EU EoW criteria exist for three product groups (scrap metal, glass cullet and copper scrap), Italy has approved EoW criteria for solid recovered fuels, reclaimed asphalt pavement, waste from absorbent hygienic products, crumb rubber from end-of-life tyres, paper and cardboard waste, and construction and demolition (CDW) waste. Legislation defining EoW criteria constitutes a fundamental step towards material recovery, creating new opportunities for material and value retention, and facilitating innovation in production processes.

Legislation on by-products also plays a crucial role in the circular economy transition. As defined by the WFD, a by-product is a substance or object resulting from a production process, the primary aim of which is not its production, and that it is used as a secondary raw material in new production processes without needing further processing other than normal industrial practice. Examples of by-products are materials resulting from production processes in the agri-food sector (e.g. fruit pits), or residues from plastics processing.

3.3.1. Competencies on waste, the circular economy and related economic instruments

In recent decades, Italy's environmental management system has evolved towards greater decentralisation (OECD, 2013[10]). Italy is a regionalised unitary state with three tiers of local government, including 20 regions[15], 107 intermediary governments (i.e. provinces, metropolitan cities and autonomous provinces) and 7901 municipalities (ISTAT, 2023[11]). Administrative and fiscal responsibilities have progressively shifted from the central government to the sub-national level (OECD, 2017[12]; Bulman, 2021[13]). Sub-national governments hold important roles in key expenditure areas, spending 29% of total public expenditure in 2014 and making 55% of total public investment (OECD, 2017[12]).

In the area of waste management and prevention, the national government holds a co-ordination and guiding role, while regions and municipalities hold planning and financing roles.[16] The Ministry of Environment and Energy Security (MASE) is responsible for waste management supervision and control. MASE also leads on the development of the National Strategy for the Circular Economy and the National Waste Management Plan, in collaboration with other agencies. Sub-national levels of government play key roles in the promotion of the circular economy transition. All regions oversee planning for waste management and prevention and must develop and regularly update their regional waste management plans and waste prevention plans so that they are aligned with the overall guiding principles and objectives

set out in national policy documents. Regions are also responsible for the collection of data on waste generation and disposal and for the identification of current and projected infrastructural needs. Regions hold powers to i) regulate waste management, including the separate collection of municipal waste; ii) promote waste prevention and integrated waste management; and iii) authorise waste disposal and recovery operations. Several regions have developed specific strategies and targeted measures in the areas of sustainable development and the transition to a circular economy, as presented in Box 3.2 for the case of Emilia-Romagna.

Local authorities hold operational roles, notably for waste collection and management. Municipalities assess existing infrastructure and define the local waste management plan, specifying the organisational model and the financial plan in place. They award municipal waste management services through dedicated tenders. Some cities have adopted circular economy strategies; one example is the "Prato Circular City strategy" of the city of Prato.[17] The Pact for Circular Economy, already signed by Bari, Milan, Prato and MASE, creates a network to support the implementation of actions for the circular transition at the local level (Alternativa Sostenibile, 2018[14]).

As a consequence of this decentralised system, several levels of government influence the design, implementation and enforcement of economic instruments related to the circular economy, as summarised in Table 3.4. Generally, fiscal instruments are introduced at the national level, but regions oversee their implementation. Sub-national levels of government generally collect and manage revenues.

- Extractive activities are not regulated nationally (with the exception of Royal Decree 29 July 1927 nº 1443, not updated recently). Presidential Decree 616/1977 transferred administrative functions relating to quarrying activities to the regions, which was followed by a wave of regional laws to regulate the sector. Decisions on the fee coverage, rate and use of revenues are taken at the sub-national level. The regulation of extractive activities varies widely across the regions.
- For the landfill tax, regions have authority on three important aspects: the tax rate, the types of waste subject to tax, and the allocation of tax revenues. National legislation sets the upper and lower limits for different waste typologies.

With regard to household waste charges**,** municipalities set fees based on national guidelines developed by the Regulatory Authority for Energy, Networks and the Environment (ARERA). Municipalities may provide reductions in the waste tax rate to companies that donate surplus food and other goods, helping to prevent waste. Furthermore, regions may encourage municipalities to implement pay-as-you-throw (PAYT) systems, which link charges to the amount of waste generated by households.

The ANCI-CONAI Framework Agreement is a core piece of legislation regarding waste collection and management in Italy. Introduced by the so-called Ronchi Decree of 1997, and subsequently Legislative Decree 152/06, it is a framework that guarantees that the EPR system covers the financial and operational costs of separate collection of packaging waste for municipalities. Municipalities that have implemented separate collection for each type of packaging waste may choose to sign the relative convention, according to the methods set forth in the relative technical annex of the Framework Agreement (updated every five years). By signing the convention, the municipality undertakes to deliver the packaging waste to the relative consortium, while the latter undertakes to collect the material, guarantee its subsequent recycling, and deliver fees based on the quality and quantity of the material provided (CONAI, 2023[15]).

MASE plays an important role in supervising, controlling and implementing support for EPR and GPP. On EPR, MASE is in charge of collecting and verifying the robustness and provenance of data, analysing and highlighting possible anomalies, monitoring the achievement of the targets, and verifying its proper implementation. On GPP, MASE is responsible for the definition and update of minimum environmental criteria (CAM), the application of which is mandatory in Italy since 2016 at all levels of government, and it is in charge of updating the National Action Plan on GPP. Monitoring of CAM uptake in GPP has been entrusted to the National Anti-Corruption Authority (ANAC).

Table 3.4. Overview of roles and responsibilities of selected economic instruments in Italy

Instrument	National level	Sub-national level
Price-based economic instruments		
Fees on extractive activities	National legislation only covers general matters in extractive sectors (e.g. workers' health and safety, disposal of waste from extractive activities).	Regions' main responsibilities for minerals and quarrying (not energy-related minerals) include planning and authorisation of extractive activities, environmental impact assessments, setting of royalty fee coverage and rate, recovery of waste materials, mine/quarry closure and rehabilitation requirements, collection of statistical data. Municipalities: collection of revenues (exceptionally by regions).
Landfill tax	National legislation: general criteria and guidelines on tax scope (upper and minimum levels of tax rates), destination and earmarking of revenues (e.g. 5-10% of revenues shall go to municipalities).	Regions main responsibilities include tax scope and tax rate (including reduced tax rates), collection of revenues (e.g. exact share going to municipalities, including with bonus/malus systems), use of revenues. Municipalities: may receive a share of revenues.
Plastic tax	National legislation (due to enter into force on 1 July 2024).	NA
Waste charge (including PAYT)	National legislation: guidelines for fee setting. ARERA is the regulatory body.	Regions: promotion or mandating adoption of PAYT systems. Municipalities: in charge of planning for local waste management (incl. the financing model), fee setting (incl. granting tax reductions in line with national guidelines) and collection of revenue.
Performance-based economic instruments		
Extended Producer Responsibility (EPR)	State: introduction of EPR schemes, certification of Producer Responsibility Organisations (PROs/consortia). In most cases, PROs organise and execute EPR obligations nationally.	N/A
Green Public Procurement (GPP)	National legislation: introduction of public procurement approaches and monitoring application of GPP criteria. MASE: definition and regular update of GPP criteria, update of National Action Plan on GPP Consip: National Central Purchasing Body implementing framework agreements, including GPP criteria. National Anti-Corruption Authority (ANAC): monitoring application of GPP criteria.	Regional aggregators implementing framework agreements including GPP criteria and trainings on GPP. All sub-national public entities: implementation (uptake of GPP criteria in tenders). Regions participate in the planning phase ("Intesa Stato-Regioni" of the National Action Plan on GPP).

Source: Authors' own elaboration.

Box 3.2. Sub-national policy and legislative framework in Emilia-Romagna

Emilia-Romagna was the first region to introduce circular economy principles and objectives into regional legislation and strategies. The Regional Law 16/2015 on Circular Economy mandated ambitious targets to 2020 on waste generation and separate collection. The Regional Waste Plan, approved in 2016, introduced measures to support the achievement of these targets, including: i) an **Incentives Fund** (partially funded by the regional landfill tax) to reward high-performing municipalities, and to incentivise waste prevention and reductions in waste generation; ii) **public–private partnerships** for the prevention and recovery of waste; iii) **measures to promote reuse**, including guidelines and the creation of municipal reuse centres; iv) the creation of permanent **working groups on by-products** and a dedicated regional register; and v) the development of a **Circular Economy Forum**, in the form of meetings and workshops, to disseminate guidance and information on ongoing regional initiatives related to the circular economy, as well as to engage with stakeholders and promote best practices (Ambiente Regione Emilia Romagna, n.d.[16]).

3.3.2. Multi-level governance and co-ordination mechanisms

A multi-level governance approach is fundamental to the circular economy. Generally, it encompasses two dimensions. The vertical dimension refers to the co-ordination across the national government, regions, provinces and municipalities, as well as capacity-building efforts at the sub-national level to improve the quality and coherence of public policy. The horizontal dimension refers to co-operation arrangements between regions or municipalities to improve the effectiveness of local public service delivery and the implementation of development strategies (Charbit, 2011[17]).

Some consultation and co-ordination mechanisms exist to enhance multi-level governance around the circular economy. For instance, an institutional working group ("Tavolo interistituzionale per il Piano della Gestione dei Rifiuti") was set up to inform the development of the National Waste Management Plan. It aims to involve regions, government agencies ("Istituto Superiore per la Protezione e la Ricerca Ambientale", ISPRA), municipalities ("National Association of Italian Municipalities", ANCI), the Ministry of Enterprises and Made in Italy (MIMIT), and ARERA.

In October 2022, MASE announced the establishment of an observatory tasked with co-ordinating and monitoring the implementation of the National Strategy for the Circular Economy (MiTE, 2022[18]). Once established, the observatory will be chaired and co-ordinated by MASE. with scientific and technical support provided by ISPRA and ENEA. Representatives from other ministries, as well as regions and municipalities, will also take part. The observatory is in charge of identifying any obstacles in the strategy's implementation and ensuring dialogue with stakeholders by involving them in thematic roundtables and consultation on policy documents. Another key task will be to carry out effective communication and dissemination activities vis-à-vis the public administration, public and private operators and citizens to promote initiatives and achieve its objectives, providing guidance for any updates of the strategy's timetable.

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Notes

[1] Previous OECD work on environmental fiscal reform (OECD, 2017[20]) fed into discussions at the Environment Ministerial Meeting held in Bologna on 11-12 June 2017.

[2] Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (Text with EEA relevance).

[3] Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment.

[4] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of eco-design requirements for energy-related products.

[5] Proposal for a regulation laying down harmonised conditions for the marketing of construction products, amending Regulation (EU) 2019/1020 and repealing Regulation (EU) 305/2011.

[6] Proposal for a regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020.

[7] Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel; Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU.

[8] Proposal for a directive on substantiation and communication of explicit environmental claims (Green Claims Directive). In September 2023, the European Parliament and the European Council reached a provisional agreement on new rules to ban misleading labels and provide consumers with better product information. Once formally approved, EU Member States will have 24 months to incorporate the new rules into national law.

[9] The EU has also developed an Organisation Environmental Footprint (OEF) to measure the environmental impacts of organisations.

[10] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088

[11] The Environmental Consolidated Act (Leg. Decree 152/2006) governs a wide range of environmental issues in Italy, including waste prevention and management. It enshrines the EPR principle and the EU waste hierarchy into Italy's environmental policy framework. It has been revised multiple times, including to transpose the 2018 circular economy package of directives.

[12] Notably, the 2020 Budget Law kicked off Italy's Green New Deal, a policy and investment plan to support the circular economy, including with the establishment of a EUR 4.24 billion fund (for the period 2020-2023) to promote the "Green Deal".

[13] The abandonment and uncontrolled deposit of waste is prohibited and punished with administrative and criminal sanctions (Leg. Decree 152/2006). Discarding cigarette butts and other very small waste items is prohibited and sanctioned by penalties ranging from EUR 30 to EUR 300 (Leg. Decree 152/2006 and Law 221/2015).

[14] In Italy, the authority responsible for defining EoW criteria and granting authorisations has been a matter of debate. According to current legislation, EoW criteria are adopted at the national level. However, local authorities now have the competence to grant specific EoW authorisations on a “case by case” basis (Law 128/2019). A National Registry for Authorisations, established in November 2019, collects information on new authorisations, and also supports the definition of new EoW criteria and requests for control procedures.

[15] In sustainable development governance, the first tier or government is often considered to refer to the 19 regions and 2 autonomous provinces that have regional powers.

[16] Legislative Decree 152/2006 “Environmental Consolidated Act”.

[17] The “Prato Circular City strategy” sets the following objectives: i) to promote the city's transition to the circular economy; ii) to strengthen the image of Prato as a “circular city”; iii) to establish an environment of permanent consultation among stakeholders in the area to promote shared, integrated and participatory circular economy actions; and iv) to create a circular city governance (Prato Municipality, 2022[19]).

4 International practices on using economic instruments for a circular economy

Economic instruments are widely used across OECD countries to achieve environmental policy goals cost-effectively. Economic instruments can support shifting the economy from linear to circular practices, by generating price signals that promote eco-design, reuse, recycling and material recovery, minimising resource use and waste.

This chapter reviews international examples of the use of economic instruments with links to the circular economy, such as virgin material taxes on raw materials, plastic taxes, household waste disposal charges (including pay-as-you-throw), landfill and incineration taxes, as well as Extended Producer Responsibility and public procurement approaches.

4.1. Introduction

Economic (or market-based) instruments seek to address the market failure of environmental externalities, either by incorporating the external cost of production and consumption activities through taxes[1] on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services (OECD, 2007[1]). The internalisation of externality costs ensures that the damage caused by pollution is better reflected in market prices (OECD, 2001[2]). The use of economic instruments, as well as their variety, has grown steadily in recent decades in OECD countries, and to a lesser extent in non-OECD countries.

The promise of economic efficiency is one key advantage of economic instruments. Economic instruments attach a price to undesirable behaviour, such as a tax that industry or consumers must pay to use a specific product or service. By allowing flexibility in the method and pattern of compliance, economic instruments can lower the overall economic costs of achieving a given level of environmental protection (Svatikova, Brown and Börkey, Forthcoming[3]). Environmental taxes, in particular, offer the advantage of generating dynamic incentives for pollution abatement: as environmental taxes generally require polluters to pay for residual emissions on top of abatement costs, this provides a continuous incentive to lower pollution abatement costs and reduce emissions further to avoid paying the tax.

Across OECD countries, economic instruments are used to help governments reach their environmental policy goals in a cost-effective manner, as well as promote sustainable growth and, potentially, generate revenues. One additional advantage of economic instruments is that they may strengthen incentives for innovation in green technologies, as firms along the value chain seek cost-effective abatement solutions. Well-designed fiscal policy can reinforce “green” stimuli and align traditional forms of stimulus with environmental objectives. In this vein, the European Green Deal acknowledges the crucial role of economic instruments, including taxation, in the transition to a greener and more sustainable economy. It encourages EU Member States to design appropriate green taxes that can raise revenue, remove environmentally harmful subsidies, and ensure the full implementation of the polluter pays principle, a fundamental principle for internalizing the costs of environmental protection (OECD, 1972[4]).

4.2. A typology of economic instruments for the circular economy

Economic instruments can help to re-shape the economy from a linear pattern of consumption to a circular pattern of recovery, reuse, recycling and overall lower resource use and waste, while avoiding excessive economic impacts (OECD, 2021[5]). By favouring practices that are more sustainable and circular, and penalising those that are more wasteful and harmful to the environment and human health, economic instruments help to reorient consumer choices and market forces towards lower resource use, and can boost innovation in green technologies.

Governments generally set prices or policies that indirectly impact the price signal for actors. Price-based economic instruments include taxes, charges, as well instruments such as deposit-refund systems (Svatikova, Brown and Börkey, Forthcoming[3]). Performance-based economic instruments assign businesses with the responsibility to meet circular economy performance targets or goals, which indirectly impact or set a price to motivate behavioural change (Svatikova, Brown and Börkey, Forthcoming[3]). For instance, green public procurement (GPP) provides economic incentives for bidders to compete on green criteria through the purchasing power of public authorities, leading firms to seek ways to reduce the total product or service life cycle costs.

Table 4.1 summarises the types of economic instruments related to the circular economy. Many of the listed economic instruments, including landfill taxes, packaging charges, deposit-refund systems and taxes on virgin materials, have become an established and effective part of the materials management policy landscape in OECD and EU Member States over the past decades (OECD, 2016[6]; OECD, 2019[7]; OECD, 2014[8]; Lifset, Atasu and Tojo, 2013[9]).

Table 4.1. Typology of economic instruments for a circular economy

Type	Short description
Price-based economic instruments	
Taxes and charges	Taxes and charges on goods and services elicit behavioural changes by increasing costs. As a consequence, they discourage the consumption and production of targeted products or activities. The level of a tax or a charge can be based on the social cost of the activity or physical characteristics (e.g. weight of the consumable).
Subsidies	Subsidies encourage behavioural change by reducing costs for targeted products or increasing benefits for targeted activities. They directly increase the relative cost of polluting products and activities, or they can increase the use of products or activities that have a positive impact on the environment.
Deposit refund systems (DRS)	A system in which an initial payment (deposit) is made by a customer at the point of purchase, which is then refunded when the product or packaging is physically returned to the collection scheme by the customer. DRS set a price for participating in the collection scheme, creating an incentive for customers to participate. DRS correlate with high collection rates, quality of collection, and low littering levels.
Advance disposal fees (ADF)	ADF are charged on products at the point of sale based on the estimated waste management costs. Governments or producer responsibility organisations that collectively fulfill EPR obligations set an ADF that creates a cost/price for end-of-life collection and recovery services. These help to internalize the costs of these services to the producers and consumers of the products that become waste.
Performance-based economic Instruments	
Tradeable permits and tradeable compliance certificates	Tradable permits allocate limited emission or resource exploitation rights to firms. They have two key characteristics: i) a “cap” (a quantity limit) on the pollution that is being regulated; and ii) a trading system that allows individual firms to split the cap among them. The overall cap ensures the desired overall outcome in a cost-effective way (via trading). The key requirement is the existence of a competitive market for such permits (including low transaction costs and a sufficient number of market players).
Extended Producer Responsibility (EPR) take-back schemes	The most common EPR policy instrument are mandatory take-back schemes, which oblige firms to meet targets for the collection and processing of the products they produce. This creates incentives for firms to find ways to reduce the end-of-life costs of their products and to meet their EPR requirements more efficiently.
Green Public Procurement (GPP)	GPP directs the purchasing power of public agencies to incentivise markets to innovate and to award suppliers who offer more environmental or circular modes of supply. In the first instance, GPP increases demand for targeted products, increasing their price in the short term. In the medium to long term, GPP can send a price signal that could encourage producers to increase the supply of more sustainable materials and products on the market.

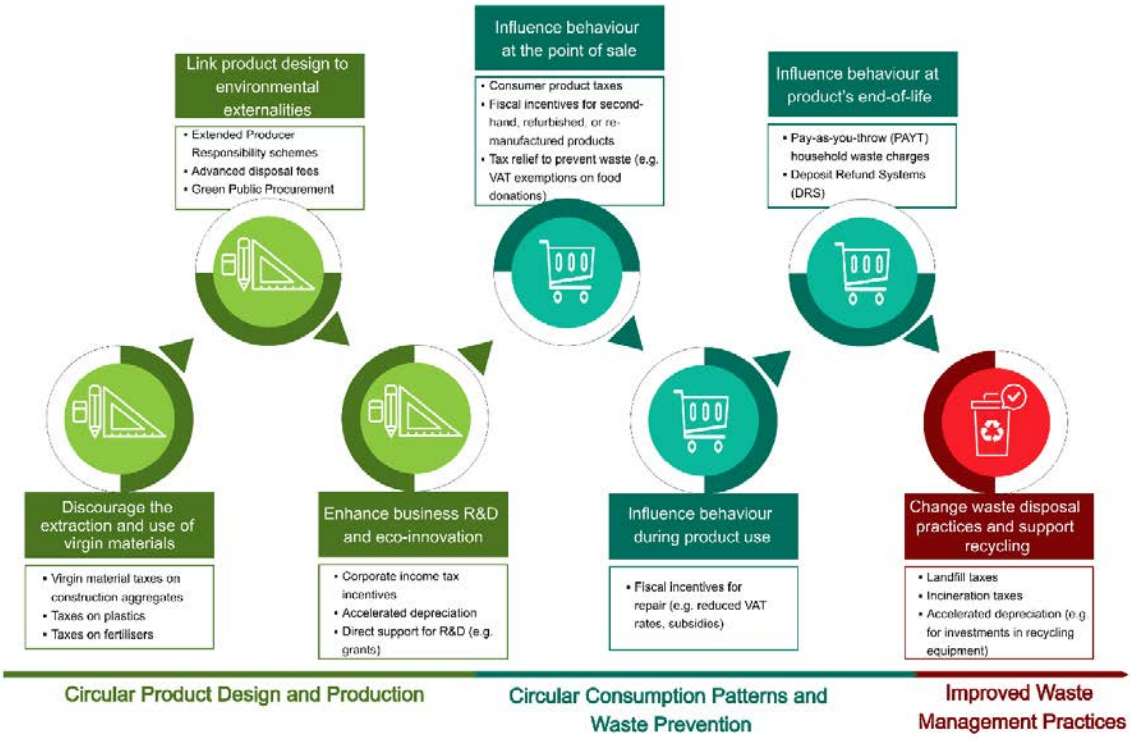
Source: (Svatikova, Brown and Börkey, Forthcoming[3]).

Countries generally strive to implement economic instruments as part of a policy mix. New regulations help to remove regulatory barriers, set targets and obligations (e.g. extended warranty obligations) or restrictions (e.g. bans on harmful substances), introduce standards, create framework conditions to enable the use of secondary materials, or ease the administrative burden for circular business development and innovation. Regulatory instruments may also encompass the monitoring and enforcement framework relevant to circular economy measures and targets. Regulation and economic instruments are often supported by voluntary approaches, such as certification schemes, sustainability standards and commitments (e.g. for recycled content in products). They may also include information-based instruments, such as eco-labelling, and communication and awareness-raising initiatives to empower consumers, as well as behaviourally informed interventions. Additionally, policy makers may support education, training and research measures, as well as measures to facilitate co-operation between the public and private sector and across sectors (e.g. waste and packaging industries), or across stakeholders (e.g. via circular hotspots).

4.3. Economic instruments along the value chain

Economic instruments can help generate price signals oriented towards higher sustainability and circularity all along the value chain, from material extraction, product design to consumption and waste processing. Figure 4.1 provides a summary of key economic instruments for the circular economy, categorised by the key point of the value chain they target.

Figure 4.1. Selected economic instruments for the circular economy



Note: Economic instruments may influence multiple life cycle stages. For instance, public procurement approaches may promote sustainability and circularity during product design and manufacturing, at the point of purchase, during the use phase, as well as at end-of-life.
Source: Based on (Svatikova, Brown and Börkey, Forthcoming[3]).

The circular economy emphasises the importance of sustainable and circular choices made at the beginning of a product's life cycle. Circular design features can preserve the functionality and usability of products, their components and embedded materials for as long as possible, thereby increasing value retention and preventing waste. These choices need to be incorporated into company decisions to support sustainable and circular production patterns, from the sourcing of material inputs to the management of by-products. Economic incentives are essential to support sustainable and circular behaviour upstream in the value chain, encouraging the use of secondary materials, linking product design to end-of-life disposal costs, and incentivising business research and development (R&D) and eco-innovation (Svatikova, Brown and Börkey, Forthcoming[3]).

Consumers and households have a central role to play in promoting new circular business models that reduce consumption levels, prevent waste generation and contribute to better waste management through good waste sorting practices. Economic instruments can influence consumer and household behaviour at the point of sale, during the product's use phase and at the end of the product's life cycle (Svatikova, Brown and Börkey, Forthcoming[3]). For instance, product taxes change the relative price of products and services

at the point of sale and can encourage more circular consumption patterns. Pay-as-you-throw (PAYT) and deposit refund systems (DRS) set a price for households' pre-sorting effort. A DRS imposes a fee (an unredeemed deposit) on households not participating in the separate collection system. In addition to economic instruments, it is worth noting that information and awareness measures, as well as interventions informed by behavioural sciences, also have an important role to play in informing consumers about the environmental consequences of their choices and in influencing their behaviour.

Although waste management, recovery and recycling are positioned lower in the waste hierarchy, they are critical steps in mitigating environmental impacts and closing material loops. As discussed in the previous chapter, the EU Circular Economy Action Plan sets ambitious targets in this field, including a recycling target of 60% of municipal waste by 2030 and a maximum landfill rate of 10% of municipal waste by 2035. Economic instruments that improve waste management practices generally provide economic incentives for waste disposal agents to change their practices towards the reuse, recycling and recovery of products and materials, as well as to increase recycling by waste operators.

4.4. Selected international practices on the use of economic instruments

This section reviews examples of economic instruments in place in other OECD countries. This section focuses on environmentally related taxes known to be particularly relevant for the circular economy and which can be employed by multiple countries, as based on the OECD database on Policy Instruments for the Environment (PINE). These include taxes on raw materials extraction, taxes on specific products, waste disposal taxes, and landfill and incineration taxes. Additionally, the section covers EPR and public procurement approaches, which are also extensively used across OECD countries to support sustainable development and the circular economy.

4.4.1. Virgin material taxes on raw materials

Virgin material taxes (or taxes on the extraction of raw materials) have been in use in Europe since the early 1990s, mainly to discourage the excessive use of virgin materials in production, and to lower the relative price of secondary raw materials. Up until now, taxes on raw materials have been used principally on quarried materials such as stone, sand and gravel (Söderholm, 2011[10]). It is also possible to apply virgin material taxes to other materials, such as oil and gas extractions, plastics (as done in some OECD countries, see also section 4.4.2), or chemical substances used in the agricultural sector.

Virgin material taxes are distinct from royalty payments, and are often associated with resource extraction. Royalties are levied in exchange for access to publicly owned resources and should, ordinarily, generate a stable revenue, whereas environmental taxes should decrease over time if they prove to be effective in changing producers' behaviour (International Resource Panel, 2020[11]). Royalties are more widely used by countries than virgin material taxes. Royalty payments are typically fees for the use of mining land per tonne of extracted material, or a small percentage of the market value of the extracted materials.

According to the OECD PINE database, there are currently 88 different fees applied to extractive activities of aggregates, gypsum and salt in OECD countries. More than half of these (58%) are earmarked and 84% are based on a physical metric, such as volumes extracted (*ad quantum*), while the remaining 16% are based on a monetary metric such as sales price (*ad valorem*). The tax base also differs, with 64% targeting specific types of construction aggregates, 24% covering all minerals, and the remaining pertaining to gypsum and salt. Table 4.2 presents examples from selected OECD and non-OECD EU countries. The majority of countries impose revenue-raising levies, whereas countries such as Sweden and the United Kingdom have designed virgin material taxes aimed at affecting the *quantities* extracted. This is reflected by the higher fee rates, compared to royalties, and the presence of regular updates.

Table 4.2. Royalties and taxes on construction aggregates in selected OECD and EU countries

Country	Name of tax, charge or duty	Taxable materials	Year of introduction	Tax rates
Colombia	Mining royalties	Minerals	1995/1996	3% of production value
Croatia	Extraction charge	Sand, gravel, crushed stone, limestone and clay	2009	EUR 0.41 /m³ (sand) EUR 0.55 /m³ (gravel)
Czech Republic	Fee for extracted minerals	Aggregates	1993	Up to 10% of market price of mineral resources
Denmark	**Duty on raw materials**	**Stone, sand, gravel, peat, clay and limestone**	**1990**	**Until 2022 : EUR 0.71 / m³** **2023 : EUR 0.75 / m³**
Estonia	Materials extraction charge	Dolomite, granite, gravel, sand, limestone, clay, peat, phosphate rock and oil shale	1991	EUR 0.75 – 1.42 /m³ (clay) EUR 0.60 – 2.43 / m³ (gravel) EUR 0.98 – 2.94 /m³ (limestone) EUR 0.42 – 1.64 /m³ (sand)
France	Tax on extracted minerals	Minerals (granulates)	2000	EUR 0.21 /t
Latvia	Natural resources extraction charge	Gravel, limestone, clay and sand	1991	EUR 0.21 /m³ (clay) EUR 0.21 – 0.36 /m³ (dolomite, sand, gravel) EUR 0.14 – 0.28 /m³ (limestone)
Lithuania	Minerals extraction charges	Minerals	1991	EUR 0.51 – 0.86 /m³ (clay) EUR 0.84 /m³ (limestone) EUR 0.38 – 0.48 /m³ (sand)
Sweden	**Natural gravel tax**	**Gravel, sand, cobble and boulder**	**1996**	**1996: EUR 0.57 /t (SEK 5 /t)** **2006: EUR 1.58 /t (SEK 15 /t)**
United Kingdom	**Aggregates levy**	**Sand, gravel and crushed rock**	**2002**	**2002: EUR 2.55 /t (GBP 1.60 /t)** **2010: EUR 2.55 /t (GBP 2/t)**
United States (state level)	Kansas: Sand royalty	Sand		EUR 0.1246 /t (USD 0.15 /t)
	Nevada: Minerals tax	Minerals		5% of net proceeds
	West Virginia: Severance tax	Sand, gravel, sandstone and other mineral products		5% of gross receipts attributable to natural resource production

Note: Bold type is for countries discussed in the text. Conversion factor of sand, gravel, crushed rock = 1.8 t/m³; and limestone = 2.8 t/m³.
Sources: (HM Revenue & Customs, 2022[12]; OECD, 2022[13]).

Denmark was one of the first countries to introduce a virgin material tax on construction aggregates, which applies to all domestic extraction and imports. The virgin material tax was implemented in conjunction with the waste disposal tax, first introduced in 1987 and later differentiated by disposal type. Söderholm (2011[10]) notes that the two taxes have caused a marked increase in recycling, in particular, of construction and demolition waste (CDW). In 1985, 82% of CDW was landfilled and only 12% was recycled, but in 2004 the recycling rate increased to 94% (European Environmental Agency, 2008[14]). There has been a slight decrease in the extraction of these materials since the introduction of the tax in 1977, although the tax has not led to a drop in consumption (Söderholm, 2011[10]). Furthermore, the introduction of mandatory separate collection at source of CDW is believed to have significantly contributed to improving the supply of secondary aggregates in the Danish market (Söderholm, 2011[10]).

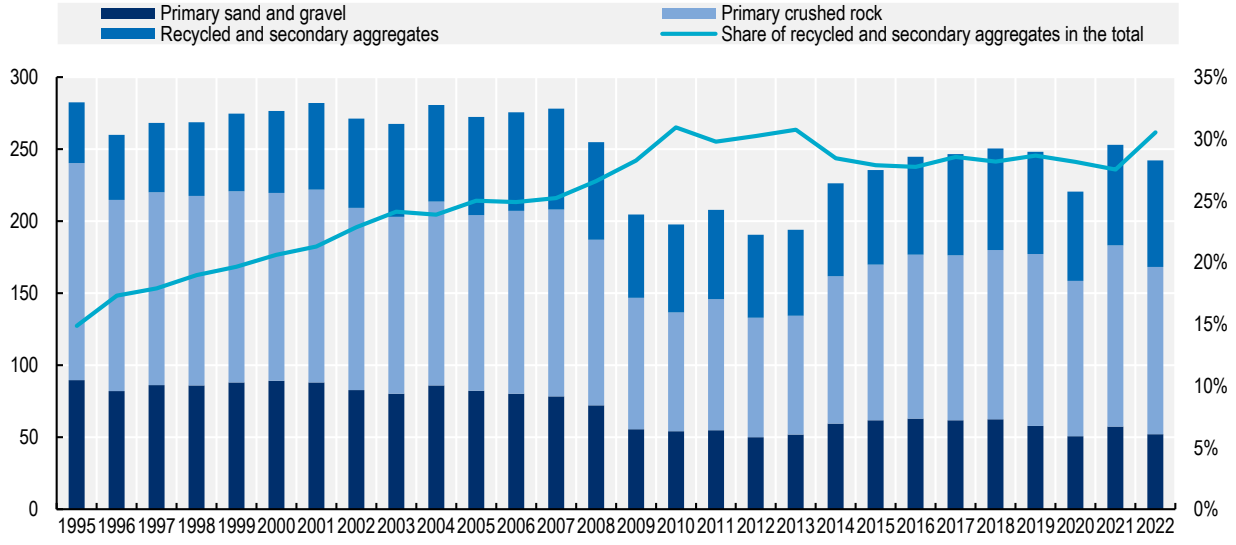
In Sweden, a low tax rate on the extraction of natural gravel has been applied since 1996 to preserve groundwater, but it was raised in 2003. This increment suggests a significant drop in the consumption of this material. However, the decrease in gravel extraction was already significant before the tax was introduced and could be due to the higher demand for crushed rock because of its higher quality compared to natural gravel. The drop in gravel consumption led to an increase in alternative materials, with a greater impact on emissions. Therefore, while groundwater quality has improved, emissions have increased. This example highlights the need for careful analysis and, possibly, additional instruments to prevent burden shifting. The Swedish case also shows that the gradual tax increase helps producers organise themselves

and contributes to increasing the elasticity of the demand, allowing for a better acceptance of the tax (Söderholm, 2011[10]).

The United Kingdom introduced the Aggregates Levy in 2002 as a nation-wide environmental tax on commercially exploited virgin rock, sand and gravel that have been quarried, dredged from UK waters or imported (HM Treasury, 2019[15]). The tax rate has gradually increased to reach the current rate of GBP 2 per tonne. Annual revenues amount to GBP 240-410 million (HM Treasury, 2019[15]). Although it is difficult to attribute environmental outcomes specifically to the tax, it is likely that the landfill tax and the Aggregates Levy together had an important impact on the overall reduction in the extraction of aggregates (Ettlinger, 2017[16]). Figure 4.2 shows the historical use of secondary aggregates in the United Kingdom. It suggests that the introduction of the landfill tax in 1996 and the Aggregates Levy in 2002 contributed to a steady increase in the use of recycled aggregates as a proportion of overall aggregate consumption. In 2019, secondary aggregates constituted 27% of the total aggregate market in the country, an estimate significantly above the EU 27 average (10%) (UEPG, 2019[17]). In a recent stakeholder consultation process, carried out as part of a government review of the levy, producers of recycled and manufactured aggregates reported that they considered the Aggregates Levy to be important to incentivise the use of alternatives in place of virgin aggregates (HM Treasury, 2020[18]).

Figure 4.2. Recycled and secondary aggregates use in the United Kingdom

Aggregates used, by type (in million tonnes, left axis) and share of recycled and secondary aggregates in total (as percentage of total, right axis)



Source: Elaboration of data from (Mineral Products Association, 2023[19]).
Note: The UK Landfill Tax applies a lower rate to most CDW, equal to GBP 3.15 /t (compared to the standard rate of GBP 98.60 /t) (HM Revenue & Customs, 2022[20]).

4.4.2. Taxes on consumer products and plastic taxes

Product taxes can encourage consumers to purchase products that are more sustainable and circular, provided that the price signal is passed forward to consumers in the form of higher product prices. If set at an appropriate level, these taxes can elicit changes in consumer purchasing behaviour away from disposable or non-recyclable products, for example, or from products that have high disposal costs. Product taxes could also act as advance disposal fees, reflecting the cost of the end-of-life treatment of

the designated products. In turn, they may incentivise businesses to bring more sustainable products to the market, which would be tax exempt.

Across OECD countries, product taxes have been widely applied to single-use plastic bags, single-use packaging and disposable tableware, fertilisers, mineral oils and tyres (OECD, 2021[5]). For instance, the Danish packaging tax, levied since 1978, aims to reduce waste and increase packaging reuse and recycling rates. Denmark chose to internalise packaging waste management costs through this tax instead of setting up an industry-run producer-responsibility scheme as implemented by many EU countries.

A handful of countries have instituted taxes on products considered harmful to the environment. One example was the Belgian "picnic tax", an environmental tax on single-use applications. The tax had differentiated rates across four categories of single-use products: plastic carrier bags (EUR 3/kg), plastic foil (EUR 2.70/kg), aluminium foil (EUR 4.50/kg) and plastic cutlery (EUR 3.60/kg) (Eunomia and IEEP, 2016[21]). It remained in place from July 2007 to January 2015, when it was dismantled on the grounds that it had successfully changed consumers' behaviour and because the tax revenues barely covered the implementation costs (De Muelenaere, 2014[22]). Later studies suggested that a pre-existing voluntary agreement for mandatory pricing of single-use plastic carrier bags (instead of free provision) was likely the main driver for the drop in consumption, while for other targeted single-use goods demand reductions were limited (Cornago, Börkey and Brown, 2021[23]).

In light of the growing awareness of the negative externalities caused by plastic products along their life cycle, in recent years several OECD countries have explored the use of environmental taxation applied to plastics. These may vary widely in scope, design, implementation and enforcement mechanisms, and will depend on the intended environmental, behavioural and economic outcomes. It is possible that more EU countries will consider introducing plastic taxes to raise funds to pay the EU plastics own resource. Selected experiences include the following:

- The UK Plastic Packaging Tax became operational in April 2022. It is a national level plastics packaging tax (of GBP 200/tonne) levied on plastic packaging containing less than 30% recycled plastic.
- In 2023, Spain introduced a weight-based tax on non-reusable plastic packaging (EUR 0.45/kg) (Svatikova, Brown and Börkey, Forthcoming[3]). The Spanish plastic tax only applies to the content of virgin plastic packaging, similarly to the foreseen Italian plastic tax (discussed in Chapter 5 of this report).
- By 2024, at least 25 OECD member countries will have introduced a policy for a minimum recycled content requirement of plastic products or packaging, with the United States enforcing a non-compliance penalty of approximately USD 0.44/kg (Brown and Börkey, 2024[24]).

Due to the emerging nature of plastic taxes, and the limited empirical evidence, ex-post assessments of the economic impacts and environmental outcomes are not yet available. However, general considerations on the design and implementation of plastic taxes can be drawn from the experience of selected countries with taxes applied to single-use plastics, as well as from similar instruments, such as charges and EPR schemes (Cornago, Börkey and Brown, 2021[23]), as summarised in Table 4.3.

In terms of the "policy coverage" (materials or products) and "target life cycle stage" (intermediate materials or goods, products or waste), weight-based taxes on virgin material input primarily aim to encourage businesses to reduce virgin material use and create demand for recycled plastics. In contrast, taxes on selected plastic products primarily target consumers' behaviour to reduce the use of single-use packaging (not only plastic packaging). The "price signal" should be high enough to provide a strong incentive for the desired behaviour (e.g. reducing resource use, shifting to recycled materials or investing in new technologies), while not excessively penalising economic actors or consumers.

Incremental implementation and stakeholder engagement can help overcome implementation barriers and reduce administrative costs, while ensuring that the tax remains sufficiently ambitious to encourage

behavioural changes among firms and consumers. Although technically not taxes, EPR fees may reflect similar price signals to producers as plastic taxes and are generally easier to implement or adjust due to their higher acceptability by the public and firms. Taxes may have revenue-raising purposes (e.g. to pay for the EU plastics own resource) or they may be earmarked partially or fully, for instance, for environmental protection causes.

Table 4.3. Summary of key aspects to be considered in the design of plastic taxes

Aspect		Advantages	Disadvantages
Target life cycle stage	Material input and production	Can incentivise the shift to materials not targeted by the tax (e.g. recycled materials, substitution alternatives). Can incentivise changes in design and production that lower materials use. Lower administrative costs (where there is a limited number of plastic producers/importers).	Does not differentiate packaging from durables. Does not differentiate by application (e.g. food packaging vs medical uses). Higher likelihood of lobbying resistance.
	Consumption	Helps to target products and applications that are particularly harmful (e.g. packaging over durables). More salient to consumers (and behavioural change).	Higher administrative costs. Implications for trade and competitiveness of domestic industry.
	Waste	Creates incentives for waste prevention. Can incentivise behavioural change. Can be levied on consumers or producers. May bear lower implementation costs where implemented as part of existing instruments (e.g. EPR fees).	May involve implementation challenges upfront (e.g. PAYT schemes). May not easily translate into incentives for better eco-design.
Policy coverage	Materials	Provides incentives for reductions in virgin materials use. Can incentivise the shift to recycled materials. Can target the most harmful resins.	May create incentives to shift to materials with a higher environmental footprint.
	Products	Can better target particularly harmful applications (e.g. single-use products).	Can mitigate the adverse effects of material substitution.
Price signal	Estimation of economic cost of negative externalities	Can better prompt behavioural change from consumers. Can alter production patterns in the long term.	Involves higher estimation complexity. May not always be sufficient for behavioural change (if the cost of environmental externalities is lower than WTP).
	Estimation of consumer willingness to pay	Allows behavioural change when the price signal is above the WTP.	Consumer WTP varies over time and it may adapt to the tax over time (unless the tax rate is adjusted accordingly).
	Ad hoc basis	Easier implementation (does not require estimation of costs or consumer WTP).	

Note: WTP stands for willingness to pay
Source: (Cornago, Börkey and Brown, 2021[23]; Zero Waste Europe, 2018[25]).

4.4.3. Household waste disposal charges, including PAYT

Pay-as-you-throw (PAYT) is a scheme for household waste charges where fees are modulated according to the amount of waste generated. Generally, waste fees are based on a fixed and a variable fee component to reflect the cost structure of waste management and thus align incentives for users (i.e. a lower fee when less waste is produced) and waste collectors (i.e. revenue stability from the fixed fee component). The overall aim of PAYT is to enact the “polluter pays principle” and lead to enhanced separate waste collection and reduced waste generation.

The experience of OECD countries with using PAYT generates numerous best practices in the design and implementation of this instrument, as discussed in Box 4.1. For instance, best practices include charging household waste fees based on a fixed and a variable, weight-based fee component, and to combine these with door-to-door separate collection of waste. Good performances are also achieved with prepaid bag schemes, which are generally less costly to implement than weight-based systems (Dijkgraaf and Gradus,

2004[26]; OECD, 2006[27]; Watkins et al., 2012[28]). Key factors for a successful implementation include the measurement of waste at individual user level, the definition of a unit price that effectively drives behavioural change, and the engagement of citizens to ensure a correct understanding of the scheme's features and widespread buy-in.

Box 4.1. Experience of selected OECD countries with PAYT

Flanders, Belgium

Flanders has implemented PAYT-based charges for all municipal solid waste on a regional level since 1995. Flemish municipalities are responsible for the collection and treatment of municipal solid waste produced within their jurisdiction. The Public Waste Agency of Flanders (OVAM) manages the PAYT system in collaboration with the municipalities or associations of municipalities. The region mandates municipalities to set the variable price for residual waste collection between EUR 0.11 and EUR 0.33 /kg (i.e. for a single bag of residual waste of 10 kg, the cost could go up to EUR 3.3). The regional PAYT system also relies on the differential pricing of residual waste, recyclables and bio-waste, with higher rates for residual waste (OECD, 2006[29]).

Initially, the scheme was a pay-per-bag pricing scheme, using stickers or standardized waste bags. Later, Flemish municipalities gradually (and voluntarily) shifted to a more sophisticated weight-based pricing scheme, whereby each household receives a waste bin marked by an identification chip. The weight of the bin is measured and automatically recorded before and after emptying, so that households are charged for the actual amount of disposed waste.

As a result of this change, the region saw a significant increase in the rate of separate collection (71% in 2012) and a decrease of residual municipal solid waste generation (approximately 21.4% in one year), while incineration and landfilling were virtually abandoned (ACR+, 2014[30]; Sasao, De Jaeger and De Weerdt, 2021[31]). Evidence from quantitative analysis indicates that weight-based PAYT schemes had a significant impact on decreasing residual municipal solid waste generation immediately after the scheme's introduction, but this impact tends to level off and disappear in the ensuing years (De Jaeger and Eyckmans, 2015[32]). Possible reasons behind this may include a sort of "policy fatigue", relatively low charges, a difficulty for households to anticipate economic savings (as compared to the pay-per-bag system), and the fading of public communication campaigns over time (Sasao, De Jaeger and De Weerdt, 2021[31]).

Key success factors in the implementation of PAYT schemes in Flanders included:

1. A clear legal framework, covering the mandatory separate collection of municipal solid waste on a regional level, a strong enforcement framework with fines to deter illegal activity, and the removal of legal obstacles.
2. Financial support in the form of subsidies for municipalities to purchase the required infrastructure (at least EUR 50 million was subsidised over the years, and the costs of PAYT schemes were partly covered by general taxes).
3. Supporting policy measures, such as landfill and/or incineration taxes and bans, which make recycling financially more attractive.
4. Wide-scale information and awareness raising campaigns informing citizens on the principles and benefits of PAYT, and the gradual implementation of the scheme once waste sorting is accepted.
5. Continuous and active dialogue with municipalities and key actors along the value chain (ACR+, 2014[30]).

Republic of Korea

The Republic of Korea was the first country to adopt PAYT on a nationwide basis in 1995, using a volume-based scheme with pre-paid bags for residual waste and charges for the collection of bulky waste. Individual municipalities, however, set different charges that were gradually increased over time. As a result, residual waste amounts significantly declined, and recycling rates more than doubled between 1994 and 2004 (OECD, 2006[29]).

Preparation prior to the full-scale implementation of the system started years in advance, with feasibility studies and pilot projects undertaken in 1992-1994, The government announced the introduction of the PAYT system in 1993, and large-scale communication campaigns were carried out during the test period. The government also prepared guidelines to support municipalities in the implementation of the PAYT scheme, providing indications on how to address issues that emerged during the test period, and from consultations with stakeholders (Yu, n.d.[33]).

In Seoul, the PAYT scheme is based on different charges and measuring methods for both residual waste and food waste. Residual waste is measured by the size (volume) of the pre-paid bag, whereas food waste can be either measured by weight (through radio-frequency identification [RFID] based weighing systems) or volume (using bins with chips or stickers for standardised bags). Stickers must also be used for the collection of bulky waste, or it can be handed to a specialised waste collection agency. Recyclables (i.e. paper, glass, scrap metal and plastics) are collected separately, free of charge. Moreover, vulnerable (poor and low-income) groups are entitled to discounted rates or exemptions. The implementation of the scheme in Seoul resulted in a 11% decline in municipal solid waste generation within two years and clear changes in consumption patterns (favouring the use of recyclable material), which in turn were reflected in product design (Yu, n.d.[33]).

A major initial issue linked to the PAYT scheme was illegal waste dumping, which was addressed through a system of fines and incentives to report illegal activity, leading to the gradual and steady decline in the number of incidents. Another issue was the growing amount of collected recyclables, while demand levels remained unchanged. This was resolved with the 2003 regulation on EPR as well as government's support for the development of recycling operating facilities for plastics and the public sector's preferential purchase of recycled plastic products. Lastly, the initial increase in landfilled food waste was tackled by integrating food waste in PAYT-based charges, a landfill ban in 2005, and the scaling up of food waste treatment facilities. Initially, the landfilled food waste stream was not included under PAYT charges and the material used for the standardised bags contaminated its quality, making it unsuitable for compost (Yu, n.d.[33]).

4.4.4. Landfill and incineration taxes

Landfill and incineration taxes are commonly employed in OECD countries to help steer waste away from landfilling and incineration and to encourage investments in recycling infrastructure. This section looks specifically at lessons to be learned from the experience of the UK Landfill Tax that has been in place since 1996. The tax is charged by weight, with a standard rate and lower rate applying to inert or inactive waste, as shown in Table 4.4. A "tax escalator" was introduced in 2015 to regularly update tax rates and maintain the effectiveness of the tax. Tax rates are adjusted yearly for inflation, and the standard rate cannot fall below GBP 80/tonne.

The UK Landfill Tax had positive environmental outcomes overall. Between 1998 and 2014, HM Treasury increased the standard rate of the landfill tax by 700% in real terms, contributing to a 65% fall in total waste sent to landfill over the period (National Audit Office, 2021[34]). The revenue raised from the landfill tax was around EUR 277 million in 1997/1998 and rose steadily to a peak of around EUR 1.02 billion in 2013/2014, in line with increasing tax rates. As the tax became effective in reducing landfilling, revenues dropped to around EUR 667 billion in 2021/2022 (Eunomia, 2022[35]).

Table 4.4. UK Landfill Tax rates

	Rate from 1 April 2022	Rate from 1 April 2021	Rate from 1 April 2020
Standard rate	GBP 98.60 per tonne	GBP 96.70 per tonne	GBP 94.15 per tonne
Lower rate	GBP 3.15 per tonne	GBP 3.10 per tonne	GBP 3.00 per tonne

Source: (HM Revenues & Customs, 2022[36]).

Since 2003, most of the revenue from the landfill tax went to the government's general budget. In addition, a part of the revenue was allocated to support environmentally and socially beneficial projects, such as closing down unauthorised landfill sites and boosting jobs in other areas of waste management. Additionally, about 10% of the total revenue was channelled to the Landfill Communities Fund to finance environmental regeneration and remediation projects, maintain public amenities and promote biodiversity, thus helping the United Kingdom deliver on its Biodiversity Action Plan (Eunomia, 2022[35]).

While the UK Landfill Tax reduced landfilling overall, it generated perverse incentives for illegal waste disposal (Eunomia, 2022[35]). The number of tax exemptions enabled the misclassification of waste at authorised landfill sites for the financial gain of the landfill site operator. Furthermore, the dual tax rates created an incentive for misclassification. HM Revenues and Customs estimated that the misclassification of waste at authorised landfill sites, as well as waste disposed at unauthorised sites, reduced revenues by around GBP 275 million (28% of tax due) in 2018-2019 (National Audit Office, 2021[34]). Additionally, increases in tax rates caused more waste crimes, such as fly-tipping, illegal dumping, exemption breaches and illegal exports.

One critical issue was insufficient enforcement and compliance (Eunomia, 2022[35]). Enforcement fines were considered low compared to the tax. Additionally, the Environment Agency, responsible for enforcing the tax in England, had limited funding and capacity to robustly monitor and enforce the tax. It was suggested that part of the revenue earned from the landfill tax could be ring-fenced for monitoring and enforcing the tax, in addition to investments in waste management.

In addition, the implementation of the landfill tax was not accompanied by an incineration tax (Eunomia, 2022[35]). The lack of an incineration tax incentivised the switch from landfill to incineration instead of the shift from landfill to recycling due to the lower costs generally of incineration compared to recycling. If an incineration tax had been implemented alongside the landfill tax, an even greater increase in recycling would have been expected. Additionally, supporting measures, such as the implementation of a PAYT scheme for household waste collection, could contribute to achieving circularity gains.

4.4.5. Extended Producer Responsibility

Extended Producer Responsibility (EPR) is an environmental policy approach whereby a producer's responsibility for a product is extended to the post-consumer stage of the product's life cycle. In practice, EPR involves producers taking responsibility for collecting end-of-life products, and for sorting them before their final treatment, ideally by recycling (Lifset, Atasu and Tojo, 2013[9]). More recently, producer responsibility organisations (PROs) in some OECD countries have experimented with the use of advanced fee modulation, whereby EPR fees are modulated on the basis of relevant eco-design criteria, such as durability or recyclability, for instance, through higher and lower fees or a system of bonus/malus adjustments. The greater specificity provided by advanced fee modulation could strengthen the incentives for the eco-design of products and packaging (Laubinger et al., 2021[37]).

Selected PROs have modulated EPR fees in line with recycled material content. Generally, producers are best placed to improve the eco-design of products and packaging in line with better recyclability (hence contributing to improving the availability and quality of recycled materials supply) and by using a higher content of secondary materials in production processes. Yet, the use of secondary materials is often not

the preferred choice among producers owing to the added costs related to adjusting production methods, as well as barriers such as contamination, supply risks and demand uncertainty (Wijayasundara, 2021[38]). Modulating EPR fees in line with recycled materials content can provide an additional factor to promote demand for recycled content. For example, in France, a 50% fee reduction is provided for polyethylene (PE) and polypropylene (PP) packaging with at least 50% recycled content (CITEO, 2019[39]; Laubinger et al., 2021[37]).

Table 4.5. Examples of EPR fee modulation for packaging according to recycled content criteria

Country (State/Province)	Examples of recycled content criteria
France	EPR fees for packaging include: • 10% fee reduction for cardboard and graphic paper (in publications) with > 50% recycled content. • 5% fee increase for using primary fibres from forests without eco-management labels. • 50% fee reduction for textiles and shoes with 15% recycled fibres/materials (EY, 2016[40]). • 50% fee reduction for PE and PP containing at least 50% recycled content (CITEO, 2019[39]).
Germany	The 2019 Packaging Ordinance requires PROs to provide incentives for sustainable packaging design and to modulate EPR fees accordingly. PROs are required to design fees that include differentiating fees along criteria of, among others, recyclability (given existing technologies) and recycled content, and content of renewable materials (BMJV Germany, 2019[41]).
Canada (Quebec)	EPR fee modulation is applied to packaging, inspired by the French bonus/malus scheme system. This involves a 20% bonus for producers who entirely manufacture packaging with recycled content and who use at least 50% to 80% of recycled content for printed materials (e.g. magazines and other publications) (EEQ, 2020[42]).
United States (California)	State law establishing EPR for carpets requires a difference in fees for the presence of post-consumer recycled content (California Legislative Information, 2020[43]).
Chile	Collective management systems for packaging must modulate fees with bonus or malus based on recycled content, if the secondary material is derived from waste generated in Chile (Ministerio del Medio Ambiente Chile, 2021[44]).

