

# ECONOMIC INSTRUMENTS FOR THE CIRCULAR ECONOMY TRANSITION: THE (NEGLECTED) ROLE OF VIRGIN MATERIALS AND LANDFILL TAXATION IN ITALY

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## ABSTRACT

The use of economic instruments in policies supporting a circular economy has attracted an extensive and growing interest in the international and European debate in recent decades. Environmental taxes and levies, subsidies and other market-based instruments have been seen as useful policy tools for enhancing environmental protection, getting the price right and creating market-based incentives – price and cost signals – to spur environmentally-friendly behaviors. From this standpoint, taxes and other economic instruments acquire, primarily or at least partially, a regulatory and preventive role: they address the market failure of environmental externalities, aligning private and social costs and, consequently, stimulating more socially desirable outcomes. The paper mainly focuses on the sector of buildings and construction, i.e. the sector responsible for the largest share of extraction of raw material and of the generation of non-municipal wastes, presenting an analysis of the two main price instruments implemented in Italy at the beginning and at the end of the flow of materials. It aims to bring to the fore the main characteristics of the two instruments in the Italian multilevel government, and to propound new paradigms for future developments. The value added of the work is to prove, through a coherent and updated policy framework, the extent to which the regulatory role of these subnational environmental levies is largely forsaken, thereby jeopardizing the possibility to use them in a more effective and consistent way.

## 1. INTRODUCTION

Policies to reduce raw material consumption constitute a salient concern in the sustainable development policy agenda of several countries. The extraction, processing, and disposal of raw materials, in fact, give rise to numerous negative environmental impacts, including greenhouse gas emissions and air pollution, noise hazards, loss of ecosystem services and landscape alteration (Auci et al., 2012; OECD, 2024; Soderholm, 2011). Furthermore, in an intertemporal perspective, the difficulty in establishing property rights and/or the implementation of too high discount rates may imply that resources are exploited at a faster rate than it is socially efficient (McKenzie, 2006; Soderholm, 2011). These consequences appeal towards the needs for a circular economy, in which the flow of virgin materials is narrowed, and the value retention of material resources is preserved, hence fostering resource efficiency and contributing to the reduction of environmental externalities.

Italy's performance in this field presents mixed results and possible favourable developments for the future.

On the one hand, Italy ranks highly for many indicators related to resource productivity and circularity (Circular Economy Network, 2022). For example, the country's material productivity of 4.6 USD/kg is well above the EU and OECD average, while domestic material consumption (DMC<sup>1</sup>), at 8.6 tonnes per capita, is one of the lowest in Europe (OECD, 2024). Non-metallic minerals account for the largest part (68.2%) of domestic material extraction, followed by biomass (29.7%) and fossil materials (2.1%) while the percentage of the extraction of metal ores is negligible (ISTAT, 2024). The net import of materials is largely positive for biomass and fossils, while for aggregates the overall effect of trans-border flows is substantially balanced. On the other hand, the country has yet to decouple resource extraction and waste generation definitively from economic activity, especially when non-municipal waste is concerned, thus revealing a percentage of waste disposed into landfill still higher than that found in EU best practices. Construction and demolition (C&D) waste is a key component of the non-municipal (special) waste stream: in 2021 its total production has been estimated at 78.7 mil.



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tonnes, corresponding to nearly 50% of the total amount of special waste produced in Italy (ISPRA, 2023b). 77% are wastes produced by the building sector (demolition and construction phases), while 23% are wastes and scraps produced in the virgin materials extraction phase. No absolute nor relative decoupling from economic growth (GDP) has taken place in the last decade: the total amount of C&D waste, in fact, increased by 36.4% from 2010 to 2021, and its ratio to the sectoral GDP increased by 50.8% in the same period (Figure 1).

Moreover, even if the total rate of recycling/recovery of C&D waste (80.1% in 2021) has largely met the minimum objective (70%) set on the EU level by the Directive 2008/98 and the Decision 2011/753 for the year 2020, a low level of 'internal' circularity can still be observed (Fondazione per lo Sviluppo Sostenibile, 2023). As emphasised by the National Waste Management Plan, in fact, the bulk of C&D waste is mainly recovered in other low-value chains, because selection and treatment plants are technologically unsophisticated, and materials obtained often do not respect technical standards adopted on the European as well as on the national level (ibidem, 2023). The Italian construction sector indicates a clear preference for virgin materials and still maintains a largely sceptical attitude towards recycled materials, which are used mainly for secondary purposes (e.g. substrates, road asphalt concrete, filling, etc.) or prepared for recycling (EEA, 2008; Fondazione per lo Sviluppo Sostenibile, 2023; Legambiente, 2021). These trends are expected to continue to prevail and become of utmost importance due to measures and projects financed by the National Recovery and Resilience Plan (NRRP), as well as by the 'Ecobonus' and 'Superbonus' tax deductions<sup>2</sup> which are strongly boosting the overall sectoral demand.

