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RE[4] Project

REuse and REcycling of CDW materials and structures in energy efficient pREfabricated elements for building REfurbishment and construction

D8.5 Use of economic instruments and waste management performances	
Author(s)	ACR+
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Abstract	Analysis of e set of economic instruments insisting in six EU countries and assessment of their performances within the framework of overall national strategies for sustainable resource management of CDW.
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ACRONYMS & ABBREVIATIONS

7th EAP	Seventh Environment Action Programme
ALSF	Aggregates Levy Sustainability Fund
BIO IS	Bio Intelligence Service
C&D	Construction & demolition
CDW	Construction and Demolition Waste
DRS	Deposit Refund System
DVR Charging	Direct and Variable Charging
E3ME	Energy-Environment-Economy Global Macro-Economic econometric model
EEA	European Environment Agency
EI	Economic Instrument
EPR	Extended Producer Responsibility
EU	European Union
IEEP	Institute for European Environmental Policy
LATS	Landfill Allowance Trading Scheme
MSW	Municipal Solid Waste
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-As-You-Throw
PPP	Polluter Pays Principle
UNEP	United Nations Environment Programme

EXECUTIVE SUMMARY

The objective of this task is to analyse the performances of the construction and demolition waste (CDW) management systems in Europe and the use of economic instruments.

Economic instruments (EI) are policy tools which work with economic incentives to influence people's behaviour. They affect the monetary costs or benefits of private actions, either through changing market prices directly (e.g. with subsidies or charges), or by introducing new markets (e.g. with cap and trade schemes). EI comprise all levies, permit trading schemes, and subsidies that create incentivises and disincentives mobilizing the self-interest of consumers, producers, and service providers to make environmental improvements or reduce adverse environmental consequences. Economic instruments are defined in the section 2.2.

The purpose of using environmental taxes and charges is to encourage more environmentally-friendly behaviour. Many other taxes and subsidies of various kinds (funding or support) have also been introduced to encourage companies and individuals to make the "right" choices with regard to production, operations and consumption. Encouragement may be in the form of state or municipal investment support (for buildings, equipment, structures and systems). Support and subsidies may also be available for work to prevent environmental deterioration or to restore landscapes or habitats (e.g., nature conservation, measures to reduce nitrogen leaching, liming of acidified waters).

Waste management policies in EU countries mainly used direct regulative instruments to achieve their objectives, and the application of EI works within a legislative and market framework that also has a major influence on their effectiveness. The main difference from other types of policy instruments, of the command-and-control type, is that economic instruments leave individuals the freedom to choose their behaviour: it is up to them if they wish to make environmental improvements in the most cost-effective manner. Also, administrative costs of implementing economic instruments tend to be significantly lower than those associated with the monitoring of compliance with command-and-control regulation. The rationale of economic instruments is to merely influence individual choices through price-mechanisms which make a specific behaviour more or less expensive.

The present deliverable starts with the analysis of main characteristics of 30 EIs supporting environmental policies in six EU countries (Czech Republic, Germany, Italy, Spain, Sweden, United Kingdom), referring to their role within the overall national strategies for sustainable resource management of CDW. Then, a limited set of EIs have been addressed to enable more substantive research to be undertaken, and to assess their impact on CDW recycling and reuse market. The purpose of the analysis was to investigate which of the selected economic instruments will be able to help prevent waste. A more complete and pervasive analysis with possible model calculation will be necessary to assess the full potential of the individual tools.

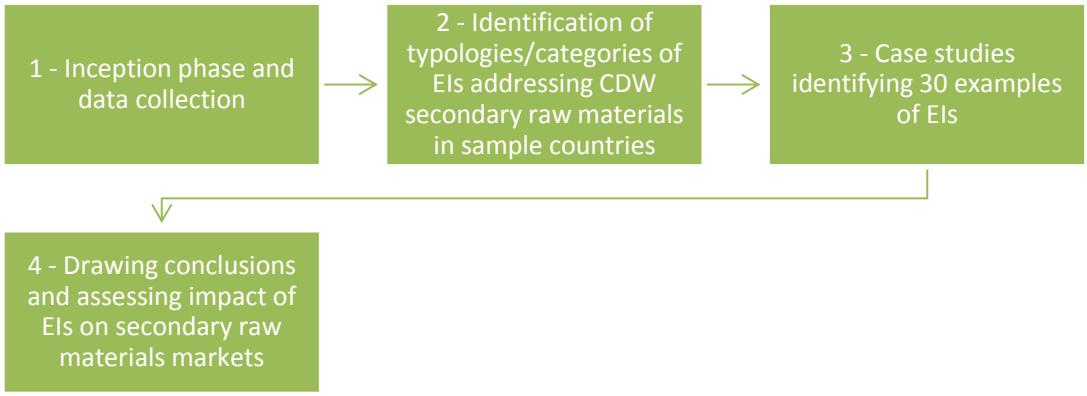

Figure 1 - Process of realization of the present deliverable

Our analysis found out only partial answers, which are presented in the main conclusion paragraph of this study. Furthermore, across the study phase, it seemed that monitoring and impact assessment of EIs is still relatively weak (Rademaekers, Laan, Smith, Brueghel, & Pollitt, 2011). A weakness reported through the analysis of a large part of EIs is the need for more consistent evaluation methodologies and standardized definitions. Improvements in this field should enable consistency of monitoring data and an easier sharing of best practice across the EU.

Main conclusions of the deliverable aim at assisting policymakers in choosing an effective environmental policy package that will address the target CDW management challenge. Last chapter focuses on four main phases considered as critical in the choice and implementation of a policy package: (1) Data assembly; (2) Development of initial policy proposals; (3) Stakeholder consultation; (4) Policy implementation and evaluation.

Within main conclusions this deliverable highlight how there **is no easy and straightforward way to increase waste prevention**. Most of the policies reviewed in this deliverable impact on only a small part of the waste hierarchy and so a **range of policies are required to promote the full waste hierarchy**. An appropriate balance needs to be struck between **regulatory, economic and communicative instruments**.

To assess economic instruments one by one is not relevant to tackle the CDW challenges. The **combination of a tax with other policy levers** introduced as a package of interventions is often more effective in delivering environmental improvements. The tax on its own may not be enough to correct the market failures, such as the environmental harm.

The choice of the most appropriate policy option given the local conditions, the problem to be solved and stakeholder feedback are central processes to tackle the CDW challenge. These phases deeply rely on public administration capacity to enact a multi-level approach. Furthermore, the complexity behind implementation of new economic instruments highlights the need of **empowerment of government staff** through training or capacity building programs. As the chosen policy package is being implemented, measurement is needed to evaluate progress, assess policy modification requirements, and to learn from the ongoing process. The monitoring and enforcement programme should be as simple as possible for success.