Source: (Laubinger et al., 2021[37]).

4.4.6. Public procurement

Public procurement is a crucial pillar of strategic governance and services delivery for governments. It accounts for 12% of GDP across OECD countries and 14% of the EU GDP (OECD, June 2022[45]; European Commission, 2022[46]). Given its economic significance, a strategic use of public procurement offers considerable opportunities to promote and accelerate the transition to a more circular economy by creating demand-side pressure in markets for resource efficiency, waste reduction and longer product lifespans. Procurement strategies and practices can influence all value chain stages, including consumption choices, eco-design for circularity, and the end-of-life phase.

In OECD countries, public procurement is increasingly used as a policy lever to promote sustainable production and consumption. Procuring in an environmentally friendly way involves looking beyond short-term needs and considering the longer-term impacts of each purchase. Particular attention is paid to the potential of green public procurement, and increasingly to circular procurement approaches.

- **Green public procurement** (GPP) usually refers to how public procurement can support the implementation of environmental objectives by purchasing products, services and public works that are less environmentally damaging. In the EU, GPP is defined as “a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured” (European Commission, 2008[47]).

- **Sustainable Public Procurement** (SPP) has a broader scope than GPP as it promotes the integration of all three pillars of sustainable development: economic development, social development and environmental protection.
- **Circular Public Procurement** (CPP) is the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, while minimising and, in the best case, avoiding negative environmental impacts and waste creation along the life cycle (European Commission, 2020[48]).

While GPP and SPP can be considered as more product- and technology-oriented, CPP focuses on choices and behaviours that lead to the retainment of the maximum value of products, components and materials. A circular procurement process focuses on changing the functional needs of the users within the organisation and retaining the maximum value of products, components and materials. Circular procurement can be implemented through different approaches, including the inclusion of circularity criteria in GPP, the procurement of innovative circular products, the procurement of services, and new business concepts that support the circular economy (Alhola et al., 2017[49]).

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Note

[1] The use of the terms "tax" and "charge/fee" varies across countries. One distinction, which is reflected in OECD statistics on government revenues, is to reserve the word "charge/fee" for an instrument where the payment leads to a direct individual entitlement to something in return (e.g. water), while a "tax" is a compulsory levy which does not give the individual payer a specific entitlement in return (OECD, 2017[50]). No significance should be attached to any differences in the use of the terms in this report.

5 Review of relevant policies in Italy

Italy's Strategy for the Circular Economy calls for an enhanced use of economic instruments to promote the circular economy. Stronger price signals can help steer production and consumption towards more sustainable choices, boost markets for secondary raw materials, and stimulate green innovation and infrastructural investments.
This chapter assesses the state of existing economic instruments in Italy and compares them to international good practices presented in Chapter 4, to identify potential avenues for the enhanced use of these instruments. Opportunities for reform or the uptake of new instruments are further explored in Chapter 6.

5.1. Introduction

As also evidenced by Italy's Strategy for the Circular Economy, an enhanced use of economic instruments can play an important role in promoting the circular economy. Stronger price signals can help steer production and consumption towards more sustainable choices, boost markets for secondary raw materials, and promote green innovation and infrastructural investments. This chapter assesses the state of existing instruments and compares them to international good practices to identify potential opportunities for the enhanced use of these instruments. This chapter focuses solely on economic instruments already in place in Italy, while opportunities for the uptake of new instruments are explored in Chapter 6.

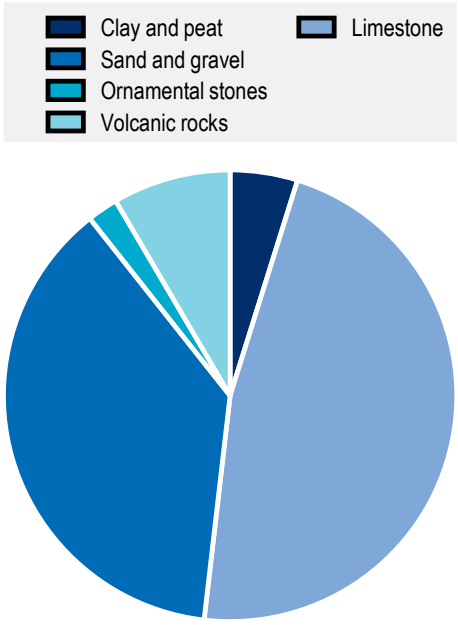
5.2. Fees on extractive activities

Although Italy is not considered rich in raw materials, such as metal ores and fossil fuels, the country ranks fifth in the EU in the extraction of non-metallic minerals (after Germany, Romania, France and Poland) (Eurostat, 2023[1]). Italy's National Institute of Statistics (ISTAT) has identified 3 580 active quarrying sites as of 2018 (of which 2 094 were used for extraction in the same year), and 120 actives mines (of which 75 were used in 2018). About half of the quarries are located in the north of the country.[1]

Quarrying accounts for 92% of total extracted non-metallic mineral resources. In 2021, 184 Mt of materials were extracted from quarrying sites, one-fifth more than in 2017 (ISTAT, 2023[2]). As shown in Figure 5.1, these are mostly limestone (45% by weight), and sand and gravel (36%). These are generally considered as relatively low-unit value materials, which are, nonetheless, important for many economic sectors, including construction.

Figure 5.1. Limestone, sand and gravel account for the majority of quarried minerals (by weight)

Share of mineral resources extracted from quarries (unit of weight), data for 2021



Source: (ISTAT, 2023[2]).

Italy has established fees on extractive activities, which are defined and implemented by regions. In most cases, fees are calculated per cubic metre (m^3) of minerals extracted. Revenues are collected and managed at the sub-national level. Table 5.1 presents the fee rates applied in each region by type of material extracted. Fee rates vary widely across the country, with three regions (Valle d'Aosta, Basilicata and Sardegna) not enforcing any fees. Existing fees on extractive activities are likely to generate limited revenues for the public budget of local entities. Annual revenues are estimated at EUR 50.5 million.

Due to their design and intended purpose, these fees are too low to generate meaningful price signals against the extraction of virgin materials. Where present, the fees on extractive activities only intend to cover the direct and indirect costs of the land use impacts caused by quarrying activities and to protect the landscape. Taking the example of sand and gravel, fee rates imposed in selected Italian regions are comparable to royalties in place in other OECD countries. However, the average rate remains well below tax rates imposed in front-runner countries, such as Sweden and the United Kingdom.

Table 5.1. Royalty payments applied and revenues generated in Italian regions

Estimates of fee rates (EUR/m^3) and total revenues (thousand EUR)

Region / Autonomous Province	Sand and gravel	Ornamental stones	Peat	Limestone	Clay	Revenues
Piemonte	0.51	0.85	0.57	0.57	0.57	3 457
Valle d'Aosta	0	0	0	0	0	0
Liguria	1.30	0.16	0	0.24	0.30	206
Lombardia	0.70	5.30	1.65	0.49	0.55	15 034
A.P. Trento	0.67[2]	1.79	0.52	0.52	0.45	1 977
A.P. Bolzano-Bozen	0.50	0.50	0.50	0.50	0.50	496
Veneto	0.62	0.75	0.31	0.36	0.52	3 158
Friuli-Venezia Giulia	0.55	0.65	0	0.67	0.20	1 039
Emilia-Romagna	0.70	0.32	1.26	0.60	0.60	3 305
Toscana	0.50	1.79	0.30	0.50	0.23	2 346
Umbria	0.25	0.45	0	0.35	0.35	1 038
Marche	0.71	0.80	0	1.00	0.42	1 211
Lazio	0.30	2.00	0.30	0.50	0.30	2 758
Abruzzo	1.33	10.30	0	0.80	0.66	3 244
Molise	1.00	2.00	0.50	0.30	0.50	1 718
Campania	1.25	1.67	0	1.01	0.95	2 177
Puglia	0.08[1]	0.11	0.08	0.11	0.07	686
Basilicata	0	0	0	0	0	0
Calabria	0.35	1.05	0.30	0.40	0.45	1 137
Sicilia	0.67[2]	1.79	0.52	0.52	0.45	5 488
Sardegna	0	0	0	0	0	0
Total						**50 475**
Average fee	**0.57**	**1.54**	**0.32**	**0.45**	**0.38**	
Average fee, excluding regions not enforcing any fees	**0.67**	**1.79**	**0.38**	**0.52**	**0.45**	

1. In the A.P. of Trento, the fee on extractive activities is set on a case-by-case basis.
2. In Puglia and Sicilia, fees are also calculated, in part, according to the surface size of the extraction sites.
Source: (MiTE, 2021[3]).

5.3. Regulation on plastics and plastic tax (not yet in force)

Italy transposed the Single-Use Plastics (SUP) Directive through its Leg. Decree 2021/196, which entered into force on 14 January 2022.[2] In consideration of existing domestic chains of organic waste collection and the growing production of compostable plastics, Italy has exempted single-use plastic products from the ban if they are biodegradable and compostable (according to standards UNI EN 13432 or UNI EN 14995) and contain renewable raw materials of at least 60% (as of January 2024). To be eligible for the exemption, products must also fulfil one of the conditions listed in Article 5 of the decree, broadly relating to the intended use of the products (e.g. irreplaceability with reusable alternatives), the high likelihood of using SUPs in controlled environments (e.g. canteens, hospitals), or the presence of specific food safety requirements.

As mentioned in Chapter 3, the EU plastics own resource entered into force in January 2021. Each member state shall contribute EUR 0.80 per kilogram of non-recycled plastic packaging waste generated. Italy generated 2.3 Mt of plastic packaging waste in 2018, of which only 43.4% was recycled (Eurostat, 2022[4]; Eurostat, 2022[5]). Taking into account annual lump sum reductions granted to selected EU countries,[3] Italy's annual contributions would amount to approximately EUR 850 million.[4] This amount is being deducted from the public budget.

In 2019, Italy announced a plastic tax to be implemented through a decree of the Italian Customs Agency (Law 160/2019).[5] The entry into force of the tax has faced a series of delays and is now planned for 1 July 2024. The instrument is envisaged as a virgin material tax (of EUR 0.45 /kg, only applying to virgin polymers) to incentivise the shift to recycled materials. The tax will only target single-use products and packaging considered particularly harmful to the environment, including non-reusable plastic packaging (such as food packaging and plastic films) and certain SUP products (such as plastic beverage bottles). In line with Italian legislation on SUPs, specific derogations are foreseen for biodegradable and compostable plastics.[6] Recycled content is to be certified through existing certification schemes accredited by the Ministry of Environment and Energy Security (MASE), which are already used to verify compliance with green public procurement (GPP) criteria.

A timely implementation of the plastic tax could help to discourage the use of virgin plastics, while further promoting circularity in the plastics packaging sector. As an increasing number of countries adopt plastic taxes, additional data availability and lessons learned should help to identify their economic and environmental impacts, as well as the need for any future adjustments in the design and implementation of the instrument.

5.4. Support for R&D and innovation

As a response to the COVID-19 pandemic, Italy introduced several measures to create and strengthen incentives to promote investments in research and development (R&D) and green innovation, and to steer production and consumption towards green growth and digitalisation. The National Recovery and Resilience Plan (NRRP) allocated EUR 2.1 billion for investments in waste management infrastructure (EUR 1.5 billion) as well as investments in pilot projects related to the circular economy (EUR 0.6 billion).[7]

The new industrial plan "Transition 4.0" introduced a series of fiscal measures to support green and digital innovation, which are also relevant to support the transition to a circular economy.[8] These include:

- Tax credits for investments in capital goods: to encourage companies to invest in new capital goods that are functional to the technological and digital transformation of production processes for Italian production sites.

- Tax credits for research, development and innovation: to stimulate spending on research, development and technological innovation in order to make businesses competitive and to encourage the digital transition towards a circular economy and environmental sustainability.
- Tax credits "Training 4.0": to incentivise companies to train their staff in technologies and skills relevant to the technological and digital transformation of businesses.

Projects related to environmental innovation and the circular economy can also benefit from numerous funding opportunities at the EU, national and sub-national level. Italy makes use of EU funding in the form of grants and/or loans to support R&D projects (e.g. Horizon Europe), some of which are relevant to the transition to a circular economy. At the national level, in 2020, the Ministry of Enterprises and Made in Italy (MIMIT) launched a new financing fund of EUR 220 million to promote R&D initiatives related to the circular economy.[9] To be eligible for funding, projects must propose the conversion of economic activities towards a circular economy, such as innovation for the efficient use of resources and waste recovery, industrial symbiosis initiatives, technologies extending the lifespan of products, and innovation in the packaging sector (MiSE, n.d.[6]). Several funding opportunities also exist at the sub-national level. For instance, in 2021 and 2022, the region of Lombardia called for proposals related to innovation in circular economy value-chains, with the main objective to support material recovery and eco-design (Regione Lombardia, 2021[7]; Unioncamere Lombardia, 2022[8]).[10]

5.5. Corporate income tax incentives to promote circularity

Italy has announced or introduced a series of corporate income tax (CIT) incentives for enterprises, mainly in the form of tax credits, to discourage the use of virgin materials in production processes and to incentivise the shift to recycled or compostable materials (corporate tax credits are discussed in more detail in Chapter 10). Recent measures include:

1. Tax credits on recovered materials, which corresponded to 36% of expenses incurred by enterprises in 2019 and 2020 (up to a maximum annual amount of EUR 20 000) for the purchase of:
    - Finished products from the waste sorting of plastics.
    - Biodegradable and compostable primary and secondary packaging.
    - Packaging derived from the waste sorting of paper, plastics or aluminium (2019 Budget Law and MiTE Decree of 14 December 202111).
2. Tax credits on recycled intermediary and final products, which corresponded to 25% of expenses incurred in 2020 (up to a maximum annual amount of EUR 10 000) for the purchase of:
    - Semi-finished and finished products composed (of at least 75%) of materials from the recycling of waste or scrap materials.
    - Quality compost derived from the treatment of organic waste (Leg. Decree 34/2019 and MiTE Decree 6 October 2021)12.

Available information on the first measure indicates significant uptake, with demand for the tax credit largely outweighing the allocated resources. As a consequence, the measure was re-financed for the years 2023 and 2024 (and also extended to glass packaging from waste collection), and the allocated budget therefore increased. In contrast, the second measure was discontinued after 2020; available information indicates low uptake.

Additionally, in 2021, MASE announced the introduction of a tax credit for the purchase of alternatives to SUPs, either reusable alternatives or options made from biodegradable or compostable materials (Leg. Decree 196/2021).[13] Tax credits would correspond to 20% of expenses incurred in 2022, 2023 and 2024, up to a maximum annual amount of EUR 10 000 per beneficiary. At the time of writing, the measure is in the implementation phase. Moreover, planned tax credits were conceived in conjunction with the plastic

tax that would support technological upgrades in the plastic packaging manufacturing sector for production processes to shift to compostable plastics (2020 Budget Law).[14] However, as the entry into force of the plastics tax faced delays, the tax credits have not been implemented.

Beyond corporate tax credits to promote the purchase of secondary and compostable materials, other measures envisaged included financial support to incentivise the reuse or recycling of packaging by companies, applied when companies return packaging to suppliers and when suppliers reuse packaging or separately collect it for recycling (Law Decree 34/2019).[15] The measure was planned for 2020 but it was discontinued the following year (MASE, 2022[9]). Additionally, in 2022, MASE announced a non-repayable contribution of a maximum amount of EUR 5 000 to reimburse enterprises for their expenses made in the years 2020 and 2021 related to the purchase of equipment required for the sale of loose products. This measure sought to encourage commercial enterprises to reduce the use of packaging and to sell products in bulk (MiTE Decree 22 September 2021).[16] Available information indicates a lower level of uptake than the allocated resources, likely due to the limited incentive and the fact that the mechanism referred to investments made in the past and was thus inadequate in generating additional investments.

5.6. Fiscal measures to reduce waste generation

Since 2016, Italy has had in place an “anti-waste” law to facilitate and incentivise donations to charities and food banks (Law No. 166/2016).[17] Donated goods are not subject to VAT, and their upstream expenses can be deducted from corporate or income taxes, e.g. distributors can deduct the costs of purchase while producers can deduct the costs of raw materials and labour. Donors may also be granted reductions in the waste disposal tax owed to municipalities for an amount that should be proportional to the amount of donated goods. While the measure initially only covered donations of food and medicines, in response to the COVID-19 pandemic, the fiscal incentives were also extended to other categories of unsold goods (Law Decree 18/2020).[18] In line with this law, Milan was one of the first cities (already in 2018) to introduce a cut in the waste tax for commercial and public entities that donate surplus food, and around 10 000 businesses have already benefited from the waste tax reduction (OECD, 2020[10]).

Since 2018, companies and individuals that donate goods to not-for-profit organisations may benefit from tax relief, mainly in the form of tax deductions corresponding up to 10% of the declared income (Leg. Decree 117/2017).[19] As the collection, preparation for reuse, and sale of used goods (e.g. clothing, furniture, toys) is often carried out by registered not-for-profit social enterprises, this tax relief contributes to waste prevention. Although the measure does not necessarily differentiate between new and used goods, it may help to reduce pre-consumption waste by incentivising donation over the environmentally harmful disposal of unsold merchandise.[20]

5.7. Consumer product taxes and charges

Italy has introduced a number of product taxes relevant to the circular economy, such as excise duties on mineral oils and energy products (e.g. natural gas, coal, diesel, fuel oil) (OECD, 2022[11]). Currently, there is no specific product tax on disposable or hard-to-recycle products, other than environmental contribution fees applied through EPR schemes (i.e. on batteries and electrical and electronic equipment). Consumers are charged for the use of light plastic bags; however, this is more about restricting a free supply than imposing product taxes (Law Decree 91/2017).[21]

Italy could potentially consider the use of additional product taxes to act as advance disposal fees for products with high end-of-life costs or products that are hard-to-recycle if these are not already covered by other incentive schemes (for example, EPR or a deposit refund system). Most other EU Member States have made only limited use of product taxes, most of which are applied to SUPs, tyres, batteries or

household electronics. Currently, most of these products are either regulated through EPR or are/will be banned from the market, thus, there is no need to impose additional product taxes on these products, as long as the existing systems work effectively at financing their end-of-life treatment.

However, product taxes could be considered for selected hard-to-recycle products that are currently not regulated, but which are expected to be in the future. Examples include clothing made of certain composite fibres or furniture manufactured with materials that cannot easily be separated for recycling. The product tax could be implemented as an advance disposal fee to cover end-of-life costs or, alternatively, as a refundable tax that promotes the collection of end-of-life products. In these cases, Italy would need to assess what combination of policy instruments (e.g. EPR or product tax) would be most appropriate to internalise the end-of-life treatment costs of such products.

5.8. Household waste charges, including pay-as-you-throw

As outlined in Chapter 3, waste policies are implemented at the sub-national level in line with national framework legislation and the National Waste Management Plan. Waste management is financed by a local waste charge ("TARI") payable by all households and companies generating waste. The waste charge shall implement the polluter pays principle and fully cover the costs of waste collection and management incurred by municipalities.

Municipalities set the rates of the local waste charge on the basis of national guidelines. The Regulatory Authority for Energy, Networks and the Environment (ARERA) regulates waste charges (2018 Budget Law). The first tariff calculation method for integrated waste management services, defined for the period 2020/21, aimed to incentivise improvements in waste collection, treatment and disposal. It also set out to harmonise rules across the country for operators, municipalities and regional authorities, to improve coherence between tariffs and the quality of the service, and to guarantee transparency to users (ARERA, 2019[12]).

Local waste charges are generally composed of a fixed component (based on the building surface area and, in the case of residential uses, the number of inhabitants) and a variable component to cover waste collection, sorting and disposal costs, as well as the costs of road sweeping and cleaning. Reductions in the waste charge may be granted to enterprises and public entities that adopt virtuous behaviour aligned with lower waste management costs, for instance, in the case of donations of surplus food or in the case of measures to compost organic waste.

In line with the Waste Framework Directive (WFD)[22], municipalities may set up pay-as-you-throw (PAYT) systems and apply a PAYT tariff instead of the standard charge. Introduced in Italian legislation in 2014[23], PAYT is a system that links waste management fees to the amount of waste produced by each household. In the Italian PAYT system, variable fees are linked to the weight or volume of the non-recyclable waste fraction, and sometimes also include the waste fractions destined for recycling. Similarly to the standard charge, a PAYT tax or tariff shall fully cover the waste management costs. However, while the standard fee represents a fixed charge for households, which is not dependent on their behaviour, the PAYT fee creates an economic incentive for households to minimise their waste management costs by better separating waste.

Several regions have introduced regional legislation to accelerate the transition to PAYT systems. For instance, since 2015, Emilia-Romagna introduced a series of economic incentives and supporting measures to promote the transition to PAYT systems in all municipalities. As of January 2020, 27% of municipalities (corresponding to 34% of the population) had PAYT systems in place (Ambiente Regione Emilia Romagna, 2020[13]). Other regions also have relevant initiatives: i) Friuli-Venezia Giulia promotes sustainable consumption and lifestyles aimed at reducing waste production and encouraging the application of PAYT by municipalities; ii) Piemonte acknowledges the importance of the PAYT system for

reducing waste production, reuse and minimising the amount of diverted urban waste; iii) Campania provides economic incentives (in the form of tariff bonuses) to municipalities with the best results in terms of waste reduction, separate waste collection and recycling.

The dissemination of PAYT systems remains low at the national level, but it has been rapidly expanding in recent years. The 2021 ISPRA survey (2021[14]) identified 872 municipalities with a PAYT system in place as of 2019 (11% of total), corresponding to 6.5 million inhabitants (10.8% of the total population). There are important territorial differences in the distribution of PAYT systems, with the vast majority (96.7%) of municipalities with a PAYT system in place located in the North of Italy, especially in Trentino Alto Adige / Südtirol (86% of population covered), Veneto (39%), Emilia-Romagna (34%), Friuli-Venezia Giulia (21%) and Lombardia (11%). Conversely, PAYT schemes only cover 3.8% of the population of regions in the Centre, and 0.2% of the population in the South.

Generally, there is a correlation between the waste charge model applied at the local level and the levels of waste generation and quality of sorting. Municipalities located in the north of the country, where most municipalities with a PAYT system are located, perform better in terms of recycling rates for municipal waste and in landfilling rates. This is evidenced by the results of the "Comuni Ricicloni" initiative, a programme sponsored by MASE, which rewards municipalities that have achieved the best results in waste management, mainly in terms of separate collections sent for recycling. The 2022 edition recorded 590 Italian municipalities where waste production was below 75 kg/capita (Comuni Ricicloni, 2022[15]).

Extending the coverage of PAYT models for waste collection could enable a better implementation of the polluter pays principle and generate significant incentives to improve sorting at source for higher recycling rates of municipal waste. Shifting to a PAYT system may also contribute to reducing local waste management costs. An assessment of ISPRA municipal waste data conducted by MASE (2019[16]) observed that per capita waste management costs in municipalities with a PAYT system in place were lower than the regional average.

Chapter 6 further discusses options to accelerate the introduction of PAYT across the national territory.

5.9. Landfill taxes

Italy's landfill tax, first introduced in national legislation in 1996 (Law 549/95), has the primary aim of discouraging disposal in landfills and incentivising material and energy recovery. The tax is charged on any entity that sends solid waste or sludge to a landfill or to an incineration plant without energy recovery. The tax rates vary by waste type, i.e. hazardous or non-hazardous, municipal or non-municipal waste. National regulation defines the upper and lower level of the tax for each waste category, but the precise landfill tax rates and destination of the revenues are determined at the regional level (ETC/SCP, 2012[17]).

Current legislation states that operators pay the proceeds directly to the regions, with a share going to the municipalities where the landfills are located (or to nearby municipalities that may be negatively affected by their presence). Revenues to municipalities shall be earmarked for environmental protection, health and sanitary interventions, and measures for waste treatment and prevention. Revenues to regions shall be used to support waste reduction goals, material and energy recovery objectives, land reclamation projects or for protected areas.

Landfill tax rates are summarised in Table 5.2 for all regions. Additionally, some regions have bonus/malus systems in place granting up to 70% fee reductions, depending on the recycling rates achieved by municipalities (e.g. Abruzzo, Liguria, Lombardia, Marche, Puglia, Sardegna, Toscana, Valle d'Aosta and Veneto), and the quantities of pro-capita non-recyclable waste generated (Lombardia, Autonomous Province Bolzano-Bozen) (REF Ricerche, 2020[18]; Legambiente, 2019[19]).

Despite wide regional differences in the tax rates applied, most regional landfill taxes are significantly below the European average and are likely too low to discourage landfilling. Although there has been a decrease in landfilled waste since the introduction of the landfill tax in 1996, this was not accompanied by a progressive and robust increase in landfill tax rates in most regions. For municipal waste, tax rates range from EUR 5.17/tonne in Molise and EUR 5.2/tonne in Campania to the maximum allowed rate of EUR 25.82/tonne. For comparison, examples of landfill tax rates in other EU countries are EUR 87/tonne in Austria, between EUR 2.34 and EUR 175 per tonne in Flanders, between EUR 39.93 and EUR 51.66/tonne in Poland (for municipal waste), and EUR 17/tonne in the Netherlands (where landfilling has a minimal role) (OECD, 2022[11]).

Due to its design and implementation, the policy instrument has ensured that landfill disposal is an economically viable option in most regions. Although average landfill costs (i.e. the gate fees,[24] which usually include the landfill tax on top of the costs of landfilling) have increased in recent years, and are generally aligned with the European average (EUR 110 per tonne in 2019, up from EUR 90 in 2013), they remain substantially below the average in selected regions (Legambiente, 2019[19]). Furthermore, landfill taxes often do not generate sufficient revenues for local entities to support much-needed investments in waste management infrastructure, reinforcing the vicious cycle that maintains landfilling as an economically viable option for waste disposal (REF Ricerche, 2020[18]).

Table 5.2. Landfill tax rates in Italian regions

Region / A.P.	Municipal waste (EUR/t)	Inert waste (EUR/t)	Non-hazardous non-municipal waste (EUR/t)	Hazardous waste (EUR/t)
Molise	5.17	10	5.17	25.82
Campania	5.2	2.7	10	20
Calabria	5.33	10.33	20.66	25.82
Lazio	10.33	2.07	10.33	-
Abruzzo	11	3	10	20
A.P. Bolzano	11.4	1.55	6.2	6.2
Sicilia	12.36	1.24	6.24	6.24
A.P. Trento	12.86	1.17	5.85	5.85
Piemonte	12.91	9	12.91	19
Emilia-Romagna	15	9	11	25.82
Liguria	15	5	10	15
Lombardia	17	4	17	17
Puglia	17.24	6.5	10	20
Sardegna	18	1	7.7	10.3
Valle d'Aosta	18	1.03	5.16	10.33
Basilicata	20	10	10	10
Toscana	21	7.33	15	15
Marche	25	9	12	24
Friuli-Venezia Giulia	25.82	1.03	5.17	25.82
Umbria	25.82	10.33	5.16	5.16
Veneto	25.82	1.03	10.33	20.66
Average	**15.73**	**5.06**	**9.80**	**16.40**

Note: A.P. stands for Autonomous Province.
Source: Based on REF Ricerche (2020[18]).

5.10. Extended Producer Responsibility

The principle of Extended Producer Responsibility (EPR) was introduced in Italian legislation in 2006.[25] EPR schemes exist for end-of-life vehicles, waste from electrical and electronic equipment (WEEE), batteries, accumulators and packaging (mandatory in the EU as mandated by directives for WEEE, batteries, end-of-life vehicles, packaging and packaging waste) and lubricant oils. Additionally, an EPR scheme for the fashion industry is currently in the implementation phase. Italian EPR schemes have successfully helped to increase waste collection and recycling rates, helping the country to stay on good track to meet its recycling targets for 2025 and 2035.

Italian EPR schemes are generally organised collectively through producer responsibility organisations (PROs) that manage the collection and treatment of end-of-life products in exchange for fee contributions paid by individual producers. For instance, all companies producing and using packaging must adhere to the national PRO for packaging, the Consorzio Nazionale Imballaggi (CONAI). CONAI co-ordinates activities of the material-specific consortia (e.g. COREPLA for plastics, Biorepack for compostable plastic packaging, COMIECO for paper and cardboard, RILEGNO for wood) and is financed by EPR fees applied to packaging.

EPR schemes in Italy have contributed to alleviating the financial burden of waste management on municipalities. For instance, EPR fees paid to CONAI in 2019 covered 92% of the costs (net of revenues from the sale of recovered materials) of collecting, sorting and recycling waste or energy recovery of packaging waste. If costs related to the management of the PRO are included, EPR fees covered 84% of net costs.[26]

The Italian EPR scheme for packaging includes advanced fee modulation for selected material types (see Table 5.3). Fees for plastic packaging vary depending on the origin (industry or households), its recyclability and ease of sorting, and the availability of technologies and recycling chains. An EPR fee for biodegradable and compostable plastic packaging was introduced in July 2021. Likewise, since 2019, a differentiated fee applies to paper packaging: an additional EUR 20/t is charged on paper-dominated poly-packaging suitable for liquid containment to promote the creation of a recycling chain for this material. Reduced rates (up to 85%) exist for reusable packaging, but this is limited to selected controlled circuits (Laubinger et al., 2021[20]).

Table 5.3. Overview of modulated EPR fees for packaging, as of 1 April 2024

Material	Category	Rate
Paper	1: Single-material packaging and paper-dominated multi-packaging	EUR 65 /t
	2: Paper-dominated poly-packaging suitable for liquid containment	EUR 45 /t
	Multi-packaging (share of paper between 60% and 80%)	EUR 175 /t
	Multi-packaging (share of paper below 60% or not declared)	EUR 305 /t
Plastics	Level A1: Packaging mainly from the Commerce & Industry (C&I) circuit, with an effective and consolidated sorting and recycling chain	A1.1: EUR 24 /t A1.2: EUR 90 /t
	Level A2: Packaging mainly from the Commerce & Industry (C&I) circuit, with an effective and consolidated sorting and recycling chain, but with a significant presence in municipal waste	A2: EUR 220 /t
	Level B1: Packaging from the "Household" circuit, with an effective and consolidated sorting and recycling chain	B1.1: EUR 224 /t B1.2: EUR 233 /t
	Level B2: Other sortable and recyclable packaging from the Household and C&I circuits	EUR 441-650 /t
	Level C: Packaging not sortable/recyclable with current technologies	EUR 655 /t
Compostable plastics	Biodegradable and compostable plastic packaging	EUR 130 /t

Notes: EPR fees are regularly updated and were most recently increased on 1 April 2024. The categorisation of waste is also regularly updated, in line with advancements in sorting and recycling technologies.
Source: (CONAI, 2024[21]).

Further use of EPR fee modulation for packaging could incentivise better eco-design, including recycling efforts. Designing for easier recyclability is a key aspect to consider in the eco-design of packaging to improve both the quantities and quality of materials being recycled. Italy could explore options to expand the use of advanced fee modulation for packaging types where basic fee modulation still applies (i.e. for packaging other than plastics and paper), including hard-to-recycle packaging.

The modulation of EPR fees based on recycled material content could be explored to further promote demand for recycled content. Italy already implements minimum recycled content requirements for packaging through GPP criteria and will introduce mandatory standards for plastic bottle recycled content by 2025. With the introduction of modulated EPR fees in line with recycled material content, products that verifiably meet thresholds for recycled content could receive a bonus, resulting in a lowered fee. In other OECD countries, PROs have started to use incentives for recycled content. For example, in France, a 50% fee reduction is provided for PE and PP packaging with at least 50% recycled content (CITEO, 2019[22]; Laubinger et al., 2021[20]). In Italy, targeting the recycled content of packaging through bonus/malus systems could help to mainstream the use of recycled content across the packaging sector. Gradual increases in recycled content requirements may well continue to provide meaningful incentives for integrating more recycled content into products.

As in many other EU countries, Italian EPR schemes have not provided sufficient incentives to move towards waste prevention and to improve eco-design for lower environmental impacts along the product's life cycle. Where EPR schemes are organised collectively, with EPR fees set on a per unit or per weight basis (*basic* fee modulation), producers generally see only a limited link between the design of their products and the fee contributions paid to PROs. As a result, financial incentives for producers to invest in circular design remain limited in most cases (Brown, Laubinger and Börkey, 2023[23]).

To overcome the shortcomings of EPR schemes in providing incentives for eco-design and waste prevention, the revised EU WFD mandates that EPR fees should, where possible, be modulated on the basis of relevant criteria (*advanced* fee modulation), including for durability, reparability, reusability, recyclability, and the presence of hazardous substances (European Union, 2018[24]). Advanced fee modulation increases the specificity of producer fees through a more granular allocation of end-of-life costs (i.e. through higher and lower fees) or a system of bonus/malus adjustments. In order to ensure a certain degree of cross-country harmonisation in fee modulation, the European Commission has been developing technical guidance to support implementation in Member States. Box 5.1 provides further information on the new EU requirements for EPR schemes and their transposition into Italian legislation.

Box 5.1. New EU-wide requirements for EPR schemes

The 2018 Circular Economy Package introduced a series of changes to further improve the design and implementation of national EPR schemes, in particular, to overcome the shortcomings of EPR in terms of incentivising eco-design, and also to help harmonise existing systems across member countries. In line with the revised WFD, all EU Member States shall take the necessary steps to ensure that environmental contributions paid by producers are modulated, where possible, for individual products, or groups of similar products, notably, by taking into account their durability, reparability, re-usability and recyclability, and the presence of hazardous substances.

In Italy, the transposition of the EU WFD introduced important legislative changes for EPR schemes. It extended the definition of "producer" to additional categories of stakeholders along the value chain, it facilitated procedures for the establishment of new EPR schemes, it established a National Registry of Producers to improve transparency, and it mandated that the financial contribution of producers should cover all costs (at least 80%) of waste collection, transport and treatment, as well as information and

prevention measures (Leg. Decree 2020/116)[1]. New EU minimum requirements for EPR will have to be integrated into national EPR schemes by the end of 2024.

1. Legislative Decree 116/2020 on waste and packaging (amending Leg. Decree 152/2006) implements i) Directive (EU) 2018/851 amending Directive 2008/98/EC relating to waste, and ii) Directive (EU) 2018/852 amending directive 1994/62/EC on packaging and packaging waste.

While EPR schemes have primarily focused on minimising end-of-life management costs and improving recycling, there is growing consensus that the concept of EPR holds untapped potential to implement the waste hierarchy, specifically to promote waste prevention and reuse. New requirements for EPR schemes set at the EU level should contribute to promoting the design and manufacturing of higher-quality and longer-lasting products, including electronics, batteries and other product groups covered by EPR schemes.

The effective expansion of EPR to cover additional aspects related to the life cycle of products would necessitate substantial shifts in the design and setting of EPR fees in terms of how EPR schemes work, the cost coverage and revenue use. Currently, the financial objective for EPR schemes is to cover in full the end-of-life "efficient" management costs of products and packaging, and to incentivise producers to minimise these costs by facilitating waste sorting and recycling. Although the WFD already envisioned that EPR shall also cover costs related to waste prevention, in practice, the logic of minimisation of end-of-life costs leaves little room for financing measures aimed at fostering eco-design beyond better recyclability or the increased use of recycled materials (Sachdeva, Araujo and Hirschnitz-Garbers, 2021[25]).

Some EU countries have begun exploring options to assign financial responsibility to producers for costs beyond end-of-life management and for additional externalities associated with the life cycle of products or packaging, such as covering the costs of litter clean-up in the case of packaging, or repair in the case of electrical and electronic equipment or textiles (Brown, Laubinger and Börkey, 2023[23]). For instance, France is introducing repair and reuse funds financed by PROs to cover part of the costs of product repairs, which are typically paid in full by consumers (see Box 5.2).

Reforms to complementary policy instruments that support the implementation of EPR may also be needed to ensure a comprehensive policy mix and consistent incentives for waste prevention and reuse. In particular, "binding reuse targets" could help create the right regulatory framework that prioritises waste prevention. Within EPR schemes, PROs could implement this shift in multiple ways, such as by setting reuse targets for producers, establishing reuse systems, or modulating EPR fees based on reusability. At the same time, a good co-ordination and alignment of EPR with an advanced fee modulated with interrelated economic instruments, such as GPP, is needed to ensure that the policy mix effectively delivers on its intended waste prevention and recycling objectives.

Box 5.2. Recent reforms to French EPR schemes to incentivise eco-design and promote repair

With its 2020 anti-waste law for a circular economy, France announced reforms to EPR schemes aimed at enhancing the use of this instrument to promote eco-design and to extend the lifespan of products, in particular, by supporting repair and reuse. The reforms include more ambitious targets, especially to reinforce reuse, repair and reuse targets, and to modify the penalty system for eco-organisations. The reform also modified bonus and malus criteria to encourage design-for-environment. All product groups covered by an EPR scheme will include bonuses and penalties to help achieve the respective recycling, durability or reparability targets. For instance, there is a 75% bonus given for clothing, home textiles, and footwear that meet durability design requirements, lowering the EPR fee liability for these products (ECO-TLC, 2019[26]).

Additionally, the reform mandates the creation of repair and reuse funds for product groups covered by EPR schemes, including EEE, toys, sport and leisure equipment, DIY and garden equipment, furniture and textiles. Repair and reuse funds will be financed by producers through contributions equal to at least 5% of their EPR contributions. The repair funds, monitored by companies and PROs, will need to

guarantee lower costs of repair to consumers who go to repair shops accredited by the EPR organisation. Beyond reducing the price, such a system also aims to structure the repair offer, thus rendering repair more visible to consumers and ensuring minimum standards of quality in repair services. The reuse funds aim to support social economy actors who give a second life to products, thus promoting employment, social integration, as well as the development of circular solutions.

Source: (ADEME, 2022[27]).

Responsibility for monitoring compliance with EPR obligations sits with MASE. All producers with EPR obligations are required to register with the relevant National Registry of Producers and, either individually or collectively, submit relevant information including data on volumes placed on the market, on collection and treatment activities carried out, and on the EPR costs covered (or EPR fees paid). Monitoring and vigilance costs are covered by producers (Leg. Decree 152/2006).

There are opportunities to enhance the implementation and governance of EPR schemes, including to reduce free riding. Free riders are producers who benefit from EPR systems without contributing their share of the costs (Lifset, Atasu and Tojo, 2013[28]). Non-compliance with EPR obligations is particularly an issue in online retailing, especially for the EEE product category (Hilton et al., 2019[29]). According to estimates by Eucolight (European Association of PROs for WEEE lighting), 81% of lamps, 69% of washing machines, 92% of fitness trackers and 86% of tablets sold in Italy do not comply with EPR obligations (OPTIME, 2021[30]). In the absence of stronger policy intervention, this issue is expected to worsen as the share of e-commerce in total retail sales continues to rise.[27]

As EU countries consider expanding the use of advanced fee modulation, mitigating free ridership becomes increasingly relevant to ensure that revenues are guaranteed despite the additional complexity of compliance (Laubinger et al., 2021[20]). Options to consider include awareness-raising measures to support more widespread compliance, strengthened monitoring and enforcement of EPR regulations, as well as easily understandable and verifiable modulation criteria (Hilton et al., 2019[29]; Laubinger et al., 2021[20]). Selected good practices from other countries in mitigating free riding on EPR obligations are outlined in Box 5.3.

Box 5.3. Selected good practices to reduce free riding in EPR schemes

France: compliance assurance through multi-seller platforms

France's Anti-Waste Law for a Circular Economy includes specific provisions for online selling platforms to tackle free riding on EPR obligations, specifically for the EEE sector. France now requires all retailers selling products on online multi-seller platforms to register with the French Environment and Energy Management Agency (ADEME) to obtain a unique identification number (UID). This identification number serves as proof of compliance with producers' obligations and must be communicated to the online platforms. While the duty to comply with EPR obligations remains with producers, the law now places the onus directly on multi-seller platforms that must now prove that retailers are participating in EPR schemes or risk having to pay the EPR contribution themselves.

German EPR scheme for packaging: central register for all packaging PROs

The Packaging Act (VerpackG) of 2019 introduced a number of new requirements for the packaging EPR scheme and instituted the Central Agency Packaging Register (ZSVR) to increase transparency and ensure compliance with EPR requirements. All producers placing packaging on the German market are now required to register on this web-based, public register. If a producer is not registered, it may be banned from distributing its products, or be subject to fines of up to EUR 200 000 (Prevent Waste, 2020[31]).

Source: (Sachdeva, Araujo and Hirschnitz-Garbers, 2021[25]).

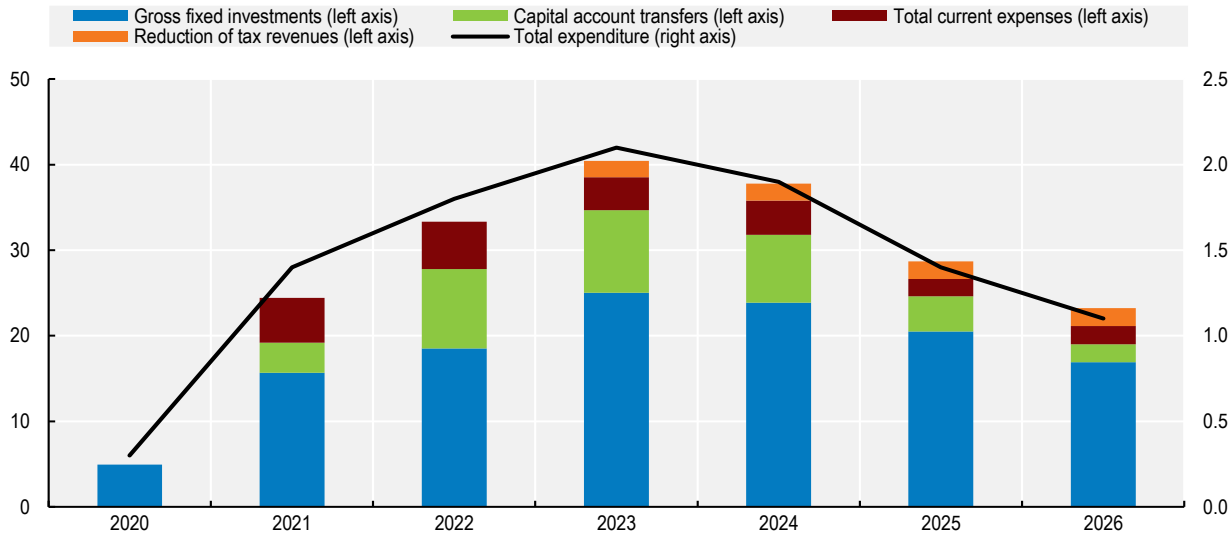
5.11. Green public procurement

Green public procurement (GPP) has a long-established role in the EU policy and legal framework: it was first introduced with the 2004 EU Directives on Public Procurement[28] and later strengthened with the 2014 EU Directives on Public Procurement.[29] It is a voluntary instrument in the EU. Currently, the European Commission develops EU GPP criteria for selected products and services to support the inclusion of green requirements in public tender documents and to set a non-binding level of ambition for greening purchasing activities. However, the new EU Circular Economy Action Plan introduced the ambition to establish common mandatory GPP criteria.

Public procurement approaches have a large potential to contribute to the transition to a sustainable and circular economy in Italy, where public procurement represents 11.8% of the GDP and 21.2% of total government expenditures (OECD, 2021[32]). Furthermore, most of the funds from the NRRP are channelled through public procurement, as shown in Figure 5.2.

Figure 5.2. Investment dominates spending plans

Funds spending (% of GDP)



Note: Only includes the Recovery and Resilience funds, grants and loans.
Source: (Ministry of Economy and Finance, 2021[33]) and OECD calculations.

Italy recognises the key role that public procurement approaches can play to support the country's transition towards a circular economy. The National Action Plan on GPP, first approved in 2008 and last updated in 2023, establishes a national framework to support the dissemination and implementation of GPP. Since 2016, all public entities, at all levels of government, must apply minimum environmental criteria ("Criteri Ambientali Minimi", CAM) during the procurement of selected goods and services of any market value.[30] Moreover, in product groups where the most economically advantageous tender criteria are applied, contracting authorities employ "award environmental criteria" that improve the evaluation score for a specific product or service.

MASE defines and updates CAM, which are informed by existing EU GPP criteria and other reference documents, market analyses for the relevant sector, as well as information collected from stakeholders. CAM are to be defined for some or all the stages of the procurement procedure, including the subject matter of the contract, the technical specifications, the award criteria, and the contractual clauses. Moreover, each criterion shall also include information on the appropriate means, documents and mechanisms to verify compliance (MiTE, 2021[34]). As of December 2023, MASE has adopted CAM for 20 categories of goods and services.

Various existing CAM integrate circularity principles and include recycled content requirements. For instance, all public construction interventions require circular specifications for the materials used in the construction project.[31] The GPP criteria for interior and urban furniture include minimum recycled content requirements for paper and cardboard packaging (80%) and plastic packaging (60%) (CONAI, ReMade in Italy, 2021[35]). In other cases, the presence of recycled content constitutes an award criterion that improves the evaluation score for the product or service in question. This is the case, for instance, of GPP for textile products and services.[32] Existing labelling and certification schemes enable companies to declare compliance with GPP criteria, such as the "ReMade in Italy" certification for recycled content. Additional circular principles used in CAM relate to the promotion of products as a service, such as in the case of printing management services or increasing repairability or disassembly.

Overall, the use of GPP in Italy is advanced and, in recent years, significant efforts have been made to define and regularly update CAM, including to further integrate circular principles. The National Strategy for the Circular Economy has emphasised the ambition to further strengthen the use of GPP, including by increasing uptake and enhancing the technical capacity of contracting authorities to adopt CAM in public tenders (MiTE, 2022[36]). Although the uptake of GPP in Italy has steadily increased in recent years, there is room to further expand the application of CAM in all public procurement. Data collected from voluntary surveys found that CAM were applied in 78% of public procurement in surveyed regions and metropolitan cities (MEF, 2021[37]). According to the Green Procurement Observatory,[33] knowledge and uptake of GPP criteria is improving. Barriers to the broader use of GPP include insufficient training for staff, complexities related to procurement procedures, and the limited availability of products and services that respect CAM criteria, or the limited number of companies that hold CAM-recognised labels and certifications (Osservatorio Appalti Verdi, 2021[38]).

Institutional capacity to monitor GPP implementation is also improving. The absence of monitoring in the application of CAM within public entities has been a key gap for a long time. Having a thorough monitoring system in place helps not only to have a clear understanding of the dissemination of GPP in the public administration, but also to identify the barriers inhibiting full implementation. This requires a targeted measurement framework on GPP with appropriate performance indicators and clearly identified data sources. The automation of monitoring activities represents one way to drastically expand the scale of surveys on GPP uptake and reduce administrative costs (see Box 5.4 for the example of the Republic of Korea).

Box 5.4. Harnessing data and digitalisation to monitor GPP uptake in the Republic of Korea

The Republic of Korea is a frontrunner in the use of electronic procurement systems and platforms for GPP implementation and monitoring. GPP is monitored using three indicators: i) the number of public organisations that submit GPP implementation plans and performance records; ii) the total annual green procurement, in economic value and units; and iii) green standards and specifications.

GPP implementation is monitored across 30 000 procuring entities via an online platform, the Green Procurement Information System (GPIS-I) monitoring system, which is intended to make the monitoring and reporting process easier and less burdensome. The GPIS-I provides access to resources, such as GPP guidelines, a repository of good practices implemented by contracting authorities, and a catalogue of certified products. In addition, records of green purchases procured through the central procurement agency (the Korea Public Procurement Service) are automatically transferred to the GPIS. With about 60% of the national green procurement data automatically reported via the GPIS, this greatly reduces the administrative burdens of both the procurers and the monitoring agency.

Source: (Hasanbeigi, Becqué and Springer, 2019[39]; UNEP, 2019[40]; The World Bank, 2021[41]; UNEP, 2017[42]).

Aggregators at all levels of government play a leading role in championing GPP to accelerate the transition towards a circular economy. The Italian public procurement system is composed of more than 30 000 contracting authorities active at local, regional and national level. There is a risk that a decentralised, fragmented system may not provide the scale needed for public procurement approaches. In this context, the centralisation of procurement through regional aggregators can better take advantage of the aggregated purchasing power of public administrations, which in turn would provide suppliers with the incentives required to introduce circular economy principles into their production lines.

Some exemplary initiatives already exist in Italy. For example, in 2009, the region of Emilia-Romagna committed to promoting the inclusion of environmental criteria in public procurement. To support the implementation of this commitment, the regional purchasing body, Intercent-ER, has been developing three-year action plans since 2012. These include targets, objectives, guidelines and instruments to promote green purchases by public administrations across the region. Intercent-ER also supports GPP uptake at the sub-national level through training courses, practice-oriented guidance, handbooks and toolkits, as well as a GPP Help Desk Service to disseminate information and offer technical support to contracting authorities. In 2018, the regional agency established an award ("Green Public Procurement: green purchases with Intercent-ER") for the best performing local administrations.

Another virtuous example is that of Consip, the Centralised Purchasing Body of the Ministry of Economy and Finance, which plays a central role in the advancement of green and circular public procurement in Italy. Consip aggregates demand from central government at the national level. It includes 31 centralised purchasing bodies ("soggetti aggregatori") at regional and local level (PwC, 2021[43]). In 2020, Consip managed procurement spending for a total of EUR 13.91 billion (Albano, 2021[44]). As of 2017, about 91% of active and awarded agreements and 85% of e-marketplace initiatives included green criteria (Consip, MEF, 2017[45]). This centralised, yet flexible structure, allows for the effective dissemination of circular principles across various public entities.

In the health sector, Consip launched initiatives involving innovative forms of procurement in the renewal of diagnostic equipment. For instance, under a "pay-per-use" procurement model, healthcare facilities gain access to high-technology equipment through the payment of a fixed fee and a fee linked to the number of examinations performed, without being bound to the purchase of new equipment. This approach offers several advantages for buyers, including the guarantee of a product that is always in line with the latest quality standards and without the need for additional maintenance or technology upgrade costs. Moreover, machines operate more efficiently and provide better utilisation management, including sharing between different departments or facilities. End-of-life management is optimised through the reuse or recovery of parts or components and the separation of materials (Consip, 2018[46]; Stunning, October 2019[47]). Further use of centralised procurement could help steer production patterns towards increased circularity across multiple sectors.

Further leveraging circular procurement approaches could yield substantial benefits to promote sustainable and circular production and consumption patterns. As mentioned earlier, Italy already promotes the inclusion of circularity into procurement requirements through minimum and award environmental criteria that align with circular priorities (e.g. the promotion of eco-design, recycled content, repairable equipment, as well as energy or water consumption requirements). However, there is scope for a broader adoption of procurement strategies that promote circularity in consumption. These strategies mainly revolve around:

- **The definition of needs.** A better assessment and identification of needs for procurement can help limit the volume of purchases, and thus the amount of potential waste generation. Often, what is needed is not a new product, but the function that it provides. In Scotland, for example, senior leaders and procurement professionals of public bodies have an obligation to thoroughly evaluate their purchasing needs and rethink them before making any new purchasing decision to minimise waste and resource consumption. Moreover, they must have an appreciation of how procurement can support net-zero climate goals for their organisation and Scotland as a whole (Scottish Government, 2022[48]).

- **More focus on services (and new business concepts) than products.** The adoption of circular practices, such as leasing or sharing, can be effective instruments to help move towards a resource efficient and circular economy. Instruments include product-service systems, shared use, buy-per-use, or buy-back service models. Box 5.5 presents the benefits of procurement of a car sharing system, as compared to buying or leasing municipal car fleets, in Bremen, Germany.
- **The adoption of contractual clauses and tender specifications that extend product lifespans.** Public procurers can apply tender specifications that help reduce waste generation as well as contractual clauses that make suppliers responsible for keeping a product or material in the supply chain after its first use. This can be achieved by adopting product service systems, where the supplier retains the ownership of the product and the user pays-per-use or according to performance. Public tenders may also include purchase and buy back agreements (see Box 5.5, the second example from Aalborg, a municipality in Denmark), as well as purchase and resale agreements, where the contract prescribes who will recover the item after use, normally for a lower-value material reuse or recycling. Award criteria can also be used to reward tenderers that make an effort to extend the product's lifespan by offering solutions for maintenance, repair and refurbishment, re-manufacturing, reuse, recycling or re-selling (European Commission, 2017[49]).

Box 5.5. Examples of circular practices in public procurement

Replacing vehicle fleets with a car sharing service in Bremen, Germany

In 2013, following a pilot period, the city of Bremen's Senate Department for Environment, Construction and Transport shifted to a car sharing service to reduce CO_2 emissions from its business-related travel, also lowering costs associated with its vehicle fleet. The department previously owned (or leased) a fleet of 11 cars, but the utilisation rate was low (on average below three hours a day). By switching to a local car-sharing service with an online booking system, users had access to a more flexible and efficient fleet of vehicles, including electric vehicles, and saved on costs such as parking fees. In terms of environmental impact, the average CO_2 emissions of the car sharing fleet (107 g/km CO_2 in 2014, and 102 g/km CO_2 in 2015) were lower than the wider municipal administration (141 g/km CO_2 in 2013).

From waste to value: a buy-back service for used information and communications technology (ICT) equipment in Aalborg, Denmark

The city of Aalborg in Denmark is a large consumer of electronics, spending an estimated 2.5% of its annual budget on ICT equipment and software. The average lifespan of a laptop in the city is 3-4 years. Laptops were replaced often, as this was cheaper than the repair and maintenance of old equipment. However, these trends generated high costs and a high environmental footprint for the municipality. Only three out of seven ICT departments had agreements in place for the collection of old equipment, and the financial value recaptured from these agreements was low. The Environmental Department of the municipality calculated that by simply keeping laptops for six years instead of three, the city could cut the same amount of CO_2 emissions generated by heating and powering all municipality buildings in the city for a whole year. It would also reduce waste by an equivalent amount produced by 3 000 households in one year.