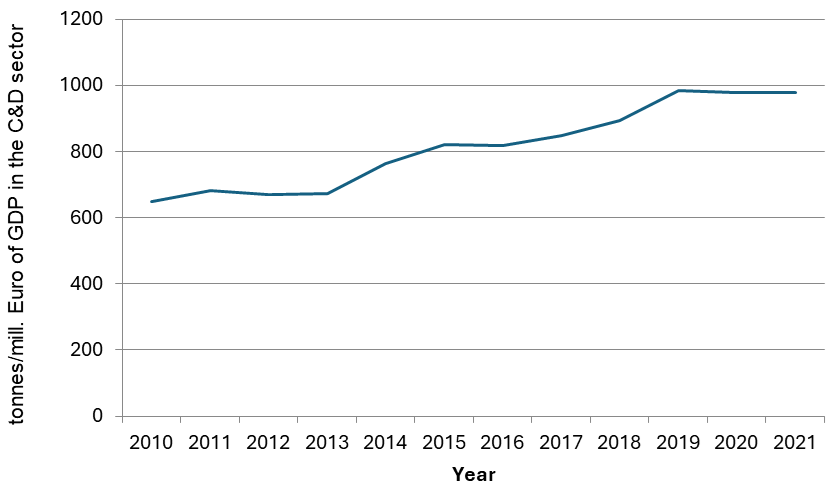
Through the adoption of the National Circular Economy Strategy in June 2022, Italy has explicitly placed the circular economy transition and the construction sector at the centre of its environmental policy agenda, regarding this commitment also as a key lever in implementing the 2030 UN Sustainable Development Agenda. The Strategy identifies objectives, actions, and measures, hinging its

implementation upon a multi-level and multi-instrument approach. From one perspective, it requires the vertical and horizontal coordination amongst all the governments involved, with full recognition of the decisive role of sub-national governments in enacting the main contents of the Strategy. Nonetheless, it entails the combination of several kinds of instruments: regulatory instruments, economic instruments, voluntary approaches, information-based instruments, research-promoting measures, communication, and awareness-raising campaigns.

Under this framework, economic instruments (taxes and charges, subsidies and tax reliefs, tradeable quotas and compliance certificates, extended producer responsibility, green public procurement) may represent important tools to align existing incentives and behaviours with environmental goals and objectives. Correct price signals, achieved via the internalisation of costs associated with activities that contribute to environmental harm, foster practices that are more sustainable, maintain resources in circulation and penalise those that are detrimental to the environment.

Economic policy instruments can act at different stages of the value chain, discouraging the extraction of raw materials, improving product design in line with principles of circularity, supporting the use of recycled materials, influencing consumer behaviour in sales and during product utilisation, modifying waste disposal practices and, at the end of the circle, incentivising recycling by operators.

The current Italian policy framework already includes several economic and quasi-economic instruments that may stimulate the transition to a circular economy (Table 1). They represent relevant opportunities to induce behavioural changes in a flexible way, avoiding excessive economic impacts and providing a continuous incentive for innovation and for the improvement of environmental performance above the regulatory standards. At the same time, many technical and political obstacles can hinder their implementation; they therefore necessitate well-designed execution strategies and implementation paths.



**FIGURE 1:** C&D wastes and Gross domestic product (GDP) in the construction sector (Italy, 2010-2021) - Source: our calculations on data from ISPRA (2023b).

**TABLE 1:** Potentially hazardous components of HHSW - Source: elaborations on OECD (2024).

| Instrument                                       | National level                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sub-national level                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explicit economic instruments                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Fees on extractive activities                    | National legislation only covers general matters in extractive sectors (e.g. environmental standards, workers' health and safety, disposal of waste from extractive activities) .                                                                                                                                                                                                                                                                                                           | Regions detain main competencies on quarrying (barring energy-related minerals), including the planning and authorisation of extractive activities, environmental impact assessments, regulation of fee coverage and rates, recovery of waste materials, mine/quarry closure and rehabilitation requirements, and the collection of statistical data.<br>Municipalities: collection and use of revenues (exceptionally by Regions). |
| Landfill tax                                     | National legislation: general criteria and guidelines on tax scope (tax rate upper and minimum levels), destination and earmarking of revenues, bonus/malus mechanism for separated collection.                                                                                                                                                                                                                                                                                             | Regions hold main competencies, including 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 (paused)                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NA                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Waste charge (including Pay as you throw - PAYT) | National legislation: guidelines for fee setting. ARERA is the regulatory body.                                                                                                                                                                                                                                                                                                                                                                                                             | Regions: promotion or mandating of adoption of PAYT systems.<br>Municipalities: in charge of planning for local waste management (incl. the financing model), fee setting (including granting tax reductions in line with national guidelines) and collection of revenue.                                                                                                                                                           |
| Quasi-economic instruments                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Extended Producer Responsibility (EPR)           | State: introduction of EPR schemes, certification of Producer Responsibility Organisations/Consortia (PROs). In most cases, PROs organise and execute EPR obligations nationally.<br>PROs charge Advanced disposal fees at the point of sale.                                                                                                                                                                                                                                               | Municipalities are responsible of waste management and obtain payments from PROs for the different waste flows collected, also according to their quality.                                                                                                                                                                                                                                                                          |
| Green Public Procurement (GPP)                   | National legislation: introduction of public procurement approaches, and monitoring of application of GPP criteria.<br>MASE (Ministry of Environment and Energy Security): definition and regular update of GPP criteria, as well as of the National Action Plan on Green Public Procurement.<br>Consp: National Central Purchasing Body implementing framework agreements including GPP criteria.<br>National Anti-Corruption Authority (ANAC): monitoring of application of GPP criteria. | Regional aggregators implementing framework agreements including GPP criteria and trainings on GPP.<br>All sub-national public entities: implementation (uptake of GPP criteria in tenders).<br>Regions participate in the planning phase.                                                                                                                                                                                          |