1. INTRODUCTION

The present document is included in the framework of the ongoing RE[4] research project, funded by the European Commission in the context of the Horizon 2020 research funding programme, call H2020-EEB-2016. The objective of this deliverable is to analyse the performances of the construction and demolition waste (CDW) management systems in Europe and the use of economic instruments. Specifically this means to assess potential impact of the use of economic instruments in six EU countries. The economic instruments analysed in this report are taxes on raw materials and products, waste taxes, waste collection charges (such as Pay-As-You-Throw schemes), Extended Producer Responsibility scheme, deposit-refund schemes, and subsidies and fiscal incentivises.

1.1. Relevant work package input and output

Activities of Task 8.1 for the present report derive their main input from Task 1.1 of the RE[4] project. In Task 1.1, an initial diagnosis of construction and demolition waste (CDW) management in the European Union was conducted. This task gave a clear picture of the full regulatory framework of CDW in each of the EU 28 Member States. Data gathered for this task included information on relevant economic instruments for each of the relevant countries for the present deliverable.

This deliverable started with task leader ACR+ sending other involved partners a list of information to be completed for each country. Each involved partner provided information about the main economic instruments present in their country (and identified good practises) through literature review analysis and desk research activities. Only limited data was given on the assessment of economic instruments per country. Table 1 shows the distribution of countries among involved partners.

Country	Partner
Czech Republic	FENIX
Germany	ROS
Italy	CETMA
United Kingdom	QUB
Spain	ACCIONA
Sweden	CBI

Table 1 - Countries studied in this report and associated partner

ACR+ then realized the present deliverable D8.5 on the use of economic instruments and waste management performances, reviewing relevant thematic literature and assessing the impact of the use of economic instruments through waste management plans and strategies review and definition of the main policy options.

Main conclusions of this deliverable provide useful input for Tasks 8.2 and 8.3, defining some of the factors impacting on successful business modelling and market assessment of European CDW recycling and reuse.

2. DESCRIPTION OF THE ECONOMIC INSTRUMENTS

2.1. Instruments portfolio to protect the environment

Five types of instruments could be identified and arranged on a continuum from high to low levels of public intervention (see Table 2). Traditional command-and-control instruments, such as emission limits, involve the highest degree of intervention and are characterised by a pronounced top-down outlook. By contrast, market-based and economic instruments aim at altering the behaviour of polluters by providing positive or negative economic incentivises for actors to consider alternative modes of action that are less harmful to the environment (Schmitt & Kai, 2011).

	Type	Description/Examples
1.	Regulative instruments	Command and control, permits, technological prescription
2.	**Market-based instruments**	Taxes, tariffs, subsidies, tradable permits
3.	Procedural instruments	Auditing programmes, environmental impact assessment
4.	Co-operative instruments	Commitments and agreements, roundtables, action plans, harmonisation, research
5.	Persuasive instruments	Information , education, public campaigns, appeals, eco labels

Table 2 – Types of economic instruments (Boecker, 2007)

In this report, only market-based instruments will be analysed. UNEP identified different basic principles behind market-based instruments:

- the "polluter pays" principle;
- the "user/beneficiary pays" principle
- the principle of "full-cost recovery".

These principles are widely adopted by many governments, acting as a driver to support the application or reform of market-based instruments.

The "polluter pays principle" (PPP), has become increasingly applied and widely accepted as one of the main frameworks for internalising environmental externalities. According to this principle, polluters are called to take measures to reduce externalities they are responsible for, eventually paying taxes or charges to compensate for environmental impact. Generally, the process of "internalisation" of environmental costs is reflected in the price and the output of goods and services. This mechanism generally serves as a lever to incentivise companies to find alternative productive processes with a lower environmental impact.

The "user/beneficiary pays principle" is an alternative interpretation of these principles, suggesting that where an action provides a benefit, those who receive the benefit should pay for externalities related to that benefit.

The "full-cost recovery principle" is based on the assumption that costs of environmental services may be fully recovered from whomever benefits from such services. As an example, pricing for waste is largely moving in this direction, even if it is still too often conceived as part of local and regional authorities' duty, and financed via general taxes.

There has been an increasing move internationally for the full-cost recovery principle to be applied directly and explicitly to electricity and to water pricing.

2.2. Focus on Economic Instruments

A report produced for the European Commission (Watkins, et al., 2012) identifies a number of economic instruments which have a clear impact and traceable results. The following have been identified as most effective: charges for waste disposal and treatment (landfill and incineration taxes and fees) and restrictions/bans providing the legal context for the charges; pay-as-you-throw (PAYT) schemes; and extended producer responsibility (EPR) schemes for specific waste streams. The report stresses the need to ensure an appropriate balance between regulatory (such as targets, technical standards, bans) and economic instruments. It also highlights the need to consider carefully what should be done with the revenues generated from the application of economic incentivises.

EIs can be used to promote resource efficiency at all life-cycle stages, for example through tradable quotas, tax reductions or incentivises, and deposit-refund systems. The number of applications of these instruments to waste management policies has grown steadily since the 1970's. It is commonly argued that a more widespread utilisation of EIs would significantly contribute to enhanced effectiveness of waste management policy making.

Following paragraphs will present a general description of a wide range of EIs applied to support waste management policies.

2.2.1. Taxes on raw materials

Sufficiently high resource prices would present a powerful incentivise to reduce resource use. Resource taxes provide a clearer price signal, as the volatile market prices do not reflect resource scarcity. By supporting resource efficiency, taxes can be a mean to reduce dependency on resource-producing countries and companies, while also moderating price fluctuations, if the tax is not a simple quota of the price. According to the European Topic Centre on Sustainable Consumption and Production, taxation on resources can be categorized as follows (Eckermann, Golde, Herczeg, Mazzanti, Montini, & Zoboli, 2012):

- **Extraction taxes**, such as taxes levied on resources at the point of extraction, generally introduced at a national level. This kind of taxation influences the price of a resource, affecting the quantity of the resource extracted and ensuring it is maintained at a sustainable level. On the one hand, this kind of taxation makes extraction of resources more costly, thus creating a competitive disadvantage for the local industry. On the other hand, externalities caused by extractive activities are lowered, and resources are preserved for future generations. Since the EU imports most metals, rather than extracting them, there are quite limited options for EU Member States to enact this kind of resource policy. Extraction taxes within EU Member States are more widely implemented for aggregates, due to the limited international trade and short economic transportation distances. Border tax adjustments may complement extraction taxes to avoid competitive disadvantages for domestic extractive industries. Extraction taxes mixed with border tax adjustments will have marginal

effects on extractive industries, impacting more on domestic manufacturing industries that have to pay more for both domestic and imported inputs.