The municipality adapted its policy on ICT equipment to make its consumption more circular, including to improve the collection of old equipment and to extend its use time. The municipality's policy of engraving laptops with the city's logo was revised, as it was creating an obstacle to laptop reuse. Aalborg is now considering other options to improve the use and collection of ICT equipment, including more effective systems to ensure that laptops stay within the city's ownership, and to better protect equipment (e.g. screen protection, covers) so as to increase their lifespan.

Source: Adapted from (Clean Fleets, 2015[50]; ICLEI, n.d.[51]; McLennan and Krebs Schleemann, 2021[52]).

To support public agencies in the use of CAM in public tenders, MASE organises training activities, such as distance training modules or thematic webinars. Some of these activities have been realised with the support of CReIAMO PA, a previous project that aimed to strengthen administrative capacity in the public administration and to support the integration of environmental considerations in their activities. Additionally, regional administrations and individual contracting authorities may carry out their own information and training initiatives to improve GPP knowledge and implementation within their internal organisations or within their local territories.

The creation of dedicated competence centres can play a key role in providing expertise on circular procurement. Competence centres can operate as centralised advisory services for public contracting authorities. They may support the incorporation of circularity into public procurement and its implementation through practical tools (i.e. practice-oriented guidelines, handbooks, training initiatives, workshops, ad hoc technical support, help-desk services, etc.). They can also facilitate peer learning, or support contracting authorities with drafting and implementing green public tenders.

There are several examples of competence centres on public procurement in OECD countries (e.g. Austria, the Netherlands, Spain, Sweden), some of which focus on innovation and sustainable public procurement. The type of support provided by these competence centres varies across countries (as shown by the Finnish example in Box 5.6). Networks of national competence centres, such as the European Governmental Competence Centres for Sustainable Public Procurement, help share practical experiences of public procurement. In a decentralised environment, such as in Italy, the centralisation of expertise and resources, through competence centres on specific topics, could prove highly beneficial (OECD, 2022[53]).

Box 5.6. The Finnish network-based Competence centre for Sustainable and Innovative Public Procurement, KEINO

KEINO is a consortium funded by Finland's Ministry of Economic Affairs and Employment that started operating in 2018. KEINO aims to raise awareness of strategic procurement management and impact thinking among contracting entities by providing advisory services and organising network meetings for procurement professionals. KEINO offers support with the creation of buyer groups, consisting of procurement entities with shared needs in the fields of social welfare and health services, construction and energy use, mobility and logistics, and the circular economy. Buyer groups develop joint plans of activities to clarify common challenges, develop joint criteria, tools and roadmaps, and organise joint market dialogues. The groups also compile best practices from Finland and abroad.

Additionally, KEINO supports the implementation of the Green Deal Agreement for Public Procurement, which is a voluntary commitment made between a procurement unit and a government entity relating to, for example, carbon neutrality goals, the circular economy, or sustainable and innovative procurement. Under this framework, KEINO supports procurement units in concrete procurement activities by providing expertise during the joint preparation phase as well as the tendering phase.

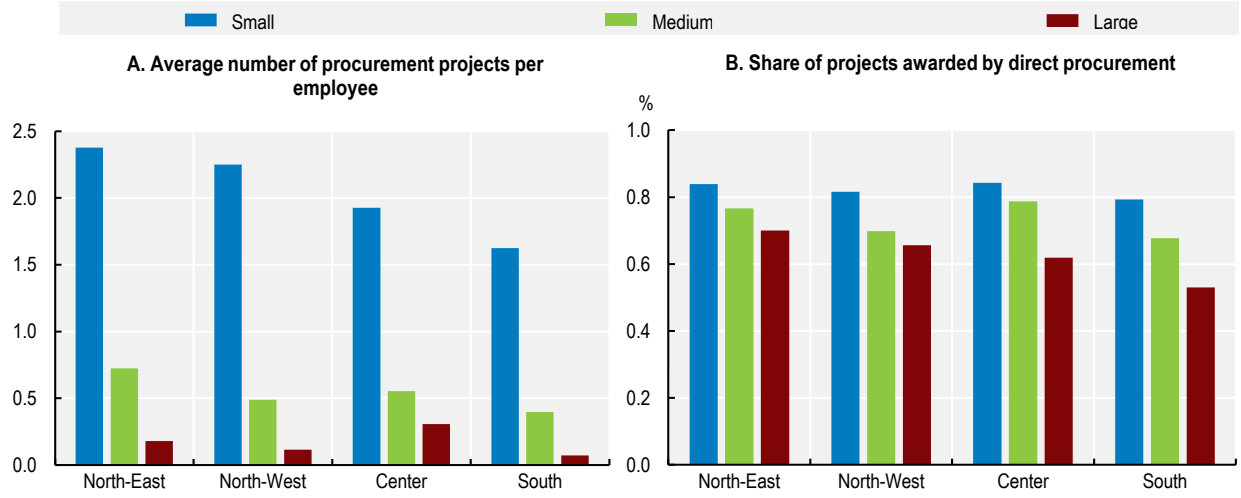
Source: (UNEP, 2017[54]; The World Bank, 2021[41]; Motiva, 2019[55]; UNEP, 2017[42]; KEINO, n.d.[56]).

Further upskilling the procurement workforce could substantially accelerate the uptake of CAM by public entities. Accelerating the transition towards a circular economy requires a skilled public procurement workforce that is well equipped and confident in using strategies and tools, such as comprehensive needs assessment, preliminary market consultation, life cycle costing and performance-based procurement, or criteria that prioritise the reuse and recycling of materials. Capacity building and awareness raising are even more critical for smaller municipalities that tend to use direct purchasing more often (as shown in

Figure 5.3). Different solutions exist for upskilling the public procurement workforce, including training programmes, help-desk services, or the creation of multi-disciplinary teams in public administrations that gather experts from different fields (i.e. legal, technical/ engineering, procurement and environmental sustainability).

Figure 5.3. Smaller municipalities in Italy have lower procurement capacity and typically use direct purchasing

Indicators (average number of procurement projects by employee, and share of projects awarded by direct procurement) by municipality size, Italy, 2017



Note: Procurement projects relate to the municipalities' offices covering road management, urban planning and environment. "Large" municipalities have more than 250 000 inhabitants, "medium" between 20 000 and 250 000 inhabitants, and "small" below 20 000 inhabitants.
Source: (OECD, 2021[57]).

The provision of practical tools could also support a greater uptake of circular procurement. The adoption of circular procurement approaches can be challenging, as they might appear inconsistent with well-established principles of transparency and open competition required of public procurement. Another challenge is the general perception that the costs of products and services that follow circular economy principles are higher. A range of tools can be made available to help contracting authorities navigate this complex environment (especially for product categories that are not centrally managed by aggregators), including:

- **Operational tools on circular procurement, such as guidelines, model contracts or templates.** For instance, the Dutch Public Procurement Expertise Centre (PIANOo) provides national and local procurers, and businesses, with information and resources on the implementation of circular procurement, including in specific sectors. Its "Guide to Circular Procurement" offers step-by-step guidance on how to incorporate circular aspects into public procurement, with background materials and practical examples. In addition, the Dutch Ministry of Infrastructure and Water Management commissioned a circular procurement guide ("Circular procurement in 8 steps") with guidance on how to promote circularity at different stages of procurement (Copper8, 2018[58]).
- **Eco-labels or eco-design criteria.** Public procurement approaches can play an important role in promoting the use of eco-labels and eco-certification schemes. In Italy, multiple CAM directly refer to green certifications, schemes and labels (e.g. the EU Ecolabel) as a way to certify compliance with technical requirements. Some CAM also refer to eco-labels as part of the award criteria, for

example, for work footwear and leather products.34 Box 5.7 provides more information on the benefits and potential limits of eco-label uptake in GPP. In addition to labels and certifications, GPP can promote other instruments to raise consumer knowledge on the availability of green products and services, including through the creation of official databases (for instance, see Box 5.7 and the example of a centralised information system on green products established in the Republic of Korea).

- **Lifecycle costing tools.** Box 5.8 presents the experience of the national aggregator, Consip, in developing a simplified methodology to consider life cycle costing in some of its framework agreements, to include, for instance, the costs of energy consumption or repair.

Box 5.7. Eco-labels in green public procurement: advantages and complexities

Eco-labels intend to influence consumer or business decisions by offering clear, accurate and comparable information on the environmental performance of products. They are increasingly used by contracting authorities when implementing GPP, as they can both help define technical specifications of products and services, and support compliance with GPP requirements or award criteria. This can incentivise enterprises to apply for eco-labels, in turn, mainstreaming the purchase of greener products. For instance, a study on municipal buildings in California suggested that public procurement policies produce spill-over effects that stimulate both private-sector adoption of green standards and investments in green building expertise by local suppliers (Simcoe and Toffel, 2014[59]).

However, eco-labels present features that might influence competition in public tenders. Eco-labels often entail sizeable costs for companies related to certification and verification procedures, in addition to investments made to develop green products. Moreover, compliance verification can be a lengthy and costly process, requiring expensive testing equipment. Once the eco-label license is awarded, its usage implies the payment of a fee by companies. These costs could be a significant bottleneck for SMEs. These barriers could be particularly problematic in the context of already low levels of competition in public procurement (European Commission, 2017[60]). Moreover, in the absence of common criteria underpinning different schemes or mutually recognised agreements across countries, eco-labels could in fact create trade barriers. In an increasingly globalised market, harmonisation and mutual recognition of different eco-labels is hugely important to promote their uptake.

Green public procurement and the uptake of eco-labels in the Republic of Korea

In Korea, GPP and the Korea Eco-label were introduced in tandem in 1994. In 2005, the Act on Encouragement of Purchase of Green Products gave a strong push to the implementation of GPP. It mandated all contracting authorities to submit an implementation plan on green purchases for the current year and performance records for the previous year. State agencies were recommended to purchase green products and services for which eco-label criteria exist. If the total amount of purchases exceeds a certain threshold, the purchase is commissioned by the central purchasing body (the Korea Public Procurement Service). As a result of these measures, the number of products certified by the Korea Eco-label increased by a factor of 3.8 between 2004 and 2012.

Source: (Rubik et al., 2007[61]; Prakash et al., 2021[62]; Iraldo, Griesshammer and Kahlenborn, 2020[63]; UNEP & KEITI, 2020[64]).

Box 5.8. Consip's integration of life cycle costing in framework agreements

Consip, the Centralised Purchasing Body of the Ministry of Economy and Finance, developed a methodology for the incorporation of life cycle costing in its framework agreements. The methodology, adapted for each product group, combines energy consumption of the product category with other green criteria. For instance, for the procurement of desktop computers and monitors, GPP criteria are based on the lowest costs, in addition to minimum environmental and social requirements. The full costing calculation formula includes information on the expected energy consumption based on certified data on energy performance and the price of electricity. For public lighting, criteria applied by Consip allow for the reduction of costs during the entire duration of service. In addition to mandatory GPP criteria, defining the threshold consumption for lamps, award criteria for the design of lighting systems grant extra points for solutions that facilitate repair or the replacement of a single component. In the health sector, the cost of servicing, maintenance and disposal is included in the purchase of certain appliances. Overall, this approach favours eco-design, extended lifespans and reductions in maintenance costs.

Source: (OECD, 2022[65]).

Risk aversion, a systemic issue in public procurement systems, could be addressed through capacity building and peer learning activities, in addition to the acquisition of technical skills. Creating safe spaces for experimentation in circular procurement is important, not only to build capacity but also to gain the confidence of public organisations in going beyond traditional and legalistic approaches. "Communities of practice" could provide such a space, where participants can learn and inspire each other, discuss challenges and share practical solutions. Within the framework of communities of practice, this powerful tool can be deployed to conduct pilot projects and communicate results widely. Pilot organisations usually become the ambassadors of circular procurement and can inform other purchasers on its financial, social and environmental advantages. Box 5.9 below presents examples of regional "Green Deals" on circular procurement initiatives. Notably, the setting up of a community of practice in Portugal's Centro Region was a crucial element in delivering on regional circularity goals at a time when the use of circular public procurement was a new concept for most actors in the region.

Risk aversion could be further overcome by influencing the motivations of public buyers. Non-financial, behavioural incentives include rewarding good practices (e.g. via national circular procurement prizes), making circular procurement a goal in the annual performance of procurement officials, or providing promotion opportunities for public buyers who successfully implement circular procurement. For instance, the Procura+ Awards reward sustainable, circular and innovative procurement solutions that have a strong potential for replication and upscaling in Europe.[35]

Box 5.9. Regional 'Green Deals' on circular procurement and communities of practice

The Flemish Green Deal on Circular Procurement

The Flemish Green Deal on Circular Procurement was inspired by the Dutch Green Deal on Circular Procurement to promote circular procurement as a lever for its circular economy transition. In June 2017, 153 participants signed the Flemish Green Deal Charter on Circular Procurement. Each of the participating buyers committed to structurally change the way their organisation buys and sets up at least two circular procurement projects. The 52 facilitators pledged to use their varied expertise to support the public buyers, and they formed a unique learning network.

The Flemish Green Deal on Circular Procurement, however, ended in November 2019. The multiple lessons learned were shared online to facilitate dissemination (www.circularprocurement.be). A specific tool and reporting system was created to measure the individual results of the more than 100 experiments. Based on these experiences, on how to run a community of practice, a specific guide was published.

The Centro Green Deal on Circular Procurement in Portugal

The Centro Green Deal on Circular Public Procurement, launched in April 2019, gathered five inter-municipal communities, three municipalities, two polytechnic schools, one university and one hospital from the region with the ambition to build a local circular economy by shifting to sustainable and circular public procurement practices, among other things. Each signatory committed to launch at least two circular public procurement tenders by the end of the project and to share the knowledge acquired during this process. Circular tenders were launched in various fields, such as the provision of school meals, the purchase of electric vehicles, or the rental and maintenance of uniforms.

The Centro Green Deal is led by the Regional Coordination and Development Commission (CCDR-C), a regional branch of Portugal's National Administration, which created a community of practice (the Centro Green Deal Network) to bring together contracting authorities participating in the Green Deal. The network provided a safe space for signatories to share their experiences and to learn from each other on how to implement circular procurement. Peer learning was enriched through exchanges with the Netherlands, the United Kingdom and Denmark, as well as through practical support from the OECD. This enabled the region to raise its capacity and bring circularity into its procurement strategy.

Source: (Flanders Circular, n.d.[66]; OECD, 2021[67])

Strengthening strategic relationships with the business sector can boost circular innovation. Market knowledge is an essential part of any public procurement, whether for long-term strategic goals or to understand the options available for a specific tender. Public authorities experience challenges in adequately identifying and assessing their "green" needs. Furthermore, they often lack awareness of existing solutions, or the market's readiness for green innovations. Sustainable procurement therefore often requires tender specifications to be set following previous exchanges with potential suppliers to better align with market capacity. These market consultations can effectively support GPP implementation (Fidone and Mataluni, 2016[68]; Edler and Georghiou, 2007[69]; Brammer and Walker, 2011[70]).

EU directives on public procurement[36] specifically refer to preliminary market consultations (PMCs) to gather information from market suppliers and to inform economic operators of procurement plans. The use of a PMC is particularly suitable for complex or experimental contracts with strong technological or innovative components that fall outside the expertise of the contracting authority. The example from Scotland (in Box 5.10) offers an illustration of the benefits of market engagement. PMCs were introduced into Italian legislation in 2016,[37] also foreseeing the possibility for corrective measures to ensure equal treatment of market operators. Italy's National Anti-Corruption Authority (ANAC) (2019[71]) has published guidance on PMC, clarifying that it is a preliminary, optional step, not a decisive one. PMCs remains a relatively new instrument and is scarcely used by contracting authorities in Italy.

A broader adoption of PMCs could benefit the implementation of GPP in many ways. By signalling procurement plans to the market, it may reduce the risk of unsuccessful tenders and increase both cooperation and competition. Where products or services are not yet available on the market in a way that fulfils circular principles, innovation procurement could be used to encourage R&D, and to pilot new products or services. Conversely, where the technological solution exists and is ready for large-scale commercialisation, the contracting authority may act as an "early adopter" of innovative solutions.

Box 5.10. Engaging with the market and users to define procurement needs in Scotland

In 2016, the Scottish Procurement Directorate established a new suite of framework agreements for the supply of ICT client devices. The new ICT frameworks were developed with extensive market engagement, including meetings with industry experts, manufacturers, resellers and other organisations within the supply chain. The extensive market engagement, preceding the tendering process, ensured that potential bidders were made aware of the requirements for obtaining the necessary accreditation. The focus was on circular economy outcomes of procurement through, among others, management of end-of-life of devices. Awarded bidders demonstrated how they would extend the useful life of devices through the reuse of components. While this was readily available for certain devices, it was variable for tablet devices, which can be difficult to disassemble and repair. The successful contractor introduced a "buy back" scheme for used tablet devices, contributing to circular economy outcomes.

Source: Adapted from (European Commission, 2017[72]).

Public administrations can play an exemplary role by making green purchases, influencing staff and consumers on their consumption choices, and encouraging them to choose eco-compatible products and services (Wang et al., 2021[73]). Public administrations often serve as lead consumers of green solutions, demonstrating the value and functionalities of environmentally sustainable products and raising early awareness (Bauer et al., 2009[74]; Edler and Georghiou, 2007[69]), which helps mitigate consumers' mistrust in green products (UNEP & KEITI, 2020[64]). Box 5.11 presents an example of how public procurement of food in Sweden had influenced individual consumer behaviour more widely.

Box 5.11. Influencing behaviours through strategic procurement decisions in Sweden

In 2006, the Swedish Government launched a new GPP policy mandating a 25% increase in the public sector's organic food consumption. In 2017, this policy ambition was raised to reach a 60% organic share of the public sector's food consumption. According to an empirical analysis on data covering Sweden's 290 municipalities and 21 counties over the period 2003-2016, public organic food purchases increased (from 2.2% in 2003 to 30% in 2016) and had a significantly positive impact on the share of organic farmland in the country. The researchers found that, while an increase in public organic food procurement did not have a significant effect within a single county, the collective increase in municipality spending across all counties did entice producers at the local county scale. This experience suggests that public authorities, acting together, have sufficient buying power to influence wholesalers, despite the small size of the public sector in terms of food purchases (4% of the Swedish market).

Source: (Lindström, Lundberg and Marklund, 2020[75]).

5.12. Summary of assessment

This chapter looked at the state of existing economic instruments in Italy to identify potential opportunities for improvement, and the possibilities for introducing additional instruments. Table 5.4 summarises the main findings. Chapter 6 expands on selected opportunities for instrument reform or introduction.

Table 5.4. Summary of economic instruments discussed in this chapter

Instrument	Successes / advantages	Issues or opportunities for improvement
Fees on extractive activities	Some revenue raising.	Low fee rates Very limited incentives to affect the quantities extracted No harmonisation (no minimum rate) and large variations across the country
Plastic tax (due to enter into force in July 2024)	Could provide incentives to favour secondary (and other recovered) materials. Could raise revenues for the EU plastics own resources.	Limited experience when implemented on virgin materials Uncertain time frames of implementation
CIT incentives to support non-virgin materials	Support for R&D and green innovation, including growing support of the circular economy transition.	New measure when applied to support for secondary and other recovered materials. Ex-ante and ex-post monitoring and evaluations of measures are required, where possible (see Chapter 10 for further insights).
Fiscal measures to reduce waste generation	Promotes donations of surplus goods. Likely contributes to food waste prevention.	Opportunities to increase price signals to promote waste prevention and reuse more structurally in the economy.
Pay-as-you-throw (PAYT)	High uptake in several regions. Favours recycling over landfilling and incineration. Tendency to lower waste management costs.	Disparities in regional uptake. Opportunities for higher diffusion, but there are often barriers of a political economy nature.
Landfill and incineration taxes	Possibly generate price signals against landfilling in the initial phase of introduction.	Tax rates are too low to discourage landfilling. Cap on tax rates does not allow higher tax rates. Substantial regional differences in tax rates. Incineration tax only applies to incineration without energy recovery (classified as an environmentally harmful subsidy). Landfill and incineration taxes are only effective if implemented in a well-functioning system (separate waste collection, infrastructural improvements taking place in parallel).
Extended Producer Responsibility	Coverage of many sectors, including an ongoing extension for textile-fashion. Contribution to improved collection and recycling. Some advanced fee modulation based on recyclability criteria. Technical support to municipalities and lower financial burden for separate waste collection. Allowed to reach some recycling targets in advance of the target year.	Limited incentives for eco-design, opportunities to extend the use of advanced fee modulation. Opportunities to extend EPR to cover waste prevention and reuse. Opportunities to enhance governance and reduce free riding.
Green Public Procurement	Longstanding presence in Italian policy framework. Mandatory application of GPP criteria. Circular economy principles integrated in CAM for some products and service categories.	There are opportunities to further increase uptake and shift to circular procurement approaches, including by leveraging the role of aggregators, further upskilling the workforce and providing relevant practical tools, and strengthening strategic relationships with the business sector (e.g. through preliminary market consultations) to boost circular innovation. Opportunities to enhance institutional capacity to monitor GPP implementation.

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Notes

[1] Major reports by ISTAT related to extractive activities include (ISTAT, 2023[78]; ISTAT, 2024[79]; ISTAT, 2024[80]) as well as (Auci and Vignani, 2020[77]).

[2] Legislative Decree No. 196 of 8 November 2021, implementing Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment.

[3] Council Decision (EU, Euratom) 2020/2053 of 14 December 2020 on the system of own resources of the European Union and repealing Decision 2014/335/EU, Euratom.

[4] This indicative value was calculated based on waste generation levels (2.3 Mt), the recycling rate (56.6% not recycled), the rate of the EU plastics own resource (EUR 0.8 / kg), and the lump sum reduction granted to Italy (EUR 184 048).

[5] 2020 Budget Law (Law 27 December 2019, n.160), art 1, paragraphs 634-658.

[6] Law of 30 December 2020 No 178 "State budget for the financial year 2021 and multi-year budget for the period 2021-2023". Additionally, the Budget Law also envisioned tax credits for investments made by plastics producers in technological upgrades for the production of biodegradable and compostable plastics.

[7] Public procurement can act as a strong lever to boost circular innovation, as further discussed in section 5.10.

[8] The forthcoming plan "Transition 5.0", an evolution from Transition 4.0, aims to further support green and digital transitions by focusing on the shift to more energy-efficient and sustainable production processes, modulating the share of the tax benefit for firms based on the extent of their improvements in energy efficiency.

[9] The measure was launched through the Decree of the Ministry for Ecological Transition 177/2020 "Research and development projects for the circular economy".

[10] The measure was introduced through Resolution no. 4536 – Call for support to SMEs for the innovation of circular economy supply chains in Lombardia, 2021 Edition, and Resolution no. 6402 – Call for support to SMEs for the innovation of circular economy supply chains in Lombardia, 2022 Edition.

[11] Law 30 December 2018, No. 145 "State budget for the financial year 2019 and multiannual budget for the three-year period 2019-2021". Decree of the Ministry for Ecological Transition of 14 December 2021 "Technical requirements and certifications attesting to the eco-sustainable nature of products and packaging according to current European and national legislation".

[12] Leg. Decree 2019/34 "Urgent measures for economic growth and resolution of specific crisis situations", then converted to Law 28 June 2019, No. 58. The Decree of the Ministry for Ecological Transition of 6 October 2021 "Implementing provisions for the tax credit on products from recycling and reuse" defined the technical criteria certifying the types of materials and products eligible for the tax credit, as well as the procedures for benefiting from the tax credit.

[13] Leg. Decree 196/2021: "Implementation of Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment".

[14] 2020 Budget Law, Law 27 December 2019, No.160.

[15] Law Decree 30 April 2019, No. 34 "Urgent measures for economic growth and for resolving specific crisis situations", then converted to Law 28 June 2019, No. 58.

[16] Decree of the Ministry for Ecological Transition 22 September 2021 "Measures to encourage the sale of products in bulk or on tap".

[17] Law 19 August 2016, No. 166 "Provisions concerning the donation and distribution of food and pharmaceutical products for social solidarity purposes and for the limitation of waste".

[18] Law Decree No. 18 of 17 March 2020 "Measures to strengthen the National Health Service and economic support for families, workers and businesses related to the COVID-19 epidemiological emergency".

[19] Leg. Decree No. 117 of 3 July 2017 "Third Sector Code", pursuant to Article 1(2)(b) of Law No. 106 of 6 June 2016.

[20] Tax benefits provided by the Anti-Waste Law (Law No. 166/2016) and by the Third Sector Code (Leg. Decree 117/2017) cannot be combined.

[21] Law Decree No. 91 of 20 June 2017 "Urgent provisions for economic growth in the Mezzogiorno geographical area".

[22] Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste. For reference on the use of economic instruments to provide incentives for the application of the waste hierarchy, see Annex IVa "Examples of economic instruments and other measures to provide incentive for the application of the waste hierarchy referred to in Article 4(3).

[23] Law No. 147 of 27 December 2013 "Provisions for the formation of the annual and multi-year budget of the State".

[24] Gate fees, i.e., the charge levied by landfill operators upon reception of waste, vary widely across regions. They are lowest in Abruzzo (EUR 87/t), Umbria (EUR 60-110/t), Calabria (EUR 90/t) and in the autonomous province Bolzano-Bozen (EUR 62.53/t) (Legambiente, 2019[19]).

[25] Legislative Decree 152/2006 “Environmental Consolidated Act”.

[26] In terms of cost coverage, there is often a need to put in place incentives for the efficient management of waste by municipalities. To this end, in some countries, EPR systems have established reference costs for municipal services, which provide a benchmark or limit regarding what constitutes reasonable costs (Lifset, Atasu and Tojo, 2013[28]). In Italy, ARERA is tasked with defining “efficient” waste collection and management costs.

[27] The importance of online sales has continued to grow In Italy in recent years, with the overall economic value of e-commerce sales more than doubling between 2015 and 2020 (ISTAT, 2021[76]).

[28] Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the co-ordination of procedures for the award of public works contracts, public supply contracts and public service contracts.

[29] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC Text with EEA relevance.

[30] The reference legislation for GPP in Italy is the Public Contract Code, Legislative Decree No. 36 of 31 March 2023.

[31] Decree of the Ministry of Ecological Transition 23 June 2022 No 256, Awarding of Design Services and Contracting of Works for Building Interventions.

[32] Minimum environmental criteria (CAM) for the supply and rental of textile products and for the restyling and finishing service of textile products, adopted by decree of the Ministry of Environment and Energy Security, 7 February 2023.

[33] The Green Procurement Observatory (“Osservatorio Appalti Verdi”) managed by Legambiente has been collecting survey data on the adoption of CAM by different contracting authorities since 2018. A sample-based monitoring, using data extracted from the National Observatory of Public Contracts managed by the National Anticorruption Authority, has recently been conducted by CNR IIA. The monitoring has been made on some public procurements categories in which CAM are in force. This monitoring, and the surveys conducted by Legambiente, represent the most comprehensive measurement of GPP across the national territory. The collected data can support policy makers to understand the level of use of CAM among contracting authorities and approximate the volume of public expenditure involved.

[34] Supplies of non-PPE and PPE (personal protective equipment) work footwear, leather items and accessories in Italy (approved with Ministerial Decree of 17 May 2018, in Official Journal no. 125 of 31 May 2018);
https://www.mite.gov.it/sites/default/files/archivio/allegati/GPP/allegato_CAM_Calzature_31052018.pdf

[35] https://procuraplus.org/awards/

[36] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC.

[37] Legislative Decree 18 April 2016 (The Code of Public Contracts), No. 50 is the result of the transposition into national legislation of art. 40 and 41 of Directive 2014/24/EU and art. 58 of Directive 2014/25/EU.

6 Instruments for consideration for reform or introduction

Building on the assessment of economic instruments currently in place in Italy presented in Chapter 5, this chapter explores opportunities for instrument uptake and reform. The chapter focuses on virgin material taxation on construction aggregates, landfill and incineration taxes, fiscal incentives for circularity and reuse, pay-as-you-throw and deposit-refund systems. The chapter concludes with cross-cutting recommendations for improving the use of economic instruments to promote the circular economy, including the need for regular monitoring and evaluation and insights on multi-level governance.

6.1. Introduction

The analysis contained in the previous chapter suggests that there is a large potential to enhance the use of economic instruments in Italy to promote the transition to a sustainable and circular economy. Stronger price signals can help steer production and consumption towards more sustainable choices, boost markets for secondary raw materials, and promote green innovation and infrastructural investments. This chapter delves into identified opportunities for instrument uptake and reform, including virgin material taxation on construction aggregates, landfill and incineration taxes, fiscal incentives for circularity, pay-as-you-throw (PAYT) and deposit-refund systems. This chapter concludes with cross-cutting recommendations on the improved use of economic instruments for the circular economy, including insights on multi-level governance.

6.2. Virgin material taxation on construction aggregates

The construction sector plays a crucial role in the Italian economy. However, it also has a large and growing impact on the demand for raw materials and on non-municipal waste generation. Baseline projections from OECD modelling indicate that both output and material intensity of the construction sector are expected to increase significantly by 2050, driving up materials use (see Chapter 2 for further details). The reliance on virgin materials in the construction sector exposes the country to supply risks and volatile commodity prices, potentially slowing down economic activities and hindering Italy's competitiveness. Recently, the National Recovery and Resilience Plan (NRRP)-funded infrastructural projects and tax deduction measures for renovations in buildings (e.g. the "Superbonus 110%" tax credit) exposed the country's reliance on domestic extraction and imports of virgin materials, as well as its vulnerability to supply shocks. At the same time, the country will need to continue to enhance its efforts to reduce construction and demolition waste (CDW) and increase recycling in order to meet the increasingly stringent EU targets on waste recovery and recycling.

Italy could consider the introduction of a virgin material tax primarily aimed at discouraging the extraction of quarried construction aggregates and accelerating the shift to secondary alternatives. Quarrying generates important environmental impacts across Italy's regions (MiTE, 2021[1]). During the extraction phase, adverse consequences include air, water and noise pollution, land use, loss of biodiversity, and impacts related to the movement of heavy machinery. In addition, some adverse effects may manifest only after the extraction phase is finished, for example, hydrological impacts or soil erosion.

Although virgin material taxes are more challenging to implement than royalties, taxes may contribute to a drop in the demand for virgin materials. Experience from selected OECD countries suggests that taxation can have an impact despite the relatively low price elasticity of construction aggregates, especially when implemented in combination with landfill taxes and other supporting measures. Furthermore, revenues have been used to finance funds with community or environmental aims, such as recovering abandoned quarries or carrying out environmental rehabilitation (Söderholm, 2011[2]). Potentially, revenues could also be used to finance incentive mechanisms aligned with higher circularity and sustainability, such as support for secondary materials.

The potential environmental and economic impacts of the introduction of virgin material taxes in Italy would need to be evaluated. To date, virgin material taxes have been confined to commodities with relatively limited international trade due to concerns about disrupting domestic industry with higher material costs (OECD, 2021[3]). The introduction of virgin material taxes might therefore face challenges in terms of political feasibility. Economic impacts, especially on the competitiveness of domestic firms, may be significant under certain conditions. Environmental outcomes may vary depending on various factors, including the tax rate, the enforcement level, as well as the effectiveness of complementary measures in increasing the supply of recycled materials. The impact of taxes on competitiveness may also reduce

environmental outcomes, where the tax may lead to the relocation of extraction or production to countries with lower environmental standards.

The literature recommends implementing taxes or fees on construction aggregates in combination with additional policies aimed at increasing the demand for and supply of recycled materials to enhance the positive impacts of the tax on the use of secondary raw materials (Söderholm, 2011[2]). Virgin material taxes alone, often, may not provide sufficient incentives for operators to improve their environmental performance and to substantially increase the supply of recycled materials (Söderholm, 2011[2]). The difficulty possibly lies in ensuring that the full impact of the virgin material tax is transferred down the supply chain to the users of virgin materials. Relevant measures that generate synergies with virgin material taxes include landfill taxes, end-of-waste criteria for CDW and classification of industrial by-products, minimum recycled content requirements, support for selective demolition and improved quality standards for CDW, and enhanced monitoring of waste and controls on illegal disposal.

6.3. Landfill taxes

A reform of the Italian landfill tax will likely be needed to discourage landfilling in favour of recycling, especially in regions where both landfill tax rates and recycling rates are particularly low. Existing practices both at the international level and in Italy's regions show that higher landfill costs are usually associated with better sorting at source and lower landfilling (Legambiente, 2021[4]). Higher landfill taxes can incentivise the much-needed development of recycling and organic waste management infrastructure, especially when introduced as part of a policy mix (OECD, 2019[5]). The National Strategy for the Circular Economy and the related roadmap (Cronoprogramma) foresees the reform of the Italian landfill tax as well as the removal of environmentally harmful subsidies related to waste disposal, as identified by the National Catalogue on Environmentally Harmful and Favourable Subsidies. This action will also be in line with the ambitions of the revised EU Landfill Directive.

General principles for the reform of landfill taxes in Italy may include the following elements:

- A reform of the instrument at the national level to ensure the presence of minimum disincentives against landfilling. The maximum threshold of EUR 25.82/t, applied only for certain types of waste in selected regions, has not been updated since the introduction of the landfill tax in 1996, losing one-third of its initial value in real terms (REF Ricerche, 2020[6]).
- A continued, progressive increase of minimum landfill tax rates could help to ensure that the instrument continues to provide an effective price signal. The example of the UK Landfill Tax is a relevant one, as its rate has increased steadily since its introduction. The tax helped to internalise the environmental impacts of landfilling, and has contributed to major structural changes in the management of waste. The gradual increase in landfill tax rates could also generate support for the reform of the tax. At the same time, it is important that increases in minimum tax rates are planned in advance, for instance, with an annual escalator, to minimise the risk that revisions of tax rates are delayed or not adequately implemented, and to ensure clarity and transparency for industry and waste management operators.
- The removal of provisions that can be considered subsidies to disposal in landfills. According to Italian legislation, waste disposal is eligible for a reduced value added tax (VAT) rate at 10%. As the VAT reduction applies indiscriminately to the management, storage and disposal of selected municipal and non-municipal waste, it also covers landfilled, unsorted municipal waste. As such, the Ministry of Environment and Energy Security (MASE) (2022[7]) has classified it as an environmentally harmful subsidy.
- The partial earmarking of landfill taxes for investments in waste management (e.g. infrastructural investments, the post-closure costs of landfills), as well as for waste prevention objectives, could be considered to further support progress in the sector. Although there was a commitment to use

a share of the revenues to finance infrastructural investments for more virtuous waste management, in practice, only 1% of revenues has been allocated to such investments (European Commission, 2021[8]). The earmarking of tax revenues for waste management should be considered carefully, as it also has drawbacks and could lead to risks for revenue dependency and lock-in effects.1

- In terms of complementary measures, it is important that higher landfill tax rates are introduced in parallel to infrastructural improvements. Past experience from EU countries shows that landfill (and incineration) taxes are effective where alternative options are available to waste operators, i.e. where there is a generally well-functioning system of separate collection and infrastructure for recycling and composting. The gradual introduction of additional landfill bans on certain types of waste can also be seen as creating a stronger policy mix (OECD, 2019[5]).

6.4. Incineration taxes

Italy applies a tax on incineration *without* energy recovery that is equal to 20% of the standard rate applied to landfilling. The existing tax does not apply to incineration *with* energy recovery. As the incineration tax does not provide meaningful incentives to prefer more virtuous waste disposal options, MASE (2022[7]) has classified it as an environmentally harmful subsidy. Its detrimental impact is expected to be minimal overall as this disposal option represents a negligible amount of non-municipal waste (and the country does not have incineration plants without energy recovery for municipal waste).

Italy could consider a reform of the incineration tax to include waste-to-energy facilities so as to prioritise recycling over incineration, and also to favour better-performing energy recovery options. This intervention could be especially relevant in regions that need to substantially reduce their use of landfilling and thus ensure that foreseen landfill restrictions and higher landfill costs do not drive waste operators towards investing solely in incineration capacity to replace landfilling. An incineration tax could help to prioritise waste prevention and treatment options that sit higher in the waste hierarchy. It could also help to mitigate the potential drive to invest in incineration capacity to replace landfilling and thus prevent potential lock-in effects in the long term. The introduction of an incineration tax might also help to transition towards the inclusion of waste-to-energy plants in the EU Emissions Trading System market, foreseen in the coming years.

Incineration taxes may include an energy tax on the use of fossil fuels or a tax on fossil CO_2 emissions from the incineration of waste, as was the case in Sweden (Sahlin et al., 2007[9]). For comparison, Table 6.1 shows the price of landfill and incineration for combustible waste in a number of OECD countries and regions.

Table 6.1. Comparison of the price of landfill and incineration for combustible waste (various years)

	Landfill (EUR/tonne)			Incineration (EUR/tonne)			After-tax cost differential
	Cost	Tax	Total	Cost	Tax	Total	(incineration as % of landfill)
France	65	16	81	117	4	121	149
Catalonia (Spain)	34	12	46	50	9	59	128
Netherlands	20	17	37	71	13	84	227
England (UK)	26	101	127	109	0	109	86
Austria	70	87	157	125	8	133	85
Sweden	114	54	168	59	0	59	35
Wallonia (Belgium)	70	76	146	70	10	80	55

Source: calculated from data on page 95 of the "Comparative study of the taxation of waste disposal in Europe" (ADEME, 2017[10]) from (OECD, 2022[11]).

The report recommends that Italy continue to work on reforms to remove identified environmentally harmful subsidies applying to waste disposal operations, to maximise incentives for waste prevention and treatment options that sit higher in the waste hierarchy. As identified in the Italian Catalogue on Environmentally Harmful and Favourable Subsidies (MASE, 2022[7]), currently, a reduced VAT rate of 10% that applies indiscriminately to all waste operations, including landfilling and energy recovery. Any additional revenues from the reform of EHS could be dedicated to interventions that promote waste prevention and higher material recovery.

6.5. Fiscal incentives for circularity and reuse

Several countries employ fiscal measures to promote behaviour aligned with circularity and waste prevention, such as changes to the fiscal scheme to enable donations of unsold goods. Measures currently existing in Italy align with practices across EU countries (as summarised in Box 6.1 on food waste prevention). In Italy, corporate tax credits or reductions in the municipal waste tax (for non-households) incentivise donations of surplus goods, especially food, thereby contributing to waste prevention. However, there may be opportunities for the enhanced use of fiscal incentives to support secondary materials (as emphasised by Italy's Strategy for the Circular Economy), as well as to promote refurbished, remanufactured and second-hand products.

Box 6.1. Food waste prevention measures across EU countries

Reducing food waste has large potential for reducing the environmental impact of food production and consumption. EU Member States have committed to meeting Sustainable Development Goal (SDG) target 12.3: to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains by 2030. Selected EU countries have introduced a range of fiscal measures to reduce food waste along the value chain, including:

- **VAT exemptions.** Like Italy, other EU countries (e.g. Austria, Denmark, Germany and Slovenia) regard the monetary value of the donated food to be close to its "best before/use by" date and thus low or zero, equating to a very low or no VAT payable on the donated food (irrespective of the original value of the food product).
- **Corporate tax credits.** Some countries offer corporate tax credits on food donations. For instance, in France and in Spain, 60% and 35%, respectively, of the net book value of donated food can be claimed as a corporate tax credit that can be deducted from the corporate taxes due.
- **Tax deductions.** Other countries offer an enhanced tax deduction where donors can deduct more than 100% of the value of the food at the time of donation. For instance, Portugal has in place an enhanced tax deduction of up to 140%, if the food is used for a social purpose, limited to 0.008% of the donor's turnover.

Beyond fiscal incentives, selected countries have introduced regulations to mandate the donation of unsold food and other goods. For instance, since 2016, France bans the destruction of food products that are still fit for consumption, and obliges retailers to create partnerships with charity organisations to donate unsold food products. Accompanying measures may include the creation of an anti-food waste hierarchy (e.g. in France), support for civil society initiatives, as well as soft measures, such as the obligation to offer doggy bags in commercial catering (e.g. in France) and environmental awareness campaigns.

Source: (European Commission, n.d.[12]).

In Italy, corporate income tax (CIT) incentives were recently introduced specifically to stimulate the circular economy and the shift to secondary raw materials and other recovered materials (discussed in section 5.4). Despite the recent implementation of these measures, it is important to assess their effectiveness in achieving the set objectives, also to better inform the instrument design. Some of the opportunities for improvement in the use of these instruments are further discussed in Chapter 10.

Italy may wish to consider fiscal measures and other policy instruments that could more systematically incentivise sustainable and circular production and consumption patterns and waste prevention. While measures currently in place are likely to contribute to waste prevention (as discussed in Chapter 5), they focus on encouraging donations to charities, food banks and other not-for-profit organisations. There are limited price signals for enterprises operating in the profit-seeking economy to shift to activities such as reuse, repair, leasing and second-hand sales. Moreover, it is possible that this differentiation may disadvantage businesses such as second-hand shops, as social enterprises can sell donated goods at low prices, while the former generally have higher labour costs and do not necessarily benefit from VAT reductions. Italy could consider the relevance of introducing tax relief measures in support of:

- **Sales of second-hand, remanufactured or refurbished goods:** to mitigate economic barriers and move towards a higher preference for used goods in consumer purchasing decisions. The measure would also contribute to supporting emerging business models that are based on leasing, refurbishing or second-hand sales.
- **Repair activities:** to increase the affordability and availability of repair services and boost the uptake of reuse as a significant option in consumer decisions concerning old, used products (Milios, 2021[13]). Repair services are particularly labour intensive and small-scale activities, often involving local shops and micro-enterprises. The measure would therefore help to enhance the competitiveness of repair businesses as well as create jobs.

Some OECD countries have implemented reduced VAT rates on labour-intensive repair activities. Italy could evaluate the relevance of extending the list of goods and services to which a reduced VAT applies, to incentivise circular practices. VAT reductions and other fiscal incentives are implemented by some countries to incentivise repair and reuse both at the national or sub-national level (as presented in Box 6.2). In Italy, the VAT standard rate is set at 22% and super-reduced and reduced rates are provided for specific lists of goods and services (e.g. 4% for essential goods, 5% for selected social, health and educational services, and 10% for certain construction services).[2] In the EU, the scope for environmental differentiation of VAT rates remains limited by EU rules governing VAT structure (Directive 2006/112/EC).[3] Products and services that are considered less harmful for the environment, including repair activities, have recently been added to the list of goods eligible for VAT exemptions or reductions (European Commission, 2021[14]).

VAT reductions could potentially incentivise changes in business and consumer behaviour, but several important considerations would need to be taken into account in their design and implementation. The environmental outcomes economic impacts of VAT reductions would need to be carefully evaluated, as well as any distributional impacts. Furthermore, differentiated VAT tax rates may create new opportunities for tax evasion by misreporting sales at a lower tax category, and thus sharply increasing administration and monitoring costs, both for enterprises and tax authorities. The relevance of VAT reductions to promote circularity and the potential associated drawbacks are further discussed in Chapter 9 (for the example of products with recycled content).

The economic and environmental impacts of tax incentives may strongly depend on the presence of complementary regulatory, economic and information-based measures. A recent assessment of Sweden's repair/reuse tax relief highlighted the importance of increasing public awareness about repair opportunities and their related environmental benefits, as well as adequately disseminating the existence of tax reduction measures to citizens (Dalhammar et al., 2020[15]). For measures aimed at incentivising second-hand sales, accompanying interventions might be needed to minimise the risks of rebound income effects (i.e. consumers buy more goods with the same budget) and substitution effects (i.e. second-hand goods do not

replace the acquisition of new goods, with consumers buying additional goods). Complementary measures may include measures targeted at promoting longer lifespans for products, either at the production level (e.g. through measures promoting eco-design or bans on the landfilling/incineration of unsold merchandise) or by disseminating best practices among consumers (for instance, wash and care instructions for textiles).

In this sense, the integration of new initiatives into existing structures could potentially facilitate implementation, reduce costs and increase awareness by stakeholders. For instance, as France intends to do by introducing reuse and repair funds within existing EPR schemes (as already discussed in Box 5.2 in Chapter 5). The incorporation of reuse and repair targets, as well as of modulated fees for durability requirements, could be considered for potential introduction in the context of existing EPR schemes (including the EPR scheme for textiles currently in the implementation phase).

Beyond fiscal incentives and modulated EPR fees, other opportunities include: municipalities taking advantage of reductions in the municipal waste disposal tax and the full incorporation of waste prevention objectives in regional waste management and prevention plans. Furthermore, there is scope for the full integration of waste prevention objectives in public procurement specifications, as is already the case for donations of surplus food in catering services.

Box 6.2. International experiences with measures to promote reuse and repair

VAT reductions for repair services have been introduced in Sweden, Belgium, Ireland, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Finland, and the Czech Republic (the latter in 2020, but discontinued in 2024). In Sweden, a reduced VAT rate (from 25% to 12%) applies to the repair of bicycles, shoes, clothes and other textiles since 2017. In addition, 50% of the labour costs of repairing large appliances are deductible from personal income tax, up to a maximum of KR 25 000/year (EUR 2 385), or KR 50 000/year (EUR 4 770) for people over 65 years old (European Environmental Agency, 2019[16]). Since labour income taxes are high in Sweden, this measure has positively altered the relative attractiveness of repair versus replacement.

Other countries have introduced other tax relief measures and incentives, either at the national or local level, to reduce the labour costs of repair. In Austria, a repair scheme was set up to reduce the costs of repair services, which is often very labour intensive. For instance, in the city of Graz, residents can apply for small grants covering 50% of the labour costs of repair, up to an annual maximum of EUR 100 per household.

Flanders: a success story of integrating reuse shops into the regional materials management policy

Flanders, one of the three regions of Belgium, is among the best performers in the EU in terms of waste management and recycling. Since 2016, with the approval of an updated waste plan, the region has aimed to move beyond waste management to effectively prevent waste. The plan included waste reduction targets as well as a reuse quota of 7 kg per inhabitant to be achieved by 2022. As of 2019, the Flemish region achieved reuse amounts of 33.3 kg per capita for furniture, electrical and electronic equipment (EEE), textiles and household goods, cumulatively (Delanoeije and Bachus, 2020[17]).

The setting of reuse targets in the Flemish waste prevention policy is, so far, recognised as a key element in driving this change. The creation of a federation of recognised thrift/reuse shops ('Kringloopwinkels' or 'Kringwinkels') was also key. The network provides support to reuse shops in the form of regular quality auditing and training programmes, or help with marketing campaigns, hence contributing to guaranteeing minimum quality standards for the products sold at reuse centres (OVAM, 2015[18]). Across Belgium, a reduced VAT rate applies to sales in all reuse centres.

Source: (Reeuse, 2017[19]).

6.6. Pay-as-you throw systems

As discussed in Chapter 5, pay-as-you-throw (PAYT) systems, which charge households on the amount of their mixed waste, can generally help reduce the amount of residual waste generated by households, thereby reducing local waste management costs. Although PAYT is already common in municipalities in many regions in Italy, especially in the North and Centre, there is a large scope to expedite the implementation of PAYT at the national level.

Common challenges to the introduction of PAYT include political-economy barriers nature at the level of local administrations, the financial and administrative burden on the implementing authorities, and the organisation requirements associated with the initial implementation of the system. Measures to promote the wider adoption of PAYT schemes include increased obligations to adopt PAYT systems, economic incentives and other supporting measures. An effective monitoring and enforcement system will be required to limit illegal waste dumping as a response to the PAYT scheme, preceded by effective awareness raising campaigns to educate households on the "why and how" of waste separate collection.

In the case of Italy, enhanced technical and financial support to municipalities, as well as local cooperation, may help spur the transition to PAYT systems, especially in small municipalities where PAYT implementation costs tend to be disproportionally high. A gradual implementation of the system may also help to achieve higher environmental outcomes once the system is accepted by the community. Strong political will at the regional level, including in regional waste management plans ("Piani Regionali di Gestione dei Rifiuti"), can be pivotal in adopting PAYT models at the local level. Obligations and economic incentives can also support the implementation of PAYT, as implemented by Emilia-Romagna[4] (obligation to implement PAYT and economic incentives) and Lazio[5] (regional law mandating the implementation of PAYT systems).

Accompanying soft measures, such as information, awareness-raising and behaviourally informed measures, may substantially enhance the effectiveness of PAYT systems. Informing citizens and businesses on the rationale behind PAYT and the environmental benefits of sorting waste collection can more effectively change their sorting behaviour. Increased awareness of the impacts of waste could also generate changes in consumption patterns towards habits that are better aligned with waste prevention. The use of interventions informed by behavioural sciences could promote more virtuous household behaviours and drive improvements in municipal waste sorting.[6]

6.7. Deposit refund systems

Deposit Refund (or Return) Systems (DRS) are employed in several OECD and non-OECD countries to ensure high collection rates and the quality of specific end-of-life products, currently mostly for beverage packaging. A DRS requires consumers to pay a deposit on the item at the point of sale, which is refunded when the customer returns the item or packaging to a collection point. As such, a DRS provides consumers with an economic incentive to return a product or product packaging in a high-quality condition to appropriate collection points instead of disposing of it in mixed municipal solid waste, fly-tipping or littering (Laubinger et al., 2022[20]). DRS most often apply to beverage containers, as well as products that would otherwise be costly or hazardous if mixed with general household waste, such as batteries.

Although common up until the 1960s and 1970s in Italy, the use of DRS is today limited to specific commercial cases, usually for the supply of beverages to households or companies. In 2017, the Ministry for the Environment, Land and Sea (MATTM, currently known as the Ministry of Environment and Energy Security, MASE) launched a year-long voluntary pilot scheme to test DRS for specific types of food packaging (Decree 142/2017).[7] In 2021, the Simplifications Decree opened up new opportunities for the implementation of DRS by introducing economic incentives for "deposit return systems" and "systems for

the reuse of packaging" (Decree Law 77/2021).[8] It foresaw the introduction of DRS for plastic, glass and metal beverage containers. However, the legislative process for the development of specific criteria and objectives for deposit refund systems is currently on hold. Recent reforms made to EPR schemes (Leg. Decree 116/2020)[9] could also help create a favourable environment for the introduction of DRS in combination with EPR schemes for specific waste streams.

As also mentioned in Chapter 3, the revised EU Regulation on Packaging and Packaging Waste is expected to introduce rules for the mandatory introduction of deposit refund schemes for single-use plastic beverage bottles and single-use metal beverage containers by 1 January 2029 to ensure the separate collection of at least 90% of these packaging materials. In addition, at least 40% of these containers should be made available as reusable packaging, with a system for reuse available to consumers.

The introduction of DRS for packaging could offer opportunities to improve resource efficiency and contribute to better recycling rates. Typically, packaging design and implementation are complex in terms of investment and operational costs, but DRS can be highly effective in improving the quality and quantity of collected materials. The Reloop Platform (2020[21]) estimates that European countries with DRS in place achieve the highest collection rates: from 85% in Sweden (84% for PET bottles and 86% for metal cans) to 98% in Germany (99% for metal and 97% for PET containers). When combined with existing EPR schemes, they can contribute to increasing collection and recycling rates, enabling the creation of reuse systems, providing incentives for eco-design, as well as generating opportunities for economies of scale (Laubinger et al., 2022[20]).

According to a recent study (Eunomia, 2023[22]) for Associazione dei Comuni Virtuosi and A Buon Rendere, the introduction of a DRS in Italy would increase the collection rate of PET bottles from 73% to 94%. This would help achieve EU targets for the collection and recycling of single-use plastic bottles, save around EUR 72 million of annual local waste management costs for municipalities, and reduce littering in the environment by around 30%, among other benefits. Other studies commissioned by ANCI (Associazione Nazionale Comuni Italiani) and CONAI indicate that a DRS for plastic bottles in Italy would face significant implementation costs, amounting to EUR 1.4 billion of investments, or EUR 579 million of annual management costs (550% more than in the current EPR system). They also point to the limits of DRS, including required changes in consumer habits and a lack of incentives for waste prevention (Di Stefano, 2023[23]).

In general, several important considerations would need to be taken into account in the design of DRS for beverage bottles, including (Laubinger et al., 2022[20]):

- A DRS should be implemented with quantifiable targets to ensure that the system works towards high collection rates.
- Deposit fees should be set at rates sufficiently high to provide a price signal to return the item. They should also be updated periodically to mitigate inflation and the erosion of incentives over time.
- DRS can be implemented as voluntary schemes or be mandated by regulation. Various DRS can be set up by industry, especially where there are sufficient economic incentives to recover products or packaging for reuse or recycling. Moreover, policy intervention can ensure that a DRS is implemented despite the lack of a business case, for instance, where the value of recovered materials or products is relatively low, or where policy makers intend to prevent littering.

The introduction of DRS should be co-ordinated with existing EPR schemes. As a DRS often targets high-value materials and isolates this from the remaining waste stream, this can have financial implications for the incumbent producer responsibility organisation (PRO) that are deprived of recycling revenues. Furthermore, the PRO may still be responsible for the costs of unreturned items that end up in mixed waste or are being littered. These issues can downgrade the support of stakeholders for the adoption of DRS policy. DRS policy should establish methods for arbitration between producers, DRS operators and PROs so as to address instances of overlap or compensation for services rendered.