In what follows, after a brief outline of the vertical distribution of environmental and tax competencies, we will focus on two price instruments implemented in Italy at the beginning and at the end of the material stream - i.e. the aggregates levy and the landfill tax - with the aim of emphasising the main characteristics of the two instruments and suggesting some prospective developments. Even if single topics have been already scrutinized and discussed, at least partially, in other works, this is the first time, to our knowledge, that all these elements are critically reviewed for the Italian experience in a coherent and updated framework.

## 2. ENVIRONMENTAL AND TAX COMPETENCES IN THE ITALIAN MULTILEVEL SYSTEM

Although environmental protection is listed as among the exclusive competences of the national government (art. 117, 2 co, Lett. S, Constitution), the Italian Constitutional Court has repeatedly affirmed that the environment is a 'horizontal value', for the safeguard/realisation of which the State and the territorial governments take part with shared responsibilities. In this regard, the national

competence does not exclude the possibility for Regions to pursue and enhance environmental protection and promotion, even by dint of the enactment of competences that are intrinsically related to the environment such as health, transport, energy, territorial and land management, etc.

This complex set of connected and potentially overlapping responsibilities is governed by the principle of prevalence, according to which national rules prevail over regional legal acts when they are aimed towards environmental protection. The principle has been further developed in two directions of interest for the purpose of this analysis.

Firstly, the Constitutional Court has stated in several cases <sup>3</sup> that interventions regarding environmental protection, made by Regions employing their 'legislative' prerogatives <sup>4</sup>, must be carried out in compliance with the minimum levels of environmental protection set by the central government and, potentially, only increasing them (unidirectionality principle). For example, in the Judgement 86/2014, the Court has stated that 'the only direction allowed by the legal system to the regional legislator is that of raising the level of environmental protection established by the State'.

At the same time, the Court has acknowledged the possibility for the state to define also maximum standards and

fully binding rules for regional governments to find an equilibrium amongst possibly conflicting interests (e.g. local interests as opposed to national energy security). This general statement turns out to be particularly relevant when sites and environmental issues have strong interjurisdictional and cross-border implications, to avoid that stringent local limits and/or disproportionately high environmental taxes set at the decentralized level become tools in the service of the NIMBY syndrome (Zatti, 2023).

According to the discipline of fiscal federalism adopted in Italy, Regions can introduce new taxes for their own or for local governments but can only do so respecting the general principles set by the national government in terms of fiscal coordination. In particular, they are allowed to introduce their own taxes in their territories only if they do not duplicate state taxes (pre-emption principle), and regarding matters that are not under the exclusive competence of the State. Accordingly, there are different opportunities for subnational governments to influence the management of environmental matters through fiscal disincentives (Verigni, 2013; Zatti, 2020):

- Regions will be allowed to introduce autonomous new taxes on matters indirectly related to the environment (tourism, energy, land management) that are devolved to the shared legislative competence between the central State and Regions, or to the exclusive competence of the Regions, but only if the link with this matter prevails over the environmental one (prevalence principle).
- Regions and local governments have the power to discipline pre-existing environmentally related taxes introduced by the State, within the range set by the national law. The more or less detailed prescriptions included in the laws directly influence the degree of autonomy conceded to the local government.
- Regions and local government have the power to establish and fix non-tax levies, including user charges and special fees, even in the absence of an explicit national rule. For the management and design of the main characteristics of these hybrid instruments (rates, rebates, exemptions, etc.), it is in fact widely recognised that a larger room of manoeuvre for local governments is generally granted.

All things considered, there are several reasons to enhance the role of subnational governments in environmental management, even acting through the disincentive effects of fiscal instruments. However, their design and administration require a well-coordinated approach to valorise synergies and co-benefits and prevent overlaps and strategic behaviours. The cases of the extractive activities' levy and the landfill tax show how relevant steps are still to be done in this direction.