- **Material input taxes** are levied on any raw materials from domestic and foreign sources at the first point of industrial use. As raw materials from foreign sources might be processed already abroad, imported intermediate products should be taxed too according to their resource contents. A balanced determination of the tax base for import is complicated, since generally intermediate products often contain different raw materials. A tax on a determined raw material may cover all kinds of intermediate products or even semi-final products. Hence, difficulties in determining an accurate material tax may create distortions of the market, since not all materials can be included in the tax system. Tax bases may vary from very broad ones, containing any kind of materials, or they could target special materials. The main objective of a material input tax should be to create incentivises for increased efficiency in production. Material input taxes should be applied to both domestic and imported material or intermediate products. When considering different policy options, further trade-policy adjustments can be necessary to avoid competitive disadvantages for domestic industries.
- **Taxes on materials consumption** target the resource contents of final products. Depending on the complexity of final products, consumption taxes may be rather inaccurate, not taking into the right consideration resources contained in final products, or resources needed for their production. Hence, determination of consumption taxes bases effectively reflecting resource use is complex: only if a product is simple and consists mainly of one resource, like fossil fuels, a consumption tax can target resource use directly.

2.2.2. Taxes on products

Product taxes are designed to discourage the production and consumption of disposable items and encourage the use of non-disposable alternatives. As an example, taxes on plastic bags are widespread in different parts of Europe like Denmark, Ireland, Belgium, and Italy. The 2012 BIO-IS study looks specifically at the Irish plastic bag tax, which has shown excellent results. The amount of plastic bags was considerably reduced as a direct result of the introduction of the charge, and the results furthermore indicate that consumers have substituted plastic bags with reusable bags, instead of paper bags. The number of bags sold has also been shown to be reduced dramatically in Belgium, Ireland, and Italy as a result of a tax on plastic bags. In Belgium, the tax on plastic bags was introduced as part of a "picnic" tax, which goes beyond plastic bags and also covers different types of food packaging and disposable tableware.

According to the same study, this type of charge was found to have no appreciable effect on other types of products. A number of Member States make use of product taxes. Several of these have been shown to affect waste generation. Product taxes are likely to reduce waste when they are applied to products for which there are clear substitutes which lead to lower levels of waste generation. The most obvious, in this respect, are taxes on disposable items. The positive effect of a particular product tax is obtained when it is included in a mix of instruments (both economic and other types) to best avoid any unwanted side effects.

2.2.3. Landfill taxes

The report "Use of economic instruments and waste management performances", realised by Bio Intelligence Service (Watkins, et al., 2012), differentiates between **landfill taxes** (a levy charged by a public authority for the disposal of waste) and **gate fees** (a charge set by the operator of the landfill for the provision of the service). The total charge for the disposal of waste in a landfill is represented by the sum of both.

The same report shows how nineteen EU Member States currently have landfill taxes in place for the disposal of non-hazardous municipal waste sent to legal landfills. Gate fee rates are heterogeneous, starting from €3 per tonne in Bulgaria up to €107.49 per tonne in the Netherlands. The total charge for landfilling, considering landfill tax plus the middle of the range of gate fees for one tonne of municipal waste in the EU, ranges from €17.50 in Lithuania to up to €155.50 in Sweden.

There is a general trend linking directly higher total landfill charges with lower percentages of landfilled municipal waste. Three broad groups of Member States emerge from the BIO IS analysis:

- Member States having high rates of charges for landfill and low percentages of municipal waste landfilled (Austria, Belgium, Denmark, Germany, Luxembourg, the Netherlands, Sweden);
- Member States with mid- to high-range total charges and mid-range percentages of landfilled waste (Finland, France, Republic of Ireland, Italy, Slovenia, the United Kingdom);
- Member States with low total charges and high rates of landfilled waste (Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Spain).

Member States having lower percentages of landfilled municipal waste generally combine landfill charges with regulations on landfill restriction for unsorted or untreated municipal waste. Those kinds of restrictions are widely present even in Member States of the second group. It is reasonable to believe that, in addition to the taxes and total charges, these restrictions also have an influence on forcing landfill rates down to low levels.

This general data seems to confirm a linear trend correlating total landfill charges and the percentage of municipal waste recycled and composted. It is reasonable to state that higher landfill charges, other than reducing the amount of waste sent to landfill, tend to push waste towards recycling and composting, therefore moving waste treatment up the waste hierarchy. Member States are much more likely to meet a 50% recycling target once landfill charges (or the cost of the cheapest disposal option) approach €100 per tonne. The general trend for landfill tax rates is to increase over time, even if some of them may remain constant for an extended period. Eleven Member States, where adequate time series data have been found, do not show a constant trend linking tax rates increase and decrease of amounts of municipal waste sent to landfill. Strong apparent correlations can be observed in Austria, Sweden and the United Kingdom, although landfilling bans had a strong impact on reducing landfill rates. Apparently weaker correlations are observed in Denmark, Estonia, Finland and the Netherlands whilst in France, Ireland, Latvia and Poland there is no distinguishable correlation.

2.2.4. Waste collection charges

Waste fees can be designed in several different ways, but they are most often either by weight, by volume, and frequency- and/or bag-based. In short, this means that households pay a fee directly proportional to the quantity of waste they produce which is collected and treated. In foreign literature this type of fee is often referred to as so-called "Pay As You Throw "-schemes (PAYT) or DVR Charging (Direct and Variable Charging). The instrument must be combined with information to create the behavioural changes, but if it is designed so that it creates clear incentivises, it has in some cases been found to have a reducing effect on waste.

Seventeen European Member States established one or more waste management systems based on waste fees. The system is usually designed using a fixed price combined with a variable price for the quantity or size of the containers, so as to ensure that all costs are covered. There seems to be a correlation between weakest incentivise waste prevention strategies and volume-based fees.

The determination of an appropriate fee system has a delicate balance. On the one hand, charges must be high enough to create a waste prevention incentivise, but on the other hand charges must not be so high that they encourage illegal disposal of waste. The highest waste preventive effect is achieved by means of the weight-based waste charge, followed by the volume-, frequency- and bag-based systems. The weight-based system is also the most expensive, but is expected to be justifiable given the better effect. However, the fee must be combined with a general information campaign to promote the desired effect.

Pay-As-You-Throw (PAYT) charging systems show high potential because they address two important environmental challenges for waste management: making individuals responsible for the waste they create, thus fully integrating the Polluter Pays Principle (PPP), and rewarding less wasteful behaviour, as opposed to concealing it beneath the conventional flat fee (Dohogne, Labriga, & Longworth, 2016). This step of clearly placing responsibility for waste and pollution and the larger challenge of addressing increasing levels of production and consumption represent one of the critical global trends that affect sustainability. Connecting consumption with environmental impact will make up a critical part of addressing this challenge, and PAYT offers a potential piece of this puzzle by giving citizens an incentivise to reduce waste. PAYT is not a standalone policy measure. PAYT should always be incorporated in a mix of environmental policy measures such as prevention/recycling targets, EPR, bans/taxes and public information campaigns. There is no one-size fits-all approach in different countries/ municipalities and for different waste streams. In general terms, if backed by sufficient recycling infrastructure PAYT has a strong potential to reduce waste and increase recycling.