6.8. Cross-cutting recommendations

6.8.1. Overcoming challenges in the reform of economic instruments

The present analysis calls for a rethinking of the country's use of economic instruments with a view to making it more coherent and effective in delivering on the ambitions of Italy's Strategy for a Circular Economy and enabling progress on sustainable development goals and climate commitments. The effective design and implementation of any wide-ranging reforms in the use of economic and fiscal instruments for environmental policy will face a number of challenges.

- **Limited empirical evidence to inform policy design on less-tested instruments.** While the use of economic instruments in environmental policy is not new, there is still only limited experience with the use of fiscal incentives for behavioural change by firms or consumers aligned with circular economy policy objectives. This implies that there are limited comparative lessons to be drawn from the experience of other countries, as well as less data to evaluate the economic and environmental impacts of the policies under consideration. This especially applies to measures that have been less thoroughly tested up to now, such as corporate tax credits, to support recycled materials.
- **Political economy barriers (especially around environmental taxes).** Considerations for the reform of economic instruments will also need to consider potential barriers, such as public acceptability or feasibility. Some degree of negative public perception and industry resistance to fiscal reform is usually expected. The current context of a cost-of-living crisis and deteriorating public finances due to the COVID-19 pandemic and pre-existing strains (OECD, 2022[24]) may be especially unfavourable to the introduction of economic instruments that are likely to raise concerns over economic impacts on consumers and firms (especially environmental taxes).
- **Instrument choice.** Challenges of a political economy nature may also influence decisions on instrument choice. Experience from OECD countries suggests that the reform and introduction of environmental taxes, such as landfill or incineration taxes, are to be prioritised over the introduction of less explicit instruments, such as ad hoc incentives through the tax code. This is due to the clear price signal that environmental taxes are capable to send consumers and firms to influence their behaviour, while being considerably less complex to administer and evaluate. However, the introduction of environmental taxes often leads to political economy challenges. Any reform will not only require good policy design but also effective policy communication and consensus-building if political acceptance is to be secured (OECD, 2021[25]).

6.8.2. Continue to foster monitoring and evaluation

The regular monitoring and evaluation of economic instruments is critical to inform current reform efforts and to ensure that the instruments remain effective in reaching set objectives in the long term. Better access to reliable data and information on instrument uptake, environmental outcomes and economic costs, as well as administrative and enforcement costs at all levels of government, can improve the quality and effectiveness of interventions.[10] In this respect, a useful initiative in Italy is the creation and regular update of the Catalogue of Environmentally Harmful and Favourable Subsidies (EHS and EFS), under the supervision of MASE. Going forward, the expertise that has been created through this exercise could be further leveraged to accelerate the collection, sharing and update of relevant data on the use of economic instruments related to the circular economy at the right territorial scale.

There is a particular need to improve the evaluation of fiscal incentives with links to the circular economy transition that are relatively new in the policy mix and can benefit from less available empirical evidence. As additional information on their use becomes available, improved evaluation of environmental and economic outcomes could improve their effectiveness in reaching set objectives.

Ensuring the timely implementation and continuation of fiscal incentives over multiple years would help to send clear and consistent price signals, provide better long-term visibility to economic actors, and enhance opportunities for adequate ex-post evaluation.

There is scope to enhance **transparency over the governance of economic instruments and the use of associated revenues** (especially at the sub-national level) to promote their role in the circular economy transition, increase the involvement of stakeholders and, more broadly, generate higher public acceptability. A good way of mainstreaming integrity and transparency practices would be to clearly communicate who pays for what for each economic instrument and to inform how revenues collected would be spent and according to which criteria.[11] Proactively sharing information with key stakeholders could help secure social buy-in for the underlying policy goals.

6.8.3. Enhancing multi-level governance through improved co-ordination and capacity building

Obstacles linked to multiple levels of governance hinder the effective design and implementation of economic instruments for the circular economy. Economic instruments are often implemented in a fragmented and scattered way across the country, resulting in limited incentives for waste prevention, sustainable waste management and material recovery. The assessment presented in Chapter 5 highlighted a low uptake of PAYT in municipalities in the South of Italy, as well as wide variations in fee rates applied to extractive activities and landfilling. Some regional variation in the implementation of economic instruments does not contrast with the experience of other OECD countries[12] and is generally justified in light of different local circumstances. However, some harmonisation would be desirable at the national level to ensure that the economic instruments implemented at the sub-national level are successful. The landfill tax, for example, would require a national level reform to update the rules setting the tax rate, and to introduce minimum requirements in terms of tax design, implementation and the use of tax revenues.

There is also room for clarity and transparency in roles and responsibilities at the different levels of government in the governance of economic instruments for the circular economy. While the Strategy for the Circular Economy foresees the implementation of several economic instruments across the value chain, it does not always identify clear roles, mechanisms and fora that may support their reform or implementation. Cities and regions are only mentioned as members of the Observatory for the implementation of the strategy. The observatory, which monitors the state of implementation of the strategy, could play an important role to support the reform of economic instruments.

There are also opportunities to continue to enhance co-ordination across levels of governments and to clarify the role of sub-national governments. MASE could facilitate co-ordination across local, regional and national levels of government by making the most of existing co-ordination mechanisms. Dedicated spaces, such as regular co-ordination meetings and working groups, as well as external initiatives (ICESP, 2022[26]; Circular Economy Network, 2022[27]), could be further leveraged to gather representatives from national, regional and local levels to share information on the implementation of economic instruments. Continued and strengthened consultations with lower levels of government could help to identify good practices and share lessons learned on the implementation of economic instruments. Collecting this information could provide a good basis for MASE to initiate some harmonisation of economic instruments across the regions. This is particularly relevant given that the views of local governments in public consultations do not always appear to be sufficiently recognised in national decision making (e.g. on the determination of waste tariffs) (ANCI Lombardia, 2022[28]).

Building capacities at scale remains key, as capacities of local governments vary across the country. Capacity building initiatives and trainings, such as those that were carried out within the CReIAMO PA programme (now concluded), remain crucial to identifying and mitigating capacity gaps in the design and implementation of economic instruments. The presence and regular update of guidelines for lower levels

of government are also beneficial to facilitate their implementation. Future activities could focus on the mapping of the capacities of regional and local authorities related to the design, setting, implementation and monitoring of economic instruments so as to shed light on where capacity development efforts would be most beneficial.

Raising awareness on the potential of economic instruments could enhance their uptake, effectiveness and acceptability. According to the Eurobarometer survey, 55% of small and medium enterprises (SMEs) in Italy were not aware of any financial incentives in government programmes that supported circular economy-related activities (European Commission, 2016[29]). Although 41% of SMEs were aware of incentives, they were unsure of their nature or had not used them. Furthermore, two-thirds of SMEs, that had implemented a circular economy, reported not using any external funding (European Commission, 2016[29]). Better communicating the objectives of financial incentives, both with stakeholders and the general public, for example, through awareness raising campaigns on the use and functioning of existing fiscal incentives, could improve their uptake.

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Notes

[1] OECD (2019[5]) notes that earmarking tax revenues for waste management can sometimes create complications. There is a risk that earmarking revenue creates dependency on funds from harmful activities and locks-in inefficient spending commitments. For example, in Estonia, where municipalities are dependent on landfill taxes to fund their waste management activities, the decline in landfilling rates have resulted in significant budget shortfalls.

[2] Presidential Decree No. 633 of 26 October 1972 "Establishment and regulation of value added tax".

[3] Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax.

[4] Regional Law 16/2015 "Provisions in support of the circular economy, reduction of municipal waste generation, reuse of end-of-life goods, separate waste collection and amendments to Regional Law No. 31 of 19 August 1996 (regulation of the special tax for the landfilling of solid waste)".

[5] Regional Law 12/2016 amending Regional Law 27/1998.

[6] Zoli and Congiu (2024). Individual behaviour and circular economy policies: opportunities in Italy.

[7] Law Decree of 3 July 2017, No. 142 "Regulation on the testing of a deposit-refund system for specific types of packaging intended for food use, pursuant to Article 219-bis of Legislative Decree No 152 of 3 April 2006".

[8] "Semplificazioni" Law Decree of 31 May 2021, No. 77 "Governance of the National Recovery and Resilience Plan and initial measures to strengthen administrative structures and accelerate and streamline procedures".

[9] Legislative Decree 116/2020 on waste and packaging (amending Leg. Decree 152/2006) implements: i) Directive (EU) 2018/851 amending Directive 2008/98/EC relating to waste; and ii) Directive (EU) 2018/852 amending Directive 1994/62/EC on packaging and packaging waste.

[10] Some countries have established clear roles and responsibilities for the monitoring of environmental policies, for instance, in Japan, the Government Policy Evaluations Act (Act No. 86) of 2001 clarifies the role of each ministry involved in policy evaluation, and describes how it should be carried out (OECD, 2020[31]).

[11] A good example is provided in France where the Ministry of the Economy and Finance and the Ministry of Public Action and Accounts have dedicated a section[11] on their website to explaining the benefits and use of taxpayer contributions (OECD, 2021[30]) À quoi servent mes impôts? (What are my taxes for?) https://www.economie.gouv.fr/aqsmi.

[12] For instance, Japan applies a landfill tax on industrial waste in only 27 of 47 prefectures and in one city (OECD, 2019[5]).

Part II Practical guidance on selected economic instruments

7 Fiscal reform to reduce primary material demand and support secondary materials – modelling possible outcomes

This chapter assesses the outcomes of fiscal reforms that would disincentivise the use of virgin materials and encourage demand for secondary materials instead. It evaluates the expected environmental outcomes and economic consequences of implementing different sets of policies by modelling stylised policy scenarios. The results suggest that a fiscal reform that combines taxation on primary materials with subsidies for recycling and secondary materials would significantly reduce environmental impacts while achieving budget-neutrality. The chapter also lays the basis for a deeper going discussion of three fiscal interventions in Chapters 8 to 10.

7.1. Introduction

Part I of this report assessed the current use of economic instruments in Italy and identified opportunities for potential intervention to enhance their effectiveness in promoting the circular economy transition, primarily based on available data and evidence from international good practices. Part II focuses on providing more detailed guidance on policy options to promote a fiscal reform away from virgin material demand and to strengthen markets for recycled and other recovered (secondary) materials (Chapter 7). It specifically explores policy guidance on three fiscal instruments that could further support this policy objective (Chapters 8-10).

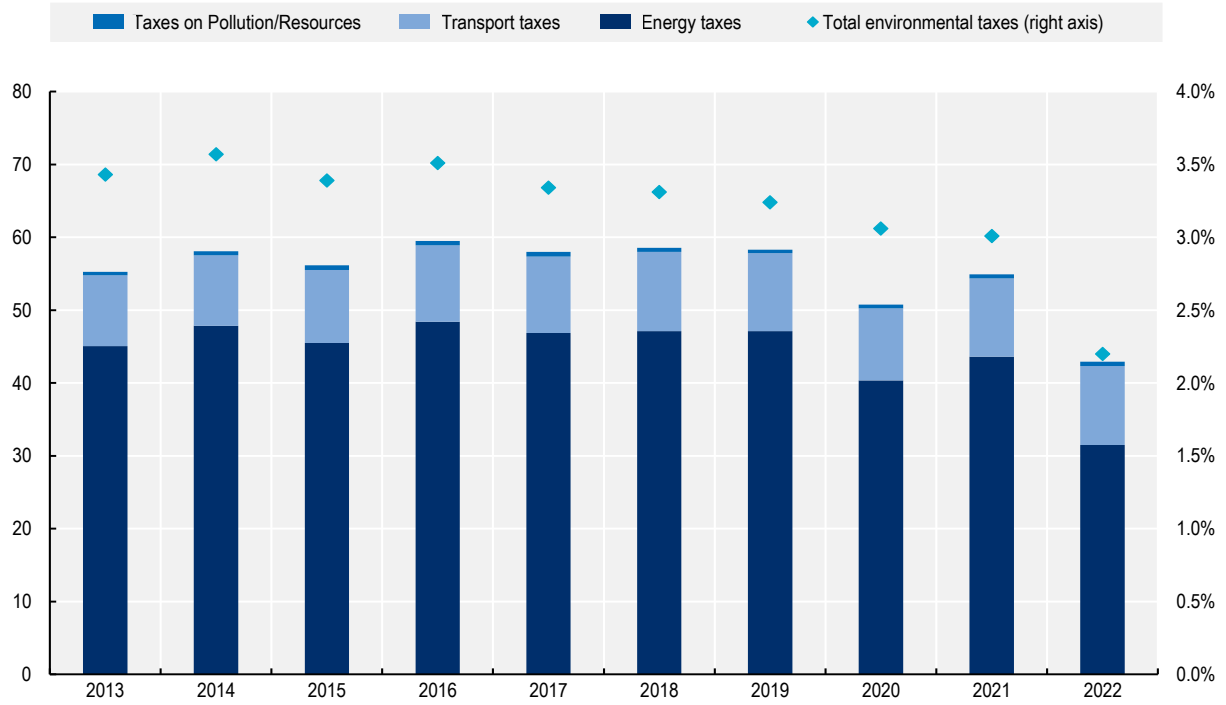
Multiple options are available to policy makers to improve the use of economic instruments to support greater circularity and sustainability, including targeted reforms to individual economic instruments, the removal of environmentally harmful subsidies and wider environmental fiscal reforms. An environmental fiscal reform is understood as an improved alignment of taxes and tax-like instruments with environmental harm, coupled with using the generated revenues in socially productive ways, including potentially shifting the tax burden away from less desirable sources such as labour. In essence, an environmental fiscal reform involves: i) using market-based instruments in environmental policies to factor in the cost of environmental damage in prices paid by polluters; ii) raising public revenue; and iii) deploying it in a socially useful way (OECD, 2017[1]). Environmental fiscal reform generally involves tax reforms to internalise negative externalities and to generate price signals to redirect production, consumption and investment behaviour aligned with higher sustainability and circularity, as well as the removal of environmentally harmful subsidies (and the introduction of environmentally beneficial subsidies).

The topic of environmental fiscal reform has been discussed in EU countries for several decades. A first wave of fiscal reforms took place in the Nordic countries in the 1990s, followed by various efforts in France, the United Kingdom and Spain, among others. Progress in the introduction or application of economic instruments is often held back by obstacles of a political, political economy, economic or budgetary nature, including concerns over their impacts on competitiveness, distributional effects and affordability concerns, public resistance to new taxes, and the political costs of action (IEEP, 2014[2]). One concern is the erosion of the tax base: as the aim of environmental taxes is to reduce environmental damage, when successful, they will effectively erode their own tax base. There may be a case for striking a balance between achieving the objectives of an ecological transition while ensuring the stability of tax revenues (World Bank Group, 2022[3]; European Environmental Agency, 2022[4]).

In Italy, environmentally related taxes generated EUR 42 billion in 2022 (Figure 7.1), corresponding to slightly more than 2% of GDP. The vast majority of revenues from environmentally related taxes and charges come from the energy sector (73%) and the transport sector (25%). In contrast, revenues from taxes and charges on pollution and resource use are minor, generating 1% of total revenues (i.e. mainly due to the environmental protection and preservation fee, destined for provinces, and the landfill tax).

Figure 7.1. Revenues from environmentally related taxes have been declining in Italy

Revenues from environmentally related taxes, by type (in billion EUR, left axis) and total environmental taxes (as a percentage of GDP, right axis)



Note: In addition, there are several environmentally related taxes not reported in ISTAT or Eurostat databases, such as the fee on extractive activities.
Source: Elaboration of (ISTAT, 2022[5]).

The prospect of an environmental fiscal reform in Italy has been on the table for a long time, but little has been accomplished so far (Zatti, 2017[6]). Already in 2014, Law 2014/23 empowered the government to develop a fiscal reform for an ecological transition. More recently, environmental taxation reform has been highlighted as a priority in the National Recovery and Resilience Plan as part of broader fiscal reforms envisaged for the country. The increased availability of information and data today could support an environmental fiscal reform in Italy. The regular update of the Catalogue of Environmentally Harmful (EHS) and Favourable Subsidies (EFS) provides a wealth of insights on current environmentally harmful subsidies, which include both direct subsidies (e.g. to producers) and indirect subsidies (e.g. tax exemptions). Recently, a previous OECD-Italy project, also funded by the European Commission and administered by the Directorate-General for Structural Reform Support, aimed to support the development of a national policy agenda and action plan for environmental fiscal reform in Italy, considering options such as the removal of environmentally harmful subsidies, the reform of environmentally related taxes, and a broader fiscal reform (MASE - OECD, 2021[7]; MASE - OECD, 2021[8]).

Against this background, and in the context of the implementation of the National Strategy for the Circular Economy, there is strong interest in the Italian Government to develop fiscal measures that could help reduce the reliance on primary materials and accelerate the shift towards the use of recycled and other secondary materials. As mentioned earlier, Part II focuses on providing policy guidance in this area. In a first step, Chapter 7 evaluates the expected environmental outcomes and economic consequences of implementing different sets of policies that aim to reduce primary materials demand and promote secondary materials. The impacts are explored by modelling such policy scenarios within the OECD ENV-Linkages model (see Chapter 2 for the presentation of the baseline scenario and further details on the model).

This chapter is structured as follows:

- Section 7.1 describes the methodology employed for the policy scenario simulations.
- Section 7.2 presents results for a scenario that introduces subsidies to secondary materials and recycling.
- Section 7.3 presents results for the fiscal reform scenario that combines the aforementioned subsidies with taxation on primary materials.

Chapters 8-10 of the report focus on providing in-depth guidance on a select number of instruments that may support the markets for secondary materials. After consultation with the Ministry of Environment and Energy Security (MASE),[1] it was decided to look at one type of taxation and two types of fiscal incentives. The following instruments were chosen for further assessment:

- Virgin material taxation applied to construction aggregates (Chapter 8).
- Reduced VAT rates on products that contain recycled content (Chapter 9).
- Corporate income tax credits to promote secondary (and other preferred) materials (Chapter 10).

7.2. Description of methodology employed for the modelling simulations

To explore the expected environmental outcomes and economic impacts for Italy of selected fiscal instruments, as well as possible synergies across measures, simulations were performed with the OECD ENV-Linkages model. This is a Computable General Equilibrium (CGE) model that links detailed projections of economic activity to material demand and environmental impacts, and adapted to produce baseline projections for Italy to 2040 (for business as usual, see Chapter 2 for more details). Two policy mixes are modelled and presented here:

- Subsidies to support secondary materials, combining a subsidy for recycling and a subsidy for secondary metals production.
- A budget-neutral fiscal reform for materials, combining subsidies to support the use of secondary materials and taxes on primary materials, using tax revenues to finance subsidies.

These policy mixes are derived from past work carried out at the global level (Bibas, Château and Lanzi, 2021[9]) which showed that the implementation of a global fiscal reform for materials (focused on metals and non-metallic minerals) would enable a relative decoupling of primary material use from economic growth. Model simulations showed that global primary materials use could be reduced by 27% for metals and 8% for non-metallic minerals, with an overall reduction in total primary material use of around 7% compared to the baseline for the year 2040.[2] The shift from primary to secondary materials, resulting from the core policy reform, is projected to reduce the environmental impacts of global materials use, with an overall limited impact on economic activity (i.e. a loss of 0.2% of global GDP in 2040).

The subsidies scenario combines: i) a subsidy for recycling that corresponds to a 75% subsidy rate on the purchasing price of the recycling commodity for firms; and ii) a 25% subsidy on secondary metals production, in line with a previous study by Bibas, Chateau and Lanzi (2021[9]). The impact of the subsidies to support secondary materials is modelled on recycled metals.[3] This choice was made due to the availability of data and given that industrial processes for metals recycling are widespread. Although there are limitations in generalizing the results to other materials (for instance, the assumption that secondary materials are readily available may not always hold, as the recycling of other materials is technically more difficult), the model may still help assess the expected trends as a result of fiscal incentives that support the transition away from primary materials.[4]

The fiscal reform for materials scenario combines taxes and subsidies to achieve budget neutrality. The tax rates on primary metals are designed to increase linearly from 2023 to reach the following levels in

2040: 7 EUR/tonne for iron ores, 14 EUR/tonne for copper ores, 36 EUR/tonnes for aluminium ores, 11 EUR/tonne for other non-ferrous metals ores and 4 EUR/tonne for non-metallic minerals.[5] Tax rates have been calibrated for different metals according to the different environmental impacts. In addition, the same types of subsidies are implemented as the subsidies scenario, but the rate of the subsidy on secondary material production is adapted to 5% (compared to 25% in the first policy scenario). As detailed in section 7.4, this difference in the design of subsidies stems from the larger impact expected from the subsidies when combined with taxes.

Annex B contains further details on the modelling assumptions for these scenarios.

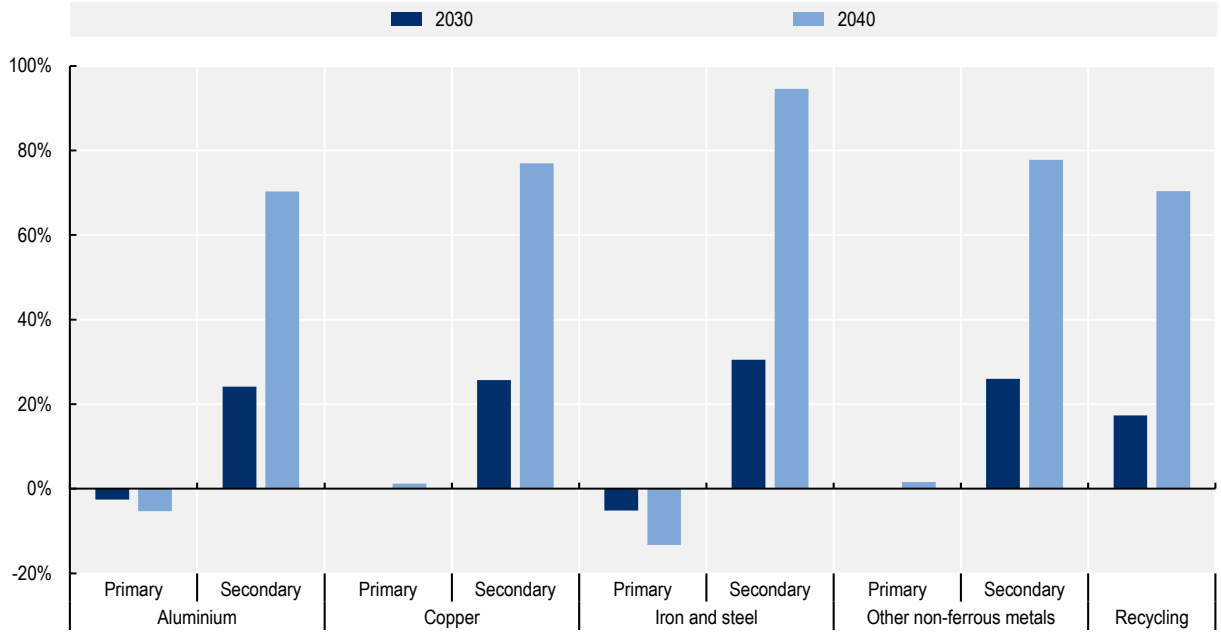
7.3. Subsidies to secondary metals and recycling

7.3.1. Environmental outcomes (material demand and GHG emissions)

The subsidies modelled are expected to shift metal production towards more secondary materials. Based on the model, the production of secondary metals will increase by 70-95% in 2040 compared to the baseline (in blue in Figure 7.2). With the implementation of the subsidies, this corresponds to an increase of the share of secondary metals in production by 40-60% by 2040. In parallel, the demand for recycling (in red in Figure 7.2) is projected to increase by 70%.

Figure 7.2. The subsidies would lead to a shift towards higher secondary metals production and recycling

Evolution (percentage change) w.r.t. the baseline scenario of primary and secondary production for selected metals and the demand for recycling in 2030 and in 2040



Source: OECD ENV-Linkages model.

While it is important to support the value chain for secondary metals to shift the balance of production towards secondary materials, subsidies alone do not significantly alter the overall demand for (primary and secondary) metals. Table 7.1 shows that total demand increases for all metals compared to the baseline as a response to materials made cheaper by the subsidies. Total metals demand in 2040 is expected to increase by 4-13% compared to baseline levels, despite a decrease in the production of most primary metals.

Table 7.1. Projected changes in primary and secondary metals production

Share in total production of primary and secondary metals, and percentage change for real gross output w.r.t. the baseline scenario, in 2040

		Share in total production *Baseline scenario*	Share in total production *Subsidies scenario*	Evolution w.r.t. the baseline *Subsidies scenario*	Total metal use evolution w.r.t. the baseline *Subsidies scenario*
Iron and steel	Primary	65%	46%	-13%	13%
	Secondary	35%	54%	95%	
Aluminum	Primary	66%	52%	-5%	5%
	Secondary	34%	48%	70%	
Copper	Primary	93%	89%	1%	6%
	Secondary	7%	11%	77%	
Other non-ferrous metals	Primary	95%	92%	2%	4%
	Secondary	5%	8%	78%	

Source: OECD ENV-Linkages model.

The impacts of the subsidies are different across the various metals. The main impact of the subsidies is (by design) an increase in the share of all secondary metals through the decrease in the price of secondary inputs (as shown in Table 7.1). Table 7.2 sheds light on the dynamics behind this evolution by examining the price of primary and secondary commodities as well as the costs to purchase mining inputs for the metal sectors. It is also relevant to look at the impacts of the subsidies on primary metals, which vary across metals. For ferrous metals (iron and steel) and aluminium, the subsidies scenario leads to a decrease in the price of primary metal production and thus of the purchase of mining inputs, whereas, for copper and other non-ferrous metals, the primary production price and purchase of mining inputs increase slightly. These results reflect: i) the different levels of subsidy rates across metals (calibrated to the metal-specific environmental impacts); ii) the limited substitutability of metal ores in primary production (generally, productivity gains can be found when using more capital); and iii) diverse levels of substitution from primary materials to secondary materials. For all metals, secondary metals production increases by an order of magnitude more than primary.

Table 7.2. Sectoral consequences

Percentage change for metal ores w.r.t. the baseline in 2040

Metal sector Indicator	Iron and steel	Aluminum	Copper	Other non-ferrous metals
Costs to purchase mining inputs for the primary metal sectors (real value)	-14%	-6%	1%	1%
Primary production (price)	-3%	-4%	0%	1%
Secondary production (price)	-35%	-28%	-24%	-24%
Primary production (real value)	-13%	-5%	1%	2%
Secondary production (real value)	95%	70%	77%	78%

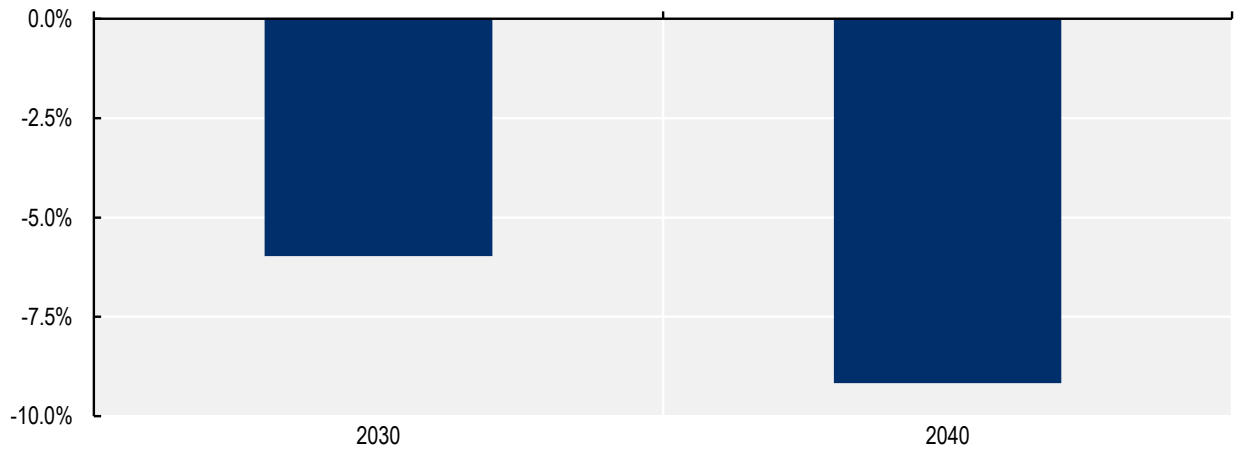
Note: Prices are net of tax.
Source: OECD ENV-Linkages model.

The slight increase in demand overall for metals explains why the shifts in materials use triggered by the subsidies lead only to a slight decrease (by 10% in 2040) in greenhouse gas (GHG) emissions compared to 2021 levels (Figure 7.3). As the activity in primary metal production decreases, so do the related GHG

emissions. However, the model projects a concurrent increase in GHG emissions related to projected increases in secondary metals production due to a doubling of electricity demand and an electricity mix that is assumed to remain reliant on fossil fuels (mostly gas-fuelled power plants). Overall, the net effect is a reduction in GHG emissions, as the decrease in emissions related to primary metal production more than offsets the increase in emissions related to secondary metals production. Compared to the baseline (not shown in Figure 7.3), the subsidies will achieve a similar reduction in GHG emissions in 2040 from 2021 levels. This is mainly due to the fact that total demand in 2040 for metals increases by 4-13% compared to baseline levels, despite a decrease in primary materials production.

Figure 7.3. The subsidies would lead to a slight decrease in GHG emissions compared to 2021 levels

Percentage changes w.r.t 2021



Source: OECD ENV-Linkages model.

Model results for overall material demand to 2040 and the related implications for GHG emissions suggest that the design of the policy mix should pay attention to mitigating possible unintended effects of subsidies (or similar instruments such as fiscal incentives). Finished goods generally contain a combination of different materials, incorporating both primary and secondary materials. Thus, although the subsidies aim to support a shift to secondary metals, they could trigger a rebound effect on overall material demand, including primary demand. To address this, one option could be to implement policies that curb demand for physical goods (construction, manufactured goods), including through circular policies that seek to encourage reuse and repair, for example. Another option is to implement policies that disincentivise the use of virgin materials in production, such as targeted taxes. Section 7.4 illustrates the potential environmental outcomes and economic impacts from implementing material taxation in combination with subsidies in the context of a budget-neutral fiscal reform.

7.3.2. Economic implications

The modelling results indicate that the subsidies would lead to macroeconomic impacts that are small overall, as detailed below for impacts on gross domestic product (GDP) and employment, and impacts on public revenues.

The modelling exercise presented here investigates the possible macroeconomic and sectoral structural changes[6] brought about by the measure and possible impacts on employment.

In response to the presence of subsidies for recycled materials, two main trends are expected: changes in production modes and demand patterns. First, firms are expected to adapt by using fewer raw and refined

resource inputs in production, while shifting towards secondary materials. Economic activity in primary metals sectors is likely to decline, while the opposite effect is expected for secondary metals production. In parallel, demand patterns could change because of policy-induced variations in the relative price of goods or services, or when preferences evolve to adapt to the new economic environment (for example, due to greater consumer awareness), leading consumers to prefer goods that contain secondary materials. In turn, changes in demand patterns would lead to the expansion (or contraction) of certain economic activities. Changes in wages and thus household income are also likely to influence choices in savings or the labour force participation rate. Moreover, government spending on resource-efficient sectors may "crowd out" private investments in other sectors, negatively affecting output and employment within these sectors.

For the subsidies evaluated in this modelling exercise, the macroeconomic impacts are small overall. As shown in Table 7.3, GDP is projected to decrease by 0.4% in 2040 in Italy compared to the baseline. This is overall a slight decrease, corresponding to a decrease in the average growth rate over the 2021-2040 period of about 0.02% per year. The subsidies would lead to a minor increase in real wage rates and employment; these small impacts are aligned with the small share of the economy, represented by the metal processing sectors (about 3% of GDP).

Table 7.3. Summary of macroeconomic consequences

Percent change w.r.t. the baseline scenario for 2040

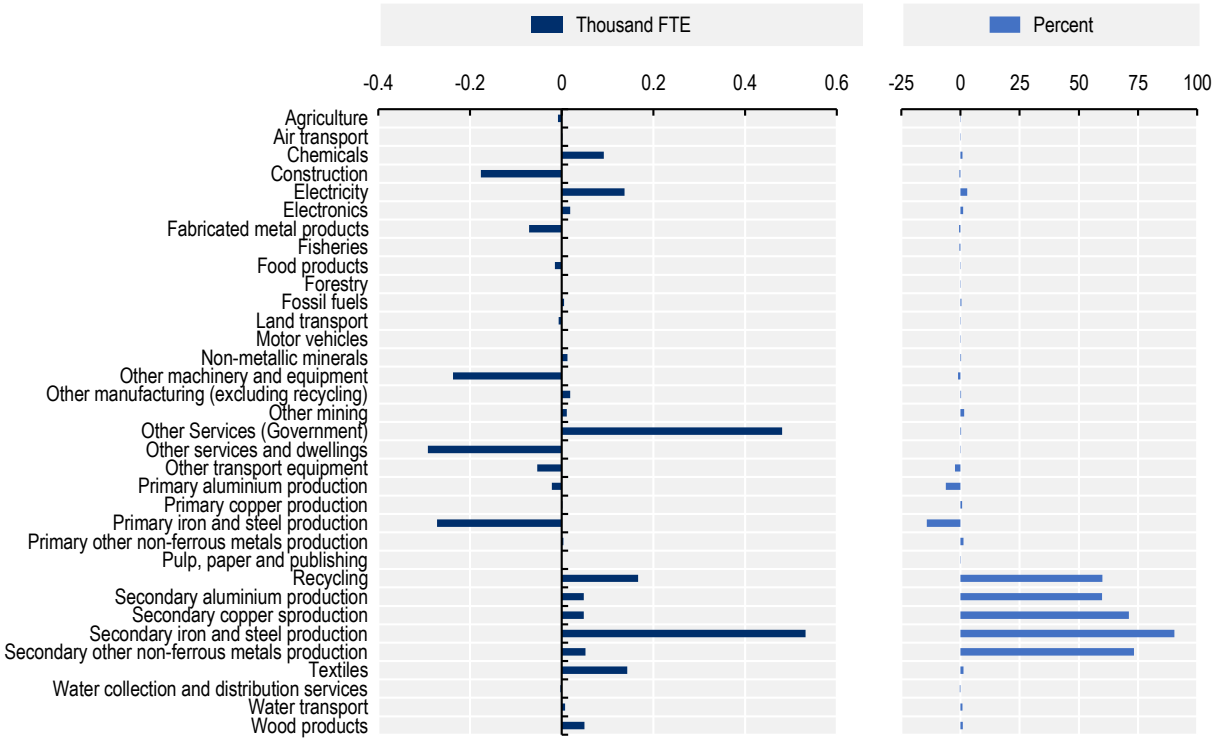
	2030	2035	2040
GDP (constant PPP)	-0.1%	-0.2%	-0.4%
Household consumption	-0.2%	-0.4%	-0.7%
Employment (prs)	0.1%	0.1%	0.1%
Wage rate (relative to CPI)	0.0%	0.1%	0.1%
All materials (volume)	0.0%	0.0%	-0.1%
Primary material intensity	0.1%	0.2%	0.4%

Note: CPI stands for Consumer Price Index, PPP stands for Purchasing Power Parities.
Source: OECD ENV-Linkages model.

The macroeconomic and sectoral structural changes triggered by the subsidies affect employment in specific sectors, although the overall effect on employment is small (+0.1%), as shown in Table 7.3. The evolution of sectoral employment depends on the sector. It is not only determined by the level of activity within each industry but also by the substitution possibilities between primary and other forms of materials, and between labour and other inputs, both of which result from changes in their relative prices. As illustrated in Figure 7.4, the implementation of the subsidies has a positive effect on employment, mainly in the sectors targeted by the subsidies, i.e. secondary materials production and recycling (with an increase of 60-90% in employment in these sectors). Conversely, primary metals production is negatively affected (employment would either remain constant or decrease up to 14%). As these sectors employ less than 3% of the total workforce, the rest of the economy is only marginally affected by these policies.

Figure 7.4. The modelled subsidies are expected to support employment in targeted sectors

Variation of employment by sector w.r.t. the baseline scenario, in 2040



Note: FTE = Full-Time Equivalent.
Source: OECD ENV-Linkages model.

In terms of expected impacts on public finances, the modelled subsidies are of varying importance in the composition of government budgets. While subsidies on the consumption of recycling goods remain marginal (around 0.2% for Italy), the subsidies on secondary metals are important, around 1.7% of tax revenues. Even in 2017, before the implementation of the reform, the subsidies for secondary metals production already absorbed 0.4% of total tax revenues. From a macroeconomic perspective, the modelled subsidies would not significantly affect the composition of government revenues and expenditures.

Table 7.4. The subsidies in the composition of government budgets

Changes in composition of government budgets, percentage of tax revenues

	2021	2040	
		Baseline scenario	Policy scenario
Tax on labour income	27.3%	26.5%	26.6%
Tax on primary metals	0.0%	0.0%	0.0%
Subsidy on recycling good use	0.0%	0.0%	-0.2%
Subsidy on secondary metals production	-0.4%	-0.4%	-1.7%
Tax on primary metals production	0.7%	0.7%	0.6%

Note: Negative values correspond to subsidies.
Source: OECD ENV-Linkages model.

7.4. Fiscal reform to support secondary materials

The modelling results presented in the previous section suggest that subsidies alone could support shifts towards a higher demand for secondary materials in production processes, but without necessarily guaranteeing reductions in GHG emissions. The promise of environmental and climate benefits of higher circularity rests on the assumption that demand for primary materials will decline, that is, they are displaced by secondary materials (which are generally less impactful on the environment), or higher resource efficiency is achieved in production processes. However, the use of subsidies on their own may lead to higher consumption levels and a greater demand for (primary and secondary) materials overall, potentially cancelling out environmental and climate benefits.

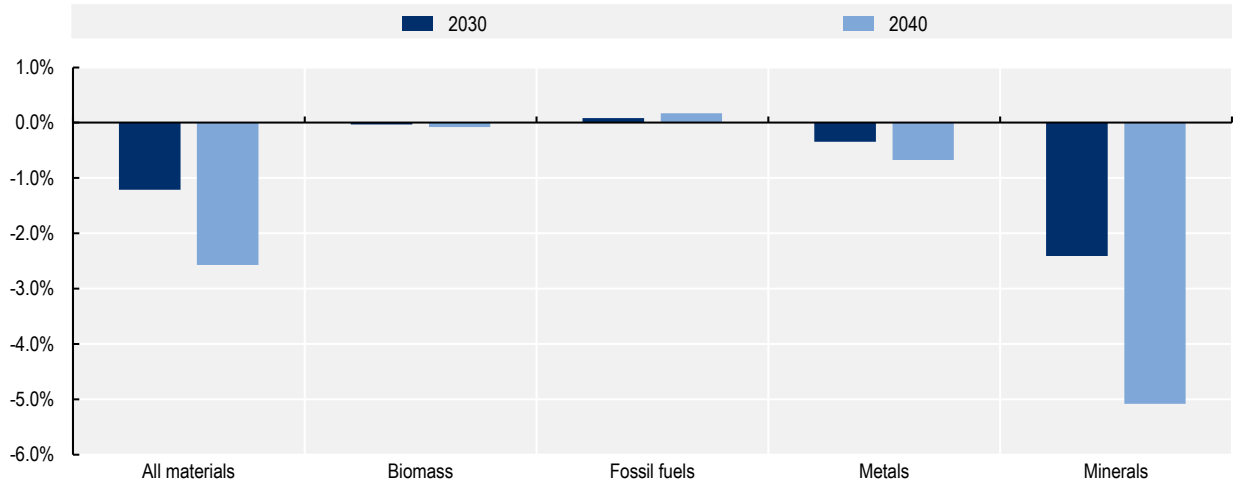
For these reasons, the combination of subsidies and other incentive measures, with explicit, revenue-raising instruments, is generally preferable to amplify the benefits of the policies and thus achieve budget neutrality. This section explores the environmental outcomes and economic implications of a fiscal reform scenario that combines virgin material taxes with subsidies (on recycling and on secondary materials). As described in section 7.2, the fiscal reform for materials scenario includes taxes on primary metals (with different tax rates calibrated according to the environmental impacts and market prices) as well as a subsidy for recycling and a subsidy for secondary metals production. The latter was adapted to a lower value (of 5%, compared to 25% in the first policy scenario) due to the larger impact of the subsidies expected in this scenario.

7.4.1. Environmental outcomes

The implementation of a fiscal reform for materials is projected to lead to an overall reduction of material use, while promoting the shift to secondary materials. Figure 7.5 shows the potential impacts on material use of the fiscal reform for materials described earlier. In particular, the implementation of primary material taxes could reduce the amount of materials used in the economy, mostly primary minerals and metals (i.e. the material groups targeted by the tax). In addition, there is a slight projected increase in fossil fuel consumption due to the energy requirements of producing domestic secondary materials.

Figure 7.5. The fiscal reform for materials would reduce the use of minerals and metals overall

Evolution of total (primary and secondary) material use (percentage change) w.r.t. the baseline scenario



Source: OECD ENV-Linkages model.

The implementation of the fiscal reform also boosts the use of secondary metals across all represented categories. Table 7.5 shows the share of secondary metals in monetary values based on the fiscal reform (for materials) scenario and the baseline. Assessing the specific rates of growth for each material will depend on the level of policies implemented, as well as the differential in prices between material inputs in the production of goods. The overall result is that the share of secondary materials is boosted by the tax imposed on primary materials and the subsidies introduced for secondary materials and recycling.

Table 7.5. Evolution of secondary metals in the *fiscal reform for materials* scenario

Percentage share of secondary sectors in real gross output.

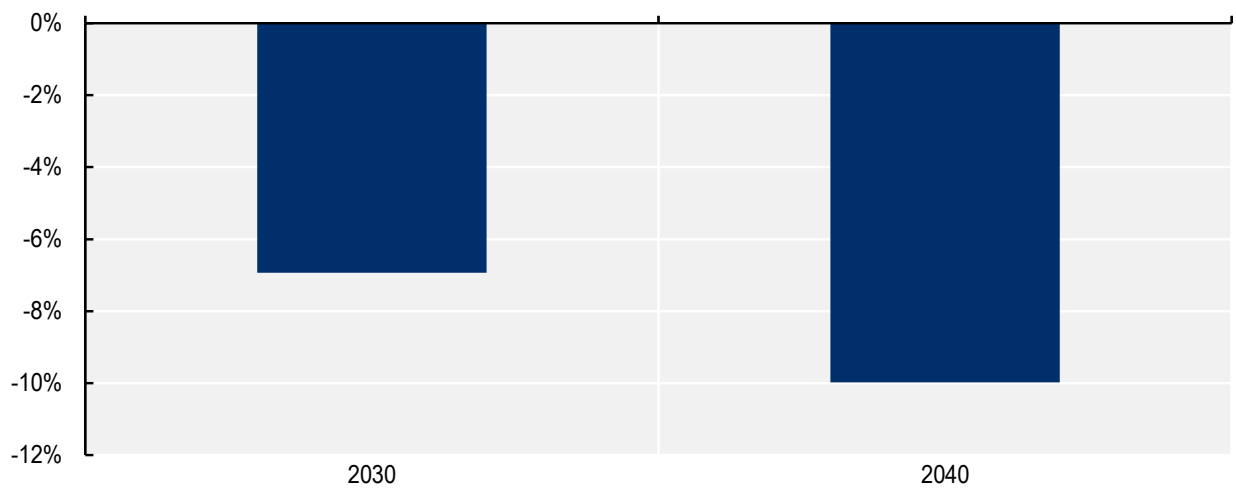
	2021	2030		2040	
		Baseline	Fiscal reform for materials	Baseline	Fiscal reform for materials
Iron and steel	33.2%	33.9%	36.0%	34.6%	39.3%
Aluminium	32.9%	33.3%	34.7%	33.6%	36.9%
Copper	6.8%	6.7%	7.2%	6.8%	7.9%
Other non-ferrous metals	5.2%	5.0%	5.3%	4.9%	5.7%

Note: These shares are based on the output of the sectors in value and thus are different from shares in metal content.
Source: OECD ENV-Linkages model.

The combination of taxation for primary materials and subsidies for recycling and secondary materials would lead to a greater decrease in GHG emissions (compared to the subsidies only scenario) of around 10% in 2040 compared to 2021 (see Figure 7.6). Nevertheless, the still significant GHG emissions linked to the use of secondary metals underscore the importance of implementing circular economy policies that focus on improving resource efficiency, for example, by encouraging reuse and repair, which could lead to greater reductions in GHG emissions than substituting primary metals with secondary metals.

Figure 7.6. GHG emissions are projected to decrease as a consequence of the *fiscal reform for materials* scenario

Percentage changes w.r.t 2021



Source: OECD ENV-Linkages model.

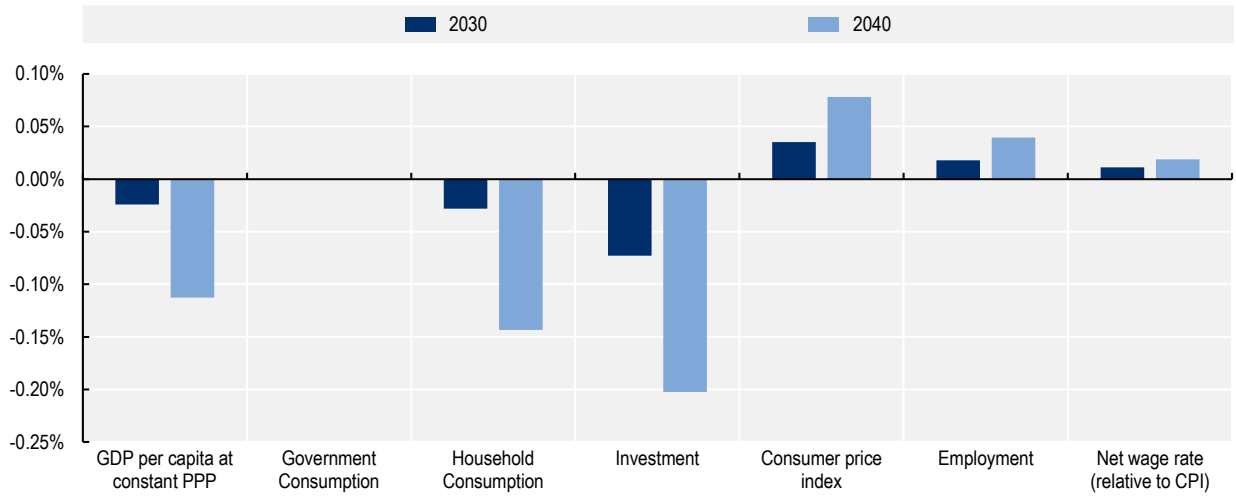
The results for Italy are aligned with previous findings on the expected outcomes of a fiscal reform for materials (Bibas, Château and Lanzi, 2021[9]), which showed that global primary materials use could be reduced by 27% for metals and 8% for non-metallic minerals compared to the baseline for the year 2040, leading to GHG emissions savings. However, the results showed that OECD countries, and particularly OECD Europe, showed the lowest reduction globally. This result is likely to stem from the specific characteristics of countries in the region, including their material endowment, material use, and extraction levels.

7.4.2. Economic implications

The implementation of the fiscal reform scenario has a negligible impact on macroeconomic indicators. For most of the macroeconomic indicators, the variation remains smaller than 0.2% in 2040 (Figure 7.7). The main effect is seen in the slight decrease of GDP, leading to a slight drop in investment and household consumption. Government consumption remains unchanged. Employment and the net wage rate increase slightly. Overall, the macroeconomic situation remains largely unchanged.

Figure 7.7. The fiscal reform scenario is not expected to lead to large macroeconomic consequences

Percentage changes w.r.t. the baseline scenario



Source: OECD ENV-Linkages model.

The overall impact on government budgets is neutral as, by design, the subsidies are financed by tax revenues. Table 7.6 shows the variations for the different items in government spending and revenues. The changes are similar to the scenario in which only subsidies were implemented, but the scenario also raises taxes on metals and non-metallic minerals. Revenues from material taxes would remain moderate compared to other sources of tax revenues, for example, labour taxation accounts for 26.6% in 2040, while indirect taxes of commodities like VAT (not presented here) account for around 50% of total tax revenues.

Table 7.6. Changes in composition of government budgets following a *fiscal reform for materials*

Percentage of tax revenues

	2021	2040	
		Baseline scenario	Fiscal reform scenario
Tax on labour income	27.3%	26.5%	26.5%
Tax on primary metals	0.0%	0.0%	0.0%
Subsidy on recycling good use	0.0%	0.0%	-0.2%
Subsidy on secondary metals production	-0.4%	-0.4%	-0.7%
Tax on primary metals production	0.7%	0.7%	0.6%
Metals tax	0.0%	0.0%	0.0%
Non-metallic minerals tax	0.0%	0.0%	0.2%
Total taxes	100.0%	100.0%	100.0%

Note: Negative values correspond to subsidies.
Source: OECD ENV-Linkages model.

7.5. Conclusions from the modelling results and next chapters

Overall, the results of the simulation suggest that stand-alone subsidies to promote the use of secondary materials may only marginally improve environmental outcomes. Policies that promote secondary materials in production (i.e. closing resource loops, see also Chapter 1) would only lead to environmental benefits if secondary materials have a much smaller environmental footprint than primary materials. Furthermore, the environmental benefits of a fiscal reform for materials come mainly from the premise of displacing virgin production. Although promoting secondary materials is an important part of the policy mix in accelerating the transition to a circular economy, measures are also needed to discourage primary material extraction and use to enable changes in production and consumption patterns that lead to higher material productivity or higher asset utilisation (i.e. narrowing resource flows).[7] Taxation can counter potential rebound effects on material consumption or undesired material substitution and, simultaneously, generate stronger price signals to reduce virgin materials use. When such taxes are combined with subsidies, aimed at increasing the supply and quality of secondary materials, the overall policy mix can amplify GHG emissions savings.

Overall, a policy mix comprising taxes and subsidies can help to safeguard public revenues, generate budget resources for targeted support measures, and help achieve environmental policy objectives. Such a policy mix would need to be carefully calibrated for each of the targeted materials and goals. Subsidies or fiscal incentives should be designed so as to target specific barriers that would not be overcome by pricing alone, such as a lack of awareness of opportunities in R&D and innovation for circularity, or possibly to generate political support for larger reforms. Where possible, policies should be based on life cycle metrics to ensure that shifts in production processes reduce overall environmental impacts.

The following chapters present key considerations to guide policy makers in the development of selected policy instruments to support the demand and supply of secondary materials.

- Chapter 8 provides practical guidance on the introduction of virgin material taxation on construction aggregates, a relatively well-known instrument already in place in selected OECD countries and recommended for introduction following the stocktaking exercise presented in Part I.
- Chapter 9 explores the potential of reduced VAT rates to support secondary materials.
- Chapter 10 looks at opportunities to strengthen the use of corporate tax credits, a type of corporate income taxation incentive currently used in Italy to support preferred materials in production.

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Notes

[1] The full list of options considered for further analysis is contained in Annex A.

[2] The report carries out policy scenario analysis to 2040 because multiple national strategies currently implemented or planned contain targets to 2040 at the latest. For instance, the Italian National Strategy for the Circular Economy includes actions planned by 2035.

[3] A tax on non-metallic minerals was also modelled to support the ex-ante evaluation of virgin material taxation on construction aggregates, the results of which are presented in Chapter 8.

[4] The main limitation is that secondary materials are not readily available. Results presented here are for metals, which tend to have high recycling rates and are used in very different products, but other materials face such issues as quality and insufficient supply, as well as more complex recycling and reprocessing operations.

[5] The instruments are introduced in the model at the global level to mitigate trade implications, which would be outside the scope of the current analysis. Annex B provides further details on how the tax levels were set.

[6] Previous OECD work by Chateau, Bibas and Lanzi (2018[10]) suggests that environmental policies generate structural adjustment pressures on goods and labour markets through four main channels as a result of changes in: i) production modes; ii) demand patterns; iii) macroeconomic conditions; and iv) trade-specialization and competitiveness.

[7] Reductions in demand for virgin materials can occur in all three of the main mechanisms discussed in Chapter 1, including a slowing down of resource use. The policy simulations presented in this chapter solely focus on closing the resource loop and narrowing the resource flow. Modelling non-market policies aimed at slowing the resource loop is difficult in a CGE setting due to the lack of sufficient data on their costs and impacts. Nevertheless, policies to slow down resource use, for instance, through improved eco-design for durability and repairability, form a critical component of a comprehensive policy mix for the transition to a circular economy.

8 Virgin material taxation of construction aggregates

The construction sector is pivotal for Italy's transition to a circular economy, mainly due to its demand for raw materials and the substantial levels of waste generation. Virgin material taxes have been used by some countries to lower virgin material demand, promote a more efficient use of resources as well as accelerate a shift to secondary and other recovered materials.
This chapter offers practical guidance for the possible introduction of virgin material taxation on construction aggregates in Italy. It provides key data and considerations for instrument design and implementation, including information on current trends in mineral extraction in Italy, various options for defining the tax, and an evaluation of the associated economic and environmental implications. The chapter concludes with policy recommendations on the definition of a national legislative framework on extractive activities and considerations for creating an effective policy mix.

8.1. Introduction

Construction is a strategic sector for the circular transition in Italy, mainly due to its raw material demand and significant waste generation. As discussed in Chapter 2, baseline projections suggest a marked increase in the sector's output and material intensity by 2050. Furthermore, the sector's dependency on virgin materials raises concerns over security of supply, potentially impacting the competitiveness of the Italian economy. This dependence, magnified by infrastructure projects funded by the National Recovery and Resilience Plan as well as tax incentives for building renovations, underscores the need to focus on reducing waste and boosting recycling in the sector.