### 3. FEES ON EXTRACTIVE ACTIVITIES

A tax on natural resources extraction can be implemented for several reasons (EEA, 2008; Ettlinger, 2016; HM Treasury, 2020; Soderholm, 2011; Zatti, 2023). It can slow down the rate of resource depletion in cases where property rights are not well defined and the intertemporal rate

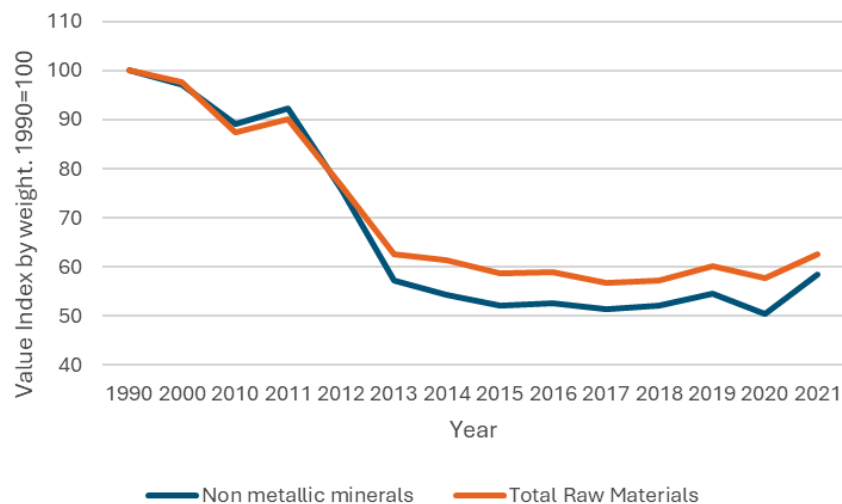
of consumption underestimates the needs of future generations; it helps to reduce the environmental impact of quarries and pits by decreasing extraction of materials, while stimulating the market for using secondary sources, such as construction waste; it also provides financial resources to cover administrative costs, and to mitigate local environmental impacts and ensure site restoration. Positive aspects also include a limited influence on competitiveness, simple structure (for rates) with an easily identifiable tax base, and relatively little cross-border impact due to high transportation costs (EEA, 2008; Ettlinger, 2016; HM Treasury, 2020).

At the international level, according to the OECD database, there are currently 88 taxes applied on extractive activities on non-metallic minerals, 16% are applied on market value, whereas the remaining on weight or volume (OECD, 2023). Several European countries apply extraction taxes – i.e. taxes on gravel, rock, limestone, ornamental stones, etc. – to reduce both the reliance on virgin materials and to limit the amount of construction and demolition wastes landfilled (Soderholm, 2011). Often, revenues are earmarked for environmental or compensation purposes: this is the case for the UK 'Aggregate Levy', the proceeds of which are utilised for environmental rehabilitation and improvement, and for improving the quality of secondary materials (HM Treasury, 2020).

In cases where some form of policy evaluation exists (Ettlinger, 2016; Soderholm, 2011), they indicate that taxes have had effects on the use of aggregates and on material substitution. At the same time, evidence from international case studies suggests that virgin material taxes on construction minerals are most effective when they are combined with additional policies aimed at stimulating the demand for and the supply of recycled materials (e.g., landfill taxes, minimum recycled content requirements, support for selective demolition and improved quality standards for CDW, end-of-waste criteria for construction and demolition waste and classification of industrial by-products), and with more effective controls on waste management, especially on illegal disposal.

In Italy, internal resource extraction has considerably declined since 1990, but the trend has stabilized in the last decade (Figure 2). Among other sectors, the construction industry plays a crucial role, since it is one of the largest consumers of non-metallic raw materials and significantly contributes to waste generation (Auci et al., 2013; EEA, 2008; Mazzanti, Zoboli, 2013). Recently, the sector's output is experiencing a new growth and OECD projections indicate that both output and material intensity of the construction sector are expected to increase significantly by 2050 (OECD, 2024). In the same study it is reported that in 2021 184 Mt of materials were extracted from quarrying sites, a fifth more than in 2017. This baseline scenario raises concerns in terms of environmental externalities and security of supply, underscoring the need to focus on reducing waste generation, boosting recycling, and enhancing secondary raw materials use.

In Italy, mining activities<sup>5</sup> have been progressively delegated to the regional competence with both the Presidential Decree N.616/77 and the Legislative Decree N. 112/98,



**FIGURE 2:** Internal raw material extraction in Italy (by weight, 1990=100) - Source: our calculations on data from ISTAT (2024a).

even if the State can still establish minimum standards according to its exclusive competence in the field of environmental protection and worker health and safety. Regions oversee the adoption of provincial plans, establishing the identification of exploitable sites, quantity, and quality of materials to be extracted, exploitation techniques, and the final management of the sites where the quarrying activities end up.

In this regulatory framework, four main actors are involved: the Region, the Province, the Municipality, and the site owner (EEA, 2008). Exploitation by site owners must be based upon an agreement between the owner and the Municipality in which the site is located and authorised by the Province. These agreements include details on quantity and quality of materials to be extracted, allowable exploitation techniques, and the commitment to carry out restoration of the site after the cessation of the activity.