The design of the fee structure, or mix of fixed and variable fees, is critical to fully incentivise changes in waste behaviour: the fee structure should correctly reflect the costs of the waste services for the municipality, but also hold the proper balance of fixed and variable parts to encourage reductions. This means the municipalities need to have a solid understanding of the costs involved with their waste collection infrastructure.

PAYT schemes appear to be most effective when the fees payable by households are at levels high enough to encourage reflection by householders on their waste generation behaviour. They have to be sufficiently well-balanced in order to avoid providing a strong incentivise for illegal dumping. Potential barriers to success include lack of diversion goals, lack of corresponding recycling infrastructure expansions, limited outreach to customers about how to change purchasing habits, and charging of a separate fee for recycling.

With regards to waste prevention, weight-based systems are most successful, followed by combined volume and frequency-based/bag-based systems, and then volume-based systems (i.e. schemes where households simply choose a specific size of container). Care should be taken for PAYT and producer responsibility schemes to be complementary.

2.2.5. Producer Responsibility Schemes

Extended producer responsibility (EPR) can be defined as a policy principle according to which producers, who put products on the market, take responsibility for those products in the various stages of the products' life cycle and, in particular, for their end-of-life treatment. EPR principles rely on the idea that producers, which are bound to treat their products at the post-consumption phase, are indirectly encouraged to reconsider design of their products, thus promoting environmental improvement of production systems in the long run.

Rather than implying one single policy design, EPR can be achieved through a combination of policies and instruments, in order to flexibly adapt to differing local contexts, legislative climates, economic situations or legal constraints (Spasova, 2014). Today, EPR is applied globally to manage post-consumer waste from different kinds of products.

Typical example of product addressed by EPR policies is packaging. Legislative instrument requiring financial and organizational responsibilities once their products become waste are being addressed to producers around several European countries since early 1990's.

These individual initiatives were followed by the adoption of an EU-wide legislation in 1994 – the Packaging Waste Directive (the Packaging Directive or the Directive). The Directive aimed at harmonising national measures to reduce the environmental impacts of packaging and packaging waste and to safeguard the functioning of the internal market. Although the Directive does not impose EPR, it indirectly invokes it insofar as it requires Member States to establish systems for the collection and recycling of packaging waste with the view of achieving a set of mandatory quantitative recycling and recovery targets (Packaging Directive, Article 7). As a result, most European countries have some kind of EPR policies in place for managing packaging waste

Although EPR is an individual responsibility in theory, when it comes to packaging waste this is very often neither economical nor feasible in practice. This is why most producers join a collective organisation to which they contribute financially and which is in charge of meeting the legislative obligations on behalf of the parties responsible for compliance. In the expert literature such an organisation is known as "Producer Responsibility Organisation" (PRO). A range of further actors are often also implicated to varying degrees (public authorities, municipalities, consumers).

2.2.6. Deposit and refund systems

OECD defines Deposit Refund Systems (DRS) or schemes as *the surcharge on the price of potentially polluting products. When pollution is avoided by returning the products or their residuals, a refund of the surcharge is granted* (OECD, 2001).'

DRSs incentivise the return of the materials into reuse, recycling, treatment or disposal processes. Generally, producers finance the process paying an administration fee on each container. DRS widely address drinks containers, but economic theory suggests that DRS could be applicable to hazardous materials and other waste streams, subject to transaction costs being minimised. Typical other products and waste streams addressed by DRS are tyres (Italy, Denmark), cars (Finland), batteries (Denmark, Sweden), WEEE (South Korea) and lubricating oil (Norway).

DRSs are a lever to encourage reuse or recycling of products that can be otherwise easily disposed with residual waste or discarded as litter. DRSs can also address waste which is difficult to dispose of, or hazardous, thus ensuring that these products do not reach the residual waste stream. The key environmental benefits mentioned in the literature referring to DRSs are (Hogg, Sherrington, & Vergunst, 2011):

- Increasing the recycling of containers covered by deposits (for refill or recycling);
- Reducing the extent of littering;
- Increasing the use of / reducing the extent of decline in the use of refillables;
- Avoiding harmful chemicals being mobilised in the environment (usually not in beverage schemes, e.g. lead acid batteries, or pesticides).

2.2.7. Subsidies and EHS

Any form of explicit financial assistance to producers, or to incentivise the use of a product, can be considered as a subsidy (grants, soft loans, tax breaks, accelerated depreciation, etc.). Subsidies can act as a stimulus for design and production innovation, or they can promote individual behaviours with a lesser environmental impact.

There are many environmental subsides in place in countries across the globe, but few of them are directly targeted at promoting waste prevention. Waste prevention is generally a small component of subsidies programmes, hence it is difficult to monitor the impact that these subsidies have on waste prevention. A number of subsidies promote, as an example, composting in countries such as Italy (Tittarelli & Centemero, 2010) and the UK. (Hogg, Sherrington, & Vergunst, 2011) suggested that in UK, over the course of a composting bins' operational lifetime, a typical local authority, rolling out such bins to residents could realise a net saving of up to approximately €680,000. This is due to savings associated with disposal costs and gate fees through subsidising and promoting compost bins.

Another example of incentivise of environmental friendly products is the one of reusable nappies. Reusable nappies have also been widely promoted through the use of subsidies in countries such as Italy and the UK.

The use of subsidies can actually lead to increasing environmental problems. Consequently, the removal or change of environmentally harmful subsidies is also a way of encouraging more

environmentally friendly behaviour. OECD defines **environmental harmful subsidies** as 'a result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs, but in doing so, discriminates against sound environmental practices.'

Examples of negative effects of environmental harmful subsidies can be very heterogeneous, such as (Whithana, 2013):

- Direct transfers of funds (e.g. coal mining subsidies);
- Potential direct transfers (e.g. limited liability for oil spills);
- Provision of goods or services including specific infrastructure (e.g. road servicing a single mine or factory);
- Provision of general infrastructure (e.g. a highway);
- Income or price support (e.g. price premiums for electricity from waste incineration);
- Foregone government revenues from tax credits, exemptions and rebates (e.g. from excise duty for fuels, favourable tax treatment of company cars);
- Preferential market access, regulatory support mechanisms and selective exemptions from government standards (e.g. feed-in tariffs);
- Lack of full cost pricing (e.g. incomplete coverage of drinking water costs);
- Absence of resource pricing (e.g. absence of charges on rock extraction);
- Non-internalisation of externalities (e.g. damage to ecosystems from bottom trawling and dredging).

2.2.8. Tax deductions

Tax provisions and deductions are widely used in EU Member States, especially focusing on energy efficiency for house building and equipment, for energy efficient vehicles and heating systems.