In Italy, sub-national levels of government have authority over extractive activities. Currently, most Italian regions impose fees on the extraction of materials such as sand, gravel and rock. Regional laws specify the tax rates, the allocation of revenues, and any requirements for restoration. They can also determine the configuration of municipal or provincial plans that can specify, among other things, extraction sites or exploitation criteria. In general, the Regional Board collects the tax and disperses the revenues, ideally to municipalities with extractive activities to compensate for the environmental impact of the activities.

Due to their design, existing fees do not alter behaviour at the level of material extraction and sourcing. As previously discussed, Italy could benefit from the introduction of a virgin material tax applied to construction materials. By definition, virgin material taxes are designed and implemented to encourage lower virgin material demand, resulting in a faster shift to secondary and other recovered materials, and more efficient resource use, unlike fees (which are payments for the use or right to use land) or consumer product taxation (which is levied on final products). From a legislative point of view, such a tax could be introduced at the national level, either as a new instrument or as a reform of the existing royalty system.

This chapter considers the design and implementation of a national taxation framework for the extraction of construction aggregates in Italy. It includes:

- Key information on current trends in aggregates extraction in Italy, which is useful to inform decisions on tax definition and its ex-ante assessment (section 8.2).
- The development of possible options for tax definition, including on the taxable event, the tax base, the tax rates, and options for revenue allocation (section 8.3).
- An evaluation of the possible environmental outcomes on virgin demand and greenhouse gas (GHG) emissions and other environmental impacts (section 8.4). This combines insights from the Computable General Equilibrium (CGE) modelling of a virgin material tax on construction aggregates with insights from analysis performed with an input-output methodology.
- An evaluation of possible economic implications, including revenue generation, behavioural implications, distributional impacts, as well as employment and VAT implications (section 8.5). This also combines insights from both the CGE modelling with the analysis performed with an input-output methodology.
- A conclusion with policy recommendations regarding the tax definition (section 8.6).

Even though, at the time of writing, the latest available annual data by the Italian National Institute of Statistics (ISTAT) on quarrying in Italy are for 2020, the study uses 2019 as the reference year because the country's quarrying activity was affected by the COVID-19 pandemic in 2020.

8.2. Current trends in Italy

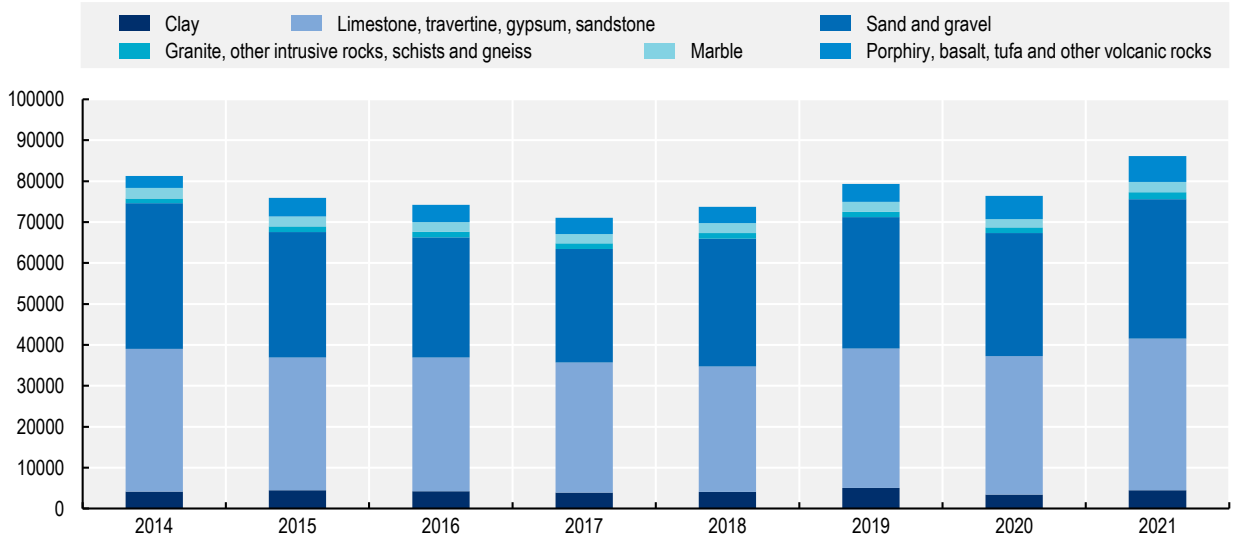
This section provides key information regarding aggregates extraction in Italy to be considered when defining the tax and estimating its impacts.

8.2.1. Extraction of virgin construction aggregates

According to data on mining activities published by ISTAT, in 2021, 86 million cubic metres (m^3) of virgin construction aggregates were extracted annually in Italy. Figure 8.1 illustrates extraction data for 2014-2021. The “limestone, travertine, gypsum, sandstone” and “sand and gravel” categories account for more than three-quarters of total extraction, while the rest is clay, marble, basalt and granite.

Figure 8.1. Extraction levels of construction aggregates in Italy have been relatively stable in recent years

Construction aggregates extracted in Italy (million m^3) by type, 2014-2021



Notes: “Clay” includes clay and peat; "limestone, travertine, gypsum, sandstone" includes alabaster, sandstone, limestone, calcarenite, dolomite, gypsum, marl, quartzarenite, travertine, limestone tuff, verdello; "sand and gravel" includes breccias, conglomerates, inert, alluvial aggregates, mixed material of quarry, stones, sand and gravel, silica sands, tout venant; "granite, other intrusive rocks, schists and gneiss" includes slate, beole, calcareous, diabase, jasper and shingle, diorite, gneiss, granite, repen, serpentine, quartz; "porphiry, basalt, tufa and other volcanic rocks" includes basalt, lapillo, lava and basalt, pepper, pumice, porphyry, pozzolan, trachyte, tuff, volcanic tufa.
Source: Authors’ elaboration based on (ISTAT, 2023[1]).

As detailed in Annex 8.A:

- More than 35% of the limestone was extracted in the South of Italy, primarily in Puglia and Campania.
- Most of the sand and gravel extractions occurred in the North of Italy, with over 39% in the Northwest (mainly in Lombardia) and more than 32% in the Northeast (with the largest extraction in Veneto).
- Over 54% of alluvial aggregates are extracted in Piemonte (Northwest) and more than 26% in Emilia-Romagna (Northeast).
- The extraction of clay was distributed fairly evenly across the Italian territory. Approximately one-quarter of the extractions occurred in the Northeast, one-quarter in the Centre, and one-quarter in the South. Additionally, more than 9% was extracted in the Northwest and over 6% in the Islands.

- More than half of the basalt was extracted from the Islands, and over one-third in Lazio (Centre).
- Most of the silica sand was extracted in Piemonte and Emilia-Romagna.

The report leverages data from the mines and quarries survey (ISTAT, 2023[2]). Another source of data now available is the Economy-wide material flow accounts (EW-MFA) database. This database was not used because some data processing/assumptions were needed to estimate extracted amount per type of material and because there is some misalignment with data used for the current application of fees in Italy.

8.2.2. Recycled construction aggregates

In 2021, 42.3 million tonnes (Mt) of the mineral waste from the construction and demolition sector were prepared for reuse, recycling and other forms of recovery in Italy (ISPRA, 2023[3]), corresponding to 79% of the total mineral waste generated in the same year (53.3 Mt). This represents a high recycling rate, indicating that the construction industry reintegrates substantial amounts of materials back into the economy. However, current recovery of construction and demolition waste (CDW) largely relies on backfilling or lower-grade uses, such as in road sub-bases (European Environmental Agency, 2020[4]). Although information is limited, as of 2015, Italy supplied only around 3% of its demand for aggregates through recycling (Ortiz, 2017[5]).

8.2.3. Prices of construction aggregates and transport costs

Prices of construction aggregates fluctuate over time and vary depending on the type of material, its quality, and the region where it is extracted. Table 8.1 shows the price estimates used in this study. No differentiation was made between primary and secondary construction aggregates, as no price comparisons for Italy or Europe were found in the literature.

Table 8.1. Price and density per type of aggregate included in the study

	Price (EUR per tonne)*	Density** (t/m^3)	Price (EUR per m^3)
Clay (argilla)	5.4	1.9	10.1
Limestone (calcare)	8.0	2.3	18.1
Gypsum (gesso)	12.5	2.1	26.2
Sandstone (arenaria)	24.1	2.3	55.0
Sand and gravel (sabbia e ghiaia)	9.1	1.9	17.6
Alluvial aggregates (inerti alluvionali)	10.7***	2.0	21.5
Silica sands (sabbie silicee)	13.0	1.7	21.9
Granite (granito)	52.6	2.5	130.2
Basalt (basalto)	11.1	2.6	29.0

* The prices per unit of weight were calculated as weighted averages for the period 2016-2022 based on the quantities sold of aggregates in Italy every year (ISTAT, 2023d).
** Densities were estimated using the annual Italian statistics on mineral resource extracted in 2020 in weight and volume (ISTAT, 2023[2]). These densities were used to convert prices per tonne to prices per m^3.
*** The price of alluvial aggregates was not available, and it was assumed to be equal to the weighted average of all aggregates.
Source: Authors' elaboration based on (ISTAT, 2023[2]; ISTAT, 2023[6]).

In general, prices of recycled materials can vary significantly based on factors such as the quality of the material, regional market conditions and the type of material, as well the price of virgin materials. Recycled construction aggregates are expected to be more affordable and cost-effective compared to virgin aggregates, as recycled construction aggregates are not quarried and involve less transportation and processing.[1] Furthermore, they can offer a higher volumetric yield per tonne compared to virgin construction aggregates (McLanahan, 2023[7]). Nevertheless, quality concerns may hinder the use of secondary construction aggregates. Although recycled alternatives are recognized for being just as durable and strong as virgin construction aggregates for most

applications (with the possible exception of certain load-bearing applications), the construction industry often favours virgin materials for their perceived superior performance (McLanahan, 2023[7]). Measures to support the supply and demand of recycled construction aggregates could further improve their competitiveness.

Aggregates are usually not transported over long distances from the quarry site as transportation costs significantly impact the overall pricing (European Environmental Agency, 2008[8]). According to the Italian Ministry of Infrastructure and Transportation, the average unit cost of transport for lorries heavier than 26 t was EUR 2.54/km as of January 2023 (category D) (MIT, 2023[9]). Consequently, the unit cost of transporting aggregates 50 km away from the quarry, using full capacity lorries (assumed 32t), would be EUR 3.97/t or EUR 8.37/m^3 (assuming a weighted density of 2.11 t/m^3).

8.2.4. Price elasticity of construction aggregates

Based on the experience of selected EU countries in implementing virgin material taxes, it can be concluded that the demand for construction aggregates is relatively inelastic. Chapter 4 presents the following insights on the price elasticity of aggregates in certain countries:

- The Danish tax on aggregates extraction led to a slight reduction in extraction, but the consumption of aggregates did not significantly decrease, suggesting a relatively inelastic demand. Implementation of the aggregates tax in conjunction with other measures, e.g. the waste disposal tax, mandatory separate collection at source of CDW, generally helped to improve the supply of secondary aggregates in the Danish market (Söderholm, 2011[10]).
- In Sweden, a tax was introduced in 1996 on natural gravel extraction to protect groundwater sources. While the tax started with a low rate, an increase in 2003 resulted in a more pronounced reduction in virgin gravel consumption. However, this decline was also influenced by a rising demand for higher-quality crushed rock (Söderholm, 2011[10]).
- In the United Kingdom, an aggregates tax was introduced in 2002. Although there has been a decrease in aggregate extraction, this trend began before the introduction of the tax and was likely also influenced by such factors as a decrease in infrastructure investment and the landfill tax on CDW.
- Italy has not seen any substantial shifts in the demand for aggregates in reaction to the fees applied since the early 1990s. This indicates the relative inelasticity associated with the low tax rate and the industry's limited preparation to assimilate recycled materials of similar quality to virgin products, combined with weak disincentives to landfilling (European Environmental Agency, 2008[8]).

The inelasticity in the demand for aggregates is explained by multiple factors (OECD, 2023[11]). Firstly, the low price of aggregates makes their medium-distance transport unprofitable. This significantly limits competition in the market and the possibility of importing these aggregates from other countries. Aggregates are generally consumed within a 50 km radius of their extraction (Mineral Products Association, n.d.[12]) because transportation over longer distances is unprofitable, resulting in limited competition in the sector. Secondly, the use of extracted aggregates, as an input by most productive sectors, has incomplete substitutes, as recycled aggregates are not yet available in sufficient quantity and quality to meet demand. Thirdly, the construction and infrastructure sector is a market that plans years in advance and, therefore, it is significantly slow to react. Additionally, the cost of aggregates typically represents a small percentage of the final price for buyers, so their demand is not greatly influenced by price fluctuations for these materials.

There are limits to the substitution rate from primary materials to secondary recycled materials due to insufficient quantities of recycled aggregates of appropriate quality currently available. Furthermore, even with the total recycling of all CDW, recycled aggregates would not cover the entire yearly demand for construction aggregates. Currently, the countries with the highest percentage of recycled aggregates impose a levy on virgin aggregates (e.g. the United Kingdom), or they have a shortage of available natural rocks (the Netherlands, Malta), or a shortage of CDW disposal space (Sweco, 2022[13]).

The elasticity of demand may increase in the medium to long term if the possibility of substituting virgin aggregates grows, or in the presence of technological advances in production processes. Measures to support markets for recycled aggregates are pivotal to increasing the availability and quality of substitutes.

8.3. Tax definition

This section describes key design characteristics for a proposed tax on construction aggregates.

8.3.1. Taxable event and tax base

The recommended taxable event is the affectation of ecosystem services and the environmental impact of the extractive activity of construction aggregates. Regarding the scope, it is recommended to impose taxes on all construction aggregates so as to prevent the risks of regrettable substitution and to encourage the use of recycled materials.[2]

The tax base depends on when the taxable event occurs (during extraction or consumption) and on the physical magnitude to be taxed (e.g. quantities extracted, affected areas, affected ecosystem services). Conversely, the taxation of extractive activities is generally preferred as it provides a clearer link to environmental impacts and is simpler to implement and enforce compared to taxing the consumption of construction aggregates. One drawback of this approach is that it could inadvertently promote imports, which could give materials imported to Italy a competitive edge, compared to domestic extractions. Given that this is not believed to be a concern in the Italian context, where the quantity of aggregates imported has been very low in recent years (according to EW-MFA data), taxing the extraction of aggregates appears to be the better option.

Virgin material taxes on construction aggregates may generally be implemented as *ad quantum* taxes based on a physical metric (e.g. quantities extracted, surface of the affected area), *ad valorem* taxes based on a monetary metric (e.g. sales price), or a combination of the two models. In principle, environmental taxes should be directly levied on the negative environmental externalities generated by polluters (or a close proxy), thereby aligning environmental damage with pricing and steering business and consumer choices towards a preferred direction. Generally, *ad quantum* taxes are more correctly aligned to environmental harm and are often simpler to administer than *ad valorem* taxes.

Within the *ad quantum* option, the tax is ideally based on both the affected area and the quantity extracted to provide closer links to environmental externalities. In practice, the choice of the physical magnitude on which to apply the tax often depends on the availability of the data: while information on the volume and weight of extracted materials is routinely reported by extraction operators, data concerning the exploited and restoration areas are not as readily available and requires constant updates to align with any variations in extraction operations or changes in land use.

8.3.2. Tax rate

The tax rate is a key factor that might determine environmental and economic outcomes of environmentally related taxes. A tax rate that is too low, although it may generate public revenues, will not be sufficient to drive behavioural change by firms or consumers. Conversely, a tax rate that is too high could lead to negative economic impacts, especially on the competitiveness of firms and the domestic economy.

Economic theory offers varied perspectives on the optimal way to define tax rates:

- **Negative externalities.** A Pigouvian approach sets the tax rate to reflect environmental damage, which is a clear implementation of the polluter pays principle. As such, it ensures that producers and consumers have a financial incentive to take those impacts into account in their decisions. While this is the preferred approach, the valuation process of environmental externalities can be difficult, especially where the

damage is inflicted on something that does not have a clear market value, and policy makers might need to resort to a proxy for assessing pollution. The proxy should be as close as possible to pollution, thus minimising the risk of introducing distortions in production patterns.

- **Achievement of environmental objectives.** In some cases, tax rates can be adjusted to meet set environmental targets, such as reductions in GHG emissions or in municipal waste generation. Ecological economics advocates for determining the desired activity level as a technical and political decision. Consequently, environmental taxes would be set to curtail activity to these predetermined levels.
- **Revenue raising.** Funding public spending is one main reason why governments may levy explicit environmentally related taxes. This is often the case of taxes applied on goods with inelastic demand curves. These approaches are not aligned with the objectives of environmental taxes.

A common theme in the first two perspectives outlined above is the idea that the tax rate should reflect the environmental repercussions of the activity, allowing for potential variations based on the severity of the impact. Selected studies have delved into the environmental costs tied to aggregates extraction across various regions (Damigos and Kaliampakos, 2003[14]; Garrod and Willis, 2000[15]; Garrod and Willis, 2000[16]; London Economics, 1999[17]). However, to the best of the authors' knowledge, such investigations have yet to be conducted for Italy. In the absence of specific studies for Italy, which differentiate environmental impacts based on activity type, one approach would be to introduce a flat tax across all aggregates. While this method simplifies the process, cheaper materials could be disproportionately impacted by the relatively higher tax. An alternative strategy might be to differentiate tax rates based on the location of the extraction. For instance, extraction activities on sites situated in protected natural areas could incur a higher tax rate.

The feasibility of importing aggregates significantly influences demand elasticity, which in turn affects the effectiveness of the tax. Two main factors determine the decision to import: the proximity of available materials in neighbouring countries, especially as aggregates are usually used within a few kilometres, and the transportation costs from these countries. As outlined in section 8.2.3, Italy's current transport costs average around EUR 3.97/t (corresponding to EUR 8.37/m^3, assuming an average aggregates density of 2.11 t/m^3 and 50 km). To encourage the use of domestic recycled materials over imported raw materials, particularly in Italian regions bordering other countries, it is advisable to set average tax rates below these transportation costs. Alternatively, a tax on imports could be considered, although the additional administrative costs would need to be justified by the risk of expected large quantities of imports.

8.3.3. Revenue allocation

Revenue from environmentally related taxes may be paid into the general government budget and used in accordance with wider policy issues, or it may lower other taxes. Countries may decide to partially or totally earmark revenues for specific spending purposes, which are generally related to environmental policy objectives. The earmarking of taxes is usually not advised as it may lead to inefficient use of government revenues or even a violation of the polluter pays principle. However, earmarking can be helpful to improve the political acceptability of environmental taxes or to ensure a minimum level of targeted public expenditure on the environment.

Multiple options could be considered for earmarking tax revenues. One common option for earmarked environmental taxes is to offset the loss of ecosystem services in municipalities that are close to extraction sites. Resources channelled to municipalities could be used to initiate restoration efforts to counteract the environmental degradation from extraction activities or to develop recreational spaces for locals. Linking the expenditure of the tax revenue to the taxed sector and the affected municipalities could increase the transparency of the tax and its acceptance by economic agents. Additionally, as discussed in Chapter 7, a structure that partially earmarks funds to bolster the appeal and market competitiveness of recycled materials, for instance, with subsidies, could help promote a shift from virgin to secondary materials within the construction sector. Funds could also be earmarked for infrastructural improvements to improve the recycling of CDW, although there are risks of lock-in effects (as discussed in the case of the landfill tax in Chapter 6).

8.3.4. Tax definition scenarios

Table 8.2 summarizes the different tax scenarios used in the following sections to assess the expected environmental outcomes and economic implications of the tax. Differences relate to the tax base, the tax rate and the use of revenues, as well as the elasticity assumptions (0% and 10% price elasticity).

For scenarios with earmarked revenues, it is assumed that the tax revenue will be used to fund actions for the environmental restoration of the quarrying sites and to promote the production and use of recycled materials. While most regions currently have land restoration obligations linked to regional plans of extractive activities ("Piani Regionali delle Attività Estrattive") and permitting, compliance is not consistently achieved. Additional funding could therefore help to ensure nationwide coverage, especially to address priority sites that have the largest adverse impacts on local communities. The sectoral allocation of revenue is assumed to be as follows: forestry and use of forest areas (28%), waste treatment (28%), construction (28%), and education (6%). The remaining 10% would be retained by the public administration to support the administrative costs of the tax.

Table 8.2. Key aspects of the scenarios analysed for the tax on aggregates extraction in Italy

Scenarios	Tax base	Tax rate	Price elasticity	Earmarked tax
S1	ad quantum Quantity extracted in volume	Tax of EUR 2.5 /m^3	0%	Yes
S2			10%	
S3		Tax of EUR 5 /m^3	0%	
S4			10%	
S5	ad valorem Monetary value in EUR	Tax of 10% of the aggregate price	0%	
S6			10%	
S7	ad quantum Quantity extracted in volume	Tax of EUR 2.5 /m^3	0%	No
S8			10%	
S9		Tax of EUR 5 /m^3	0%	
S10			10%	
S11	ad valorem Monetary value in EUR	Tax of 10% of the aggregate price	0%	
S12			10%	

Source: Authors' own elaboration.

8.4. Environmental outcomes

Taxes are widely employed to influence consumption levels. Most governments of OECD countries impose excise taxes on fuel consumption or they differentiate value added taxes (VAT) on food products. Taxes on the extraction or use of primary aggregates are less common, but have been employed by some countries on construction aggregates, such as stone and gravel.

This section discusses the potential environmental outcomes of a tax on the use of primary construction aggregates, and the impact it would have in terms of demand for materials as well as the implications for GHG emissions and other environmental impacts. The environmental outcomes of introducing a virgin material tax on construction aggregates are assessed using two complementary approaches:

- The introduction of a tax on non-metallic minerals of EUR 4/tonne, modelled in ENV-Linkages with a similar methodology as presented in Chapter 7.
- Analysis performed using an input-output methodology to assess the implications of the tax on the switch from primary to secondary aggregates under different tax design options (i.e. for the different tax scenarios

described in Table 8.2). To facilitate the calculations and to provide a higher boundary estimate in this exercise, it is assumed that the tax does not affect total demand of construction aggregates, i.e. that any reduction in primary aggregates demand is compensated by a higher use of secondary materials.

8.4.1. Reduced demand for virgin construction aggregates

It is expected that the introduction of a tax on virgin construction aggregates will reduce the use of virgin aggregates, with gains in resource efficiency or a shift to recycled aggregates, resulting in associated reduced environmental impacts (e.g. extraction-related impacts, GHG emissions).

Policy simulations performed using the ENV-Linkages model indicate that a tax on primary non-metallic minerals of EUR 4/tonne would lead to a 5% reduction in overall demand for these materials in 2040 compared to the baseline. However, the introduction of the tax alone would only lead to modest savings in terms of GHG emissions.

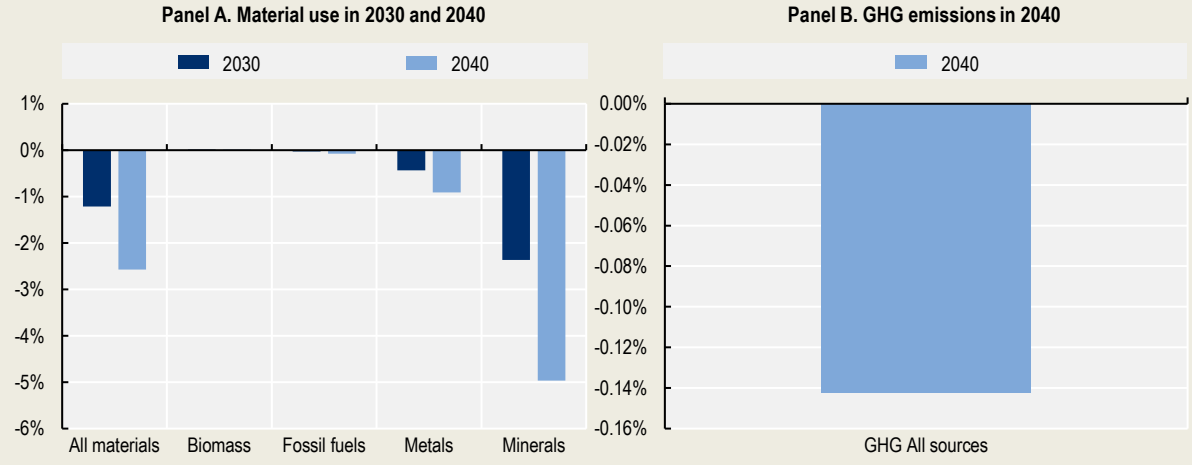
Box 8.1. Results from ENV-Linkages on the introduction of a tax on non-metallic minerals

The introduction of a tax on non-metallic minerals of EUR 4/tonne, modelled in ENV-Linkages with a similar methodology as presented in Chapter 7, is projected to lead to a 5% decrease in the overall use of non-metallic minerals compared to the baseline. Panel A in Figure 8.2 shows the impact of the tax described on the various material categories. In addition to reducing minerals use compared to the baseline, there is also a smaller reduction of metals use due to the impacts on activities that also use metals, as well as in the use of fossil fuels.

The reduction in material use caused by the introduction of a tax on non-metallic minerals would lead to GHG emissions savings of 0.14% compared to the baseline, as shown in Panel B in Figure 8.2. The main impact is on CO_2 emissions, which is linked to the process emissions and energy use in processing non-metallic minerals.

Figure 8.2. A tax on non-metallic minerals is expected to reduce material use

Variation in percentage compared to the baseline scenario



Source: OECD ENV-Linkages model.

As presented in Table 8.3, the results from the input-output methodology suggest that the virgin material tax could substantially shift demand from primary to secondary aggregates, and that the largest reductions in primary demand are expected with *ad quantum* taxes. Demand for all aggregates would decrease by 1.4% for the tax rate option of EUR 2.5/m^3 (S2 and S8), 2.8% with tax rates of EUR 5/m^3 (S4 and S10), and by 1.0% in the *ad valorem* option (S1 and S12). Within the *ad quantum* scenarios, limestone (43% of total reduction) and sand and gravel (28% of total reduction) contribute more than 50% to the total demand reduction, followed by clay (13%) and alluvial aggregates (11%). This largely reflects the current composition of aggregates demand in Italy. The *ad quantum* tax options impact more aggregates with higher extraction levels and lower prices. For instance, under scenarios S2 and S8, the tax rate of EUR 2.5/m^3 represents up to 25% of the price of the cheapest aggregate, which is clay, and only 2% of the price of granite. These proportions double with the tax rate at EUR 5/m^3.

Table 8.3. Demand variation in the scenarios with 10% demand elasticity

Variation in demand compared to current levels, thousand m^3 and % change

	S2 and S8		S4 and S10		S6 and S12	
Scenario Tax rate	***ad quantum* (EUR 2.5 per m^3)**		***ad quantum* (EUR 5 per m^3)**		***ad valorem* 10%**	
	Thousand m^3	%	Thousand m^3	%	Thousand m^3	%
Clay (argilla)	125	2.5%	251	5.0%	51	1%
Limestone (calcare)	413	1.4%	826	2.8%	299	1%
Gypsum (gesso)	12	1.0%	23	1.9%	12	1%
Sandstone (arenaria)	2	0.5%	4	0.9%	4	1%
Sand and gravel (sabbia e ghiaia)	270	1.4%	541	2.8%	190	1%
Alluvial aggregates (inerti alluvionali)	103	1.2%	206	2.3%	88	1%
Silica sands (sabbie silicee)	16	1.1%	31	2.3%	14	1%
Granite (granito)	1	0.2%	1	0.4%	3	1%
Basalt (basalto)	25	0.9%	49	1.7%	29	1%
Total	**966**	**1.4%**	**1 931**	**2.8%**	**690**	**1%**

Note: numbers may not add up precisely due to rounding.
Source: Authors' own elaboration.

8.4.2. GHG emissions and other environmental savings

As emissions from the recycling process of CDW (mainly associated with energy consumption) tend to be lower than GHG emissions related to the extraction of natural aggregates and landfilling of CDW, the tax is likely to have a climate positive effect. Box 8.1 presents estimates for GHG emissions impacts derived from CGE simulations, suggesting that benefits in GHG emissions from the introduction of the virgin material tax alone (i.e. in the absence of additional climate mitigation policies) could be modest overall. This aligns with results obtained for OECD countries and, in particular, for Europe in a previous analysis (Bibas, Château and Lanzi, 2021[18]). Furthermore, considerable GHG emissions occur in the later stages of the life cycle of construction aggregates, such as cement production, but this is beyond the scope of the current analysis.

This section complements the insights presented, with estimates specific to Italy provided from the academic literature. Borghi et al. (2018[19]) estimated that a shift to best recycling practices for CDW would reduce GHG emissions by 152%. Under current management, the impact is 3.40 kg CO_{2e} per tonne of CDW, while a shift from landfilling would have a net benefit of -1.78 kg CO_{2e} (saved) per tonne of CDW. The largest environmental burden associated with the current management comes from waste transportation, which is not compensated

by the use of recycled aggregates. Based on the results of the study by Borghi et al., rough estimates predict that around 13.22 kg CO_{2e} could be saved for every tonne of CDW diverted from landfill to recycling, and thus avoiding the extraction of around one tonne of virgin aggregates (mainly sand and gravel).

According to the life cycle assessment carried out by Simion et al. (2013[20]), using primary data collected for Emilia-Romagna, the production of 1 tonne of aggregates from crushed natural inert quarries generates 103 kg of CO_{2e}, whereas the production of 1 tonne of recycled aggregates from CDW generates 15.5 kg of CO_{2e}. Using estimates by Simion et al. (2013[20]), around 87.5 kg CO_{2e} could be saved from producing and using recycled aggregates instead of virgin aggregates.

In practice, the implications of the tax for the embodied GHG emissions of buildings and infrastructure depend on the sector's response to the tax as well as advancements in the energy mix. A carbon footprint analysis would be needed to accurately estimate the implications on GHG emissions as a result of the tax, also taking into consideration specific features of the tax design and the local context. One aspect highlighted in the literature is the importance of facilitating transportation of CDW to recycling facilities (Borghi, Pantini and Rigamonti, 2018[19]; Cerchione et al., 2023[21]; Colangelo, Petrillo and Farina, 2021[22]). Borghi et al. (2018[19]) recommend localising recycling sites and promoting connections between recyclers and constructors, as well as improving the quality of recycled aggregates.

Beyond GHG emissions, slowing down demand for virgin construction aggregates could mitigate the range of environmental impacts caused by their extraction and consumption. Quarrying operations are often located in natural settings and significant landscape disruptions may occur. During the exploratory and extraction phases, the use of explosives and heavy machinery generates dust, gases and noise. Depending on the location of the activity, the contamination of groundwater and surface waters may occur, as well as disruptions to aquatic ecosystems and sediment transport patterns, potentially reducing water quality. Furthermore, as construction aggregates are a non-renewable resource, their extraction would be increasingly costly, both in economic and environmental terms, in the absence of measures to slow down extraction levels. In addition, quarrying significantly contributes to the generation of waste, including sludge, dust and other non-useful materials.

One indirect environmental benefit of the tax would be a drop in CDW landfilling if the decrease in demand of virgin materials is compensated by a greater demand for recycled alternatives. These impacts would be more likely with a higher landfill tax rate on CDW disposal. In addition, revenue earmarking could amplify the environmental benefits, for instance, if part of the revenues is destined for the restoration of old quarrying sites or to support the availability and quality of secondary materials.

8.5. Economic implications

Economic implications of the introduction of virgin material tax on construction aggregates are assessed using two main approaches.

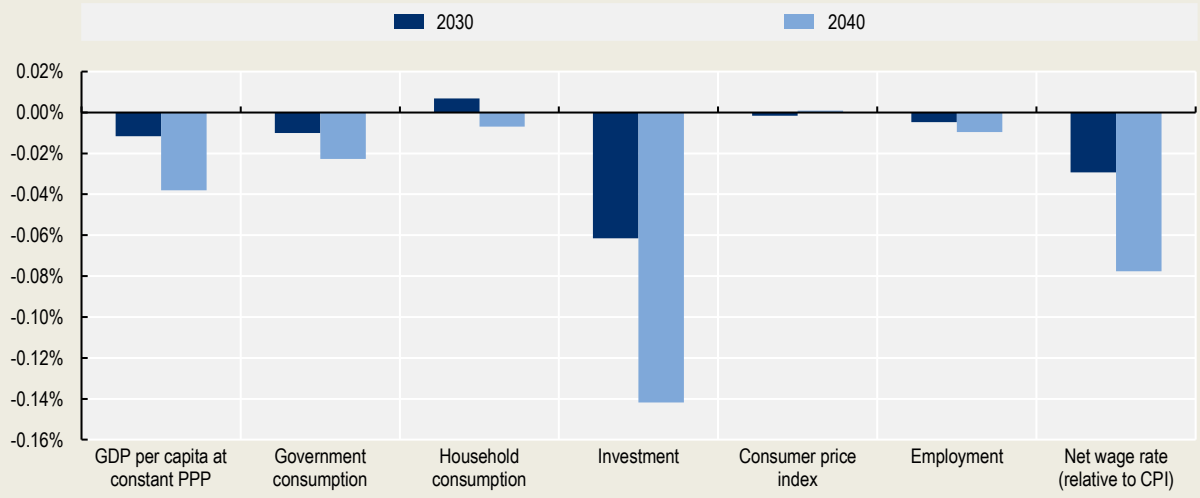
- Simulations performed with ENV-Linkages suggest that the introduction of a tax on construction aggregates is likely to lead to limited impacts on the main macroeconomic indicators, such as GDP and employment. Box 8.2 contains a more detailed description.
- Insights from the empirical literature and calculations performed using an input-output methodology are leveraged to assess the economic implications of different options in instrument design to estimate the economic implications of the different scenarios in terms of revenue generation, behavioural changes, distributional impacts and gross value added (GVA). To facilitate the calculations, and to provide a higher boundary estimate, it is assumed that the total demand of aggregates is not affected by the tax, i.e. that any reduction in virgin aggregates demand is compensated with an increase in the use of secondary aggregates. The estimation has been carried out using 2019 data.

Box 8.2. Results from ENV-Linkages on the introduction of a tax on non-metallic minerals: macroeconomic implications

The introduction of a tax on non-metallic minerals of EUR 4/tonne, modelled in ENV-Linkages with a similar methodology as presented in Chapter 7, would lead to limited macroeconomic implications. Figure 8.3 presents the variation in 2040 compared to the baseline scenario. The variation of GDP per capita is projected to remain below 0.04% in 2040. The principal reason is that the tax is targeting a small sector of the economy, mainly impacting the processing and extraction of non-metallic minerals and their main end-use sector: the construction industry. This explains why the impact on investment (of which construction is the main beneficiary) is greater than the impact on GDP. The impact on employment and wage rates remains limited.

Figure 8.3. The tax on non-metallic minerals would lead to minimal changes in macroeconomic indicators

Variation in percentage compared to the baseline scenario

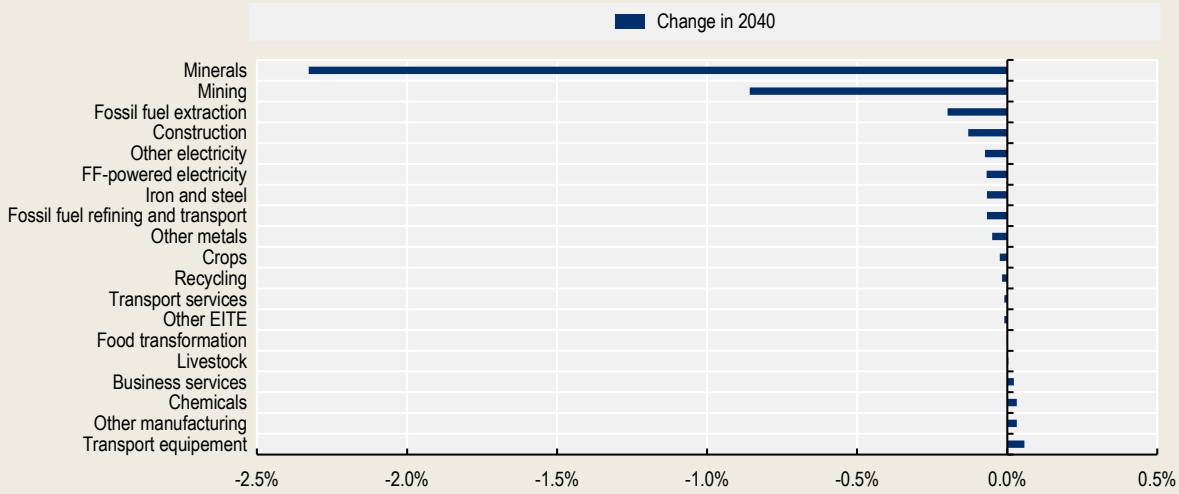


Source: OECD ENV-Linkages model.

The small change in overall employment hides a larger disparity in sector-specific employment. Figure 8.4 shows the evolution of employment compared to the baseline scenario in 2040. As expected, the largest impact is projected to occur in sectors linked to non-metallic minerals: processing and extraction, and construction. The energy sectors (fossil fuel extraction and power generation) are impacted because of the (small) macroeconomic impacts and because of the fall in output in the sectors linked to metals and minerals.

Figure 8.4. The tax on non-metallic minerals is expected to negatively affect employment in the targeted sectors

Variation of employment by sector w.r.t the baseline scenario, in 2040



Source: OECD ENV-Linkages model.

8.5.1. Revenue generation

The revenue generated by a virgin material tax would be one order of magnitude higher than the revenues generated by existing fees, which, in 2021, amounted to approximately EUR 50 million at the national level for all construction aggregates, including ornamental stones (see Chapter 5).

Table 8.4 reports expected tax revenues by type of aggregates for scenarios S1-S12 (see Table 8.2.). The potential revenues are higher for *ad quantum* taxes (than for *ad valorem*). For the *ad quantum* taxes, revenues would amount to EUR 170-172 million at a tax rate of EUR 2.5 per m^3 (S1 and S2), and to EUR 335-344 million at a tax rate of EUR 5 per m^3 (S3 and S4). Revenues would amount to EUR 131-132 million for the *ad valorem* tax of 10% of the aggregates price (S5 and S6). The effect of demand elasticity on revenue is limited overall. For the 12 scenarios, limestone is the aggregate contributing the most to the total revenue of the tax (at 40-41%), followed by sand and gravel (at 25-27%), and alluvial aggregates (at 12-13%).

Table 8.4. Aggregates tax revenue per scenario

Tax revenues by scenario, EUR millions

	S1 and S7	S2 and S8	S3 and S9	S4 and S10	S5 and S11	S6 and S12
Scenario Tax rate	***ad quantum* (EUR 2.5/m^3)**		***ad quantum* (EUR 5/m^3)**		***ad valorem* 10%**	
Scenario Elasticity	**0%**	**10%**	**0%**	**10%**	**0%**	**10%**
Clay	12.7	12.4	25.3	24.1	5.1	5.1
Limestone	74.7	73.7	149.4	145.3	54.1	53.6
Gypsum	3.0	3.0	6.0	5.9	3.2	3.1
Sandstone	1.0	1.0	2.0	2.0	2.2	2.2
Sand and gravel	47.6	46.9	95.2	92.5	33.5	33.2
Alluvial aggregates	22.1	21.9	44.2	43.2	19.0	18.8
Silica sands	3.4	3.4	6.8	6.7	3.0	3.0
Granite	0.8	0.8	1.6	1.6	4.1	4.1
Basalt	7.2	7.1	14.3	14.1	8.3	8.2
Total	**172.5**	**170.0**	**344.9**	**335.3**	**132.5**	**131.2**

Note: numbers may not add up precisely due to rounding. As the revenue generation does not depend on whether the tax is earmarked or non-earmarked, the scenarios with the same tax characteristics and elasticity (e.g. scenarios S1 and S7) are reported together. These calculations assume that the virgin material tax would not affect overall materials use in the short term. However, in practice, revenues would be lower once the tax is effective, i.e. it effectively reduces the extraction of construction aggregates.
Source: Authors' own elaboration.

8.5.2. Behavioural and distributional implications

The construction sector could respond to the tax implementation through any combination of possible scenarios that affect the demand of virgin construction aggregates: i) keeping constant levels of material extraction, with the tax mostly passed on to the final price (paid by the end consumer); ii) reducing extraction, shifting towards alternative raw materials, such as wood, which is only feasible in specific cases; and iii) reducing extraction, transitioning to secondary materials, contingent on the ability of recycled aggregates markets to meet the required quantities and quality standards at a competitive price.[3]

Monitoring and controls are crucial to ensure a satisfactory level of tax compliance within the extractive and construction sectors. Firms, particularly those with environmental tax liabilities, tend to engage in evasion practices, unless there is a strong likelihood of an audit. As discussed in the previous sections, an earmarked tax could enjoy a more positive reception among economic actors, potentially contributing to higher compliance rates while promoting the use of recycled materials.

The readiness of the market and the industry's response will ultimately influence who bears the burden of the tax and to what degree. When the demand for materials is more elastic than supply, producers shoulder most of the tax cost. However, if demand is more inelastic than supply, the tax would have a minimal effect on extraction levels in the short term, with the greatest impacts of the tax affecting consumers. The latter scenario is more likely for construction aggregates, given that extraction rates can, to a certain extent, be adjusted, whereas demand for construction aggregates is typically inelastic in the short and medium term (as already discussed in section 8.2.4). The risk of distributional impacts is expected to be minor overall because the aggregates contribution to the total cost paid by the construction sector is small. Hence, corrective measures to adjust for disproportionate impacts on low-income consumers may only be required under specific circumstances. However, this scenario highlights the importance of complementary measures to amplify the potential of the tax.

8.5.3. Gross value added and employment implications

This section estimates the direct and indirect implications for each scenario in terms of GVA and the effects on employment associated with the variation in demand and the distribution of tax revenues allocated to public spending. This estimate has been made using the input-output methodology and information from the Italian input-output (I-O) tables for the year 2019. The input-output methodology is described in more detail in Annex 8.C. The calculations have been performed using the 63 productive sectors disaggregated in the Italian I-O tables, but which are presented in aggregate form within 12 sectors for better readability.

Direct effects are generated within a specific production sector and result from expenditures on the final demand within that sector. These effects are therefore directly linked to final demand in that particular branch of production. Indirect effects are generated across all production sectors because the demand originates from a specific sector's production processes. As this demand ripples through the economy, various sectors need to purchase inputs from one another. Collectively, these cascading impacts comprise the indirect effects associated with the final demand originating from the production sector which initiated this chain reaction. Detailed GVA and employment impacts of the proposed tax, disaggregated by productive sector, are available in Annex 8.D. It is important to consider that the implications on GVA and estimated jobs, in this section, relate exclusively to reduced demand of virgin aggregates; any effects of this tax on the variation in the demand of recycled aggregates is beyond the scope of this study.

Economic implications of reduced demand

While the modelling insights suggest that the economic impacts of the tax would be small overall, there are likely to be significant variations depending on tax design. GVA and employment would be affected by variations in the demand for virgin aggregates (as summarised in Table 8.5). The scenarios with EUR 5/m^3 (S4 and S10) get approximately twice the demand reduction obtained by the other tax options (EUR 2.5/m^3 and *ad valorem*).[4]

Table 8.5. Variations in the demand for virgin aggregates in the scenarios with (10%) demand elasticity

EUR thousands

	S2 and S8	S4 and S10	S6 and S12
Scenario Tax rate	**ad quantum (EUR 2.5 /m^3)**	**ad quantum (EUR 5 /m^3)**	**ad valorem 10%**
Scenario Elasticity	10%		
Clay	1 267	2 534	512
Limestone	7 471	14 942	5 409
Gypsum	302	604	316
Sandstone	101	203	223
Sand and gravel	4 758	9 517	3 350
Alluvial aggregates	2 211	4 422	1 902
Silica sands	341	681	298
Granite	79	157	409
Basalt	717	1 433	831
Total	**17 245**	**34 491**	**13 249**

Note: no results are presented for odd scenarios with zero demand elasticity, as there is no demand variation.
Source: Authors' own elaboration.

While effects on GVA and employment are expected to be small overall, they vary across scenarios (see Table 8.6 and Table 8.7). The scenarios with EUR 5/m^3 tax rate have around twice the effects associated with the other two options. Indirect effects are highly important as they account for 68% of employment and 46% of GVA effects (in all the scenarios). With respect to the impact on productive sectors, the most significant direct effects occur in the "mining and quarrying" sector. Indirect effects, i.e. the impacts of reduced demand in the extractive industry sectors on the rest of the economy due to reduced sales, are present in the sectors of "transportation and business services", "wholesale and retail trade" and "energy, water and waste treatment". According to the Italian I-O tables, these relationships are not very relevant.

Table 8.6. Impact on employment in the scenarios with 10% demand elasticity

Number of people in full-time employment

Scenarios	S2 and S8			S4 and S10			S6 and S12		
Scenario tax rate	*ad quantum* (EUR 2.5 per m^3)			*ad quantum* (EUR 5 per m^3)			*ad valorem* 10%		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	0	0	0	0	-1	-1	0	0	0
Mining and quarrying	-8	0	-8	-16	0	-16	-6	0	-6
Manufacture of food products, beverages and tobacco products	0	0	0	0	0	0	0	0	0
Manufacture of textiles, wood and paper	0	0	0	0	0	0	0	0	0
Manufacture of coke and chemicals	0	0	0	0	0	0	0	0	0
Other manufacturing	0	-1	-1	0	-2	-2	0	-1	-1
Energy, water and waste treatment	0	-1	-1	0	-2	-2	0	-1	-1
Construction	0	-1	-1	0	-1	-1	0	0	0
Wholesale and retail trade	0	-2	-2	0	-5	-5	0	-2	-2
Transportation and business services	0	-9	-9	0	-19	-19	0	-7	-7
Public administration and collective services	0	-1	-1	0	-2	-2	0	-1	-1
Other services	0	0	0	0	-1	-1	0	0	0
Total	**-8**	**-17**	**-25**	**-16**	**-35**	**-51**	**-6**	**-13**	**-19**

Source: Authors' own elaboration.

Table 8.7. Impact on GVA in the scenarios with 10% demand elasticity

EUR millions

Scenarios	S2 and S8			S4 and S10			S6 and S12		
Scenario tax rate	ad quantum (EUR 2.5 per m^3)			*ad quantum* (EUR 5 per m^3)			*ad valorem* 10%		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	0	0	0	0	0	0	0	0	0
Mining and quarrying	-1	0	-1	-3	0	-3	-1	0	-1
Manufacture of food products, beverages and tobacco products	0	0	0	0	0	0	0	0	0
Manufacture of textiles, wood and paper	0	0	0	0	0	0	0	0	0
Manufacture of coke and chemicals	0	0	0	0	0	0	0	0	0
Other manufacturing	0	0	0	0	0	0	0	0	0
Energy, water and waste treatment	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0
Wholesale and retail trade	0	0	-1	0	0	0	0	0	0
Transportation and business services	0	-1	-1	0	-1	-1	0	-1	-1
Public administration and collective services	0	0	0	0	0	0	0	0	0
Other services	0	0	0	0	0	0	0	0	0
Total	**-1**	**-1**	**-3**	**-3**	**-2**	**-5**	**-1**	**-1**	**-2**

Source: Authors' own elaboration.

Economic implications of the use of tax revenue

Tax revenues used by sub-national levels of government as public expenditure will generate direct economic benefits on specific productive sectors, and subsequent indirect effects on the rest of the economy. Based on the assumptions made with respect to the use of tax revenues, the economic impact would be greatest with the highest tax rate. The direct economic impact (both on employment and GVA) will be concentrated in the productive sectors of agriculture, forestry and fishing, construction, public administration, and waste treatment, whereas the main indirect effects will be observed in the transportation and business services and in other manufacturing sectors. The economic implications of the earmarked taxes (S1-S6) are detailed in Annex 8.D (in terms of employment and GVA generation).

For the estimate of "annual economic impact" of the non-earmarked tax, it is assumed that generated tax revenue will be used in the public administration sector. In terms of both job creation and GVA, the direct economic impact is concentrated in the productive sector of public administration, whereas indirect effects are generated in activities related to transportation and business services, public administration and collective services, and energy, water and waste treatment. In Annex 8.D, Annex Table 8.D.3 and Annex Table 8.D.4 detail the results for the non-earmarked tax options.

The "public spending impact" columns in Table 8.8 report on the estimated annual employment and GVA associated with the tax revenue for all the scenarios.

8.5.4. Total economic implications

As illustrated in Table 8.8, the economic benefits associated with tax revenues are significantly greater than the losses caused by the reduction in demand. Based on the assumptions of the proposed scenario, the total economic impact of the tax would be positive in terms of both employment generation and GVA. In addition, Table 8.9 shows the main sectors affected, distinguishing between direct and indirect sectoral effects.

Table 8.8. Total economic impacts, by scenario

Scenarios	Potential revenue (EUR millions)	Job impact (annual employment)			GVA impact (EUR millions)		
		Demand-related impact	Public spending impact	Total	Demand-related impact	Public spending impact	Total
S1	173	0	2 553	**2 553**	0	144	**144**
S2	170	-25	2 517	**2 492**	-3	142	**139**
S3	345	0	5 106	**5 106**	0	288	**288**
S4	335	-51	4 963	**4 913**	-5	280	**275**
S5	132	0	1 962	**1 962**	0	110	**110**
S6	131	-19	1 942	**1 922**	-2	109	**107**
S7	172	0	1 870	**1 870**	0	156	**156**
S8	170	-25	1 844	**1 819**	-3	154	**151**
S9	345	0	2 470	**2 470**	0	312	**312**
S10	335	-51	3 636	**3 585**	-5	303	**298**
S11	132	0	1 437	**1 437**	0	120	**120**
S12	172	-25	1 423	**1 397**	-3	118	**116**

Note: In terms of employment, an earmarked tax (S1-S6) results in a greater impact than the non-earmarked one. This is because sectors, where the impact of the earmarked tax option is concentrated, generate higher employment per product. Conversely, in terms of generated GVA, the non-earmarked tax option (S7-S12) has a greater impact because sectors where the impact of this tax option is concentrated have a higher potential for generating GVA per product.
Source: Authors' own elaboration.

Table 8.9. Main sectors affected by the different tax options

	Earmarked tax S1-S6		Non-earmarked tax S7-S12	
Effects	**Demand-related impact**	**Public spending impact**	**Demand-related impact**	**Public spending impact**
Direct Job Impacts	Mining and quarrying	Agriculture, forestry, fishing Construction Public administration and collective services Energy, water and waste treatment	Mining and quarrying	Public administration and collective services
Indirect Job Impacts	Transportation and business services Wholesale and retail trade	Transportation and business services Other manufacturing	Transportation and business services Wholesale and retail trade	Transportation and business services Public administration and collective services Energy, water and waste treatment

	Earmarked tax S1-S6		Non-earmarked tax S7-S12	
Effects	**Demand-related impact**	**Public spending impact**	**Demand-related impact**	**Public spending impact**
Direct GVA impacts	Mining and quarrying	Agriculture, forestry, fishing Construction Public administration and collective services Energy, water and waste treatment	Mining and quarrying	Public administration and collective services
Indirect GVA impacts	Transportation and business services Wholesale and retail trade Energy, water and waste treatment	Transportation and business services Other manufacturing	Transportation and business services Wholesale and retail trade Energy, water and waste treatment	Transportation and business services Public administration and collective services Energy, water and waste treatment

Note: In the indirect effects, the "energy, water and waste treatment" sector is more significant in terms of GVA than in terms of employment because this sector has a greater capacity to generate GVA per unit of production.
Source: Authors' own elaboration

8.6. Implications for policy design and implementation

While virgin material taxes are more challenging to implement than fees, taxes may contribute to the reduction of virgin materials demand. Experience from selected OECD countries suggests that taxation on virgin materials can have an impact despite the relatively low price elasticity of aggregates, especially when implemented in combination with landfill taxes and other supporting measures. Furthermore, revenues have been used to finance initiatives with community or environmental aims, such as recovering abandoned quarries. Revenues could also be used to potentially finance incentive mechanisms aligned with higher circularity and sustainability, such as support for secondary materials.

This ex-ante assessment can provide a useful guide for the design and implementation of virgin material taxes in Italy.[5] The next section summarises the key considerations for such policy design and implementation in the Italian context.

8.6.1. Possible key characteristics of a national legislative framework on extractive activities

> *Introduction at the national level for a harmonised approach across regions*

In the Italian context, the majority of decisions concerning the design and implementation of a virgin material tax on construction aggregates would be made at sub-national levels of government. However, the establishment of a national legislative framework could help to harmonise the implementation of the tax instrument. For instance, minimum tax rates set at the national level could be pivotal in ensuring an increase in the level of taxation across the country, while allowing for some flexibility across regions to adapt to local circumstances.

> *Taxable event and tax base: extraction of all quarried non-energy minerals.*

It is recommended that the tax applies to the extraction of all categories of quarried construction aggregates. While the analysis here did not include ornamental stones (due to limited data availability), in principle, there would be no environmental or economic reason to exclude these materials from the tax.