Regional governments are in charge of defining concession (mainly authorization) fees for the extraction and to decide the allocation of revenues. According to national legislation (Leg. Decree 112/1998), maximum limits of concession fees should be set by the State, but these coordination measures have never been established, allowing Regions to benefit from a large degree of freedom. This is partially due to the hybrid nature of the levy, representing a borderline case between taxes and user charges, in that it shows clear connections with benefit and compensation principles, without fully relying on a cost-recovery approach (Zatti, 2023). This ambiguity is confirmed by the fact that the Italian Constitutional Court has recognised the non-tax nature of the aggregate fee (e.g. Judg. 89/2018), while a different approach is found in the OECD tax guide, according to which: 'any severance payments that are imposed on the extraction of minerals and fossil fuels from reserves owned privately or by another government should be classified as taxes' (OECD, 2021, p.9).

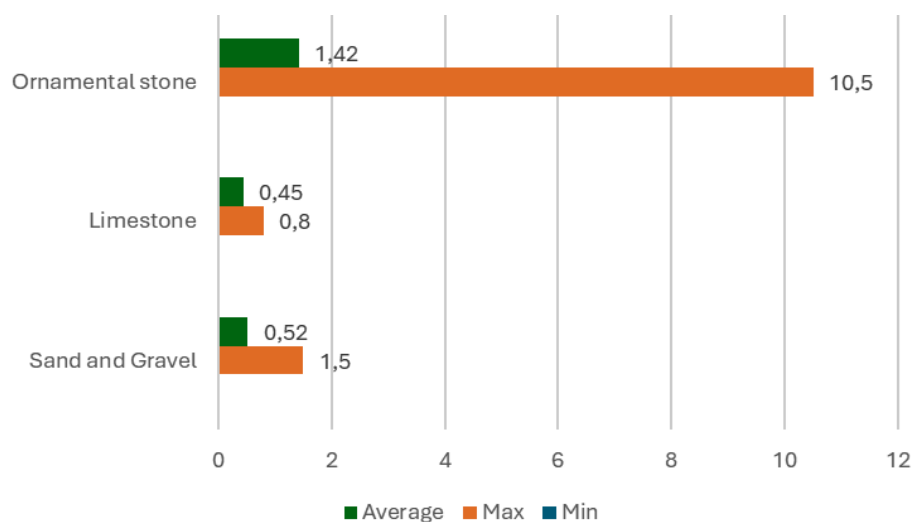
The overall implementation process shows a great heterogeneity and fragmentation of rates and procedural requirements (Auci et al., 2013; Zatti, 2023). Generally, the fees cover a wide range of aggregates (sand and gravel,

limestone, clay, peat, ornamental stones) and are set on metre cubic of materials extracted<sup>6</sup>; in some cases (in Apulia, Sicily and in the Autonomous Province of Trento), the area of the extraction site is also considered for the quantification of the due amount. Planning and authorisation procedures generally integrate considerations of the heterogeneity in land use and values, but even fee rates are sometimes differentiated according to the supposed ecological value of the land. For example, Lombardy and Emilia-Romagna apply higher fees for extractions within the boundaries of regional parks, while Calabria applies a higher fee (x 8) for extractions from riverbeds. Even without the definition of a ceiling by the State, a race to the top has not occurred: three Regions out of 21 adopt a 'zero rate' on all aggregates and the average rate applied to aggregates in Italy are below average values present in the OECD Database (Figure 3).

Revenues of the fees are generally assigned/left to the Municipalities and communities involved to grant environmental restoration and more general territorial compensation; in some cases, Regions and Provinces retain a share to cover administrative, monitoring and enforcement costs. In actual fact, the process of earmarking funds for rehabilitation projects at the municipal level is far from being transparent and well documented and there is no available data gathered on the regional or national scale (EEA, 2008; Legambiente, 2021; Mazzanti, Zoboli, 2013).

The Italian experience clearly reveals a limited consideration of the role of this price instrument in influencing the behaviours of the economic agents involved.

The fee is not included in the ISTAT database on environmental taxes and even values comprised in the annual report on quarries of the environmental NGO Legambiente are only indirectly estimated, relying on rates and quantities extracted but not on true budget data (EEA, 2008; Zatti, 2023). Time series on prices of aggregates are not available and values published by the Chambers of Commerce are far from being entirely representative, due to the presence of many direct private transactions (EEA, 2008). As a matter of fact, the full regionalisation of competences



**FIGURE 3:** Fees applied on the principal materials extracted in the Italian Regions (€/m<sup>3</sup>, year 2021). The three materials described are estimated to be nearly the 90% of total non-metallic minerals extracted (ISTAT, 2024a). Minimum values are = 0 for all the three categories. - Source: own elaborations on Legambiente (2021).

in 1998 has aggravated the situation, bringing about fragmentation and missing data (Auci et al., 2012).

Moreover, the Italian approach to extraction is mainly based on a command & control logic, in which the planning of sites and quantities exploitable are based on the priority of keeping pace with demand in the construction and infrastructure sectors, while the substitution of virgin materials is not the main concern (EEA, 2008; Mazzanti, Zoboli, 2013). With this consideration, price signals are not aimed at influencing volumes extracted or to create real incentives for recycling and substitution, but mainly to cover administrative costs and to finance compensation for the affected local communities for land restoration and environmental improvement.