International Institute for Labour Studies analyses a set of different cases of tax deductions schemes around EU Member States, such as (International Labour Organization, 2013):

- Green Funds Scheme in 1995 (Netherlands, 1995), consisting in environmental tax credits to investors and loans to environmental projects through "green banks";
- Tax deduction for environmental investments (Spain, 2006), such as renewable energy, air and water quality in 2006;
- Tax credits for biomass heating systems (Italy, 2001), subsidies for the support of eco-friendly activities (2004) and subsidies for energy efficiency (2007);
- Tax exemptions for bio-fuels (Lithuania, 2000);
- Bio-Energy Infrastructure Schemes (UK, 2003 and 2008) to stimulate the use of small-scale biomass supplier fuel for heating and electricity generation;
- Finance Law (France, 2009) targeted to support renewable energy, increase financing for energy efficiency investments and promote consumption on a variety of bio-fuels;
- Reduced VAT on reusable packaging (Belgium, 2007) as well as on certain types of charity shops.

2.2.9. Environmental taxes

Taxes and charges are traditional levies. They entail extra cost for a specific activity or for an individual, and make environmentally-unfriendly production or consumption more costly.

Literature offers a clear distinction between taxes and charges. Charges are characterized by the fact that the proceeds may be used for general financing of public expenditure. Charges are for a specific one-off payment, and should reflect the actual direct economic costs associated with the service (Speck & Paleari, 2016). There is a considerable difference between viewing a charge as general revenue for the state or as a payment that will be refunded to the payer. The European Environment Agency (EEA) classifies environmental taxes between three categories: (a) energy, (b) vehicle, and (c) pollution and resources. Current application of environmental taxes in European Environment Agency countries highlights how energy and vehicle taxes are the most commonly used, and waste-related instruments exist in the majority of these countries. This third category generated only 4 % of overall revenues from environmental taxes in EU-28 in 2014, representing 0.26 % of the total tax intake. This general data shows how this specific type of economic instrument is mainly used to generate positive impact on resource efficiency and reducing externalities of industrial processes.

A further classification proposed by the EEA categorizes environmental taxes into three main typologies, according to their main policy objectives, in order to facilitate measuring the effectiveness (European Environment Agency, 2008):

1. Cost-covering charges – designed to cover the costs of environmental services and abatement measures, such as water treatment (user charges) and which may be used for related environmental expenditures (earmarked charges),
2. Incentivise taxes – designed to change the behaviour of producers and/or consumers, and
3. Fiscal environmental taxes – designed primarily to raise revenues.

In many cases a mixture of these three functions can be observed in practice. Those can be applied in respect of resources with three main objectives, such as: providing incentivises to reduce use of resources, levering financial sources to manage the consequences of resource use, or fixing market failures so environmental impacts directly commute into financial consequences for the user.

Environmental taxation primarily aims at incorporating costs of environmental damage into the prices of goods, services, and activities internalising negative environmental and social impacts. Producers and consumers are encouraged to shift away from environmentally-damaging behaviour, thus reducing costs of externalities. Social and political acceptance of environmental taxes is often a complex result to reach, as is the definition of a suitable and appropriate tax rate for the internalization of externalities. Generally, environmental rates tend to be low, sometimes with a vision for scaling these up over time (tenBrink & Mazza, 2013).

The Seventh Environment Action Programme (7th EAP) calls for a shift in taxes from labour towards pollution and resource use as a means of helping to achieve environmental objectives and stimulating employment and green growth. As shown in the following graph, taxes on labour remain

eight times higher than environmental taxes in the EU. Analysis by the European Commission also suggests that higher energy taxes, compensated for by a reduction in labour taxation, can, in fact, improve competitiveness.

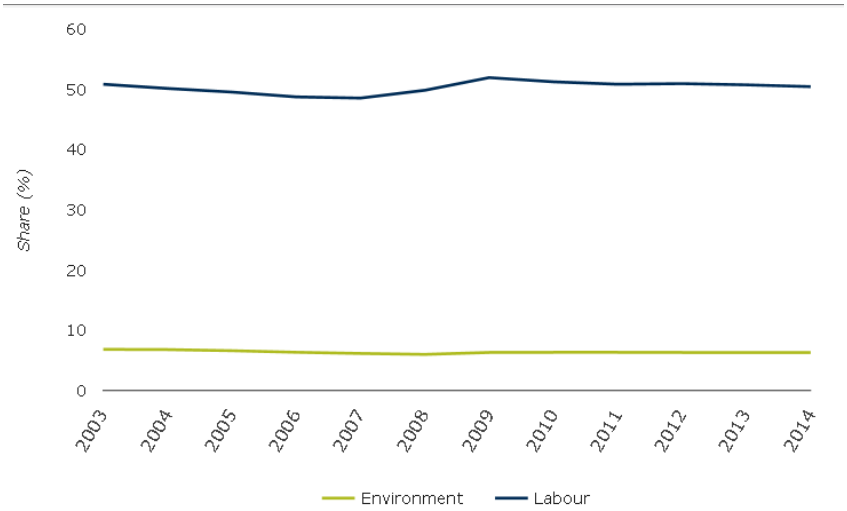

Figure 2 - Share of environmental and labour taxes. Data Source Eurostat – Table code n. tsdgo410

The shift called by the 7th EAP (from labour to pollution) has the potential to result in a 'double dividend' (promoting an improvement in environmental issues and encouraging employment at the same time). Even revenue fiscal neutrality is associated with the shift within labour taxes and environmental taxes, as the tax shift can be designed in a way that the increase in green taxes is compensated by an equivalent decrease in labour taxes, resulting in no overall change in the tax burden.

3. ASSESSING ECONOMIC INSTRUMENTS RELATED TO CONSTRUCTION AND DEMOLITION WASTE

3.1. RE^4 Assessment objectives

The objective of this assessment is to analyse the performances of the CDW management systems in Europe and the use of economic instruments. Specifically this means to assess potential impact of the use of economic instruments through:

- waste management plans and strategies review,
- definition of the main policy options,
- identification of best practises.

Economic instruments, that will be analysed, are waste taxes, waste collection charges, taxes on raw materials and products, deposit-refund schemes and subsidies and fiscal incentivises.

Little analysis could be found on the evaluation of waste management plans and strategies with a focus on Construction and Demolition Waste. What does work? What does not work? Real-time evaluations could be used to inform policymakers about what is happening on the ground so they can take action to address problems before they get worse. Public authorities have to invest in the capacity building that can turn raw data into relevant evidence through evaluation. Further efforts are needed to make this evidence available to the multiple actors that can benefit from the knowledge gained, most notably the administrators and policy-makers that are responsible for the formulation and implementation of government programmes. The planning, funding, management, quality control, and dissemination of evaluations are critical in order to be effective (Marcel, 2015).