> *Tax rates:* ad quantum *taxes are preferable, ideally combining a measure of both the areas affected and the extracted volumes.*

The assessment carried out suggests that *ad quantum* taxes are preferred, as they represent a closer proxy to the environmental impact associated with extraction than *ad valorem* taxes. *Ad quantum* taxes should ideally combine both a measure of the areas affected (e.g. extraction surface areas) and the extracted volumes (in

tonnes or m^3), where data is available. In specific local contexts, a combination of *ad valorem* and *ad quantum* taxes could also be considered. With *ad quantum* options, it is suggested to start with a lower tax rate that gradually increases over time. Taxes that are introduced progressively are often better received by the affected parties and, as they provide more long-term visibility, they may allow economic actors to mitigate economic impacts. Hence, the national framework could allow for *ad quantum* taxes (via volumes and/or extraction surface areas) as well as minimum tax rates for each material type that progressively increase over time.

> *Use of revenues: sub-national governments are best placed to allocate revenues according to local circumstances. Requirements for partial earmarking could be considered to support environmental restoration.*

The earmarking of tax revenues is usually not advised as it may lead to inefficient use of government revenues, even though it can be helpful in specific instances, for example, to improve the political acceptability of environmental taxes or to ensure a minimum level of targeted public expenditure on the environment. Earmarked revenues could be used for the environmental restoration of quarries, as well as the transition of the construction sector towards a circular economy, for instance, with measures that enable material recovery and reuse. In Italy, the regions also have the authority to make decisions on the use of revenues. It may not be advisable to be prescriptive on the use of revenues at the sub-national level as, in general, local governments may be better placed to identify the most efficient use of revenues (e.g. paid into the general government budget, contributions to wider policy issues, reduction in other taxes). However, national legislation may be helpful in establishing minimum requirements on environmental restoration. The institution of specific funds for restoration may be considered. Currently, regional plans on extractive activities provide a key tool to regulate the sector. This includes planning obligations for environmental permits and provisions for quarry restoration after closure. National legislation could also include specific provisions to support the municipalities that are directly affected by quarrying activities.

8.6.2. ***Considerations on the policy mix***

The scenarios considered in this section suggest that both the economic implications and environmental outcomes of the proposed aggregates tax appear to be relatively modest, mainly because of assumptions of a high degree of inelasticity in the demand for virgin aggregates. While this suggests limited economic impacts on firms and stakeholders, it also implies limited environmental benefits. Additional efforts would therefore be required to amplify the benefits of the tax. Efforts should be directed towards increasing elasticity in the demand for virgin aggregates, for instance, by increasing the substitution options of virgin aggregates or supporting investments in greater resource efficiency in the sector.

The literature recommends implementing aggregates taxes or fees in combination with additional policies aimed at increasing the demand for and supply of recycled materials in order to enhance the positive impacts of the tax on the use of secondary raw materials (Söderholm, 2011[10]). Virgin material taxes alone may not provide sufficient incentives for operators to improve their environmental performance and substantially increase the supply of recycled materials (Söderholm, 2011[10]), whereas the outcomes can be significant when combined with other policies. The following complementary measures could be considered.

Furthering the development of **End-of-Waste (EoW) criteria for CDW, as well as the classification of industrial by-products, will enhance the market for recycled aggregates.** Italy has already developed EoW criteria for CDW for paving roads. In addition, green public procurement (GPP) criteria are forthcoming for inert CDW.[6] Given that common regulatory frameworks are not being developed at the EU level, the Recycling Task Force of the European Aggregates Association has developed a “Guidance on End of Waste Criteria for Recycled Aggregates from Construction & Demolition Waste” to set key common requirements that should enable recycled aggregates to meet the relevant product standards (European Aggregates Association, 2022[23]).

It is also pivotal to strengthen obligations for on-site sorting and selective demolition. Other non-economic policy interventions also remain crucial. Support for **selective demolition** and the sorting of waste by type, where it is generated to facilitate reuse and recovery (on-site sorting), are critical and could be improved by setting requirements in construction permits. Improved **quality standards** for CDW, **enhanced monitoring of generated CDW** and better enforcement of **measures to prevent illegal disposal**[7] also remain crucial.

Italy could consider the introduction of requirements for a minimum content of recycled aggregates in all construction works. Italy was the first EU country to implement mandatory GPP criteria, including minimum certified recycled content in major construction materials and products for all types of public construction contracts, not only for new buildings and infrastructure but also in the renovation of existing ones (see Chapter 5). It is possible that the extension of these obligations could be expanded to all construction works, including the construction and renovation of private buildings. As an example, Catalonia established an obligation to use at least 5% of recycled aggregates in all new construction works (ITeC, 2021). Subsidies and fiscal incentives to use recycled materials are also an option, as discussed in the following chapters for the example of reduced VAT rates and corporate tax credits.

As discussed in Chapter 6, it is crucial to consider a gradual yet substantial increase in **landfill tax rates** across regions to divert CDW from landfills and towards recycling. As the potential of recycling materials depends on the market for these products, policies would have to favour the use of recycled materials in complementarity to the tax on the extraction of aggregates. As presented in Chapter 4, the introduction of virgin aggregates taxes in combination with economic disincentives for landfilling in Denmark (in the form of a waste disposal tax differentiated for landfilling) and in the United Kingdom (in the form of a landfill tax) were effective at improving the recycling of CDW, creating a market for secondary materials and reducing the use of primary aggregates (Söderholm, 2011[10]; Ettlinger, 2017[24]).

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Notes

[1] https://ozinga.com/blog/recycled-vs-virgin-aggregates/

[2] Although not entirely included in the calculations in this chapter, due to limited available data, it is recommended to also tax ornamental stones (e.g. marble) given their significant level of extraction in Italy and the considerable environmental impacts of extraction.

[3] In addition, the construction sector could respond by increasing material productivity, i.e. implementing actions that reduce materials input while maintaining the same level of output. Although not discussed in this section, this is the outcome that is most likely to generate environmental benefits, as overall materials consumption is reduced.

[4] In addition to the reduction in demand for virgin aggregates, the implementation of the tax has other effects, such as the costs of substitution with recycled aggregates, variations in prices, or changes in final production. Analysing these effects on sectors like construction requires the development of other models, such as the Ghosh supply input-output model or general equilibrium models.

[5] This analysis was constrained by some data limitations present at the time of writing. Future efforts, aimed at better informing the design and implementation of such taxes, could focus on estimating aggregates' price elasticities for Italy and using extraction data cross-checked between EW-MFA and the mining and quarries survey. Future efforts could also include ornamental stones, as well as more detailed regional insights on the impacts of tax measures.

[6] http://anpar.org/wp-content/uploads/2023/12/schema_regolamento_eowinerti.pdf

[7] Italy is currently establishing the National Electronic Register for Waste Traceability (RENTRI) system, which will support authorities in preventing and combating illegal waste management.

Annex 8.A. Annual extraction levels per region, 2016-2020

Annex Table 8.A.1. Extraction levels of clay, limestone and gypsum in Italian regions

Thousands of m^3 extracted, 2016-2020

	Clay (argilla)					Limestone (calcare)					Gypsum (gesso)				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Italia	4 289	3 935	4 056	5 067	3 444	28 132	28 066	26 325	29 883	29 172	1 166	1 030	1 423	1 207	1 387
Piemonte	319	358	362	333	347	1 160	1 225	1 273	1 470	1 348	261	NA	264	253	0
Valle d'Aosta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liguria	0	0	0	0	0	625	656	663	657	611	0	0	0	0	0
Lombardia	123	154	182	128	91	2 411	2 904	2 856	3 268	2 579	27	NA	44	46	0
A.P. Bolzano	63	50	63	76	56	0	0	0	0	0	0	0	0	0	0
A.P. Trento	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
Veneto	105	153	173	203	144	995	987	1 014	1 017	1 175	0	NA	NA	NA	NA
Friuli-Venezia Giulia	41	61	74	66	56	932	1 112	1 183	1 091	1 005	0	NA	NA	NA	NA
Emilia-Romagna	780	774	523	1 045	693	NA	NA	NA	NA	348	76	79	99	91	NA
Toscana	288	232	210	125	169	2 499	2 265	2 276	2 279	1 785	NA	NA	NA	NA	NA
Umbria	586	519	363	558	509	1 532	1 867	1 727	1 545	1 463	0	0	0	0	0
Marche	30	0	0	0	0	844	793	782	854	688	NA	NA	NA	NA	NA
Lazio	375	380	873	873	46	2 925	2 169	1 665	1 665	2 852	0	0	0	0	0
Abruzzo	182	101	72	105	76	423	453	439	433	680	NA	NA	70	NA	78
Molise	113	180	146	146	146	811	910	863	979	901	404	NA	599	527	0
Campania	163	126	10	0	0	2 162	2 734	2 214	2 704	3 431	0	0	0	0	0
Puglia	376	299	373	447	223	5 482	4 402	4 189	5 848	5 085	NA	NA	NA	NA	NA
Basilicata	194	160	350	358	367	1 020	1 285	1 552	1 399	1 489	0	0	0	0	0
Calabria	68	42	49	49	65	351	240	209	209	253	0	0	0	0	0
Sicilia	435	290	190	375	394	2 830	2 854	2 492	3 286	2 574	62	28	43	26	50
Sardegna	48	55	44	178	63	810	866	618	793	896	0	0	0	0	0

Note: NA stands for “not available” as ISTAT does not report these amounts to respect statistical confidentiality.
Source: Authors’ elaboration of (ISTAT, 2023[2]).

Annex Table 8.A.2. Extraction levels of sandstone, sand and gravel, and alluvial aggregates in Italian regions

Thousands of m³ extracted, 2016-2020

	Sandstone (arenaria)**					Sand and gravel (sabbia e ghiaia)					Alluvial aggregates (inerti alluvionali)*				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Italia	412	377	431	405	570	18 738	16 334	19 498	19 033	17 494	7 726	8 002	7 848	8 844	8 513
Piemonte	NA	NA	NA	NA	NA	0	0	0	0	0	5 045	4 960	4 206	4 751	4 440
Valle d'Aosta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liguria	NA	NA	NA	NA	NA	0	0	0	0	0	0	0	0	0	0
Lombardia	78	85	NA	NA	NA	7 690	6 832	8 033	7 959	8 311	0	0	0	0	0
A.P. Bolzano	0	0	NA	0	0	775	973	829	916	775	0	0	0	0	0
A.P. Trento	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneto	0	0	0	0	0	3 267	3 097	3 570	4 248	3 977	0	0	0	0	0
Friuli-Venezia Giulia	0	0	0	0	NA	128	332	749	251	404	401	392	441	338	223
Emilia-Romagna	28	10	NA	NA	NA	1 466	1 152	559	180	118	1 951	2 100	2 864	3 371	3 487
Toscana	NA	NA	NA	214	NA	792	743	695	680	638	0	0	0	0	0
Umbria	0	0	0	0	NA	570	365	507	334	378	0	0	0	0	0
Marche	0	0	0	0	0	583	463	716	591	590	0	0	0	0	0
Lazio	NA	NA	NA	36	0	961	506	1 199	1 199	181	0	0	0	0	0
Abruzzo	0	0	0	0	0	707	429	967	1 156	765	0	0	0	0	0
Molise	0	0	0	0	0	68	22	71	65	72	0	0	0	0	0
Campania	NA	NA	NA	NA	NA	NA	0	0	0	0	0	0	0	0	0
Puglia	0	0	0	0	0	NA	80	42	54	63	111	257	80	57	75
Basilicata	NA	NA	NA	NA	NA	0	0	0	0	0	0	0	0	0	0
Calabria	0	0	0	0	0	932	711	845	845	708	0	0	0	0	0
Sicilia	NA	NA	NA	NA	NA	302	190	189	147	106	NA	NA	0	NA	NA
Sardegna	NA	NA	NA	NA	NA	470	438	528	409	407	NA	NA	257	NA	NA

Note: NA stands for "not available" as ISTAT does not report these amounts to respect statistical confidentiality.
Source: Authors' elaboration of (ISTAT, 2023[2]).

Annex Table 8.A.3. Extraction levels of silica, granite and basalt in Italian regions

Thousands of m^3 extracted, 2016-2020

	Silica sands (sabbie silice)					Granite (granito)					Basalt (basalto)				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Italia	1 565	1 598	1 694	1 362	1 267	381	422	404	314	520	2 319	2 359	2 493	2 866	3 789
Piemonte	892	856	911	870	NA	23	NA	22	16	NA	0	0	0	0	0
Valle d'Aosta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liguria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lombardia	60	NA	NA	0	NA	3	NA	1	1	NA	0	0	0	0	0
A.P. Bolzano	0	0	0	0	0	6	6	10	NA	NA	0	0	0	0	0
A.P. Trento	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	0	NA
Veneto	0	0	0	0	0	0	0	0	0	0	NA	179	118	NA	83
Friuli-Venezia Giulia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emilia-Romagna	523	696	770	461	426	0	0	0	0	0	0	0	0	0	0
Toscana	0	0	0	0	0	NA	NA	NA	0	0	0	NA	NA	NA	NA
Umbria	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA
Marche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lazio	NA	0	0	0	0	0	0	0	0	0	450	648	593	593	1,230
Abruzzo	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Molise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Campania	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA
Puglia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Basilicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calabria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sicilia	NA	0	NA	0	75	0	0	0	0	0	607	601	665	801	963
Sardegna	0	NA	0	0	0	346	404	369	279	476	491	335	252	286	395

Note: NA stands for “not available” as ISTAT does not report these amounts to respect statistical confidentiality.
Source: Authors’ elaboration of (ISTAT, 2023[2]).

Annex 8.B. Aggregates taxes in OECD countries

Annex Table 8.B.1. Taxes on aggregates extraction in OECD and other countries

Country	Year	Material	*ad quantum*	*ad valorem*		Earmarked	Funds destination
			(EUR/m³)	(% benefit)	(% market price)		
Estonia	1991	Clay-cement	0.79			Yes (partly)	Natural regeneration of resources, preserving the environment and repairing environmental damage. In 2014, 44% of the collection went to the general state funds.
		Clay-ceramic	0.75				
		Clay-Infusible	1.42				
		Dolomite-fill	0.94				
		Dolomite-high quality	2.36				
		Dolomite-low quality	1.40				
		Dolomite-technology	3.34				
		Gravel-construction	2.43				
		Gravel-fill	0.60				
		Limestone-fill	0.98				
		Limestone-finish	2.94				
		Limestone-high quality	2.36				
		Limestone-low quality	1.49				
		Limestone-technology	2.49				
		Sand-construction	1.55				
		Sand-fill	0.42				
		Sand-tech	1.64				
Lithuania	1991	Clay, Devonian period	0.86			Yes (partly)	20% of the revenue is transferred to the municipalities where the material is extracted. The funds are used by the municipality to finance the Environment Protection Support Program.
		Clay, others	0.51				
		Clay, Triassic	0.84				
		Dolomite	0.99				
		Limestone	0.84				
		Quartz sand	1.59				
		Sand	0.38				
		Construction sand	0.48				
		Sand used for silicone	0.44				
		Land used for construction	0.26				
Sweden	1996	Natural gravel	1.58 (2007)			No	State general fund.
Croatia	1959	Materials (without specifications)		2.6% (5% in protected areas) (2003)		Yes	Investments associated with economic development and environmental protection measures.
Cyprus	1990	Materials (without specifications)	0.26 (1999)			Yes	75% of the funds are used to regenerate the environmental damage in municipalities affected by extractive activity. The remaining 25% is destined for projects to restore abandoned quarries.

Country	Year	Material	*ad quantum*	*ad valorem*		Earmarked	Funds destination
			(EUR/m³)	(% benefit)	(% market price)		
Czech Republic	1991	Materials (without specifications)	3.00(2011)		Up to 10%	Yes	25% allocated to projects for the restoration of abandoned quarries. Economic compensation for damages due to mining activity.
Denmark	2006	Materials (without specifications)	0.7 (2009)				
France	1999	Materials (without specifications)	0.20*				
United Kingdom	2002		2.50*				
Italy**	1998		Vary by region		Up to 10.5% in Toscana	Yes	50% goes to environmental recovery and remediation of disused quarries and degraded areas.
Colombia	1995-1996	Minerals (mining royalties)			3% of production value		
United States**		Sand (Kansas: sand royalty)	0,25				
		Minerals (Nevada: minerals tax)		5% of net proceeds			
		Sand, gravel, sandstone and other mineral products (West Virginia: severance tax)		5% of gross receipts attributable to natural resource production			

Notes: In the OECD database, these taxes appear as mining charges, mineral extraction charges, natural gravel tax, quarrying charge, aggregates tax, and a general tax on pollution. The taxes of the United Kingdom and Italy were not found in the OECD database.
* Tax per tonne of material.
** Sub-national tax.
Source: Authors' elaboration based on the (OECD, 2017[25]) Database on Policy Instruments for the Environment (PINE). Available at: https://pinedatabase.oecd.org/ (Accessed: 18 March 2022).

Annex 8.C. Input-output analysis

The input-output (I-O) methodology helps analyse the impacts of public policies, among many other possibilities, while considering the existing intersectoral relationships, i.e. the economic structure of the country. This methodology determines the direct and indirect impacts of such variables as production, job creation and gross value added (GVA) by productive sector. In this regard, to the extent that a tax policy generates changes in production and demand decisions, this methodology can be used to estimate the resulting economic effects.

For this analysis, employment data in the Italian I-O tables (expressed in terms of hours) were converted into number of jobs, assuming 1 720 hours per annum for persons working full time (European Commission funded project standard). These models produce a multiplier index that measures the total (direct and indirect) effect or impact of a "variation in demand" on employment, VAT, income, and other variables.

The input-output method is based on the Leontief model (1942), which uses equation (1) to assess how a variation in demand impacts production:

$$x = (I - A)^{-1}y = Ly \quad (1)$$

where x is the vector *(nx1)* that represents the total production in the economy for each of the *n* production sectors, y is the vector (*nx1*) of final demand, I is the (*nxn*) identity matrix, and A is the (*nxn*) matrix of technical coefficients, with each column indicating the percentage of each input used by each sector in its total production. Consequently, L is the Leontief inverse matrix (*nxn*) that illustrates the direct and indirect impacts on production in all sectors.

Using equation (2), it is possible to estimate the effects resulting from changes in the final demand of one or more branches of production:

$$\Delta x = L\Delta y \quad (2)$$

Consequently, this allows for assessing the impacts on production resulting from changes in final demand, while considering the entirety of the existing intersectoral relationships, i.e. the economic structure of the given territory.

From the demand model (equation 1), the impact of changes in the final demand on various economic variables, such as GVA and employment, can be analysed and are examined in this study. To do this, it is first necessary to obtain the vector for sectoral coefficients of GVA and work using equations (3) and (4):

$$v_j = g_j/x_j \quad (3)$$

$$e_j = Emp_j/x_j \quad (4)$$

Where g_j and Emp_j are GVA and employment, respectively, in sector j; and x_j is production in the same sector. Accordingly, v_i and e_j are the coefficients, respectively, for GVA and jobs created per production unit in sector *j*. Pre-multiplying the demand model (equation 1) by the vector of value added or employment coefficients transforms the model into units of those variables, enabling the estimation of the impact on value added and employment using equations (5) and (6):

$$V = vLy \quad (5)$$

$$E = eLy \quad (6)$$

Where V and E indicate, respectively, the amount of GVA and jobs generated, both directly and indirectly due to variations in final demand.

Annex 8.D. Detailed economic impacts of the Italian aggregates tax

Annex Table 8.D.1. Impact on employment associated with earmarked tax revenue, disaggregated into direct and indirect effects

Scenarios	S1			S2			S3			S4			S5			S6		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	710	59	769	700	58	758	1 420	118	1 538	1 380	115	1 495	545	45	591	540	45	585
Mining and quarrying	0	1	1	0	1	1	0	2	2	0	2	2	0	1	1	0	1	1
Manufacture of food products, beverages and tobacco products	0	3	3	0	3	3	0	7	7	0	6	6	0	3	3	0	3	3
Manufacture of textiles, wood and paper	0	17	17	0	17	17	0	34	34	0	33	33	0	13	13	0	13	13
Manufacture of coke and chemicals	0	4	4	0	4	4	0	9	9	0	8	8	0	3	3	0	3	3
Other manufacturing	0	89	89	0	88	88	0	178	178	0	173	173	0	68	68	0	68	68
Energy, water and waste treatment	253	51	304	250	50	300	507	101	608	492	98	591	195	39	233	193	38	231
Construction	406	112	519	401	111	512	813	225	1 038	790	219	1 009	312	86	399	309	86	395
Wholesale and retail trade	0	72	72	0	71	71	0	144	144	0	140	140	0	55	55	0	55	55
Transportation and business services	0	434	434	0	428	428	0	868	868	0	844	844	0	334	334	0	330	330
Public administration and collective services	263	52	315	259	51	310	526	104	629	511	101	612	202	40	242	200	39	239
Other services	0	25	25	0	25	25	0	50	50	0	49	49	0	19	19	0	19	19
Total	**1 633**	**920**	**2 553**	**1 610**	**908**	**2 517**	**3 265**	**1 841**	**5 106**	**3 174**	**1 789**	**4 963**	**1 254**	**707**	**1 962**	**1 242**	**700**	**1 942**

Note: numbers may not add up precisely due to rounding.
Source: Authors' own elaboration.

Annex Table 8.D.2. Economic impact on GVA associated with earmarked tax revenue, disaggregated into direct and indirect effects (EUR millions)

Scenarios	S1			S2			S3			S4			S5			S6		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	35	3	37	34	3	37	70	5	75	68	5	73	27	2	29	27	2	29
Mining and quarrying	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacture of food products, beverages and tobacco products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacture of textiles, wood and paper	0	1	1	0	1	1	0	2	2	0	12	2	0	1	1	0	1	1
Manufacture of coke and chemicals	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0
Other manufacturing	0	6	56	0	6	6	0	12	12	0	11	11	0	4	5	0	4	4
Energy, water and waste treatment	16	4	20	16	4	20	32	9	40	31	9	40	12	3	16	12	3	15
Construction	17	5	22	17	5	22	34	10	44	33	9	43	13	4	17	13	4	17
Wholesale and retail trade	0	4	4	0	4	4	0	8	8	0	8	8	0	3	3	0	3	3
Transportation and business services	0	27	27	0	27	27	0	54	54	0	53	53	0	21	21	0	21	21
Public administration and collective services	20	4	24	20	4	24	41	8	49	40	8	47	16	3	19	15	3	18
Other services	0	1	1	0	1	1	0	2	2	0	2	2	0	1	1	0	1	1
Total	**88**	**56**	**144**	**87**	**55**	**142**	**177**	**111**	**288**	**172**	**108**	**280**	**68**	**43**	**110**	**67**	**42**	**109**

Note: numbers may not add up precisely due to rounding.

Source: Authors' own elaboration.

Annex Table 8.D.3. Impact on employment associated with non-earmarked tax revenue, disaggregated by direct and indirect effects

Scenarios	S7			S8			S9			S10			S11			S12		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	0	13	13	0	13	13	0	26	26	0	25	25	0	10	10	0	10	10
Mining and quarrying	0	1	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	0
Manufacture of food products, beverages and tobacco products	0	2	2	0	2	2	0	4	4	0	4	4	0	2	2	0	2	2
Manufacture of textiles, wood and paper	0	12	12	0	12	12	0	25	25	0	24	24	0	10	10	0	10	10
Manufacture of coke and chemicals	0	1	1	0	1	1	0	3	3	0	3	3	0	1	1	0	1	1
Other manufacturing	0	30	30	0	30	30	0	61	61	0	59	59	0	23	23	0	23	23
Energy, water and waste treatment	0	44	44	0	44	44	0	89	89	0	86	86	0	34	34	0	34	34
Construction	0	34	34	0	33	33	0	67	67	0	65	65	0	26	26	0	26	26
Wholesale and retail trade	0	35	35	0	34	34	0	70	70	0	68	68	0	27	27	0	27	27
Transportation and business services	0	354	354	0	349	349	0	708	708	0	689	689	0	272	272	0	269	269
Public administration and collective services	1 271	49	1 320	1 253	48	1 301	2 541	98	2 639	2 470	95	2 565	976	38	1 014	967	37	1 004
Other services	0	24	24	0	24	24	0	48	48	0	46	46	0	18	18	0	18	18
Total	**1 271**	**600**	**1,870**	**1253**	**591**	**1 844**	**2 541**	**1 199**	**3 741**	**2 470**	**1 166**	**3 636**	**976**	**461**	**1 437**	**967**	**456**	**1 423**

Note: numbers may not add up precisely due to rounding.

Source: Authors' own elaboration.

Annex Table 8.D.4. Economic impact on GVA associated with non-earmarked tax revenue, disaggregated by direct and indirect effects (EUR thousands)

	S7			S8			S9			S10			S11			S12		
Economic activities	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Agriculture, forestry, fishing	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0
Mining and quarrying	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacture of food products, beverages and tobacco products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacture of textiles, wood and paper	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Manufacture of coke and chemicals	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other manufacturing	0	2	2	0	2	2	0	4	4	0	4	4	0	2	2	0	2	2
Energy, water and waste treatment	0	4	4	0	4	4	0	9	9	0	8	8	0	3	3	0	3	3
Construction	0	1	1	0	1	1	0	3	3	0	3	3	0	1	1	0	1	1
Wholesale and retail trade	0	2	2	0	2	2	0	4	4	0	4	4	0	1	1	0	1	1
Transportation and business services	0	23	23	0	22	22	0	45	45	0	44	44	0	17	17	0	17	17
Public administration and collective services	118	4	121	116	4	120	235	8	243	229	7	236	90	3	93	89	3	92
Other services	0	1	1	0	1	1	0	2	2	0	2	2	0	1	1	0	1	1
Total	**118**	**38**	**155.8**	**116**	**38**	**154**	**235**	**77**	**312**	**229**	**74**	**303**	**90**	**29**	**120**	**89**	**29**	**119**

Note: numbers may not add up precisely due to rounding.

Source: Authors' own elaboration.

9 Reduced VAT rates on products with recycled content

The promotion of secondary and other recovered materials is one of the actions envisioned in Italy's Strategy for the Circular Economy. This chapter examines the potential of reduced value added tax (VAT) rates on products that contain recycled content, to support secondary materials.
This chapter provides an ex-ante analysis of the potential advantages and drawbacks of reduced VAT rates on products with recycled content, combining modelling of economic and environmental outcomes with insights from available empirical evidence on reduced VAT rates applied on other products. A case study on reduced VAT applied to garments illustrates the expected outcomes of the approach in promoting recycling and markets for recycled fibres, as well as the associated fiscal costs.

9.1. Introduction

While governments have historically introduced reduced value added tax (VAT) rates to increase progressivity, encourage the consumption of socially desirable goods or services, or support selected economic sectors, recent years have seen a growing interest in using the fiscal system, including VAT, to achieve environmental and climate objectives. Recent changes to the EU VAT Directive enable the introduction of reduced VAT rates for environmental purposes, including to support the transition to circular and sustainable economies. For instance, Sweden applies a reduced VAT rate (12%, compared to the standard 25%) for repair services for textiles, footwear and bicycles.

This chapter examines the anticipated environmental benefits and economic consequences of introducing reduced VAT rates on products that contain recycled content. The premise that reducing VAT rates could act as an incentive to promote eco-friendly supplies is based on the (theoretical) assumption that VAT reductions effectively send a price signal to consumers. In principle, a sustained reduction in the VAT rate applied to a product is expected to lower the price of that item, theoretically, equal to the VAT rate decrease in competitive markets. This downward price adjustment is projected to heighten consumer interest in the item itself, thereby creating a marked surge in its demand. Consumers would shift their demand towards the lower taxed item because of its lower price. This increased demand would thus lead to a rise in production and employment in the related sector. In practice, multiple factors could limit the likelihood of environmental impacts materialising, for instance due to a limited pass-through of reduced VAT rates on consumer prices, or to a limited response by consumers to lower prices (i.e., respectively the first and second links represented in Infographic 1).

Infographic 1. Reducing VAT on recycled content could lead to lower environmental impacts

Source: Authors' own elaboration.

Rigorous ex-ante evaluations of new proposals for VAT rate reductions are required, to safeguard public finances, to ensure efficient allocation of resources, and to minimise unintended socio-economic consequences. In Italy, VAT revenues, at EUR 138.5 billion (in 2022), represent 24% of general government revenues. The Italian VAT system already suffers from a high degree of tax evasion (for instance, due to omitted invoicing) and the presence of reduced VAT rates. Once implemented, the economic, social and environmental impacts of VAT reductions are rarely assessed. This limited oversight implies that cases, where measures offer little to no benefit, are rarely identified or discontinued, thereby reducing the resources available to introduce potentially more effective measures.

This chapter discusses the expected environmental benefits and economic and fiscal implications of reduced VAT rates on products with recycled content. As discussed later in the chapter, the current implementation of this measure would, however, face legal barriers, as products with recycled content are not eligible for preferential VAT rates under current EU rules. Nevertheless, the possible environmental and economic consequences of applying VAT reductions to products that contain recycled content merits further consideration in light of the growing interest in the relevance of this measure. Recently, at the Environment Council meeting of 20 June 2023,[1] the Czech delegation put forward a proposal on using reduced VAT rates on recycled products as a tool to promote the circular economy. Yet, despite growing interest, there is limited policy analysis informing policy makers of the advantages and disadvantages of using VAT to support the circular economy transition, especially to promote recycled materials.

The objective of this chapter is to establish the possible advantages and drawbacks of using the VAT system to support markets for recycled materials. Although the empirical evidence suggests that VAT reductions are, generally, not efficient ways to achieve environmental policy objectives, sought-after merits could include higher public acceptability and support for broader fiscal reforms. As this would represent a novel use of the fiscal system, this ex-ante analysis leverages insights from empirical evidence from VAT reductions introduced for other objectives as well as insights from the modelling exercise already introduced in the previous chapter. The chapter combines:

- Insights from modelling economic instruments in the OECD ENV-Linkages model and how they impact the transition towards a circular economy, assessing the economic and environmental outcomes.
- Insights from the empirical evidence available on other VAT measures, such as reduced VAT rates on selected goods (e.g. goods for energy efficiency in buildings) or services (e.g. reuse and repair activities).
- Calculations to quantify the possible impacts on public finances, with alternative sets of assumptions, as applied to the example of garments.

The environmental benefits expected from the introduction of this measure could vary widely depending on the product groups, to which it is applied, and the relevant sectors. Given that no product group or sector was selected for this analysis, the modelling exercise focuses on the example of metals, as this is the most mature sector where data is abundant and recycling is already happening at scale. A case study on the fashion clothing sector has also been elaborated, thereby looking at a sector where recycling (fibre-to-fibre recycling) is less mature.

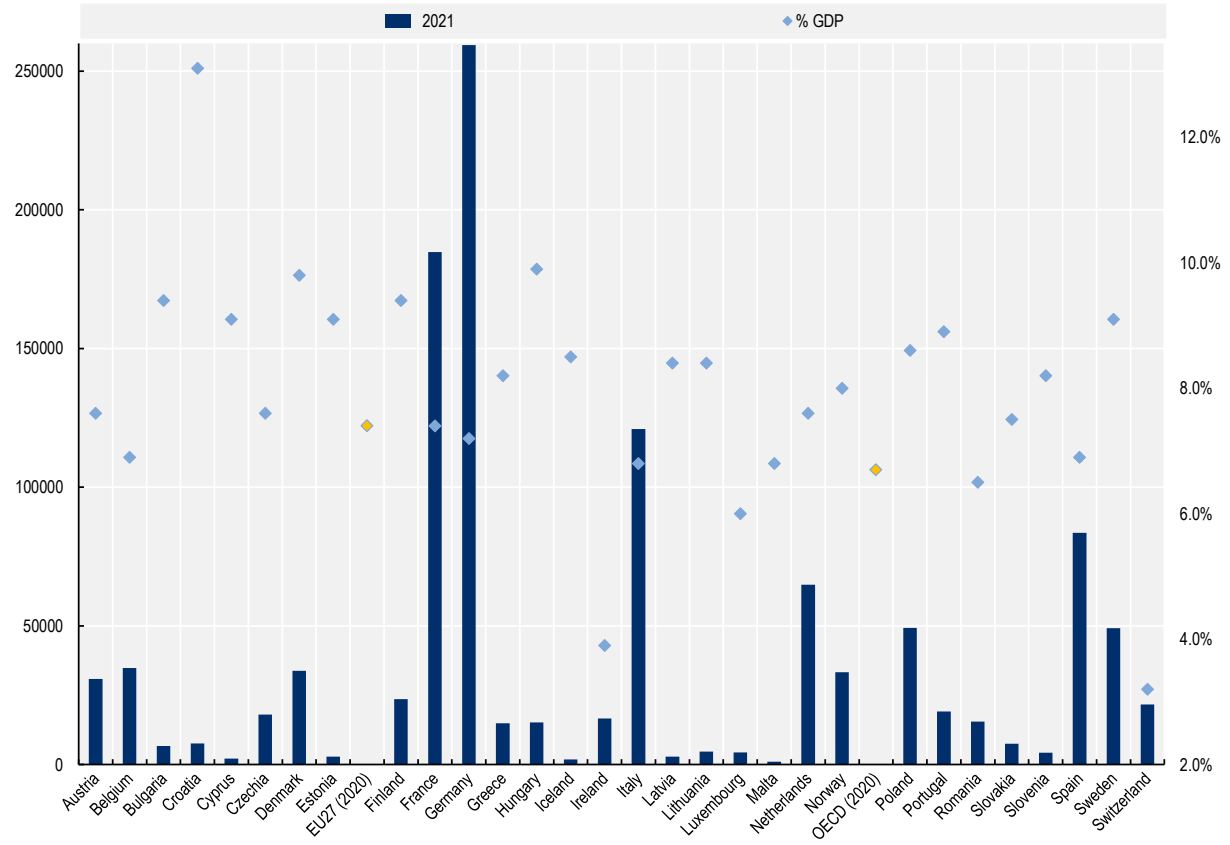
9.2. Background and current trends

9.2.1. Definition and use in OECD countries

VAT is a broad-based tax levied on the final consumption of goods and services paid by households (OECD, 2017[1]). VAT is different from excise taxes, which are targeted at specific forms of consumption (e.g. alcohol, gasoline). VAT constitutes an efficient and stable source of considerable amounts of revenue for governments (Figure 9.1). All OECD countries have adopted VAT in some form (except for the United States, which operates a range of state-level retail sales taxes) (OECD, 2022[2]). In the European Union, VAT applies, in principle, to all goods and services that are bought and sold for use, accounting for 18% of total revenues (or 7.4% of gross domestic product [GDP]) (Eurostat, 2023[3]).

Figure 9.1. Italy generates the third-largest VAT revenues in the European Union

VAT revenues in EEA countries, EUR million (left axis) and as a percentage of GDP (right axis), 2020



Note: EEA stands for European Economic Area
Source: Eurostat; OECD (2020) value from OECD Global Revenue Statistics Database.

The central design feature of VAT is that it is collected on the value added at each stage of the production and distribution chain. Businesses and taxable persons are liable to apply and collect a tax proportional to the value of the goods and services they provide. In turn, they are entitled to deduct the VAT costs incurred in the production of their goods or as part of their service provision, and must account for and remit the difference to (or receive a refund from) the tax authorities. The tax is proportional to the price of the good or service provided to the final consumer, who bears the full VAT costs. This system allows for the economic neutrality of VAT, irrespective of the number of transactions in the supply chain. Other desirable properties of VAT are that it is intended not to distort saving and investment decisions, and that it is generally less prone to fraud compared to other taxes (because it is collected at each stage along the value chain).

As summarised in Table 9.1, there is notable variability in VAT rates applied across OECD and EU countries. Standard VAT rates vary from 5% in Canada to 27% in Hungary. In the European Union, the lowest standard rate is applied in Luxembourg (at 17%), while the average EU27 standard rate is currently at 21.5%. Multi-rate systems are prominent in the EU and in most other OECD countries. The majority of countries apply reduced VAT rates to selected goods and services, as well as zero VAT rates (i.e. exemption with the right to deduction) in 17 OECD countries (excluding temporary rates). All EU Member States (except for Denmark) apply one or two reduced rates, ranging from 5% to 14%, and only five Member States apply a super-reduced rate below 5% (as low as 2.1% in France).

Table 9.1. The average standard VAT rate across OECD countries is 19%, with a wide range of reduced rates, exemptions and other preferential treatments

VAT rates in OECD countries, values for 2023

	Standard	Preferential	
		Reduced	Zero/super-reduced
Australia	10		0
Austria	20	10 / 13	
Belgium	21	6 / 12	0
Canada	5		0
Chile	19		
Colombia	19	5	0
Costa Rica	13		*(0/)* 1 / 2 / 4
Czech Republic	21	10 / 15	*(0)*
Denmark	25		0
Estonia	20	9	0
Finland	24	10 / 14	0
France	20	5.5 / 10	2.1
Germany	19	7	0
Greece	24	6 / 13	
Hungary	27	5 / 18	*(0)*
Iceland	24	11	0
Ireland	23	9 / 13.5	0 / 4.8
Israel	17		0
Italy	22	5 / 10	*(0/)* 4
Japan	10	8	
Korea	10		0
Latvia	21	5 / 12	
Lithuania	21	5 / 9	
Luxembourg	*(16)*17	*(7)* 8 / *(13)* 14	3
Mexico	16		0
Netherlands	21	9	
New Zealand	15		0
Norway	25	12 / 15	0
Poland	23	5 / 8	*(0)*
Portugal	23	6/13	
Slovak Republic	20	5 / 10	
Slovenia	22	5 / 9.5	
Spain	21	10	*(0/)* 4
Sweden	25	6 / 12	0
Switzerland	7.7		0 / 2.5 / 3.7
Türkiye	20	10	1
United Kingdom	20	5	0
EU27 average	**21.5**		
OECD average	**19.2**		

Note: Temporary VAT rates (e.g. those applicable in the context of energy crises) are shown in italics. Values for EU27 and OECD are unweighted averages.
Source: Elaboration of data from (OECD, 2022[2]).

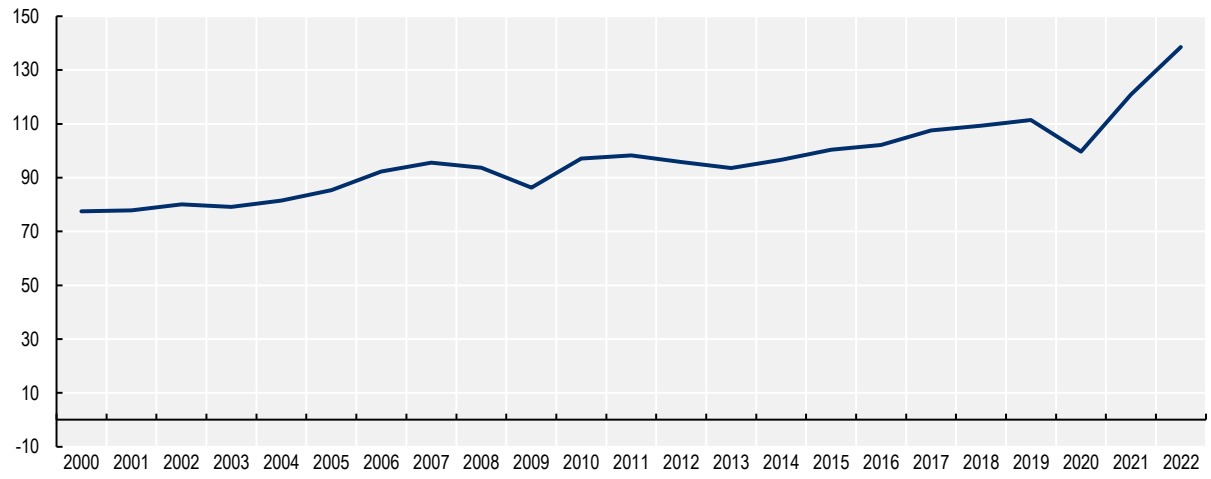
9.2.2. The Italian VAT system

In Italy, VAT ("Imposta sul valore aggiunto", IVA) came into force on 1 January 1973, replacing the general tax previously in place ("Imposta Generale sulle Entrate", IGE) (Presidential Decree No. 633/1972).[2] The Italian VAT scheme has evolved considerably since its inception. In 2013, the standard rate increased to the current rate of 22%, which is aligned with the median values of EU27 and OECD countries, and is slightly above the averages. Two reduced rates of 10% and 5% apply to a range of goods and services, including some foods, the supply of electricity and gas for domestic heating, water supplies and waste collection services, some pharmaceuticals, access to cultural services, domestic passenger transport, and certain construction and renovation works[3] (Agenzia delle Entrate, 2020[4]). A super-reduced rate of 4% applies to a list of essential goods, such as some food products, newspapers, books, and the supply and construction of first homes (Berardi and Bersanetti, 2014[5]).

VAT revenues represent 24% of general government revenues (ISTAT, 2022[6]) and 6.8% of the Italian GDP (see Figure 9.1). Total revenues increased from EUR 77.5 billion in 2000 to EUR 139 billion in 2022, with a drop in 2009 and in 2020 (see Figure 9.2). In absolute terms, Italy's VAT revenue is the third largest in the EU27, after Germany and France.

Figure 9.2. VAT generated over EUR 130 billion of revenues in 2022

VAT revenues in Italy, billion EUR, 2000-2022



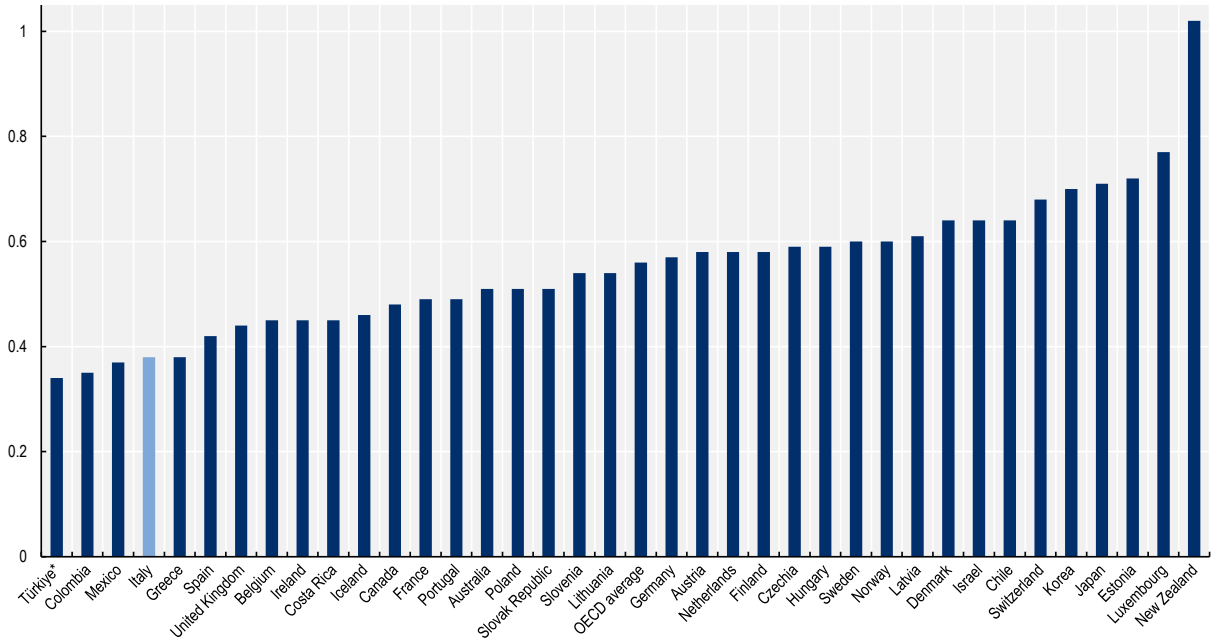
Source: (European Commission - Directorate-General for Taxation and Customs Union (DG TAXUD), 2023[7]).

Tax evasion remains a concern and there is room to improve VAT collection, despite the significant progress made in recent years to fight VAT evasion, thanks in part to the introduction of e-invoicing by businesses. The VAT compliance gap, i.e. the gap between actual VAT revenues and the potential revenues at full compliance, is the biggest in Italy across EU countries, in absolute terms (EUR 10.6 billion), and the fifth largest as a share of VAT Total Tax Liability (10.8%, compared to the EU27 average of 5.3%) (European Commission, DG TAXUD, 2023[8]). The VAT Revenue Ratio (VRR), which provides an estimate of revenue losses (as a consequence of VAT exemptions, reduced rates, weak enforcement or VAT non-compliance), is at 0.38 in Italy, well below the OECD average of 0.56, as shown in Figure 9.3 (Panels A and B).

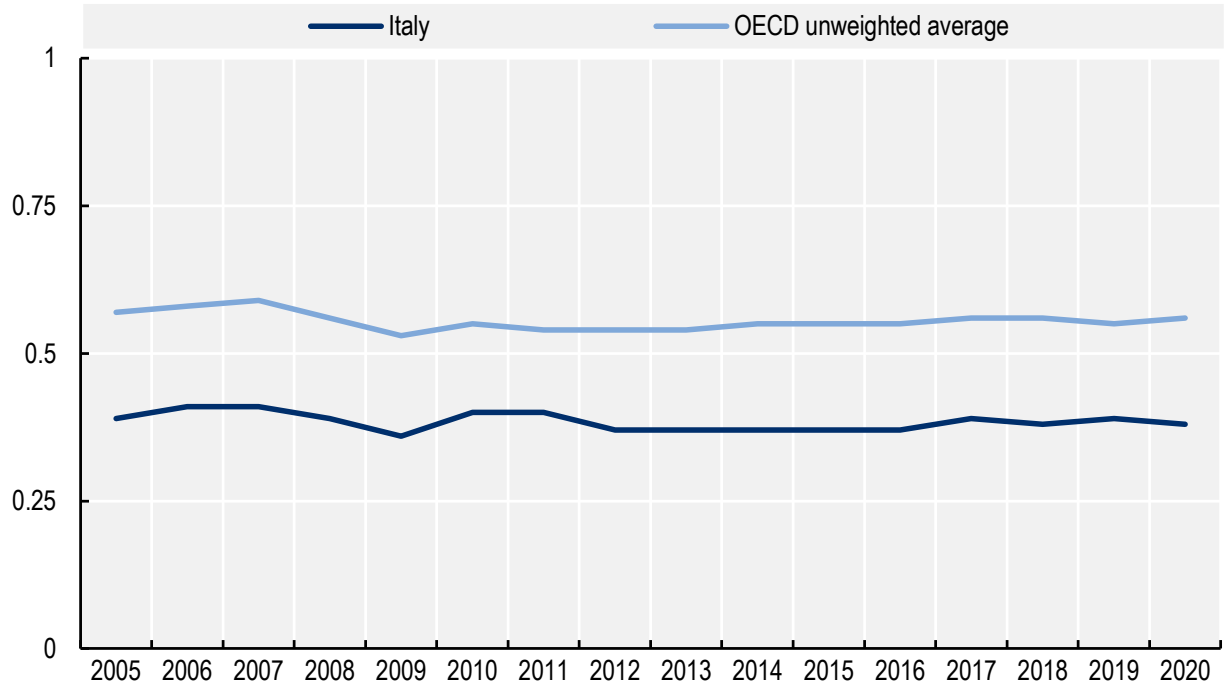
This underlying context is hardly conducive to a favourable environment for the introduction of additional VAT rates. Currently, the use of VAT rates, lower than the standard rate, represents a loss of income to the Italian treasury of approximately EUR 40 billion (Corte dei Conti, 2023[9]) compared to current total revenues from the instrument of EUR 138.5 billion (in 2022). Furthermore, the very limited monitoring and ex-post evaluation carried out on existing preferential VAT rates raises concern in terms of efficiency in the long term, and does not present a favourable framework for the introduction of additional reduced VAT rates. Since 2016, public spending has been monitored through annual reports provided to parliament.[4] The annual reports on tax expenditures calculate the impact of preferential VAT rates on public finances. However, only some reduced VAT rates are considered within scope, depending on the policy objective and the nature of the measure. Furthermore, the impacts of the preferential VAT rates are very seldom assessed in relation to the intended original objectives.[5] The limited evaluation and oversight is not conducive to reform. Indeed, VAT reductions or exemptions are rarely removed, except as a consequence of EU-level reforms.

Figure 9.3. Italy has one of the lowest VRRs across OECD countries

Panel A. VRR for selected OECD countries, 2020



Panel B. VRR, Italy and OECD unweighted average, 2005-2020



Notes: The VRR measures the performance of a VAT regime in collecting the tax on final consumption expenditure. It estimates the difference between the VAT revenue collected and what would theoretically be raised if VAT was applied at the standard rate to the entire potential tax base and all revenue was collected. A ratio of 1 reflects a VAT system that applies the standard rate to all expenditure on goods and services consumed in an economy, with perfect tax enforcement. * Data for Türkiye is for 2019.
Source: (OECD, 2020[10]; OECD, 2022[2]).

9.3. Legislative framework on preferential VAT rates

9.3.1. Historical background and the EU VAT Directive

VAT became common in EU Member States during the 1960s and 1970s when it started replacing national taxes on consumption previously in place. At the time, the legal framework granted considerable autonomy to individual Member States in the definition of national VAT systems, resulting in a heterogenous set of approaches across countries. Subsequently, in pursuit of fair competition and a well-functioning internal market, the European Union embarked on a gradual journey of harmonizing VAT regulations among its Member States, most recently, through a series of revisions to the EU VAT Directive (2006/112/EC),[6] which lays down the regulatory framework for the tax.[7] These revisions sought to reform the VAT system progressively, harmonise rates across countries, and restrict the range of application of reduced VAT rates (Berardi and Bersanetti, 2014[5]; Burnod, 2022[11]).

Directive 2022/542/EU of 5 April 2022[8] introduced substantial changes to the general regulatory framework for VAT, including a comprehensive transformation of the rules governing standard and non-standard VAT rates. It updated and broadened the list of goods and services eligible for a reduced rate. Concurrently, it phased out freeze clauses previously established to allow for super-reduced rates in certain Member States.

As a result, the EU has formed a sizeable regulatory framework for harmonised VAT rules. However, it leaves Member States with some flexibility in setting the number and level of VAT rates. Currently, the EU VAT Directive stipulates that:

- **The standard rate** cannot be less than 15%.
- **Up to two reduced VAT rates** (not lower than 5%) may be applied in addition to the standard rate. Reduced rates may only be applied to a maximum of 24 categories of goods and services listed in Annex III of the VAT Directive. Reduced rates on categories not listed in Annex III will need to be phased out by 2032, after which they may be retained at a rate not lower than 12%.
- EU countries may apply a **super-reduced rate** (of less than 5%) and a **zero rate** (i.e. an exemption to VAT with the right to deduct input VAT) to seven categories of goods and services listed in Annex III.
- Reduced, super-reduced or **zero rates** may also be allowed for "grandfathered" rates, i.e. for pre-existing reduced, super-reduced or zero rates (existent as of 1 January 2021), as listed in Article 105a(1). "Grandfathered" super-reduced rates on categories listed in Annex III may be retained.

Directive 2022/542 enables Member States to engage in the evaluation and substantial rethinking of their VAT structures, including alignment with the ambitions of the European Green Deal. Member States may apply a maximum of five different VAT rates (in addition to any special provisions), allowing for the use of reduced, super reduced or zero rates to promote certain environmentally friendly supplies, whose consumption could contribute to a climate-neutral and green economy. Furthermore, Member States must phase out any preferential rates applicable to environmentally harmful supplies (e.g. related to the supply of fossil fuels) by 1 January 2030, and on the supply of chemical pesticides and fertilizers by 1 January 2032.

Member States will have to align with the new provisions of Directive 2022/542/EU by 31 December 2024, as the new rules will apply as of 1 January 2025.

9.3.2. Considerations on the possible application on products with recycled content

Currently, the application of preferential VAT rates on products with recycled content would face legal barriers. EU Member States may only apply preferential VAT rates to categories of goods and services listed in Annex III of the EU VAT Directive. Recent amendments to the directive have resulted in the inclusion of environmentally virtuous goods to support a more targeted use of VAT rates to reflect increased environmental ambitions. The categories of environmentally friendly goods and services eligible for a reduced rate include solar panels, repair services (for household appliances, shoes and leather goods, clothing and household linen), low-emission heating systems, bicycles and electric bicycles, rental and repair of bicycles. However, the list does not include a category with specific reference to recycled content.

The key obstacle to the application of preferential VAT rates on products with recycled content is the principle of fiscal neutrality, a fundamental principle of tax policy (see Box 9.1) which prevents EU Member States from taxing similar goods differently (i.e. goods that have similar properties and meet the same consumer needs). According to EU law and recent rulings by the Court of Justice of the European Union (CJEU), for reduced VAT rates to be applied to supplies listed in Annex III, they must have a specific environmentally virtuous characteristic. This characteristic must be evident to the consumer and be a determining factor in the consumer's purchasing decision. Annex 9.A details the requirements that could potentially enable the presence of recycled content, for example, in fashion items, to respect these criteria.

However, the EU VAT legal framework is constantly evolving. Although it is currently unlikely, it is possible that VAT for environmental purposes could be used to a greater extent in the future, including to support secondary materials. There has been interest at the EU level to challenge the current legal barriers to reduced VAT rates on products with recycled content. As mentioned earlier, the Czech delegation put forward a proposal to use reduced VAT rates on recycled products as a tool to promote the circular economy at the Environment Council meeting of 20 June 2023.