The level of extraction fees is esteemed to be inadequate in influencing market evolution (Auci et al., 2012; EEA, 2008; Legambiente, 2021<sup>7</sup>) and the only quantitative exercise conducted on the Italian data concludes that 'the effects of extraction charges on aggregate market development in Italy are very limited' (Mazzanti, Zoboli, 2013 p. 910). All in all, the decentralisation of responsibilities and the absence of a minimum standard has fostered a race to the bottom, testifying how, in terms of potential distortive effects on competition, the downward trend is the most likely result to occur.

#### 4. LANDFILL (AND INCINERATION) TAX

Landfill and incineration taxes are implemented in several countries to drive waste away from the less desirable management options, to promote recycling, and to encourage the construction of plants for alternative treatments. Several case studies demonstrate how the combination of waste disposal taxes with taxes on raw materials provides strong incentives to economic agents to employ recycled materials rather than extracting virgin materials and disposing of old ones (Ettliger, 2016; Eunomia, 2022; Soderholm, 2011).

A well-known case study in the EU is that of the UK, where the tax has been in place since 1996 to internalize the external costs of landfilling (Eunomia, 2022). The tax is charged by weight, with a standard rate (122€/t in 2024) and a lower rate (3.3€/t) applying to inert or inactive waste, while a Tax Escalator was introduced in 2015 to regularly update tax rates and maintain the effectiveness of the tax. Revenues raised from the tax were used initially to reduce National Insurance Contributions and, since 2003, to finance environmental regeneration projects and promote biodiversity (ibidem). The tax had environmentally positive outcomes since the increase on the cost of final disposal incentivised local authorities and private actors to reuse products as well as develop remanufactured products from recycled goods. At the same time, some flaws in terms of misclassification of waste streams and illegal waste sites are reported.

In Italy, landfilling and incineration have, till today, a non-negligible role in waste management. In 2022, 18% of municipal waste generated (5.2 million tonnes) was landfilled and roughly the same percentage was incinerated (ISPRA, 2023a). As far as non-municipal waste is concerned, 10.2 million tonnes were sent to be landfilled in 2021 (5.7% of the total production), whilst nearly 3 million tonnes were incinerated (1.6% of the total) (ISPRA, 2023b). The construction sector proves to have a non-negligible role since C&D wastes correspond to about ¼ of the total weight of non-municipal waste landfilled (2.5 million tonnes), a percentage that rises to 30% if also waste coming from quarries and pits is included.

The landfill tax has been introduced in Italy in 1996 by the national law with the explicit environmental aim (Pigouvian tax) of increasing prevention in waste production, the recovery of matter and energy from waste, as well as containing the use of landfill, considered as the less desirable method of handling waste. Any operator conferring solid waste or sludge to a landfill or to an incineration plant without energy recovery is taxed.

Revenues are assigned to the Regions that may also fix rates (differentiated by quantity and the kind of waste stream) within upper and lower limits defined by the national law (Table 2). Since 2015 it has been established that all the revenues must be imputed by regional governments to an 'environmental fund' to be allocated to the following aims/topics: reduction of waste production, energy and material recovery, land remediation, creation and preservation of natural areas, and the financing of regional environment agencies. A percentage can also be assigned to Municipalities where the landfills are located or even to nearby territories that may be negatively affected by their presence. Total revenues generated were 115 million euros in 2022 (ISTAT, 2024b) but, even in this case, a transparent national (and even regional) reporting and assessment of the destination of funds is almost completely inexistent.

Lower and upper limits fixed by the national law have remained the same since 1996 and the unitary real value of the tax declined by nearly 1/3 in the period 1996-2018<sup>8</sup>, a clearly counterintuitive development for a price signal introduced to penalise the less preferable option in the waste management hierarchy. Figure 4 shows wide differences in the tax rates applied to inert wastes, with several Regions still adopting the lower limit (1 €/ton) fixed almost 25 years before.

At the same time, the State law (Leg. Dec. 152/2006, as modified by Law 221/2015) fixed new national targets for the separate collection of waste, with a bonus/malus mechanism in terms of landfill tax rates (Table 3). This represents an intrusive and questionable measure, since it introduces a sort of incentive redundancy and, at the same time, brings about strong discontinuities in the economic rationale of the economic operators<sup>9</sup>.

Even in this case, values are estimated to be too low to concretely influence the waste management chain, while the inertia of the national legislation has favoured the application of rates significantly lower than the European best practices (Ref Ricerche, 2020). In this perspective, a continued and progressive raise of minimum and maximum rates, even considering results obtained along the whole