Despite the importance of CDW flow, very little attention has been paid to evaluation the instruments that promote a higher level in the waste hierarchy (more prevention than landfill). This deliverable will not really address this scientific and politic shortcoming. However, this deliverable seeks to partially answer the following research questions: What types of policy instruments are used to shape the issues related to CDW? How does the portfolio of instruments influence the environmental and economic impacts?

3.2. Waste management plans and strategies review - Sample countries framework related to CDW

Environmental taxes often work best when part of a policy package aiming to address one (or more) environmental problems, but the interaction of several policy tools is then complex. In the following section we analyse economic instruments in relation with the main elements of national legislation frameworks and waste management strategies with a more direct impact on availability of CDW-derived recycled materials needed for the development of prefabricated elements for building refurbishment and construction (as stated in RE^4 D2.1 – CDW specifications and material requirements for prefabricated structures).

Having defined the range of possible EI types and in the light of the study's aim of linking their role to achieving improved resource efficiency in the CDW secondary raw materials reuse and recycle,

further analysis was necessary to provide a comprehensive overview on how EIs interact with regulatory framework and waste management strategies to affect CDW producers and consumers. The main source for information on national frameworks derives from RE^4 D1.1 Data collection on CDW.

Within country factsheets, the reviewed economic instruments are classified into three main categories:

- Raw materials & products: taxes, producer responsibility schemes for specific waste streams, subsidies and incentivises for prevention, reuse
- Waste collection: charges, deposit-refund schemes, pay-as-you-throw (PAYT) schemes
- Waste disposal & treatment: taxes, fees, restrictions, or bans on incineration and/or landfill, subsidies and fiscal incentivises for recycling.

3.2.1. Czech Republic

The Czech Republic has a weak legislative framework concerning CDW, missing a proper definition of CDW. Decree 294/2005 focuses mainly on the regulation of the conditions of storing waste in landfills and their use on the ground surface, and the current Regulation 352/2014 progressively introduces a landfill ban for recyclable and hazardous materials which indirectly affects CDW.

Waste Act No.185/2011 binds producers to collect waste sorted by types and categories. Even if not mentioning whether the obligation applies to on-site sorting or confer waste a sorting facility, the obligation is applied even to CDW.

Non-legislative instruments supporting waste management strategies mainly fall within the categories of economic incentivises awarding compliance with eco-building standards and extended producer responsibility schemes.

Price-based instruments based on positive incentivises address more than one target: the 2016 programme for waste collection, sorting and treatment facilities is introducing cost reductions for municipalities complying with recycling targets set at a national level; while private market actors can benefit from lowered VAT for certain types of recycled materials.

Key legislation	Instrument	Focus	Type of waste
Operational programmes of Ministry of Environment, 2016	Selective subsidy. Support may be up to 85% of the total eligible project expenditure – exceptionally up to 100% for some nature conservation measures	Raw Materials & Products	Bio-waste, metal, residual waste and other household waste
Waste Act no.185/2001	Fees for waste disposal and treatment	Waste disposal & Treatment	All waste
Act No. 477/2001 Coll., on Packaging	Extended producer responsibility scheme	Raw Materials & Products	All packaging

Table 3 - Economic Instruments in the Czech Republic analysed for the present deliverable

The three economic instruments analysed in the present deliverable seem to address one of the main barriers to the development of the CDW recycling market, which is the inexpensiveness of

landfilling CDW in comparison with the price of recycling. This barrier is being addressed by the Waste Act no.185/2001, which introduces a fee for landfilling based on weight of waste. Revenues of this fee (ranging from 4 Euro per tonne of concrete to 46 Euro per tonne of plastics) are mainly collected by landfill operators, and then redirected both to the competent Regional Office and State Environmental Fund of the Czech Republic. The fees are expected to increase continuously, but data is missing to assess how revenues affect desired improved environmental performances.

Construction and demolition waste in the Czech Republic represents 35 to 40% of the total amount of waste generated. Most of this amount consists of natural excavation soils and aggregates, which are especially used in backfills.

In the year 2013, 14.4 million tonnes of construction waste were produced in the Czech Republic. Recycling of construction and demolition waste has increased by almost 50% according to statistics from the year 2009 to the year 2013. According to some sources, about 80% of the total waste is still landfilled in the Czech Republic.

3.2.2. Germany

The legal framework for sustainable management of CDW in Germany relies on three pillars: obligation for selective demolition; sorting of CDW (on site or in sorting facility) and separate collection of different materials; green public procurement requirements. Many aspects of the CDW disposal are not regulated at a central level: especially the definition of entities which are subject to waste disposal obligations, and of authorizing bodies for waste disposal matters and ordinances, are regulated at a regional level.

The Recycling and Waste Management Act of 1996 entrusts a wide range of responsibilities to waste producers, who are ultimately in charge for the disposal of any waste they generate. Construction material manufacturers are responsible for designing their products in order to reduce wastage, facilitate their recovery and post-recovery applications. The Federal Government developed Guidelines for Sustainable Construction which set regulatory requirements for recyclable buildings. Furthermore, the document provides developers and owners with cost advantage mechanisms which make demolition materials that cannot be recycled a financial liability rather than a value. A resource efficiency promotion trend is granted even by the fact that demolition contractors are bound to high recycling standards for a combination of regulatory limitations and financial interests. A large rate of CDW recovery derives from the large costs faced by demolition contractors and building owners when recovered CDW are contaminated or badly sorted (ZEBAU GmbH, 2006).

Key legislation	Instrument	Focus	Type of waste
Closed Substance Cycle and Waste Management Act; (Kreislaufwirtschafts- und Abfallgesetz)	Fees for waste disposal and treatment	Waste disposal & Treatment	CDW, domestic waste, industrial waste
2013 Worldwide HBCD ban, Stockholm Convention	Waste Disposal Regulations/Restriction	Waste disposal & Treatment	EPS insulation with HBCD (flame retardant)

VerpackV	Extended producer responsibility scheme	Raw Materials & Products	Glass, tinplate, aluminium, paper, cardboard, combinations

Table 4 - Economic Instruments in Germany analysed for the present deliverable

	Disposal fees	Recycling costs
Mixed mineral Materials*	80 to 200 EUR/t	9 to 13 EUR/t
Mixed Materials (recycling and disposal) *	125 to 300 EUR/t	
Mixed Materials (only disposal) *	125 to 300 EUR/t	
Concrete Scrap		7 to 10 EUR/t
Bricks		7 to 10 EUR/t
Iron		40 to 0 EUR/t
Aluminium		-250 to -100 EUR/t
Copper		-1000 to -250 EUR/t
Untreated Wood		35 to 65 EUR/t
Lightly treated Wood		50 to 100 EUR/t
Treated Wood (pressure impregnation)		50 to 250 EUR/t
Glass		30 to 65 EUR/t
Plastics		50 to 200 EUR/t