Box 9.1. Fundamental principles of tax policy

The generally accepted principles of tax policy applicable to consumption taxes, as contained in the Ottawa Taxation Framework Conditions, are broadly applicable to VAT. These include:

- **Neutrality**: Taxation should seek to be neutral and equitable between forms of electronic commerce and between conventional and electronic forms of commerce. Business decisions should be motivated by economic rather than tax considerations. Taxpayers in similar situations carrying out similar transactions should be subject to similar levels of taxation.
- **Efficiency**: Compliance costs for businesses and administrative costs for the tax authorities should be minimised as far as possible.
- **Certainty and simplicity**: The tax rules should be clear and simple to understand so that taxpayers can anticipate the tax consequences in advance of a transaction, including knowing when, where, and how the tax is to be accounted.
- **Effectiveness and fairness**: Taxation should produce the right amount of tax at the right time. The potential for tax evasion and avoidance should be minimised while keeping counteracting measures proportionate to the risks involved.
- **Flexibility**: The systems for taxation should be flexible and dynamic to ensure that they keep pace with technological and commercial developments.

Source: (OECD, 2017[1]).

9.4. Insights from the empirical literature on the relevance of VAT reductions to support environmental policy objectives

The advantages and disadvantages of reduced VAT rates have been discussed at length in the literature and in the EU. Tax policy would favour a uniform VAT rate to ensure stable revenues and enhance economic efficiency. Reduced VAT rates have been found to be only limitedly effective so far, due to the limited pass-through of VAT reductions to consumer prices (Benzarti and Carloni, 2019[12]). Furthermore, they increase the complexity of the system, thereby increasing administrative, litigation and compliance costs, and may distort households' spending patterns (IFS et al., 2011[13]). At the same time, differentiation in VAT rates is often and increasingly put forward to deliver environmental and social benefits, for instance, by encouraging the consumption of desirable goods or services (e.g. solar panels) or generating employment (e.g. in labour-intensive sectors). This section provides insights from the empirical evidence to shed light on the advantages and limitations of reduced VAT rates in achieving the set objectives.

Reduced VAT rates are generally employed to support one of four main policy objectives. First, they are often employed to alleviate the potential regressive nature of consumption taxes. For instance, Italy applies a reduced VAT rate on essential goods and services, such as household consumption of electricity, methane and liquefied petroleum gas (LPG). The available evidence suggests that the majority of reduced VAT rates introduced to support low-income individuals have the desired progressive effect (OECD/KIPF, 2014[14]). However, the instrument is inadequate at targeting support to low-income households. At best, high-income households receive as much aggregate benefit from a reduced VAT rate as low-income households; at worst, high-income households benefit vastly more in aggregate terms than low-income households (OECD/KIPF, 2014[14]). Overall, it remains unproven whether VAT is well suited for income redistribution, especially in Member States with well-developed social security systems (Copenhagen Economics, 2007[15]).

Second, reduced VAT rates are sometimes used to encourage the consumption of goods and services that deliver positive externalities (on producers and consumers) and that are not fully considered during purchasing choices, such as cultural goods (e.g. books, music and cultural events), public transport, or goods and services with environmentally desirable characteristics. Third, VAT reductions may be deployed with the intent to incentivise the purchase of labour-intensive services (e.g. cooking, cleaning, childcare, domestic care or repair) instead of self-provision, especially for activities that are particularly vulnerable to tax evasion.

Both options, VAT reductions to encourage the consumption of goods or services that deliver positive externalities or to promote labour-intensive services, could support environmental policy objectives. As mentioned in section 9.3.2, EU Member States now have more leeway to apply VAT reductions to a list of goods with environmentally desirable characteristics (e.g. solar panels, repair services). However, the cost-effectiveness of these measures remains uncertain. Environmental taxes and the internalisation of externalities should always be prioritised over ad hoc incentives through the tax code in order to generate clearer price signals while minimising administrative costs. Furthermore, distributional impacts associated with preferential VAT rates remain an important concern, as high-income households normally consume more socially desirable goods (Copenhagen Economics, 2007[15]). VAT reductions in selected sectors are usually regressive: an analysis carried out on selected OECD countries found that reduced VAT rates on hotel accommodation and restaurants benefitted high-income individuals vastly more than low-income individuals, both in aggregate and proportional terms (OECD/KIPF, 2014[14]).

Lastly, countries may introduce VAT reductions to temporarily boost the economy or support selected sectors. Following COVID-19 restriction measures, several EU Member States reduced VAT, on a temporary basis, to promote economic recovery, either by reducing VAT in selected sectors (e.g. Belgium and Austria reduced VAT on food, beverages, restaurants, hotels and certain cultural goods) or by general reductions in the standard rate (e.g. Germany and Ireland). Temporary VAT cuts stimulate consumer purchases. In turn, the resulting higher disposable income encourages households to increase consumption and expedite planned purchases. A temporary reduction in VAT has the added advantage of being able to be deployed swiftly (Conseil des Prélevements Obligatoires, 2023[16]). Past evidence from the United Kingdom indicates that implementing a temporary VAT cut can work as a fiscal stimulus: a temporary cut in standard VAT by 2.5 percentage points in place from December 2008 until December 2009 succeeded in boosting consumer confidence and retail sales (Institute for Fiscal Studies, 2014[17]). However, both pass-through of the VAT reduction to consumer prices and employment effects may be limited (Benzarti and Carloni, 2019[12]). The introduction of temporary VAT reductions should be carefully considered, as VAT remains poorly suited to supporting demand, production and investments, and is generally less effective than more targeted interventions due to the uncertain repercussions on prices, varying price elasticities, and the limited impact on exogenous factors that might impact demand and employment.

Overall, the academic literature strongly supports uniform VAT rates, although there could be valid exceptions to support specific desirable goods. The relevance of VAT reductions for this environmental policy objective may be best evaluated on a case-by-case basis, while also considering the policy mix. Possibly, reduced VAT rates may have a role in promoting green behaviour in the presence of specific barriers to its adoption, as discussed later in this chapter for the use of recycled content. Policy efficiency objectives and possible distributional impacts highlight the need for a cautious approach to the introduction of new VAT rates, informed by rigorous ex-ante and ex-post assessments of the expected outcomes, fiscal impacts and socio-economic implications. This is especially the case when considering that VAT reductions are rarely evaluated and reformed (Conseil des Prélevements Obligatoires, 2023[16]), creating a risk that costly reduced VAT rates may persist, even if there are no beneficial impacts on households or selected sectors.

9.5. Expected outcomes of reduced VAT on products with recycled content

9.5.1. Environmental outcomes

Insights from the policy simulations

This section leverages insights from the modelling of subsidies in ENV-Linkages presented in Chapter 7 and insights from the empirical literature to assess the expected impact of VAT reductions on products that contain recycled materials.

The subsidies presented in Chapter 7 simulate a decrease in the price of the recycled materials as a result of combining: i) a subsidy for recycling, which corresponds to a 75% subsidy rate on the purchasing price of the sorted waste intended for recycling; and ii) a 25% subsidy on secondary production. These would roughly correspond to a VAT reduction of a few percentage points (1% for construction and electronics, 4% for cars and heavy machinery, 2% for other transport equipment). While these subsidy streams are not VAT rebates, they simulate the reduction of the price of recycled material that needs to be paid by sectors using the commodity and, hence, could give a good indication of the impacts of measures that reduce the price of goods with recycled content.

The results show that while subsidies for recycled materials help to increase demand for secondary materials, the environmental benefits remain uncertain. In the case of metals, subsidies could increase the share of secondary metals used in the production of goods by 40-60%. However, as final products (which typically contain both primary and secondary materials) become relatively cheaper, consumption would grow and demand would increase for all metals compared to the baseline. Consequently, reductions in greenhouse gas (GHG) emissions would fall only slightly compared to the baseline (due to the lower carbon footprint of secondary metals). This rebound effect on consumption is likely to also occur in the case of VAT reductions, and could even be amplified, as VAT reductions do not directly target the recycled materials or the recycling process but aim to influence the relative price of the final product.

Two additional limitations could reduce the likelihood of positive environmental outcomes in the case of VAT reductions compared to the subsidies modelled. First, while metals tend to have high recycling rates and are used in very different products, other materials face issues such as quality and inadequate supply, as well as more complex recycling and reprocessing issues.[9] Second, the subsidies modelled in the policy scenario reduce the price of intermediate goods, whereas a VAT rebate would necessarily have to be on the final product that – depending on the threshold for recycled content that triggers the rebate – contains both secondary and primary materials, in effect subsidizing primary materials as well. As such, the shift to secondary materials generated from the VAT rebate could be less than a direct subsidy for recycled material that was modelled here.

The rest of this section will present insights from empirical evidence to complement the analysis on environmental outcomes.

Considerations from empirical evidence on the impacts of VAT reductions

While economic theory and modelling efforts could predict some environmental benefits from reduced VAT rates on products with recycled content, empirical evidence from past applications of reduced VAT (with other policy objectives) highlight important areas of uncertainty on the likelihood of environmental outcomes. These relate to the impact on the price-setting behaviour of firms (i.e. the degree of pass-through to consumer prices), the consumer response, and the producer and retailers' response, as detailed below.

Impact on the price-setting behaviour of firms

There is uncertainty about how much lowering the standard VAT rate applied to products (and services) would translate into price reductions for consumers.

Economic theory would expect a high degree of pass-through to consumer prices in competitive markets, especially in the presence of high price elasticity and highly responsive supply (IFS et al., 2011[13]). Conversely, in sectors with limited competition, firms are more likely to re-optimise to maximise profits, typically leading to an incomplete pass-through of VAT reductions. Similarly, supply limitations may restrict the ability of firms to lower retail prices, for instance, in the case of supply shocks in value chains. Pass-through of a VAT change that applies only to a narrow category of goods is likely to be lower than that for a broad-based VAT change, as the former opens more possibilities of substitution towards other goods (IFS et al., 2011[13]). The prospect of a temporary VAT reduction could also limit incentives for retailers to adapt their retail prices (Copenhagen Economics, 2007[15]).

Available empirical evidence confirms that there is wide variation in responses to changes in VAT rates, from no impact at all to pass-through above 100%. An econometric analysis performed by Copenhagen Economics (2007[15]) on the impact of reduced VAT rates in selected EU countries found that tax increases are more heavily passed on to consumers than VAT cuts, possibly due to fixed input factors (Table 9.2). The authors also found that price adjustments usually take place within a few months of implementation (and sometimes ahead of implementation), with limited additional impacts afterwards.

Table 9.2. Pass-through of VAT rate reductions on selected goods and services

Estimated pass through (percentage of VAT change) of selected reductions in VAT rates

Sector	Country	Tax rate change	VAT change (percentage points)	Estimated pass-through (percent of VAT change)
			Goods	
Books	Sweden	↓	-19	82
Footwear	Italy	↑	4	163
		↑	10	134
Periodicals	Italy	↓	-16	0 or negative
Beverages	Portugal	↓	-5	0 or negative
		↓	-7	0 or negative
			Services	
Restaurants	Portugal	↓	-5	19
Hairdressers	Ireland	↓	-8	46

Source: Extracted from (Copenhagen Economics, 2007[15]).

Empirical evidence confirms that VAT cuts are eventually passed on to consumers in competitive sectors with elastic supply, although often in an incomplete way. Reductions in the VAT rates applied to labour-intensive goods in Finland (foodstuffs, restaurant and catering services, hairdressing services), France (restaurants) and Germany (hotels) resulted in variable outcomes. While full pass-through was observed for foodstuffs, in other cases, pass-through was as low as 15%. Low price elasticity of supply could partially explain the small effect observed in the case of hotels, where supply is constrained in the short term. In these cases, company owners and retailers benefit the most from reduced VAT rates, and consumers the least (see Box 9.2).

More recent VAT reductions on labour-intensive services related to the promotion of renovation and repair services has also shown mixed impacts on prices. The renovation and repair of private dwellings is one

sector where service providers most readily pass VAT reductions on to consumers. In Belgium, the VAT reduction, from 21% to 6%, on small repair services (for bicycles, shoes and leather goods, clothing and household linen) resulted in a price change of only 1%. The 11.5% VAT reduction in the Netherlands led to a 10.5% price reduction in clothing repair services. This is in contrast to the slight price increase for repairs of bicycles and shoes (Copenhagen Economics, 2007[18]).

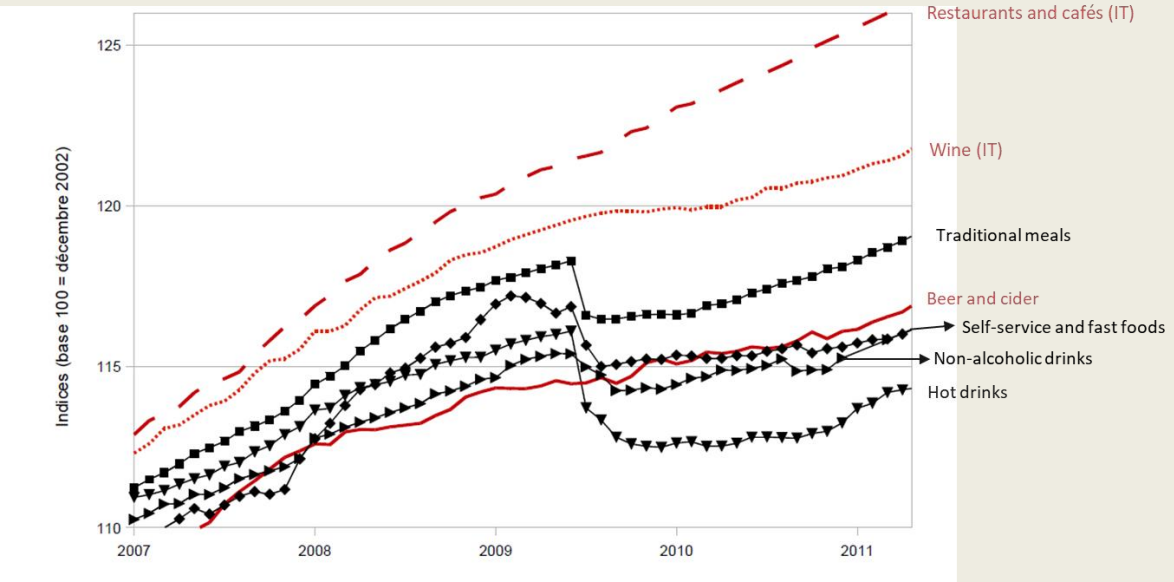
Box 9.2. Impacts of the reduced VAT rate applied to restaurants in France

An assessment of the impact of a VAT reduction for the restaurant sector in France from 19.6% to 5.5%, in July 2009, found that the measure resulted in a swift, yet incomplete, pass-through to consumer prices. Figure 9.4 illustrates the price changes that occurred post-2009 for goods covered by the VAT reduction (in black) versus the two types of counterfactuals (in red), beer and cider, as well as similar goods and services in Italy, the neighbouring country. The estimated price change was 2% in the sector as a whole, implying a 20% rate of transmission of the VAT reduction over 18 months. This is in contrast to the theoretical price decrease of 9.8% if the VAT reduction had been entirely transmitted to prices. In sum, restaurant owners likely benefitted the most from reduced VAT rates, while consumers the least.

A later study by Benzarti and Carloni (2019[12]) evaluated the incidence of the VAT cut in France and found that it mostly benefited firm owners through increased profits. They found that firm owners pocketed more than 55 % of the VAT cut, while sellers of material goods, employees and consumers shared the remaining windfall, with consumers benefiting the least. They also concluded that the measure had overall very limited impacts on stimulating demand, due to the limited degree of pass-through to consumer prices.

Figure 9.4. VAT reduction in the French restaurant sector (19.6% to 5.5%)

Prices for various goods, indexed to 2002



Source: Adapted from (Lafféter and Sillard, 2014[19]).

Consumer response

Consumers may react differently to lower prices as price elasticities vary across sectors, product groups and individuals.

In Italy, a reduction in the VAT rate applied from the standard 22% to the reduced 10% rate would lead to a 9.8% reduction in prices, assuming 100% pass-through to prices. Even in the presence of considerable pass-through, there are uncertainties about the extent of the response on the demand for eligible products as consumer price elasticity varies by commodity group and product. Furthermore, consumers generally set a reference price within a range where demand will be unaffected by small price adjustments. Thus, relatively minor price adjustments may not impact consumer demand.

The VAT reduction on products with recycled content could lead to a change in consumer behaviour, potentially causing a rebound effect with unpredictable impacts on the environment. If the VAT reduction lowers the relative price of products with (a share of) recycled content but increases the demand for those products, due to the combined price and signalling effect, the measure's expected environmental benefits could be diminished or even lost due to the overall increase in material consumption.

In the case of products with environmentally desirable characteristics, the perception by consumers of those products could generate a behavioural response that amplifies their responsiveness to VAT-induced price changes (a signalling effect). Subsidies and tax incentives, when properly communicated, tend to influence consumer demand beyond the purely financial benefit they provide, as citizens make an effort to align with purchasing and consumption behaviours that are more aligned with virtuous behaviour. For instance, the VAT reduction could potentially lead to a preference for products with recycled content (over other products) that is greater than the impact of the price reduction on its own. However, in the absence of measures to contain consumption, the risks of a rebound effect on overall product and materials demand are significant.

Response by producers and retailers

Even in the presence of increased consumer demand for recycled products in response to the lower prices, the response from producers could vary. Market conditions, including the price, supply and quality of recycled materials, are important in influencing the response of producers and retailers. In the presence of constraints to supply, for instance, if there is a short supply of good quality recycled materials, producers may face difficulties in incorporating additional recycled content in their products, especially in the short term, in which case producers and retailers would be unlikely to reduce prices until the supply constraints ease.

The characteristics of a policy design also play a crucial role. Notably, the recycled content threshold, above which a product would be eligible for the VAT reduction, is a key determinant of the measure's impact on increasing demand for recycled content. The threshold would need to be high enough to provide an incentive for producers to move away from business as usual, but not so high that it discourages them from switching to these products or overwhelms the recycling industry with the demand for recycled materials. In practice, setting the threshold level via a consultation process, involving industry and stakeholders of the specific sectors or product groups concerned, may minimise the risks of setting unrealistic targets or creating supply chain disruptions. Moreover, the threshold level may be regularly updated in line with technological and industrial developments to continue incentivising producers to shift towards the incorporation of recycled content.

Summary of considerations on environmental outcomes

Overall, the modelling exercise presented in Chapter 7 could support a theoretical argument for the introduction of reduced VAT rates on products with recycled content to promote secondary materials,

however there are important concerns on the likelihood of environmental outcomes due to the uncertain degree of pass-through to consumer prices and the possibility of rebound effects on consumption. From an environmental perspective, reduced VAT rates may at best be considered as part of a larger policy mix that intends to lower virgin material demand and the associated environmental impacts. Policies that disincentivise the use of virgin materials, such as targeted taxes, play an important part in the policy mix to control the impact on demand. Furthermore, attention should also be paid to identifying and mitigating the possible unintended effects related to material substitution. In addition, reduced VAT rates come with important distributional concerns (evidenced by the literature) and with concerns for the efficient use of public resources (discussed in the following section).

9.5.2. Economic implications

Macroeconomic implications (GDP and employment)

As presented in Chapter 7, firms are expected to respond to subsidies that support recycled materials by using fewer raw resource inputs and shifting to secondary materials in production processes. Economic activity in extractive and primary production sectors is likely to decline. In parallel, changes in demand patterns can lead to the expansion and contraction of certain economic activities, with an increase in employment by 60-90% in the sectors targeted by the measures (e.g. the recycling sector). The implementation of a VAT rebate is expected to exhibit the same changes in production modes and demand patterns as the modelled subsidies.

Empirical evidence suggests that reducing VAT rates is rarely an effective way of stimulating long-term job creation and economic growth compared to other measures. In the absence of permanent effects on the labour market, it is likely that the growth impulses would fade out quickly as the economy readjusts (Copenhagen Economics, 2007[15]).

A European Commission (2003[20]) evaluation of experiments with lower VAT rates on labour-intensive services concluded that there is no solid evidence that reducing VAT rates has a positive impact on employment. As the pass-through to prices was limited, the increase in demand that occurred was mainly explained by the favourable economic environment at the time of the measure, coupled with the associated increase in household disposable income. For instance, a set of measures to promote demand in the construction sector, enacted up to 2002 in some EU countries, overlapped with a period of extraordinary growth in the sector. While France and Italy attributed the creation of jobs (40 000 and 65 000, respectively) to the VAT reductions, these calculations do not take into account the impacts of direct tax measures nor the overall costs of the measure. Furthermore, the budgetary cost of VAT reductions is high in relation to its impact on job creation and the economy, while other measures are generally more cost-effective at stimulating job creation. A calculation performed at the EU level found that a reduction in labour charges creates 52% more jobs than a reduction in VAT fully passed down to consumer prices (European Commission, 2003[20]).

It is possible, however, that reduced VAT rates could favour investments and possibly stimulate employment (Conseil des Prélevements Obligatoires, 2023[16]). Theoretically, applying a reduced VAT rate to services provided by certain low-skilled, labour-intensive industries (e.g. domestic care, restaurants) could increase employment by boosting demand and wage levels for low-skilled workers, making employment more attractive to them than unemployment. Even though empirical evidence suggests that such policies are expected to only have a minimal impact on demand for low-skilled workers (Copenhagen Economics, 2007[15]), a stronger production and employment response may occur for goods and services that are more labour intensive. For instance, available studies show that a 10% drop in prices (due to lower VAT rates) can lead to 10% higher employment in labour-intensive domestic care, but less than 1% higher employment in capital-intensive electricity production (Copenhagen Economics, 2007[15]). As many labour-

intensive goods and services are generally also price elastic, the intervention may only lead to short-term bursts in employment and economic growth in these sectors.

Impacts on public finances

The fiscal costs of a VAT reduction on products with recycled content may be substantial. For reference, subsidies modelled in Chapter 7 generated an important impact on public expenditure, with the subsidies on secondary metals accounting for 1.7% of tax revenues. In the case of VAT, the instrument is a major source of fiscal revenues (as discussed in section 9.2), and the implementation of additional reduced VAT rates could imply significant losses for public revenues, including in the long term as producers and markets adjust their behaviour. If the measure leads to an increase in revenues from consumption taxes, this would be triggered by higher consumption levels that would likely come at the expense of higher overall environmental impacts.

The exact impacts of the introduction of a VAT reduction on products that contain recycled content may vary widely depending on the sectoral scope that such a measure would take in terms of the design of the instrument (e.g. the recycled content threshold), as well as on the induced change in consumer demand. As several product groups, potentially eligible for VAT reductions, are currently incorporating limited amounts of recycled content into new products, the fiscal costs could initially be limited. However, there are risks that the fiscal costs of the measure could increase over time as more products become eligible, unless the recycled content threshold is regularly updated to keep up with technological and industrial developments. These considerations are further discussed at the end of this chapter, with the example of garments containing recycled content.

Costs for businesses and public administrations

The use of VAT to achieve policy objectives beyond simply raising revenue can make the VAT system more complex, thereby increasing administrative and compliance costs for businesses. Compliance with reduced VAT rates can be a sizeable burden, especially for small businesses and in sectors characterised by large product ranges (e.g. food sector, fashion). The presence of recycled content would normally be a minor influencing factor on consumer decisions for most product groups. A common sale of goods could include any combination of products with and without recycled content, causing a greater burden for businesses having to apply several different VAT rates. Moreover, the multiplication of VAT rates in one sector can render the auditing process more complex, potentially increasing monitoring costs for public authorities.

Additionally, in light of the complexities that may come from the legal framework in introducing lower VAT rates on products that contain recycled content, substantial legal costs may arise. There is a high risk that differentiating VAT rates for similar products may give rise to numerous administrative and legal disputes concerning the proper classification of specific goods, incurring significant additional costs for public administrations.

9.5.3. Case study: application to textiles and fashion products

The textile and clothing sector provides an interesting case study for the potential piloting of VAT reductions on products that contain recycled content. Textiles contribute significantly to environmental and climate pressures as a result of production processes, consumption and waste generation. The fashion sector is a core economic activity in Italy, characterised by a multitude of micro and small enterprises (see Box 9.3) and a priority sector for the transition to a circular economy, with a focus on design for reuse, repair and recyclability, and on boosting markets for recycled materials (MiTE, 2022[21]). An Extended Producer Responsibility (EPR) scheme for textiles that covers fashion and clothing, furnishings and home textiles, as well as industrial and technical textiles, is currently in the implementation phase.

Fibre-to-fibre recycling, where end-of-life textiles serve as input material for the production of new fibres and clothing, still faces technical and economic challenges that hinder a broader scale-up. The National Recovery and Resilience Plan set out investment projects for additional infrastructure for the collection of pre-consumer and post-consumer textile waste, the modernization of existing infrastructure, and the construction of new recycling plants for textile waste.

Box 9.3. Economic importance and competitiveness of the Italian fashion sector

The fashion sector (textiles, garments, leather, footwear and jewellery) is a key contributor to the global competitiveness of "Made in Italy". As of 2019, the sector was dominated by small and micro-sized enterprises (56 000 firms). In general, productivity grows with business size: larger enterprises account for only 0.2% of total firms but contribute 28% of total value added. While micro-sized enterprises have lower economic performance, the lower labour costs of small enterprises lead to higher profitability of sales. The garment segment ("abbigliamento") makes up more than half of total firms in the fashion sector and 44% of total employment in the sector.

The fashion sector is one of the most competitive manufacturing sectors in Italy. As of 2019, large enterprises (with more than 250 employees) registered a price competitiveness of 177% (EUR 176.6 per EUR 100 of unit labour costs), and medium-sized enterprises (100-249 employees) registered a price competitiveness of 155% compared to a national average of 140%. Four out of ten firms in the fashion industry are innovative, although this indicator is lowest in the garment segment of the sector (where 34% of firms are innovative) compared to textiles (at 51%) and footwear (at 39%).

Source: (ISTAT, 2023[22]).

Advantage #1: fiscal incentives are likely to support recycled fibres

The theoretical rationale for reduced VAT rates for garments with recycled content is straightforward. Currently, recycled fibres can be higher priced than fibres from primary materials. As a result, producers may face challenges in integrating recycled fibres and yarns into their textile products, as this poses challenges in maintaining competitive pricing, especially in highly competitive European fashion markets (Boschmeier, 2022[23]). If prices go above certain thresholds, the fashion brand can lose its market position as sales decline.

Implementing a reduced VAT rate for garments containing recycled content would decrease their price for the consumer, potentially generating higher consumer demand for garments that contain recycled content. In addition to the effect of prices, a reduced VAT rate is expected to have a signalling effect by drawing consumer attention to the eligible products. Although there are important differences across material types, recycled materials are generally associated with lower environmental and climate impacts compared to virgin materials.

Advantage #2: ReMade in Italy certification could expedite the implementation of VAT reductions for garments with recycled content

In the garment sector, several tools required to implement a reduced VAT rate for garments with recycled content already exist. Labelling and certification schemes are already used to verify compliance for green public procurement (GPP) requirements on recycled content. For instance, the ReMade In Italy certification guarantees the presence of recycled content, and it is already used to verify compliance with recycled content requirements in GPP for a number of products, including textiles, footwear and furniture. ReMade in Italy includes an associated product label, which assigns a performance category based on the percentage of recycled content: from A+ (above 90%) to C (up to 30%). This certification system could be leveraged to help

set the threshold, above which textiles would be considered to contain recycled content and would be eligible for the reduced VAT rate, as well as to support monitoring and enforcement by public authorities.

Risk #1: uncertain environmental benefits

Consumer response is uncertain and risks of rebound effects are considerable. As already discussed in section 9.5.1, several factors contribute to the uncertainties surrounding the measure's outcome and the overall environmental impacts, including the potential impact on the price-setting behaviour of firms and retailers, and the response by consumers and producers. Moreover, there are uncertainties about the extent to which consumers will switch to products that benefit from the reduced VAT rates instead of their current purchases, without simply increasing overall consumption of garments. Historical data for the EU shows that clothing prices have been decreasing (by 30% between 1996 and 2018, relative to inflation) and, consequently, per capita consumption of clothes has climbed steadily (from 7.4 kg per person in 2015 to 7.9 kg per person in 2019). As a result, there is a risk that, in the absence of additional policies, lower prices could be leading to rebound effects in the form of an overall increase in consumer demand for clothing.

Other unintended consequences may require additional policies interventions. There is a risk that the emphasis solely on recycled content may send mixed signals to producers in terms of design priorities. Even though requirements for recycled content may generally increase demand for recycled material and reward producers who innovate with circular design, focusing on a single feature may lead to unintended consequences for product design. For instance, in the case of packaging, the inclusion of recycled content can compete with "lightweighting" as recycled materials tend to have a higher weight-to-strength ratio than virgin materials (Laubinger et al., 2021[24]). In some material chains, recycled content can affect the mechanical recyclability of a product or other desirable properties it may have.

The clothing sector has witnessed a wave of voluntary commitments in recent years to incorporate recycled content in the products sold. This growing commitment to using recycled materials in the fashion sector is creating significant pressure on supplies of recycled materials, mostly recycled polyester. However, this demand is mostly being met with recycled PET (rPET) from recycled PET bottles and other packaging. This is generally regarded as a shift towards lower value applications, for two reasons. First, food-grade rPET used in applications other than food packaging exits the food-grade loop and is therefore considered lost (it cannot circle back into food-grade applications), and second, whereas PET food packaging can be recycled several times, polyester clothing is difficult to recycle and is more likely to be landfilled or incinerated.

On the supply side, several barriers to higher fibre-to-fibre recycling in Europe have been identified. They include:

- Limited eco-design, including design for recycling, which often limits the feasibility of recycling end-of-life textiles (for instance, textiles with blended materials, or those containing elastane, are typically harder to recycle as mechanical recycling generally requires input with a high level of purity).
- The lack of incentives to invest in sorting activities (including the lack of skilled labour), which are a necessary step to enable fibre-to-fibre recycling.
- The absence of appropriate infrastructure for fibre-to-fibre recycling and the lack of investments in new recycling technologies.

Overall, a comprehensive understanding of textile design criteria is essential to enable positive environmental outcomes, while keeping in mind all the aspects mentioned. In this sense, policy instruments that include other economic instruments, regulations, support to technological and infrastructure development, and information provision can complement fiscal incentives to address these challenges and opportunities.

Risk #2: the impact on public finances could be substantial

Depending on instrument design and the market response, the fiscal impact could be large. The introduction of a reduced VAT rate on garments that contain recycled content can potentially incur significant losses for public budgets. This section quantifies possible losses for fiscal revenues generated by the measure compared to the baseline. The baseline assumes that annual sales of garments grow by 0.5% annually. A set of scenarios examines the potential fiscal impact of the introduction of a reduced VAT rate, designed as follows:

- **Tax rate reduction**: the VAT rate would decrease from the standard VAT rate of 22% to a reduced rate of 10%. Assuming full pass-through to consumer prices, this could represent a decrease in product prices by around 9%.
- **Coverage**: the reduced VAT rate would apply to all garments that contain recycled content above a set threshold.
- **Year of implementation**: from 2025.

Two alternative assumptions are taken into account regarding the growth in market share of products that are eligible for the reduced VAT (i.e. garments on the market that contain a share of recycled content above the relevant threshold and which have the necessary certification):

- Annual increase of 1 percentage point, same as in the baseline (scenarios no. 1 and 3 in Table 9.3). This could reflect the scenario where the introduction of a reduced VAT rate leads to a sustained increase in the market share of garments containing recycled content; however, the eligibility criteria for the reduced VAT rate are regularly updated in line with market developments.
- Annual increase of 3 percentage points since the introduction of the VAT reduction measure (scenario no. 2 in Table 9.3). This reflects the possibility that the introduction of a reduced VAT rate leads to a sustained increase in the market share of garments with recycled content.

Additionally, considering the risks outlined above, regarding a possible rebound effect in consumer behaviour, scenario no. 3 assumes an increase in the total consumption of garments by consumers (annual growth rate of total sales is 1%, as opposed to 0.5% in the baseline).

Table 9.3. Losses in public revenues will vary depending on instrument design, market conditions, and the responsiveness of retailers and producers

Scenario assumptions and losses in VAT revenues compared to the baseline, EUR million

Scenario no.	Scenario assumptions		Change in VAT revenues (compared to Baseline), EUR million				
	Annual % point increase in the market share of products eligible	Rebound effect in consumption	2025	2026	2027	2028	2029
1	1	No	-615	-728	-845	-965	-1088
2	3	No	-769	-1041	-1320	-1608	-1904
3	1	Yes	-549	-594	-643	-693	-746

Source: Authors' own elaboration.

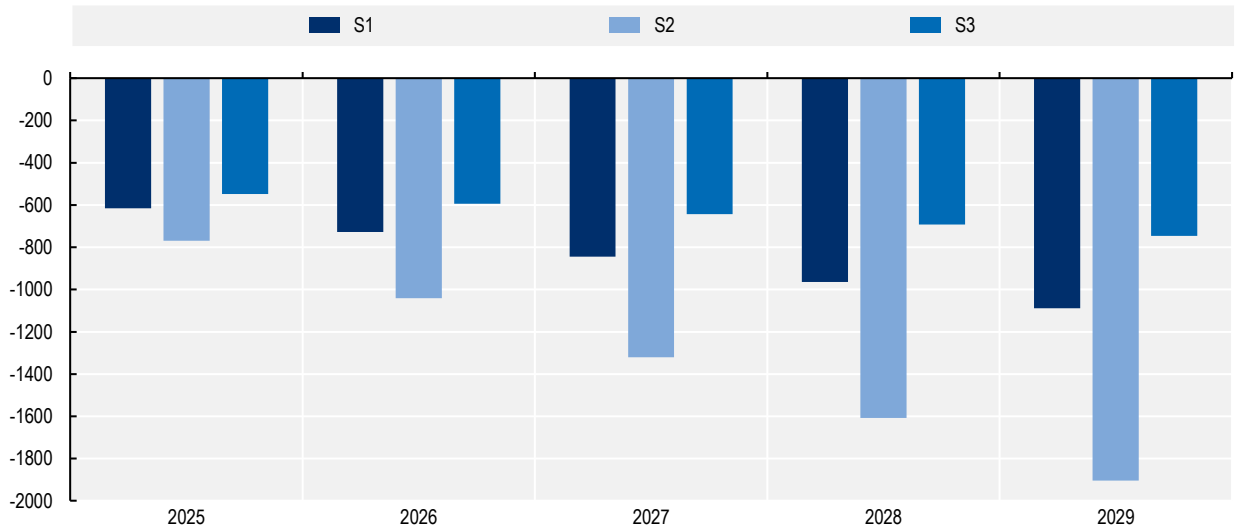
Although the calculations are based on a set of stylised assumptions, the projected fiscal impacts show that the costs for public finances would vary widely depending on both instrument design and the market response, which could be substantial overall. The fiscal impact could vary between EUR 520 million and EUR 769 million in 2025 alone. Importantly, the fiscal impact could become substantial in the medium and long term, as the market adjusts and the recycled content in products continues to increase. Scenario

no. 1, where the market share of products eligible for the reduced VAT rate grows by 1 percentage point annually (as opposed to 3 percentage points in scenario no. 2), illustrates the point that regular monitoring and revision of the eligibility criteria for the reduced VAT rate could help to alleviate the burden on public finances, while providing dynamic incentives for producers to incorporate recycled content.

The lowest impact on VAT revenues is expected for scenario no. 3, where the higher VAT revenues generated by the higher number of sales compensates for the revenue lost (i.e. foregone) from VAT reductions. However, this is also the scenario with the lowest chance of environmental gains or benefits, as the higher demand for garments will likely lead to higher material consumption overall.

Figure 9.5. Results on the projected fiscal impacts of the measure applied to garments

Losses in VAT revenues compared to the baseline under 3 possible scenarios, EUR million



Source: Authors' own elaboration.

Implementation as part of a policy mix could amplify the expected environmental benefits and achieve budget neutrality

In principle, the evaluation of proposals of the possible costs and benefits of reduced VAT rates needs to be undertaken with budget neutrality in mind. As VAT reductions imply a loss of fiscal revenue, the requirement for budget neutrality may create political opportunities to implement revenue-raising measures and a broader environmental tax reform. Importantly, the phasing out of Environmentally Harmful Subsidies (EHS), such as reduced VAT rates on environmentally harmful supplies, which is required to align with the amended EU VAT Directive, may help recover some of the foregone revenue.

Targeted environmental taxes, such as a tax on virgin material extraction, could strengthen the impact of the VAT measure by further encouraging the shift towards recycled materials and minimizing the risks of rebound effects. Conversely, if the chosen financing scheme works against the principle of VAT reduction, it may undermine or nullify the expected benefits, for example, if a reduced VAT rate on repair activities is financed through higher labour or income taxes. In the case of a VAT reduction on products with recycled content, if it is funded through a redirection of EHS, such as the reduced VAT rate that applies indiscriminately to all waste disposal options (see Chapter 6), or through increased taxation of virgin raw materials, the overall environmental and economic objectives could be mutually reinforcing. This combined approach would not only strengthen incentives for recycled content, but it would also minimise possible rebound effects in consumption levels and ensure that the increased use of recycled alternatives leads to less dependence on virgin raw materials.

9.6. Summary of the evaluation and considerations on policy design

The current analysis proposes three key areas for the evaluation of proposed reduced VAT rates for environmental purposes, namely: i) the validity of the overall policy goal, including from a legal perspective; ii) the expected outcomes in terms of environmental and social benefits; and iii) the estimated economic and fiscal implications. Guiding questions to help decision makers navigate the challenges of evaluating new VAT rate proposals and to make informed decisions include the following:

- Policy goal and legal feasibility:
  - What is the theoretical rationale for the reduced VAT rate? Is there available evidence on the use of reduced VAT rates for similar objectives as well as on the outcomes?
  - Are the goods (or services) considered listed in Annex III of the EU VAT Directive? Does the proposal respect the fundamental principles of tax policy, including fiscal neutrality?
- Likelihood of environmental outcomes:
  - Would changes in the VAT rate pass through to consumer prices and deliver incentives for behavioural change?
  - How would retailers and producers respond to changes in consumer demand (e.g. as a result of supply constraints)?
  - Are there unintended consequences or rebound effects?
- Fiscal and socio-economic impacts:
  - What would be the impact on public budgets, and are there opportunities for minimising or recovering the foregone revenue?
  - What are the expected indirect costs, e.g. compliance costs for businesses?
  - What might be the impacts on employment and job creation?
  - Do the benefits of non-standard VAT rates outweigh the costs in terms of loss of fiscal revenue, and are there alternative policy interventions that could be more efficient and effective?

Table 9.4. Summary of evaluation factors for reduced VAT on products with recycled content

	Opportunities and potential benefits	Risks and uncertainties
Policy goal and legal feasibility	• It would align with the strategic priority to align fiscal incentives with circular economy goals. • It could help to support markets for recycled materials. • Possibly, higher public acceptability compared to taxation.	• Limited empirical evidence on use of VAT reductions for similar objectives. • Limitations of Annex III of VAT Directive. • Difficulties in clearly differentiating eligible goods creates challenges with regard to respecting the principle of tax neutrality.
Environmental outcomes	• It could help to bridge the price gap between virgin and recycled materials. • It could promote a shift from primary to secondary materials in production processes, reducing environmental and climate impacts overall. • Some certification and labelling schemes already exist.	• Uncertain degree of pass-through to prices. • Risk of rebound effects on consumption. • Setting of the threshold of recycled content. • In isolation (reduced VAT alone), the impact on producers' decisions and the overall environmental impact of products is uncertain.
Fiscal and socio-economic impacts	• Growth in markets for recycled materials. • Opportunities for budget neutrality, including environmental tax reform.	• Loss of revenue for public finances. • Concern about the efficiency of this measure over alternative instruments (e.g. direct subsidies, taxation) in effecting behavioural change in firms. • Higher compliance and monitoring costs.

Source: Authors' own elaboration.

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[1] Note from the General Secretariat of the Council to Delegations: Lower VAT rate for recyclates / recycled products- a possible economic tool to promote the circular economy. Information from the Czech delegation. Brussels, 12 June 2023.

[2] Decreto del Presidente della Repubblica del 26/10/1972 n.633 – Istituzione e disciplina dell'imposta sul valore aggiunto.

[3] The complete list of goods and services eligible for reduced VAT rates in Italy is contained in Table A part II, part II-bis and part III of Presidential Decree No. 633/1972.

[4] Article 1 of Legislative Decree No. 160 of 24 September 2015 regulates the annual monitoring of tax expenditures.

[5] In some cases, the objectives of VAT rates are also imprecise or not well defined.

[6] Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax.

[7] The legal basis for the harmonisation of European VAT rules is Article 113 of the Treaty on the Functioning of the European Union (TFEU, 2016/C 202/01), which stipulates that provisions relating to VAT and other forms of indirect taxation are taken unanimously by Member States.

[8] Council Directive (EU) 2022/542 of 5 April 2022 amending Directives 2006/112/EC and (EU) 2020/285 as regards rates of value added tax.

[9] Section 9.5.3 looks into the possible environmental outcomes and fiscal implications of applying reduced VAT rates on textile products, an example of a material that has low recycling rates.

Annex 9.A. Considerations of the legal framework

From a legal perspective, the use of VAT reductions as an instrument to incentivise environmentally favourable consumer behaviour, including increased demand for recycled materials, presents substantial complexities. VAT remains a rigid consumption tax that is not well suited to delivering a bonus and malus system, like an environmental tax. Although Directive 2022/542 offers greater flexibility in the application of differentiated VAT rates for environmental purposes, options for EU Member States remain largely constrained within the framework set by the EU VAT Directive. Reduced VAT rates may only be applied to categories of goods and services listed in Annex III. However, Annex III currently does not include a category of products referencing recycled content, even though some products within the listed categories may contain recycled content.

Member States may apply a reduced rate to an entire Annex III category, or selectively isolate certain supplies within those categories. However, previous CJEU rulings suggest that the principle of fiscal neutrality shall prevail in such cases. The principle of fiscal neutrality prevents similar goods (i.e. goods with similar properties and meeting the same consumer needs) from being treated differently for VAT purposes. In other words, while the European Commission supports a more targeted use of VAT rates to reflect increased environmental ambitions, fiscal rules do not allow Member States to apply a reduced VAT rate on products that are perceived as similar or identical to other products (not subject to reduced VAT) by the average consumer.

According to the reading of EU law and recent CJEU rulings (see Annex Box 9.A.1), in order to apply reduced VAT rates to specific supplies that have an environmentally virtuous characteristic, the following would need to be determined: i) that this characteristic is evident to the consumer; ii) it is a key factor in the consumer's purchasing decisions; and iii) it constitutes by itself a factor justifying the application of reduced VAT rates, even to supplies that would otherwise be identical.

Annex Box 9.A.1. The principle of fiscal neutrality prevails in the implementation of reduced VAT

CJEU rulings have confirmed this interpretation of EU law. Member States cannot, for tax purposes, treat goods or services differently if they are similar for the average consumer (i.e. they have similar properties and meet the same consumer needs) and are thus in competition with each other. It follows that different VAT rates on supplies that are apparently similar may only be allowed if none of these conditions are met. For instance, transportation may be subject to different VAT rates, as different forms of transportation may not offer exactly the same service to the final consumer. Recent rulings by the CJEU on this topic may illustrate examples of circumstances where different VAT rates may or may not be allowed:

- France is allowed to apply different VAT rates to reimbursable medicinal products (2.1%) and on other medicinal products (5.5%) (Case C-481/98[1]). As the two categories of medicinal products are not in a competitive relationship, that is, one in which taxation could play a determinant role, and as they cannot be substituted, at the consumer's free choice, they have not been identified as similar goods.

- In a dispute that arose in the context of gaming activities, namely, bingo and slot machines, the CJEU ruled that, where two gaming services are comparable from the point of view of the average customer and meet the same needs of that customer, they must be regarded as similar and receive the same treatment for VAT purposes (Joined Cases C-259/10 and C-260/10[2]).
- In a dispute between a Polish company and the Polish government, the CJEU ruled that the criterion of "best-before date" or "use-by-date" would not be sufficient to justify the application of different VAT rates unless this factor is determinative for the average Polish consumer (Case C-499/16[3]).

Note: The dispute of Case C-499/16 revolved around whether the pastry cakes produced by AZ qualified for reduced VAT rates. According to Polish law, reduced VAT rates applied to "pastry goods and cakes, fresh" with an expiry date under 45 days. AZ's pastries fell under this VAT category, but had a longer expiry date. The CJEU ruled that Article 98 of the VAT Directive does not preclude national legislation, but the principle of fiscal neutrality needs to be respected. It concluded that "it is for the referring court to assess if, on the Polish market, there are pastry goods or cakes whose shelf life does not exceed 45 days but which nevertheless are similar in the eyes of that consumer to pastry goods and cakes which have a best-before date exceeding 45 days […], and which are interchangeable with the latter. If such goods are found to exist, a shelf life of less than 45 days would not be determinative for the average Polish consumer and that consumer's choice might be affected by the application of different VAT rates. In such a situation, the principle of fiscal neutrality would preclude the national provisions at issue in the main proceedings."

1. Case C-481/98 Commission v France [2001] EU:C:2001:237, para 27.
2. Joined Cases C-259/10 and C-260/10 The Rank Group [2011] EU:C:2011:719.
3. Case C-499/16 AZ v Minister Finansów [2017] EU:C:2017:846, paragraphs 33 and 34.

Based on the above considerations, the following questions may arise when assessing the legal feasibility of reduced VAT rates for the specific case of products with recycled content:

i. Is the presence of recycled content made visible to the final consumer through the means of a corresponding label?
ii. Is the presence of recycled content a determining factor in the consumer's purchasing decisions for a given type of product?
iii. Is the importance of recycled content for the consumer large enough to justify the application of a reduced VAT rate?

In practice, the answer to each of the above questions may vary widely depending on the type of product under consideration. For example, some certification and labelling schemes for recycled content already exist and are used in Italy for plastics and other materials, such as the Plastica Seconda Vita and ReMade in Italy schemes (IPPR, n.d.[25]; Remade in Italy, n.d.[26]). However, these schemes are normally intended for business-to-business use or to support compliance with national legislation or GPP criteria, whereas their relevance for consumers is uncertain. Along similar lines, the importance of recycled content, among other product characteristics that influence a consumer's purchasing decision, is uncertain. In general, ethical and sustainable practices are becoming increasingly important considerations for consumers, although still likely to play a limited role for most of them.[1] Furthermore, even for product groups whose environmentally related characteristics may play an important role for a significant share of consumers, it is uncertain to what extent the presence of recycled content may be a *major* influencing factor for consumer preferences.

Taking the example of fashion brands, available surveys indicate that key factors affecting consumer purchases are style and design, perceived quality, price, fit and comfort, and brand reputation (McKinsey & Company, 2020[27]). Results of a survey conducted in the United Kingdom, Sweden, Italy, France and Germany (Gupta and Ogden, 2006[28]) pointed to a significant attitude-behaviour gap in relation to sustainability and labour conditions in the fashion sector, where individuals exhibited positive attitudes to engaging in responsible behaviour but failed to execute on them. The attitude-behaviour gap was widest for sustainability dimensions, such as transparency (60% of respondents stated transparency was important to them while only 20% reported actively seeking out information) and material composition (58%

of respondents believed they should understand the product, including materials used, but only 38% reported regularly checking labels) (Gupta and Ogden, 2006[28]).

To conclude, considerations stemming from the current EU VAT legal framework and past CJEU rulings on similar cases suggest that the possibility of reducing VAT rates on products with recycled content presents significant challenges. These are mainly attributed to the current absence of a product category specifically for recycled content in Annex III of the EU VAT Directive, and that the creation of a dedicated sub-category of products may run counter to the principles of fiscal policy, in particular, the principle of fiscal neutrality.

Nevertheless, there appears to be a growing momentum at the EU level to challenge the current legal barriers to reduced VAT rates on products with recycled content. A discussion was initiated by the Czech delegation's proposal at the Environment Council meeting of 20 June 2023[2] on using reduced VAT rates on recycled products as a tool to promote the circular economy.[3]

Furthermore, the EU VAT legal framework evolves slowly, yet constantly. Recent amendments to the EU VAT Directive, facilitating the introduction of reduced rates for environmentally friendly supplies, have come into force only recently. To date, there have been few opportunities to discuss the potential of an "environmental" VAT or to challenge the prevalence of the principle of fiscal neutrality over other considerations. Nevertheless, even though the current EU legal framework makes it unlikely, the possibility of a stronger use of VAT for environmental purposes, specifically for recycled content, cannot be totally ruled out in the future.

Notes

[1] The third round of the OECD Environmental Policies and Individual Behaviour Change (EPIC) Survey produced similar findings for the food sector. Affordability, freshness, taste and nutritional value, rather than environmental considerations, are priorities when making purchasing decisions. Compared with affordability, freshness, taste and nutritional value, a product's carbon footprint and the amount of pesticides used in its production are reported to be less important, even among environmentally concerned respondents.

[2] Note from the General Secretariat of the Council to delegations: Lower VAT rate for recyclates / recycled products – a possible economic tool to promote the circular economy – Information from the Czech delegation. Brussels, 12 June 2023.

[3] A related parliamentary question has recently been posed inquiring about: i) the Commission's intentions to envisage a revision of the EU VAT Directive to allow reduced VAT rates on products with recycled content beyond the categories of products listed in Annex III; and ii) the Commission's views on the risks and opportunities of moving forward with the introduction of a reduced VAT rate on products with recycled content within selected categories listed in Annex III.

10 Corporate tax credits

The promotion of secondary and other recovered materials is one of the actions envisioned in Italy's Strategy for the Circular Economy. Corporate tax credits to support preferred materials in packaging and products were recently introduced in Italy. While corporate income tax incentives, including in the form of tax credits, have been used effectively by countries to stimulate R&D investments by firms, the rationale for their use in support of environmental policy objectives is less proven.

This chapter looks at opportunities to strengthen the use of corporate income tax incentives, with a focus on tax credits, to support circularity. It takes stock of existing practices and provides practical guidance, including considerations for their enhanced design, evaluation and implementation as part of a policy mix.

10.1. Introduction

Taxes and tax incentives have increasingly been used by countries to encourage firms to contribute towards environmental policy objectives (Ecorys, 2020[1]). Tax incentives generally target company investments in research and development (R&D), or in the conversion of technology and infrastructure. Existing corporate income tax (CIT) incentives (e.g. reduced tax rates, tax allowances and tax credits) related to the environment often target climate mitigation objectives (e.g. through energy efficiency in buildings), while incentives for sustainable and circular production and consumption are less common. While the literature suggests that CIT incentives may effectively stimulate R&D investments by firms, the rationale for their use in support of environmental policy objectives is less proven. In Italy, corporate tax credits to support preferred materials in packaging and products (already presented in Chapter 5) were recently introduced.

This chapter takes stock of existing practices in the use of CIT incentives and, from this, draws practical guidance on their use to support the circular economy transition further, with a particular focus on corporate tax credits. As already discussed in previous chapters, the literature generally recommends that the internalisation of externalities through pricing is to be prioritised over ad hoc incentives in order to generate clearer price signals while minimising costs. CIT incentives could have a role to play in overcoming specific barriers, such as unawareness of innovation opportunities towards more circular production methods. CIT incentives may also have the advantage of being deployable rather quickly, and could help to generate stakeholder support for broader environmental fiscal reforms. However, given that the associated costs may be substantial, including foregone revenues, potential distortion in resource allocation, and administrative costs of running and evaluating a scheme, the literature generally recommends a cautious approach to the use of CIT incentives for environmental objectives.

The chapter is structured as follows:

- Section 10.2 provides an overview of the use of CIT incentives and presents available information on their effectiveness in achieving policy goals, including to promote business R&D and to support environmental policy objectives. Given the lack of empirical studies on environment-related CIT incentives, the analysis in this section largely draws on evidence from their application in other policy areas.
- Section 10.3 presents CIT incentives, in the form of corporate tax credits, that have or are being used to support the circular economy transition in Italy and presents available information on the uptake of tax credits introduced by the Ministry of Environment and Energy Security (MASE).
- Section 10.4 draws on best practices from the use of CIT incentives and previous analyses to provide practical guidance on their use to promote the circular economy, including opportunities to enhance instrument design, implementation and evaluation.