**TABLE 2:** Landfill tax rates set by the Italian National law (L. 549/1995) - source: own elaborations.

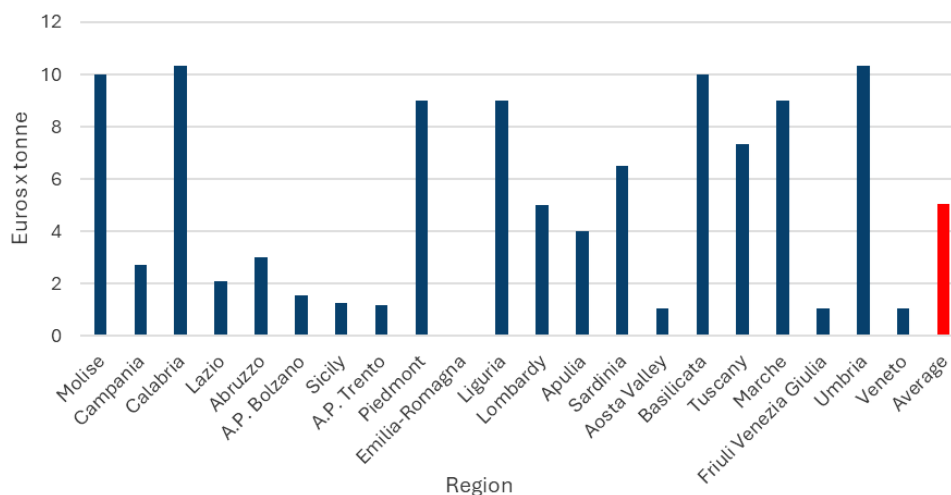
|                                      | Lower and upper limits (€/ton)      |
|--------------------------------------|-------------------------------------|
| Inert wastes                         | [1-10]                              |
| Other wastes                         | [5,17-25,82]                        |
| Incineration without energy recovery | 20% of rates applied to landfilling |
| Incineration with energy recovery    | 0                                   |

**TABLE 3:** Landfill tax rates according to the fulfilment/not fulfilment of the national targets for the separate collection of waste - source: Leg. Dec. 152/2006, as modified by law 221/2015 art. 32.

|                                             | Tax rates |
|---------------------------------------------|-----------|
| Not fulfilment                              | + 20%     |
| Over-fulfilment                             |           |
| Up to 10%                                   | - 30%     |
| From 10% to 15%                             | - 40%     |
| From 15% to 20%                             | - 50%     |
| From 20% to 25%                             | - 60%     |
| More than 25%                               | - 70%     |
| % difference with respect to standard rates |           |

waste chain, may represent a policy option to be taken into consideration by the State legal framework. A useful example is that of the UK landfill tax which has been steadily increased since its introduction through an automatic escalator mechanism (Ettlinger, 2016).

Two other contents of Italy's approach to waste management are worthy of some reflections. Firstly, the conditions applied to incineration appear to be too generous, even in the case of energy recovery<sup>10</sup>. The Italian Ministry of Environment has classified this measure as an environmentally harmful subsidy (MASE, 2022) since the lack of an incineration tax does not provide incentives to prefer more virtuous management options in the EU waste strategy. Secondly, it may be wondered if the definition of an upper limit to tax rates adopted at the regional level is necessary for a levy that, due to the self-sufficiency principle, mainly



**FIGURE 4:** Landfill tax rates for inert wastes in the Italian Regions (€/ton, 2020) - Source: own elaborations on Ref Ricerche, 2020.

affects resident people and enterprises and, therefore, generate few risks in terms of tax exporting (Millimet, 2013).

## 5. DISCUSSION

The analysis conducted on the two price instruments implemented in Italy at the beginning and at the end of the material stream - i.e the aggregates levy and the landfill tax - shows how there are ample margins to improve their effectiveness and coherence, by rationalising multilevel governance and reforming some of the main implementation mechanisms of the levies.

In the Italian fiscal system, the space for Regions to introduce new environmental taxes autonomously is limited by several binding principles and by the extensive role granted to the State government in terms of fiscal coordination. In this perspective, the definition of a coherent policy setting seems to be particularly important both to valorise the decentralised ownership of environmental policies and, at the same time, to prevent possible distortions and opportunistic behaviors (Zatti, 2023).

The State action seems to be important, firstly, to guarantee deeper and updated knowledge of the main data and variables characterizing the value chain of raw materials (quantities extracted, revenues obtained, rate of penetration of recycled materials, etc.); without this pre-condition, it is very difficult to derive any conclusions or policy recommendations. This requires having a well-structured and organised monitoring of extraction and disposal sites and, at the same time, coordinating and checking activities carried out by lower levels of government. Many studies observed discontinuity and non-homogeneity in data collection, above all on mining and quarries, leaving space to significant improvements from this point of view.

Secondly, the national framework, while allowing flexibility across the Regions, turns out to be decisive to set minimum levels both in terms of technical standards and of tax rates, thereby preventing race to the bottom trends and giving Regions the opportunity to 'go beyond' with more ambitious targets ('meet or exceed' approach). In this direction, it will be important that increases in minimum tax rates are planned well in advance, for instance with an annual automatic escalator, to minimise delays in the revision of tax rates and to ensure predictability and transparency to industry and waste management operators.

In terms of the strategies of implementation, the effectiveness of aggregate/landfill taxes cannot be achieved in isolation from the other features and instruments implemented. Pricing instruments become effective in combination with additional regulatory and voluntary instruments, adopted upstream and downstream (planning of sites, selective demolition, minimum requirements of recycled contents, better quality of waste sorting, labels on secondary materials, controls against illegal disposal, raising-awareness campaigns, etc.), to design a well-structured and coherent policy framework. Otherwise, the economic incentive/disincentive alone may prove to be ineffective to stimulate operators to improve their environmental performance and to substantially increase the diffusion of recycled materials.