Table 5 - Average disposal fees and recycling costs in Germany - 2001 (Schultmann, Garbe, Seemann, & Rentz, 2001)
** Mixed Materials have to be sorted according to their material composition*

Type of material after European Waste Catalogue	**Colone [4]**	**Aachen [2]**	**Rüsselsheim [5]**	**Franken [3]**	**Munich [6]**	**Berlin [1]**
170107						
Mix of mineral materials (with more or less foreign matter)	25-35€/t	8-35€/t	18-25€/t	16,10-76,60€/t	10,50-20€/t (+ glass)	25€/t

Table 6 - Actual recycling costs in Germany's sample cities (various sources)

The tables (Table 5 and 6) show how the combination of disposal bans for certain materials with disposal fees make recycling advantageous for many materials. Over time, disposal of mixed materials ceased to be an option for new extension of landfilling bans. The mineral mix nowadays is almost all being recycled. Prices differ from region to region. Lowest price is always the sorted mix without foreign matter. The higher price is for mixes with higher percentage of foreign matter. If mineral CDW is sorted before the prices are even cheaper. Recycler revenues also rely on the

eventual higher quality of secondary raw materials: higher valuable materials allow recyclers to pass major earnings to original material owner in the form of lower recycling costs.

The yearly monitoring report of CDW (Bericht Bauabfälle 1996, 2010) shows that the mineral CDW has reduced from 220 (1996) to 192 million tonnes/year (2010). CDW sent to disposal has also been reduced and therefore more has been recycled. The recycling rate rose in the field of road works and mostly stagnates in the sector of soil excavation.

Additionally, the recycling rate of demolition waste increased, but only from 70 to 78%. This rate really only covers 12% of the aggregate demand of the production for new building material. The recycled products are still a lot cheaper than material with non-recycled material (especially in the section of road construction and earthworks). The main customer of the recycling material is the private and commercial market sector. The public sector is still critical with the unsteady quality of the products (Schmidmeyer, 2014).

The mixed CDW recycling rate dropped from 54% to 2% recyclable. This is due to insulation material. Most of the material is processed in different ways like incineration (94%) and 3% are disposed.

3.2.3. Italy

In Italy the potential for recycling is under-exploited and constrained by economic, regulatory and organisational factors. From a regulatory point of view, Italy still lacks a national Waste Management Plan, and it is even missing a national definition of CDW: the Legislative Decree 152/2006 sets common minimum standards while delegating planning competences to Regions.

Regulatory framework and economic instruments on aggregates extractions are a good example to understand the national complex planning, authorisation, and regulation system on quarrying activities prevailing in Italy. The discipline of the mining activities in Italy is still governed by the Royal Decree of July 29, 1927, n. 1443. Since then, there has been no national regulatory action that established criteria that are valid throughout the country. With DPR 616/1977 administrative functions related to quarry activities were transferred to the Regions, which gradually approved regional regulations regulating the sector. Governmental interventions such as the Ministerial Decree of 14 January 2008 try to encourage the use of recycled aggregates for the production of concrete, setting standards for the use of recycled CDW (mainly aggregates). The economic instrument in force in Italy is a charge per cubic meter of aggregates extracted. The application is much decentralised, and fees required for the extraction companies vary from Region to Region and in most cases are differentiated according to the type of extracted material. In almost all cases, the fee collected is part of the budget of the Municipalities where the extractive activity falls, while in Piedmont, Liguria and Lazio the revenues are divided between the Region and the Municipality. A clear revenue management mechanism is lacking in Italy, and aggregate extraction rates are on average significantly lower (four regions do not charge any fees; the lowest fees are recorded in Puglia with 0.08 € /m^3 for materials such as sand and gravel; the highest rates in Abruzzo, requiring 1.48 € / m^3 for sand and 1.184 € / m^3 for gravel extraction (Moriconi, 2010). Studies show that actual combination of disposal fees (mainly landfill charges) and restrictions on the use of natural resources (tax on natural aggregates) in Italy is still not having a significant impact on the market of secondary recycled aggregates (Legambiente, 2017).

The Italian construction industry has a clear preference for virgin materials and still largely distrusts recycled materials, except for specific uses, such as filling. Recycled aggregates are not competitive with virgin materials in terms of either cost and/or quality. The lack of instruments to incentivise selective demolition practices, combined with the lack of prohibition to landfill inert waste, is a factor that tends to maintain this market equilibrium.

The "Eco-tax" (Law 549/1995) set up targets and general rules for waste landfilling, but fees are decided and collected at a Regional or Municipal level. Italy still lacks a ban or a mandatory fee for waste disposal of inert waste, rather opting for charges per weight of wastes landfilled. National organizations of aggregate producers like ANPAR look at this choice as one of the factors penalizing competitivity of recycled aggregates (Bressi & Pavesi, 2015).

Key legislation	Instrument	Focus	Type of waste
"Eco-tax", Law 549/1995 and following amendments; 1996 Financial Law	Fees for waste landfilling, gate fees and bans	Waste disposal & Treatment	Solid waste and semi-solid sludge (MSW, inert, other waste)
Legislative Decree 22/1997 (Decreto Ronchi); Legislative Decree 152/2006	Pay as you throw scheme	Waste Collection	MSW – Municipal Solid Waste
Decree 22/97; Decree 152/06, acknowledging Directive 94/62/CE)	Producer responsibility scheme; Collective responsibility scheme	Raw Materials & Products	aluminium, glass, paper, plastic, steel, and wood
Ministerial Decree of 25 September 2007 (setting up the Supervisory and Control Committee) - Ministerial Decree 185/2007 (setting up the National Register of Producers, the WEEE Co-ordination Centre, and the Policy Committee) - Ministerial Decree 65/2010 (regulation introducing measures to simplify "1 for 1" collection	Producer responsibility scheme; Collective responsibility scheme	Raw Materials & Products	WEEE is Electrical and Electronic Equipment (EEE) which has reached end-of-life (waste), photovoltaic panels included.
Legislative decree no. 209 of 24 June 2003	Producer responsibility scheme; Collective responsibility scheme	Raw Materials & Products	Vehicles and end-of life vehicles, including their components and materials
Legislative Decree No. 95/ 27 January 1992 Legislative Decree 36/2003 (ban on the landfilling of tires with the exception of tires used as engineering material)	Producer Responsibility scheme	Raw Materials & Products	Tyres

Legislative Decree No. 152/ 3 April 2006			
Decree 152/06	Producer Responsibility scheme	Raw Materials & Products	Mineral spent oils; vegetable and animal spent oils

Table 7 - Economic Instruments in Italy analysed for the present deliverable

3.2.3.1. Case study - Gravel Tax in Italy

The main economic instrument in force in Italy is a charge per cubic meter of aggregates extracted. The application is much decentralised. There is no common rate at the national level, and every region has the possibility to apply a different rate with different ways of application at the provincial and municipal level[1]. Fees are not mainly aimed at reducing the quantity of extracted raw materials, their purpose being to mitigate quarrying external costs. Even if there is insufficient evidence to determine whether local municipalities actually used the revenue for environmental measures, Municipalities are supposed to share fee revenues to implement land conservation investments.