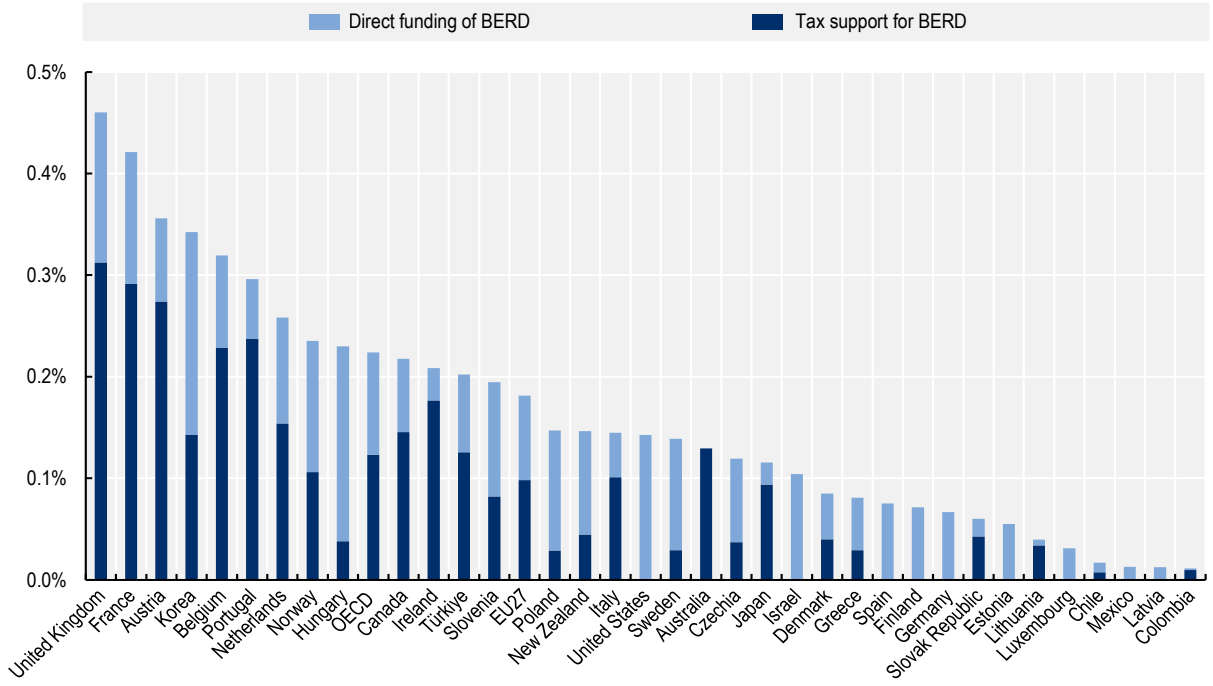
10.2. Current trends in the use of corporate tax incentives and lessons learned

10.2.1. To promote business R&D

CIT incentives for R&D (i.e. R&D tax incentives) have become a major policy tool to support business R&D and innovation in OECD countries and partner economies, in addition to direct support (e.g. research grants). Figure 10.1 shows government support for business R&D by type, i.e. in the form of direct funding or in the form of tax support, in 2020. R&D tax incentives accounted for 55% of total government support for business R&D in the OECD area in 2020 (OECD, 2023[2]). The share of government support provided indirectly in the form of tax incentives is higher in Italy, where R&D tax incentives accounted for more than three-quarters of total government support for business R&D. R&D tax incentives commonly used in OECD countries include expenditure-based incentives, such as tax credits, enhanced allowances or accelerated depreciation, in addition to preferential tax provisions that relate to outputs (i.e. income generated from R&D), such as intellectual property rights and patenting (OECD, 2023[3]).

Figure 10.1. Tax incentives play a prominent role in government support for business R&D

Direct government funding and tax support for business R&D, by type, as a percentage of GDP, 2020



Notes: BERD stands for "Business enterprise expenditure on R&D".
Source: OECD R&D Tax Incentive Database (OECD, 2023[2]).

Empirical evidence indicates that R&D tax incentives can boost both the level of investments by firms and the number of firms investing in R&D (González Cabral, Appelt and Hanappi, 2021[4]). The OECD microBeRD+ project (2023[3]) estimates a gross incrementality ratio (IR) of 1.4, meaning that, on average, each unit of R&D tax support induces 1.4 additional units of R&D. The impact is significantly larger for small and medium-sized firms (than for large firms) (OECD, 2020[5]). Moreover, R&D subsidies, which promote research, have a comparable degree of input additionality as R&D tax incentives, which promote more experimental development, suggesting that the two types of support may complement each other (OECD, 2023[3]). Box 10.1 presents results from an analysis of company-level data, providing evidence of the effectiveness of R&D tax credits implemented in Italy.

Existing studies indicate that the effectiveness of R&D tax incentives is generally determined by their design features, although more efforts would be required to comprehensively assess links between specific design features and the effectiveness of different CIT incentives (OECD, 2020[5]). The available literature suggests that, in general:

- Expenditure-based tax incentives may be more cost-effective than income-based ones to stimulate additional investments (González Cabral, Appelt and Hanappi, 2021[4]).
- Tax incentives (as well as grants) are less effective when focused on specific sectors or specific technologies (Criscuolo et al., 2022[6]).
- Provisions that allow for flexibility, such as the refundability or carry-over of tax incentives, are preferable as they may disconnect the incentive from firms' profit situation and hence significantly increase business responsiveness to the provision of tax support (OECD, 2023[3]).

Box 10.1. Evidence of the effectiveness of R&D tax credit schemes in Italy

Results from the OECD microBeRD+ project (2023[3]) provide evidence of the impact of public support policies for business R&D using confidential microdata and analyses within and across countries.

Table 10.1 shows the results of a counterfactual analysis of business-level data carried out to investigate the varying impacts that two tax credit schemes had on business R&D activities in Italy. The first tax credit (left columns), which was repealed in 2010, indicates a negative impact on both intramural (in-house) R&D (i.e. the extent of R&D that firms perform rather than outsource) and R&D employment, implying a *positive effect* of the tax incentive, but with a moderate incrementality ratio (0.59). The second measure had an equally positive (and statistically significant) effect on both intramural and extramural R&D, as well as on R&D employment, with a considerable incrementality ratio (2.24) (OECD, 2023[3]).

Table 10.1. The incremental R&D tax credit effectively encouraged business in-house R&D expenditure

Difference-in-differences estimates of the impact of volume-based R&D tax credit (2007-2009) and incremental R&D tax credit (2015-2019), Italy

Policy	Tax incentive 2007-2009			Tax incentive 2015-2019		
Estimation	Based on policy change			Based on policy uptake		
Dependent variable (log)	Intramural R&D	R&D employment	Extramural R&D	Intramural R&D	R&D employment	Extramural R&D
Average treatment effect on the treated	-0.061* (0.032)	-0.101*** (0.025)	-0.050 (0.142)	0.389*** (0.016)	0.279*** (0.009)	0.144** (0.060)
N (firms-years)	19 181	18 291	5 347	90 371	89 128	24 512
Implied incrementality ratio	0.59			2.24		

Notes: Standard errors in parentheses are clustered at the company level.
*** 1%
** 5%
* 10%.
Source: Adapted from (OECD, 2023[3]).

10.2.2. To support environmental policy objectives

In recent years, CIT incentives have been used by numerous countries to make green R&D and capital investments more attractive to business and to support environmental objectives, such as greenhouse gas (GHG) emissions reduction (Ecorys, 2020[1]). As environmentally friendly technologies may have a higher initial cost compared to conventional alternatives (albeit there are expected gains in the long term, for example, from higher energy efficiency), firms may not see an economic interest and are therefore discouraged from investing in them. Governments can use CIT incentive schemes to bridge this gap by making R&D and capital investments more attractive to firms (Van Santen et al., 2023[7]).

In practice, there are uncertainties as to whether CIT incentives offer a cost-effective means to achieve environmental gains. In general, environmental taxes would need to be prioritised over CIT incentives, which generally target environmental externalities poorly. While the available evidence suggests that expenditure-based CIT incentives may effectively stimulate R&D investments by firms, the rationale for their use in support of environmental policy objectives is less established in the literature (see for instance the reviews by Ecorys (2020[1]) and Köppl and Schratzenstaller (2021[8])). Furthermore, quantifying

environmental outcomes attributable to CIT incentives is difficult (Van Santen et al., 2023[7]). If not well designed, CIT incentives can have costs that extend beyond revenue losses, including potentially distortionary effects on the economy and significant administrative costs for monitoring and compliance (Klemm, 2009[9]). Overall, there are concerns that CIT incentives may not be a sufficient or an efficient approach to achieving environmental gains, especially if they are not implemented in combination with other supporting policy instruments (OECD, 2010[10]).

At the same time, CIT incentives could offer several advantages. CIT incentives may be well suited to targeting positive externalities, such as innovation spillovers from R&D (Köppl and Schratzenstaller, 2021[8]). They could help target specific barriers not addressed by environmental taxes and other instruments. Furthermore, CIT incentives can be easily implemented in a transparent way and are directly contingent on new investments (Klemm, 2009[9]), and, if well designed, they may bear lower administrative and compliance costs than direct subsidies (González Cabral, Appelt and Hanappi, 2021[4]). Moreover, in certain circumstances, CIT incentives are more easily introduced than environmental taxes and may help generate political support for broader policy reforms (Köppl and Schratzenstaller, 2021[8]). However, good policy design is crucial to minimise risks of windfall gains and ensure policy effectiveness.

Although there is limited information on the effectiveness of environment-related CIT incentives in achieving set environmental objectives, the evaluation of existing measures can provide insights on lessons learned in terms of policy design and implementation. Available studies on their impact tend to look at targeted measures introduced in specific countries (Köppl and Schratzenstaller, 2021[8]).[1] Two case studies from Spain and the Netherlands provide evidence of varying degrees of effectiveness of CIT incentives in generating additional environment-related investments, as described below:[2]

- **Spain's corporate tax credit for 'Environmental Investments'.** The tax credit was introduced in 1997 and covered 10% of a firm's total capital investments allocated to environmental protection, including installations to prevent air and water pollution. The measure was phased out in 2006.[3] Evaluation of the scheme showed that its use was limited (0.4% of all tax declarations in 2005), but it had significant influence on environmental capital investments, supporting most of the business initiatives in environmental protection (total EUR 1.033 billion) in Spain in 2005. This could indicate a limited additionality of the tax credit scheme, as firms benefitted from support for investments that were required to comply with existing environmental legislation (OECD, 2010[11]).
- **The "Vamil/MIA" incentives scheme in the Netherlands.** This long-standing Dutch scheme includes provisions for both accelerated depreciation ("Vamil") and tax allowances ("MIA") to support investments in innovative environmentally friendly techniques, which have been in effect since 1991 and 2001, respectively. They cover investments in techniques that are listed on the "Environmental List" and amount to at least EUR 2 500 per asset. Evidence from the scheme's evaluation indicates high uptake and effectiveness in inducing additional investments, partly due to its design features and implementation aspects, which include (Van Santen et al., 2023[7]):
    - The use of a dynamic, positive environmental technology list (Environmental List), which is annually revised and tightened to maximise the scheme's additionality and to limit windfall gains.
    - A multi-year budget envelope to compensate for over- and under-exploitation of the scheme and for flexibility in the use of funding.
    - Relatively low administration costs thanks to simplified procedures for firms (e.g. an online portal) and high awareness about the scheme among the firms concerned.

10.3. Corporate tax credits relevant to the circular economy in Italy

In recent years, Italy has been expanding the use of CIT incentives to achieve environmental policy objectives, including measures to support the circular economy transition. Relevant measures include a wide range of tax credits under Italy's industrial plan "Transizione 4.0" (Transition 4.0) as well as more recent measures introduced by MASE to support the use of secondary materials. This section provides a brief overview of both types of measures, as well as available evidence on the uptake of tax credits to support secondary materials more specifically. The analysis in this chapter focuses on the case of corporate tax credits to support recycled content and other preferred materials, as this is the more experimental type of support developed in recent years. Furthermore, evaluations of measures developed within the Transition 4.0 plan are already planned thanks to the dedicated efforts of experts.[4]

10.3.1. Tax credits under the industrial plan Transition 4.0

Various assessments of the state of the circular economy in Italy have identified the need for larger and more systematic investments for R&D and innovation related to the circular economy (European Commission, 2022[12]; Circular Economy Network, 2020[13]). Italy's 2022 Budget Law[5] introduced Transition 4.0, its renewed industrial plan, to enhance research, facilitate technology transfer and training, and promote the digital transformation of manufacturing processes and asset investments. Some insights from the experience with tax credit schemes under Italy's Transition 4.0 plan provide useful lessons learned in scheme design and implementation.

Among other things, the Transition 4.0 plan funded investments to support the circular economy transition thanks to the following measures:

- **Tax credits for investments in tangible, capital and intangible goods.** To encourage companies to invest in new capital goods that are supportive of the technological and digital transformation of production processes in Italian production sites.
- **R&D and innovation tax credits for research, development and innovation.** To boost spending on research, development and technological innovation in order to make businesses more competitive, and to encourage processes of digital transition in the field of the circular economy and environmental sustainability.
- **Tax credits "Training 4.0"**. To incentivise and support companies to train their staff in the technologies and skills relevant to the technological and digital transformation of businesses.

Several design features of the Transition 4.0 plan had been revised based on previous plans (e.g. "Industria 4.0" and "Impresa 4.0") to enhance uptake and the overall effectiveness of the incentive scheme. Importantly, incentives in the scheme were applicable to all firms in Italy, including small and medium enterprises (SMEs), as well as businesses running at a loss. The plan increased deduction rates and the maximum expenditure ceilings, while lowering the period for the reception of tax credits. Overall, it provided a stable and clear plan that could be taken into consideration by businesses in their long-term investment planning decisions. The forthcoming "Transition 5.0" plan, an evolution from Transition 4.0, aims to further support green and digital transitions by focusing on the shift to more energy efficient and sustainable production processes, modulating the share of the tax benefit for firms based on their achievements to improve energy efficiency.

10.3.2. Tax credits to support circularity

MASE has introduced a series of fiscal incentives for enterprises, mainly in the form of tax credits, to discourage the use of virgin materials in production processes and to incentivise the shift towards the use of recycled or compostable materials. Recent measures include the following:

1. Tax credits for enterprises that applied to purchase products made from recycled plastics, packaging containing recycled paper, plastics or aluminium, as well as biodegradable packaging (2019 Budget Law and MiTE Decree 14 December 2021).6 Tax credits corresponded to 36% of expenses incurred by enterprises in 2019 and 2020, up to a maximum annual amount of EUR 20 000 per beneficiary. The measure was renewed for 2023 and 2024, with an increase of the allocated maximum budget (2023 Budget Law).7
2. Tax credits for enterprises that applied to purchase: i) intermediary and final products composed (of at least 75%) of materials from the recycling of waste or scrap materials, and ii) high-quality compost produced from the treatment of organic waste (Leg. Decree 34/2019 and MiTE Decree 6 October 2021)8. Tax credits corresponded to 25% of expenses incurred in 2020, up to a maximum annual amount of EUR 10 000.
3. Additionally, to limit the consumption and environmental impacts of single-use plastic products, the Ministry announced a tax credit for enterprises that applied to purchase alternatives to single-use plastics, either reusable alternatives or made from biodegradable or compostable materials (Leg. Decree 196/2021).9 Tax credits would correspond to 20% of expenses incurred in 2022, 2023 and 2024, up to a maximum annual amount of EUR 10 000 per beneficiary. At the time of writing, the measure is in the implementation phase.

For corporate tax credits developed and managed by MASE, monitoring efforts are carried out on an annual basis as part of the preparations of proposals to be renewed or strengthened for new Budget Laws.[10] While limited in scope, these monitoring exercises offer some insights into the uptake of existing and past measures. Insights from these monitoring efforts are presented in the next paragraphs.

For measure #1 (2019 Budget Law and MiTE Decree 14 December 2021), the information available to date indicates high uptake, with demand for the tax credit largely outweighing the allocated resources. Initially, resources allocated for the years 2019 and 2020 amounted to EUR 1 million/year vis-à-vis a total of almost 600 applications and nearly EUR 11 million of requested financial support. Most of the financial support was granted for the purchase of biodegradable and compostable materials (amounting to EUR 8 million and EUR 9 million of expenses incurred in 2019 and 2020, respectively).[11] Consequently, the 2023 Budget Law renewed the measure for the years 2023 and 2024, with a total budget of EUR 6 million, and also allocated an additional EUR 10 million to cover requests from previous years.

Measure #2 (Leg. Decree 34/2019 and MiTE Decree 6 October 2021) faced low uptake (total of 184 received applications for EUR 1.3 million of financial support, compared to a maximum available budget of EUR 10 million). The majority of requests received concerned the purchase of recycled products (total EUR 8.8 million of declared expenses, compared to EUR 59 000 for compost). This measure was discontinued after 2020. Although the measure was, to some extent, similar in scope to measure #1, its design and implementation faced lower business responsiveness. MASE suggested that selected revisions could help to enhance the uptake of the measure, including: i) a higher tax credit rate, to provide a more meaningful financial incentive; ii) a lower threshold for recycled content; and iii) implementation over a longer time frame, to provide a consistent signal to businesses.[12]

For both measures #1 and #2, the majority of requests came from micro- and small-sized enterprises (76% for the tax credit on recycled materials, and 83% for the tax credit on intermediary products and compost), with large firms accounting for a minor share of requests (0.04% for measure #1). This appears to be in line with the composition of the country's industry in general, which would not suggest significant additional barriers to the uptake of corporate tax credit measures by SMEs in particular.[13] The agriculture and

fisheries sectors accounted for around one-third of applications in both cases, yet more granular data on the remaining sectors, or their share by type of investment made, is not available.

Evaluating the effect of corporate tax incentives on environmental goals requires monitoring and an assessment of the extent to which an incentive scheme led to changes (if any) in the firms' investment structure and behaviour, as well as any changes in environmental indicators (including through indirect effects) and any macroeconomic effects, such as on jobs and economic growth. However, collecting information on actual environmental outcomes is difficult given the vast array of environmental impacts and the challenges of isolating the scheme's (direct and indirect) impacts from other external factors. Nevertheless, even stylised estimates may help assess the effectiveness of environmentally related corporate tax credits (and other CIT incentives)[14] and their cost-benefit in achieving set environmental goals compared to other policy instruments.

Data collected by MASE on corporate tax credits provide a good basis to monitor the uptake of implemented corporate tax credits by firms, even if more detailed information at the company level (e.g. specific sectors) and other variables (e.g. type and size of investments) could help draw a more complete picture, including indications of any distortionary effects across firms. Such information would be crucial to evaluate the cost-effectiveness of implemented measures. The experience of designing and monitoring tax credits as part of a comprehensive scheme, such as Transition 4.0, could also provide important insights into relevant aspects for the evaluation of CIT incentives for the circular economy, as well as possible opportunities for their strengthened use.

Beyond corporate tax credits aimed at boosting the use of preferred materials in production, in recent years MASE (or previous denominations) has trialled a range of fiscal incentives, also aiming to support sustainability and circularity in production and consumption. These are detailed in Box 10.2.

Box 10.2. Other fiscal and financial incentives introduced to support circularity

In 2021/22, the Ministry of the Ecological Transition (MiTE, currently known as the Ministry of Environment and Energy Security, MASE) introduced funds to encourage retailers to reduce the use of packaging and to sell products in bulk. Firms could request a non-repayable maximum amount of EUR 5 000 per beneficiary to reimburse expenses incurred in 2020 and 2021 for the purchase of equipment required to sell bulk or loose products (MASE Decree 22 September 2021).

The measure faced a low level of uptake (total requests for funding amounted to EUR 700 000, compared to the total allocated resources of EUR 20 million for the 2020/21 biennium). It is possible that the financial support, of a maximum of EUR 5 000 per beneficiary, represented an insufficient incentive for businesses, especially for larger retailers. Importantly, the financial support mechanism suffered from slow implementation and was applied to investments made in the past, hence, it is unlikely that the measure generated considerable additionality.

Additionally, some corporate tax credits were announced but were not implemented. One example is the corporate tax credits intended to support technological upgrades, specifically to convert production processes in the plastic packaging manufacturing sector to shift to compostable plastics (2020 Budget Law). These were originally conceived in conjunction with Italy's plastic tax, whose implementation faced significant delays.

Sources: Decree of the Ministry for Ecological Transition 22 September 2021 "Measures to encourage the sale of products in bulk or on tap"; Relazioni illustrative delle Proposte per Legge di Bilancio 2023; Law 27 December 2019, no.160; Law Decree 30 April 2019, No. 34 "Urgent measures for economic growth and for resolving specific crisis situations", then converted with Law 28 June 2019, No. 58.

10.4. Lessons learned and guidance on the use of CIT incentives

Considering the uncertainties on the effectiveness of CIT incentives in achieving environmental objectives, the associated costs, risks of windfall gains and distortions, their use as environmental policy tool should be carefully considered. As already discussed in Chapter 7, other policy instruments, notably pricing, may be preferred over the introduction of subsidies or fiscal incentives in isolation. Nevertheless, in the interest of supporting markets for secondary materials, tax incentives could play a complementary role within a broader policy mix where they clearly target specific barriers that are not comprehensively addressed by other policy instruments. Moreover, even as a second-best policy option, environment-related CIT incentives can provide for leeway to the introduction of environmental taxation, as they may not always face the same barriers to introduction. Hence, it is worth to consider features of their design and implementation to ensure that CIT incentives are effective in achieving policy objectives.

This final section summarises the lessons learned on the use of environment-related CIT incentives, including corporate tax credits, and provides guidance on opportunities for enhanced design, implementation and monitoring of corporate tax credits to promote circularity.

10.4.1. Design measures to minimise risks of windfall gains and maximise additionality, with a clear policy objective

Targeted corporate tax credits, like all CIT incentives, should aim for efficiency in the use of public resources, in line with the fundamental principles of fiscal policy (Hanappi, Millot and Turban, 2023[14]). Short-term negative impacts on public budgets may be offset by environmental and economic gains in the longer term. Cost-effective corporate tax credits should aim to generate additional investments above the level of investments that would have occurred without the scheme. Risks of windfall gains should be minimised, as they run counter to fiscal efficiency objectives (Van Santen et al., 2023[7]).

Features of instrument design have been found to play a role in determining the effectiveness of CIT incentives in triggering changes in a firm's behaviour (Ecorys, 2020[1]), while providing clarity on the desired aim and the production process targeted.[15] Clarifying the underlying policy objective should be the first step of developing any policy instrument, as this will allow to address key questions, such as whether the instrument is capable and appropriate to achieve the desired objective, or whether alternative instruments might be better suited (OECD, 2015[15]). To achieve the highest level of additionality and environmental benefits, it is generally recommended to use expenditure-based CIT incentives (e.g. tax credits and allowances), which tend to be more cost-effective at stimulating additional investments, and including generous carry-forward or refundability provisions for firms to benefit from the incentive independently of their profit situation (González Cabral, Appelt and Hanappi, 2021[4]; OECD, 2023[3]).

Other important design considerations concern the definition of technical criteria, such as the recycled content threshold that triggers the tax credit and the size of the monetary incentive. The setting of recycled content thresholds is a delicate matter. They should be sufficiently ambitious and periodically tightened to continue to provide meaningful incentives for higher recycled content, but they should also reflect the current market availability in order to avoid unintended effects, such as short-term pressures in the market for recycled materials or a drop in the quality of the selected products (Brown and Börkey, 2024[16]). Preparatory studies and consultations with industry players could better inform the selection of eligibility requirements (e.g. the recycled content threshold) and other technical criteria (European Commission, 2014[17]), and defining a clear path for the periodic revision of these requirements. Market studies could also be undertaken to assess the average cost of changing targeted practices and to better calibrate the size of the financial incentives. Moreover, relevant economic and environmental indicators might be identified in the early design stages to ensure the robust monitoring and evaluation of introduced measures.

10.4.2. Ensure clarity and predictability as part of a long-term vision

Clarity in eligibility requirements and administrative procedures related to CIT incentives, stability and timing of the incentives, as well as a sufficiently long time frame of implementation, are essential to provide enterprises with an element of predictability before their investment decisions are made. Evidence from the use of R&D tax incentives indicates that having certainty in a corporate environment facilitates planning over the longer term, and that R&D tax incentives are more effective when provided over a longer time frame. Predictability is crucial for firms to integrate the tax benefit in their investment plans, which can span many years. Conversely, frequent changes are likely to strongly reduce the effectiveness of tax incentives regardless of their design features (European Commission, 2014[17]). Timely implementation is also key.[16] The presence of time gaps, between the announcement of measures and the possibility for enterprises to claim the tax benefit (e.g. following implementing decrees with the technical requirements), may be detrimental to the effectiveness of measures in influencing investment or purchasing choices that relate to manufacturing and product design processes that have long lead times.

Ensuring clarity, predictability and long-term planning may be more difficult for ad hoc measures that need to be frequently renewed (Klemm, 2009[9]), such as corporate tax credits introduced or renewed through Budget Laws. These are more prone to be characterised by short-term planning and discontinuity, besides also generating higher administration costs that could limit their effectiveness. On the contrary, CIT incentives that are introduced as part of comprehensive schemes, such as Transition 4.0, are more likely to provide a stable and meaningful incentive for firms to consider in their long-term planning compared to stand-alone measures, while also providing opportunities to reflect on the broader policy mix in which measures are introduced. A long-term vision is particularly important in the case of measures that aim to promote circularity, as these aim to modify a firm's behaviour and structure, as well as production processes over the long term.

The overall complexity of incentive schemes, as well as a lack of accompanying measures to inform about their existence, can also pose barriers to the uptake of CIT incentives (Van Santen et al., 2023[7]). Small and young firms, in particular, might be discouraged to apply due to uncertain compliance costs and decision response times (although there is no evidence of additional barriers for SMEs to the uptake of measures introduced by MASE). Better access to information and clarity in the administration of the scheme can help increase awareness and understanding of R&D tax incentives among firms, as well as increase accessibility. Moreover, having a single online application form or a one-stop portal to respond to any relevant inquires can significantly reduce both the administration and compliance costs (Van Santen et al., 2023[7]).

10.4.3. Seek opportunities for evaluation while minimising administrative costs

Timely and comprehensive data collection to monitor the uptake of CIT incentives and also to carry out an evaluation are essential, without significantly increasing the administrative burden on firms. The availability of more complete and granular data can support the evaluation process of introduced measures and inform their possible reform to enhance effectiveness (Van Santen et al., 2023[7]). Evaluations should assess, to the extent possible, the effects of the measures on corporate behaviour and the environment, incorporating both qualitative and quantitative assessments. At the same time, firms should not be burdened with excessive reporting requirements, which might discourage uptake, especially by smaller companies. The right level of granularity and frequency of data collection should be considered, in addition to measures that simplify administrative procedures for firms.[17]

The scheme should be simple and clear to administer so as to lower the costs for both the government and firms (Van Santen et al., 2023[7]). From the perspective of governments, CIT incentives may potentially have lower administration costs compared to other policy instruments, though this will largely depend on the design of the scheme.[18] In the case of measures implemented individually (as was the case of

corporate tax credits for circularity implemented by MASE) or highly complex schemes, administrative costs for public administrations are likely to be substantial. Policy makers should therefore seek to simplify administrative procedures (e.g. for application or appeals) to minimise costs and help secure business buy-in for the measures, especially as the provisions for continuous monitoring and evaluation are likely to increase costs for governments as well as firms.

Experience with CIT incentives can provide useful general guidance on opportunities to minimise administrative costs and enhance monitoring and evaluation efforts. Ad-hoc CIT incentive measures may be included into broader tax incentive schemes and in related, systematic monitoring and evaluation as well as reporting exercises. Legal provisions, to regularly monitor and evaluate tax incentive schemes, provide a strong motivation for governments to systematically collect and make high-quality data available. A representative example is the mandatory periodic revision of tax incentive schemes in the Netherlands (see Annex 10.A). Moreover, regularly publishing information from monitoring and evaluation, for example as part of tax expenditure reports, can help ensure transparency in the management of public funds and contribute to the public acceptability of tax incentive measures (European Commission, 2014[17]). Other relevant considerations include limiting fragmentation in the tax code by centralising the administration of tax incentive schemes and strengthening co-ordination between Ministries in the development of tax credit measures (e.g. with the Ministry of Economy and Finance).

10.4.4. Ensure policy effectiveness by linking corporate tax incentives to other measures

As mentioned above, consideration should be given to the overall policy mix into which CIT incentives are introduced to ensure their effectiveness. It is unlikely that CIT incentives, such as corporate tax credits, alone will deliver on the set policy objectives in a cost-effective way, given the fiscal and administrative costs and the risks of low additionality. However, combined with other policy instruments, CIT incentives could help reinforce existing policies (e.g. environmental taxes or subsidies) where there are specific barriers that may require targeted measures, for instance a lack of awareness of circular innovation opportunities in production processes. The introduction of revenue-generating instruments in a policy mix could compensate for the loss of revenue and provide options to achieve budget neutrality, and may achieve greater effectiveness in steering consumption and production patterns. However, care should be taken to prevent the overlap of instruments that would duplicate subsidies and reduce overall efficiency (European Commission, 2014[17]).

Focusing specifically on the policy objective to strengthen markets for secondary materials, there are concerns that instruments such as corporate tax credits alone may not be enough to achieve overall reductions in primary material demand, and in a way that is cost efficient. Other policies may be required to mitigate the risks of unintended effects, lower the costs for public finances, and to amplify the likelihood of positive environmental outcomes. Policies such as mandatory or award criteria in green public procurement (GPP), modulated Extended Producer Responsibility (EPR) fees and environmental taxation tend to be part of the policy mixes in OECD countries.

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Notes

[1] Examples include the Dutch Energy Investment Allowance (EIA), Belgium's Investment Allowance (IA), or Denmark's enhanced depreciation scheme for green investments. These are being studied as part of an ongoing OECD project on the evaluation of CIT incentives for climate mitigation policy objectives (Dressler and Warwick, 2024[19]).

[2] Annex 10.A provides more information on both country examples.

[3] A more recent study (Garcia-Quevedo, Martinez-Ros and Tchorzewska, 2022[20]) provides empirical evidence on the effects of policy instruments on firms' green technology adoption in Spain between 2008 and 2014, following the re-introduction of the Environmental Investments tax credit. Their results show a more positive effect of the tax credit on stimulating investment in green technologies, providing a better stimulus than taxation.

[4] An interdisciplinary committee involving experts from the Italian Ministry of Economy and Finance, the Ministry of Economic Development, and the Bank of Italy were appointed to assess the economic impact of incentive schemes under the Transition 4.0 plan.

[5] Law 30 December 2021, No. 234 "State budget for the financial year 2022 and multiannual budget for the three-year period 2022-204".

[6] Law 30 December 2018, No. 145 “State budget for the financial year 2019 and multiannual budget for the three-year period 2019-2021”. The measure replaced the tax credits introduced by the 2018 Budget Law (Law 27 December 2017, No. 55) for the years 2018, 2019 and 2020, with a similar purpose and amount. Decree of the Ministry for Ecological Transition of 14 December 2021 “Technical requirements and certifications attesting to the eco-sustainable nature of products and packaging according to current European and national legislation”.

[7] Law 29 December 2022, No. 197 “State budget for the financial year 2023 and multiannual budget for the three-year period 2023-2025”.

[8] Leg. Decree 2019/34 “Urgent measures for economic growth and resolution of specific crisis situations”, then converted to Law 28 June 2019, No. 58. The Decree of the Ministry for Ecological Transition of 6 October 2021 “Provisions implementing the tax credit on products from recycling and reuse” defined the technical criteria certifying the types of materials and products eligible for the tax credit, as well as the procedures for accessing the tax credit.

[9] Leg. Decree 196/2021 “Implementation of Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment”. Provisions for the implementation of the tax credit, including technical criteria for the eligibility of products, as well as the procedures for accessing the tax credit, will be published in an implementing decree.

[10] This is aligned with best practices in the design of policy measures, which include an explanatory report, with the explanation of the motivations behind the measure proposed and the objectives, as well as a technical report (Presidenza del consiglio dei Ministri, 2001[18]).

[11] Data and information on uptake presented here were gathered during the project’s workshop titled “The role of fiscal instruments to promote the use of recycled materials as part of the circular economy transition in Italy” (30 January 2024, Sala Santoloci, Ministry of Environment and Energy Security, Rome).

[12] Relazioni illustrative delle Proposte per Legge di Bilancio 2023.

[13] Similarly, in the case of R&D tax credits, small firms make the most use of available tax support (with the highest share), whereas large R&D performing firms (i.e. those eligible for tax support) have the lowest use of tax relief (OECD, 2023[3]). This is an opposite trend to the one observed in other OECD countries, where larger firms tend to make more use of available CIT incentives (Dressler and Warwick, 2024[19]).

[14] In some cases, stylised assessments were used to provide estimates of the possible environmental impacts (in terms of CO_2 abatement) of CIT incentives, as presented in Annex 10.A for the Dutch Vamil/MIA scheme.

[15] Presentation by Maria Teresa Monteduro (Italy’s Ministry of Economy and Finance) given at the project’s workshop titled “The role of fiscal instruments to promote the use of recycled materials as part of the circular economy transition in Italy” (30 January 2024, Sala Santoloci, MASE, Rome).

[16] Ibid.

[17] Ibid.

[18] In terms of overall costs, it is possible that instruments, such as direct subsidies, could support the achievement of environmental policy objectives at a lower cost than CIT incentives, although there is no conclusive evidence of this (Van Santen et al., 2023[7]).

Annex 10.A. Selected country experiences with environment-related CIT incentives

Spain's tax credit for Environmental Investments

Spain introduced an Environmental Investments (EI) corporate tax credit in 1997, which was initially phased out in 2006. The credit covered 10% of a firm's total capital investments devoted to environmental protection, including installations to: i) prevent air pollution from industrial facilities; ii) prevent pollution of surface, underground and sea water; iii) reduce, recover or adequately treat industrial waste; and iv) generate renewable energy from selected processes (OECD, 2010[11]).

The evaluation of the EI tax credit scheme showed that its use was limited (0.4% of all tax declarations in 2005), but its scope within environmental capital investments was significant, supporting most of the investments for environmental protection in Spain (total EUR 1 033 billion) in 2005. A sizeable percentage (68%) of the validated investments were for the installation of "end-of-pipe" solutions.

In theory, eligible investments were to go beyond legal requirements. In practice, however, the scheme also benefitted investments that aimed to comply with environmental legislation, and which would have been undertaken anyway (limited additionality). Over the period 2000-2005, the EI tax credit appeared less effective at stimulating innovation in clean production processes than the Spanish tax credit for R&D and innovation (R&D&I), which was targeted at economy-wide R&D investments, including environmental related ones. This was likely due to the limited input additionality of the EI tax credit.

Drawing from this evaluation, several lessons may be learned from the Spanish EI tax credit experience:

- If environmental R&D&I are to be promoted, horizontal incentives, such as the economy-wide R&D&I tax credit, may be more effective than targeted incentives, such as the EI tax credit. The experience of the EI tax credit indicated a low additionality effect for targeted capital investments.
- CIT incentives are justified in cases of positive externalities. They should not be granted for environmental investments that are legally required as it would run counter to the "polluter pays" principle, as well as resulting in inefficient allocation of public funds and hampering innovation.
- The effectiveness of the Spanish EI tax credit scheme was likely limited by a low awareness of its existence by businesses, complex bureaucracy and high administration costs, uncertainty about the future persistence of the scheme, and a lack of flexibility in the process of updating requirements (requiring changes in law), and carry-over options in case of a no-profit year.

The Dutch Vamil/MIA incentives scheme

The Netherlands has a CIT incentive scheme with both Random Depreciation on Environmental Investments (Vamil, since 1991) and tax allowances (MIA, since 2001) to support innovative environmentally friendly investments, focusing on the market introduction and expansion phases of innovation (Van Santen et al., 2023[7]). Eligible investments cover innovative environmental techniques that are included on the "Environmental List" and amount to at least EUR 2 500 per asset. The Environmental List, which is annually updated, determines whether a particular asset qualifies for one or both schemes, as well as the rates of support that apply (with categories from A-G). The annual revision of the Environmental List may involve the inclusion of new assets, a change of category to existing ones, or their removal from the list.

- Considering a certain risk of windfall gains (i.e. firms that benefit from the scheme but would make the same investment anyway) of 26-59% (based on survey results), the Vamil/MIA scheme led to additional "net" investments of EUR 4.4 – EUR 7.9 billion in the period 2017-2021 (compared to a

total of EUR 10.8 billion "gross" investments). However, percentages vary significantly between types of technologies and firms.

- The total implementation costs for government over the same period represented 3% of the financial support provided, which is lower than other evaluated instruments. Average compliance costs for firms amounted to 15% of received tax benefit.
- In terms of the scheme's cost-effectiveness, EUR 1 of government support induced between EUR 6.4 – EUR 11 of additional investments (adjusting for windfall gains). This has been deemed as efficient, assuming that such investments in innovative environmentally friendly techniques imply the achievement of environmental benefits. Environmental outcomes are otherwise difficult to quantify.

Some efforts are being undertaken to evaluate Vamil/MIA's effectiveness in terms of environmental outcomes, which may vary significantly by type of investment. For example, the CO_2 emissions reduction outcomes were assessed in relation to the additional "net" investments in electric vehicles (50% of investments volume in 2019 and 2020) and against the scheme's total implementation costs. Assuming that each electric vehicle replaced a diesel one, the estimated average cost effectiveness of the scheme was EUR 141/tonne (0.0071 tonne CO_2/EUR). This was significantly lower than the equivalent estimate for the country's Energy Investment Allowance (EIA), which targets investments in energy efficiency, and is possibly explained by the higher costs of the innovative assets covered by Vamil/MIA.

Some features of the scheme are likely to contribute to its estimated efficiency. First, the country's legislation requires fiscal schemes to be evaluated every 5 years (following the Fiscal Regulations Assessment Framework),[1] which provides crucial data and information for policy reform. Moreover, a multi-year budget ceiling allows compensation for occasional over- and under-exploitation of the scheme, which implies constant monitoring and adjustments of eligible assets and support rates on the Environmental List.[2]

The use of the Environmental List plays a key role in the scheme. It provides a signalling and "attention" effect by increasing firms' awareness of the existence of eligible assets, reducing search costs and increasing confidence in such investments. The periodic tightening of requirements aims to maintain incentives for innovation and environmental gains while maximising the scheme's input additionality (i.e. limiting the risk of windfall gains).

Awareness of the scheme is high among stakeholders. Surveys with Vamil/MIA beneficiaries showed that intermediaries (e.g. subsidy agencies) as well as media (Internet, specialised magazines) play a significant role in informing entrepreneurs about the existence of the scheme. Moreover, several ministries and agencies are involved in the implementation of the scheme, which involves, among others, the running of a helpdesk and online applications portal, and the development and annual revision of the Environmental List, all of which are likely to minimise compliance costs for businesses.

Notes

[1] "Act of March 22, 2017, containing rules on the management, provision of information, control and accountability of the finances of the State, on the management of public liquid assets outside the State and on the supervision of the management of public liquid assets and public financial resources outside the State (Comptabiliteitswet 2016)".

[2] For example, electric vehicles represented almost 50% of investment volume in 2019 and 2020. The investment asset moved from category G (36% MIA reduction rate) to D (27%) in 2019 and E (13.5%) in 2020. In 2022, the asset was removed from the Environmental List. This annual revision process is deemed to significantly enhance the dynamism of the scheme.

Annex A. Information on the choice of focus for Part II of the project

Table A A.1. Options proposed for further analysis as part of this project

	Examples of issues that could be explored	Selected for Part II
Virgin material taxes	• What might be the environmental impacts (i.e. GHG emission reductions) of virgin material taxes on construction aggregates in the short and long term (with the use of modelling tools)? • What might be the economic impacts, including on international competitiveness? • Based on further analysis of the experience of other OECD countries, what considerations might need to be taken into account in instrument design? For instance, pending on information availability, this might include looking at the tax base and level, and impacts on the demand for and price of secondary aggregates.	Yes

Plastic taxes	• What might be the environmental and economic impacts of a plastic tax in the short and long term (with the use of modelling tools), including:
	  ○ Impacts on overall plastics use in the economy, GHG emissions, releases of plastics into the environment.
	  ○ Impacts on domestic industry, impacts on the demand for and price of recycled plastics.
	• Based on further qualitative analysis, what considerations might need to be taken into account in the design of plastic taxes? For instance, this might include looking at the tax scope, the target life cycle stage, and the tax level.
		No

Green Public Procurement (GPP)	• How could the impacts of GPP strategies on circularity be better captured? • How could a competence centre support public buyers in the implementation of GPP strategies? • Considering the current use of GPP in Italy and lessons learned in other countries, what practical guidance and tools could be most beneficial to increase dialogue with the private sector through preliminary market consultations? • Minimum Environmental Criteria (CAM) are a useful reference tool in the implementation of the NRRP, including to show that public investments comply with the principle of "Do No Significant Harm (DNSH)" (see Chapter 2). What steps and interventions could ensure full coherence between GPP approaches and the DNSH principle, with a view to simplifying the process of fulfilling the responsibility of public administrations to respect the DNSH principle in the implementation of the NRRP?	No
Landfill and incineration taxes	Based on further analysis of the experience of other OECD countries, what considerations might need to be taken into account in the design and implementation of the instruments? For instance, pending on information availability, this might include looking at the tax base and level, possible environmental outcomes, and considerations and practical guidance on policy design and implementation.	No

Subsidies or tax relief measures (such as VAT reductions, CIT incentives)	• What is the status of VAT reductions and other fiscal incentives, with links to the circular economy, across OECD countries?
	• Italy has increased the range of fiscal incentives available to firms and retailers in recent years. What has been their level of uptake, and are there lessons to be learned to overcome barriers to their use (e.g. lack of information, complexity of fiscal system)?
	• What are the relevant considerations in the design, implementation and enforcement of incentive subsidies and VAT reductions? This may include looking at lessons learned from the experience of other countries, including in other sectors, (e.g. incentive subsidies for green innovation, reduced VAT rates in the construction or catering sectors). Deeper analysis may focus on:
	  ○ Considerations about the effectiveness and efficiency of these instruments, including by looking at choices in instrument design (e.g. amount of tax rebate, saliency to firms and consumers).
	  ○ Risks of unintended consequences, including on tax evasion, rebound income effects (i.e. consumers buy more goods with the same budget) and substitution effects (i.e. second-hand goods do not replace the acquisition of new goods)?
	• What are the main advantages and drawbacks of implementing fiscal incentives and VAT reductions (versus environmental taxes) to promote behaviour aligned with higher circularity, including in terms of economic efficiency, political feasibility, saliency to firms/consumers, and environmental outcomes?
		Yes

Annex B. Modelling methodology

In order to provide an in-depth analysis of the macroeconomic consequences of circular economy-enabling policies, these modelling tools have been enhanced by linking physical material flows to specific economic activities, and integrating essential elements of a circular economy, not least because an explicit representation of the use of secondary inputs serve as substitutes for primary resource use (OECD, 2019[1]). This provides internally consistent and globally connected policy scenarios for primary and secondary materials use and their economic drivers as they evolve over time, as well as scenarios for the main sectors and materials where resource efficiency and circularity policies have an impact.

The ENV-Linkages model

This report employs the OECD's in-house dynamic Computable General Equilibrium (CGE) model "ENV-Linkages" as the basis for the assessment of the economic consequences of environmental impacts until 2050, as well as to study the economic consequences of environmental policies.

ENV-Linkages is a multi-sectoral, multi-regional model that links economic activities to energy and environmental issues. It is the successor to the OECD GREEN model for environmental studies (Oliveira Martins et al., 1992[2]). A more comprehensive model description is given in Chateau, Dellink and Lanzi (2014[3]), whereas a description of the baseline scenario construction procedure is given in Chateau, Rebolledo and Dellink (2011[4]). The Global Material Resources Outlook to 2060 (OECD, 2019[1]) gives an overview of how the model was enhanced to represent material flows and to model circular economy and resource efficiency policies.

The model is based on the Social Accounting Matrices (SAM) contained within the Global Trade Analysis Project (GTAP) 10 database (Center for Global Trade Analysis, Purdue University, 2019[5]). This database describes bilateral trade patterns, and the production, consumption and intermediate use of commodities and services, including capital, labour and tax revenues and use. The base year of the SAM and the model is 2014. Therefore, to obtain estimates for 2019, the ENV-Linkages model was run to 2019.

Production in ENV-Linkages is assumed to operate under cost minimisation with perfect markets and constant return to scale technology. The production technology is specified as nested Constant Elasticity of Substitution (CES) production functions in a branching hierarchy. This structure is replicated for each output, whereas the parameterisation of the CES functions may differ across sectors. The nesting of the production function for the agricultural sectors is further re-arranged to reflect substitution between intensification (e.g. more fertiliser use) and extensification (more land use) of crop production, or between intensive and extensive livestock production. The structure of electricity production assumes that a representative electricity producer maximizes its profit by using the different available technologies to generate electricity using a CES specification with a large degree of substitution. The structure of non-fossil electricity technologies is similar to that of other sectors, except for a "top nest" combining a sector-specific resource with a sub-nest of all other inputs. This specification acts as a capacity constraint on the supply of electricity technologies.

The model adopts a putty/semi-putty technology specification, where substitution possibilities among factors are assumed to be higher with new vintage capital than with old vintage capital. In the short term, this ensures inertia in the economic system, with limited possibilities to substitute away from more

expensive inputs but, in the longer term, this implies relatively smooth adjustment of quantities to price changes. Capital accumulation is modelled as in the traditional Solow/Swan neo-classical growth model.

The energy bundle is of particular interest for the analysis of climate change issues. Energy is a composite of fossil fuels and electricity. In turn, fossil fuel is a composite of coal and a bundle of the “other fossil fuels”. At the lowest nest, the composite “other fossil fuels” commodity consists of crude oil, refined oil products and natural gas. The values of the substitution elasticities are chosen to imply a higher degree of substitution among the other fuels than with electricity and coal.

Household consumption demand is the result of static maximisation behaviour, which is formally implemented as an “Extended Linear Expenditure System”. A representative consumer in each region – who takes prices as given – optimally allocates disposal income among the full set of consumption commodities and savings. Savings is considered as a standard good in the utility function and does not rely on forward-looking behaviour by the consumer. The government in each region collects various kinds of taxes in order to finance government expenditures. Assuming fixed public savings (or deficits), the government budget is balanced through the adjustment of the income tax on consumer income. In each period, investment net-of-economic depreciation is equal to the sum of government savings, consumer savings, and net capital flows from abroad.

International trade is based on a set of regional bilateral flows. The model adopts the “Armington” specification, assuming that domestic and imported products are not perfectly substitutable. Moreover, total imports are also imperfectly substitutable between regions of origin. Allocation of trade between partners thus responds to relative prices at the equilibrium.

Market goods equilibria imply that, on the one side, the total production of any product or service is equal to the demand addressed to domestic producers plus exports, and, on the other side, the total demand is allocated between the demands (both final and intermediary) made by domestic producers and the import demand.

CO_2 emissions from energy combustion are directly linked to the use of different fuels in production. Other GHG emissions are linked to output in a way similarly described by Hyman et al. (2003[6]). The following non-CO_2 emission sources are considered: i) methane from rice cultivation, livestock production (enteric fermentation and manure management), fugitive methane emissions from coal mining, crude oil extraction, natural gas and services (landfills and water sewage); ii) nitrous oxide from crops (nitrogenous fertilisers), livestock (manure management), chemicals (non-combustion industrial processes) and services (landfills); iii) industrial gases (sulphur hexafluoride [SF6], perfluocarbons [PFCs] and hydrofluorocarbons [HFCs]) from the chemicals industry (foams, adipic acid, solvents), aluminium, magnesium and semi-conductors production.

ENV-Linkages is fully homogeneous in prices and only relative prices matter. All prices are expressed relative to the *numéraire* of the price system that is arbitrarily chosen as the index of OECD manufacturing exports prices. Each region runs a current account balance, which is fixed in terms of the *numéraire*. One important implication from this assumption, in the context of this report, is that real exchange rates immediately adjust to restore current account balance when countries start exporting/importing emission permits.

As ENV-Linkages is recursive-dynamic and does not incorporate forward-looking behaviour, price-induced changes in innovation patterns are not represented in the model. The model does, however, imply technological progress through an annual adjustment of the various productivity parameters in the model, including e.g. autonomous energy efficiency and labour productivity improvements. Furthermore, as production with new capital has a relatively large degree of flexibility in choice of inputs, existing technologies can transfer to other firms. Thus, within the CGE framework, firms choose the least-cost combination of inputs, given the existing state of technology. The capital vintage structure also ensures that such flexibilities are greater in the long term than in the short term.

The sectoral aggregation of the model adopted in this report is given in Figure A B.1.

Figure A B.1. Sectoral aggregation of ENV-Linkages used for this report

Agriculture, Fisheries and Forestry	Manufacturing
Paddy Rice	Food Products
Wheat and Meslin	Textiles
Other Grains	Wood products
Vegetables and Fruits	Chemicals
Oil Seeds	Pulp, Paper and Publishing products
Sugar Cane and Sugar Beet	Non-metallic Minerals
Fibres Plant	Fabricated Metal products
Other Crops	Electronics
Cattle and Raw Milk	Motor Vehicles
Other Animal products	Other Transport Equipment
Fisheries	Other Machinery and Equipment
Forestry	Recycling
Non-manufacturing Industries	Iron and Steel - Primary
Coal extraction	Iron and Steel – Secondary
Crude Oil extraction	Aluminium – Primary
Natural Gas extraction	Aluminium – Secondary
Other Mining	Copper – Primary
Petroleum and Coal products	Copper – Secondary
Gas distribution	Other Non-ferrous Metals – Primary
Water Collection and Distribution	Other Non-Ferrous metals – Secondary
Construction	Other Manufacturing
Electricity Transmission and Distribution	**Services**
Electricity Generation (8 technologies)	Land Transport
Electricity generation: Nuclear Electricity; Hydro (and Geothermal); Solar; Wind; Coal-powered electricity; Gas-powered electricity; Oil-powered electricity; Other (combustible renewable, waste, etc).	Air Transport
	Water Transport
	Business Services
	Other Services (incl. Government)

Modelling economic instruments in the ENV-Linkages model

Policies modelled in this report are taxes and subsidies on primary and secondary materials. These fiscal instruments are representative of material taxes and subsidies implemented by governments (national and local), but can also serve as a proxy to project the consequences of similar policies intended to promote resource efficiency and the transition to a circular economy.

Many instruments can be modelled using fiscal tools in a CGE model. One example is the representation of recycled content standards, where any product containing a metal has a required minimal content of secondary metal, or economic instruments with a recycled content threshold (e.g. subsidies or corporate tax credits for products with a recycled content above a certain threshold). In a CGE model, a recycled content standard or threshold translates to a mathematical relationship between primary and secondary material production, similar to that of a tax. Nevertheless, different policy instruments have different outcomes in terms of their implementation, costs and effectiveness. Not all can be represented through fiscal tools. For instance, in the absence of robust macroeconometric studies on their effects, information campaigns are difficult to represent well in CGE.

The subsidies modelled in this report aim to stimulate an increase in the production and use of secondary materials, by targeting two steps in the secondary material production process:

1. the supply of secondary raw materials (targeting the input cost in the production process); and
2. the production of secondary metals (targeting the output price, i.e. the price of refined metals).

In modelling exercises, material taxes on minerals generally take the form of taxes per tonne of primary materials paid by the firms/sectors when they use the corresponding material in their production processes. The technical implementation of such taxes is straightforward in ENV-Linkages, as material uses are linked to economic flows. This link allows the calculation of the material inputs (in tonnes) for each sector to be taxed directly (in value per tonne).

In this study, the tax rates result from a careful calibration by material. Materials are different from one another, and their extraction and use are associated to different environmental impacts. Hence, there is a case for differentiating tax rates on primary materials. The global level of metal tax rates in 2040 have been calibrated following standard theoretical principles of optimal taxation. In this setting, the levels of the tax rate for each metal are calculated, at the global level, to target the same ratio for the marginal environmental benefit to its (GDP) costs.[1] Given that the different environmental impacts calculated are not comparable (e.g. SO_2 emissions as a proxy for acidification and tonnes of ethylene as a proxy of photochemical oxidation cannot be added), each environmental impact has been assigned the same weight in the evaluation of overall environmental implications.[2]

Furthermore, the methodology takes into account existing taxes on mining extraction and royalties or fees, which already influence material use across countries. To harmonize the fiscal burden across countries, in the model, the material tax rates at the country level were adjusted to incorporate the pre-existing tax levels to reach similar (and higher) levels of taxes between countries. Bibas, Chateau and Lanzi (2021[7]) compares the effect of differentiated taxes, to reach a similar fiscal burden in each country to the effect of uniform taxes, where the environmental share of the burden is the same for all countries.

As environmental benefits associated with the reduction of non-metallic minerals are difficult to compare with those associated with the reduction of primary metals use, the choice of USD 5 per tonne for the former has been determined differently. At the global level, this tax rate is determined such that the total amount of extra tax revenues from taxing non-metallic minerals is equivalent to extra revenues from taxing all primary metals (as a percentage of GDP).

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Notes

[1] Technically-specific scenarios, which implement taxes on each metal separately, have been simulated and allowed finding tax rates that imply a ratio of global environmental benefits to GDP cost that is roughly equivalent across the different types of primary metals.

[2] Terrestrial ecotoxicity was excluded from this calculation as for this indicator, some secondary metals can have higher per unit impact than primary metals (see the OECD Global Material Resources Outlook (2019[1]) for more details). Thus, the effect of the tax would be ambiguous and make it difficult to calibrate.

Economic Instruments for the Circular Economy in Italy

OPPORTUNITIES FOR REFORM

A circular economy keeps the value of resources in the economy for longer, extends the useful lifespan of products and reduces waste, thereby reducing environmental and climatic pressures and increasing domestic competitiveness. Italy is among the leading European actors in transitioning to a circular economy. Its adoption of the National Strategy for the Circular Economy in 2022 reinforced the country's ambition to rapidly shift from linear to circular modes of production and consumption. Among the envisioned measures, the national strategy calls for a stronger use of economic instruments to achieve a more coherent and effective policy mix.

This report identifies opportunities for the enhanced use of economic instruments to support the circular economy in Italy. Part I of this report takes stock of the Italian policy landscape, compares it to international practices and recommends seven policy reforms for further consideration. Part II contains an in-depth analysis of three policy instruments that could reduce demand for virgin materials and promote a shift to secondary materials. These instruments include a virgin materials tax on construction minerals, a reduced VAT rate for products with recycled content and corporate tax credits to promote the use of secondary materials.

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