Finally, the earmarking of revenues to improve the acceptability and effectiveness of the tax can be seen a reasonable policy option. At present revenues are mainly left to regional and municipal governments for environmental and community purposes (compensation logic), but greater attention can be directed to promote the production and use of recycled materials. As displayed above, secondary aggregates are often not the first choice of construction operators - due to economic, cultural, and technical barriers - thus leaving space to a more effective policy-driven stimulus to close the loop of the sectoral material flow.

## 6. CONCLUSIONS

There is a wide and long-lasting consensus regarding the importance of fiscal instruments for boosting transformations aiming at meeting environmental challenges and promoting the transition to a circular economy. The rationale of this approach is based on the concept of *extrafiscality*, that emphasizes that taxation is not limited to raising revenues for the public budget but can also contribute to other objectives such as health protection, territorial development, environmental protection or social cohesion. In this direction, the circular economy action plan of the European Union (COM(2020)98 final) explicitly includes a section about 'getting the economics right' in which it encourages the implementation of several economic instruments at the different life-cycle stages of the value chain.

As a matter of fact, several barriers (informative, economic, legal and political) hampered the full development of economic instruments so that the focus was largely concentrated on administrative interventions and soft measures. The Italian experience confirms this statement: anti-tax approaches, inertia and overlapping of competences favoured the definition of low rates and a generally inadequate policy setting. Paradoxically, the existing taxation system often penalizes labour-intensive activities, including many activities (remediation, refurbishment, repair, recycle, maintenance, reuse) favourable to the circular economy paradigm.

Future steps towards the circular transition require a gradual but systemic change in the overall architecture of the tax system: a green tax shift able to substantially increase the tax base by broadening the degree of coverage or resources and activities (at present mainly concentrated on energy production and use) and by raising the respective tax rates. Economic disincentives can be combined, for political acceptability reasons, with tax benefits and other subsidies able to incentivize circular consumption and to mitigate more negative redistributive and social impacts.

Two further policy options can be profitably discussed in this scenario.

On the one hand, the progressive assessment and elimination of tax benefits and subsidies harmful to the environment or that promote polluting, unsustainable, and linear activities may become a key focus of the policy agenda. The fifth edition of the Italian Catalogue of subsidies that have an impact on the environment (MASE, 2022) has developed, for the first time, a specific section on 'subsidies harmful for the circular economy', identifying 52 measures

(tax expenditures), for a total amount of 18.8 billion euros: a promising starting point for the definition of future strategic environmental taxation's reform.

On the other hand, also quasi-economic instruments must be carefully taken into consideration. For example, the development and update of mandatory minimum environmental criteria in public procurement may represent an important step of policy packages. In 2015, Italy was a forerunner in implementing mandatory Green Public Procurement criteria, including a minimum certified recycled content in major construction materials and products, to be reached not only in new buildings and infrastructure but also in the renovation of existing ones. These obligations and technical standards could be expanded to all construction works, including the construction and renovation of private buildings, ensuring at the same time their continuous update together with a more effective control.

To conclude, even if the potential of green fiscal reforms has been widely investigated in the past, its extension to the circular economy seems to be still in infancy and requires further research both at the individual instrument and at the framework level.

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<sup>1</sup> Domestic material consumption (DMC) refers to the amount (in terms of 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.

<sup>2</sup> Which cover up to 110% of costs of interventions adopted to improve energy efficiency and reduce seismic risks in private buildings

<sup>3</sup> See for example: Judgements 108/2005, 246/2006, 378/2007, 187/2011.

<sup>4</sup> In the Italian legal system only Regions, among territorial governments, have a legislative power, while other levels (Municipalities,

Provinces, Metropolitan cities) have only statutory and regulatory power. The division of legislative competences between State and Regions is detailed in art. 117 of the Constitution: a first list of specific fields of exclusive jurisdiction of the national Parliament and a second set of specific subjects referring to concurrent legislation for which legislative powers shall be vested in the Regions, except for determination of fundamental principles, to be established by State legislation. Moreover, Regions shall have legislative power in all subjects not expressly attributed to the State.

<sup>5</sup> Not energy-related materials.

<sup>6</sup> In the Liguria Region the tax base is expressed in tonnes.

<sup>7</sup> According to the values here reported, average extraction fees represent in Italy nearly 3,5% of the market values for sand and gravel and 3,2% for ornamental stones.

<sup>8</sup> Calculated at the aggregate national level as the ratio of total revenues on total landfilled wastes.

<sup>9</sup> For a waste operator increasing the rate of separate collection of 1% above the national target, for example, the mechanism provides for a 30% reduction of the due amount on the whole wastes landfilled. The same discontinuity can be found at each of the bands' limit reported in Table 3.

<sup>10</sup> As a matter of fact, the country does not have incineration plants without energy recovery for municipal waste.