The effect of the extraction charge has been very limited. The level of tax is too low (around EUR 0.41–0.57/m^3) to have had any real effect on demand. Although there are regional variations, the value of these charges at national level can be estimated at EUR 110 million, which is around 5 % of the estimated turnover of the aggregate industry. In 2014, the tax increases to EUR 0.70/m^3.

In Italy, an indirect effect of introducing the tax has been to lead to an improvement in the quality of information arising from monitoring extraction activity. The environmental objectives of planning are generally aimed at minimizing external impacts, supporting sustainable management of landscapes, and providing multi-value public goods within the local area.

Italy has not discouraged extraction through high tax-based mechanisms and there is no widespread perception of scarcity of aggregate as materials. Instead the strategy has been to allow extraction to grow in response to demand although under conditions that minimise the impact on land resources. The key incentivises consist of the internalisation of local external costs in the cost structures of quarrying activities. This approach seems to encompass a 'weak sustainability' rule, according to which reduction in natural capital due to quarrying is compensated for by investments in natural capital in the surrounding areas, and investment is internalised in quarrying production costs through the charges levied. The main limitations to such an approach come from:

- the complexity of the administration required, which could produce a loss of correspondence between the costs of quarrying activities and the actual use of financial resources by local administrations;
- the limited incentivise to recycle arises from the low level of charges together with the exclusion of recycling costs from those charges. Despite these shortcomings, the Italian approach serves as a useful model in situations when high value is attached to the externalities supported by the land resources surrounding quarrying sites.

3.2.4. Spain

Many experts indicated that the lack of regulations on selective demolition and pre-demolition audits is considered to be a great source for CDW management issues. This general lack of monitoring provides minimal incentivises for waste and C&D actors to follow legislation and to be accountable of their actions.

A Royal Decree (Spanish Government-Ministry of the Presidency, 2008) implements the principle of producer responsibility (Extended Producer Responsibility, EPR), waste prevention and responsibility among the actors involved in the production and management of C&D waste. It also incorporates the obligation to introduce waste management plans and previous study to obtain a construction permit and aspects of control such as waste quantities and treatment costs. A positive driver towards promoting regulations consists of a mandatory financial deposit, required by law prior to demolishing buildings. Upon proving that the demolished building's CDW was lawfully managed, the deposit is reimbursed. While this system facilitates good management, as financial incentivises are set in place, tighter monitoring needs to be set in motion in order to ensure that all actors are following through.

In the Autonomous Communities of Madrid, Murcia and Catalonia, there are taxes on construction and demolition waste. Of the three Communities, Murcia opts for a broader definition when taxing inert waste. As for the taxable base, the form of measurement varies, since in Madrid it is measured in units of volume (m^3), while in Catalonia and Murcia the weight (t) is considered. Another element to compare is the destination that is given to the resources collected with taxes. In Catalonia and Murcia it is clearly established that the resources will be channelled to the promotion of activities of reduction and recovery of materials and energy. In contrast, the Community of Madrid does not mention a specific destination and the resources that are obtained through the tax are channelled to the general cashier of the Autonomous Community. From the comparative analysis of the economic instruments, it can be seen that the taxes that currently exist are notably different, both as regards the types of taxation and the type of waste to which they affect, among other aspects. Therefore, in addition to its generalization, harmonization would also be appropriate to create economic incentivises affecting the entire national market of secondary CDW recycled materials. An extension of the taxes to the whole country would be desirable to increase efficiency, along with harmonisation and updating of tax rates.

The deposit scheme is combined with an entry fee tax for waste entering landfills in Madrid, Catalonia, Murcia, Rioja, Extremadura and Cantabria Regions. Data on the success of this initiative are still not available, and still it is not foreseen to apply similar fees to all regional landfills. Thus, it is still hard to understand if the interaction between deposit schemes and gate fees is positively affecting the CDW recycling market in Spain (Ventosa & Gonzalez, 2012).

In Spain, the Community of Madrid also charges a landfill tax on solid hazardous and non-hazardous waste including construction and demolition waste. However, different from all other instruments described above, explicitly not on municipal solid waste. Act 6/2003, introducing a tax on waste deposit in public and private landfill as well as its abandonment in non-authorized places, came into force in April 2003. This tax was introduced with a clearly stated environmental objective as quantities of waste sent to landfill were rising steeply. Thus, this tax intends to create incentivises for recovery and recycling of materials. The object of taxation is the deposit of waste on public or

private land or the abandonment of waste in unauthorized areas of the territory of the Community of Madrid (art. 4 of the Act). Waste incineration and the temporary storage of waste are not included (Schlegelmilch, Meyer, & Ludewig, Economic instruments in the waste management sector. Experiences from OECD and Latin American Countries. Report prepared by Green Budget Germany on behalf of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, 2010).

Key legislation	Instrument	Focus	Type of waste
Royal Decree 105/2008, of 1 February 2008	Deposit Refund System	Raw Materials & Products	CDW
Regional Construction and Demolition Waste Plan – Community of Madrid (Decree 2690/2006)	Deposit-Refund scheme based on CDW generated volume	Raw Materials & Products	CDW
Legal regime for the production, possession and management of construction and demolition waste in the Autonomous Community of Extremadura (Decree 20/2011)	Deposit-Refund scheme based on CDW generated volume	Raw Materials & Products	CDW
Decree 23/2011, of 28 March, on CDW management in Navarra	Deposit-Refund scheme based on CDW generated volume	Raw Materials & Products	CDW
Regulation of the production and management of construction and demolition waste in the Autonomous Community of Cantabria (Decree 72/2010)	Deposit-Refund scheme based on CDW generated volume	Raw Materials & Products	CDW
Law 6/2003, of March 20, on the Tax on Waste Deposit in the Community of Madrid	Fees for waste landfilling	Raw Materials & Products	Industrial waste; CDW
Law 9/2005, of December 29, on Tax Measures for the year 2006 in Murcia	Fees for waste landfilling	Waste disposal & Treatment	Non-hazardous waste, inert waste and hazardous waste
Law 8/2008, of 10th July, concerning the financing of waste management infrastructures and waste disposal taxes in Catalonia	Fees for waste landfilling	Waste disposal & Treatment	CDW
Law 7/2012, of 21st December, on fiscal and administrative measures for the year 2013 in Rioja	Fees for waste landfilling	Waste disposal & Treatment	Non-hazardous waste, inert waste and hazardous waste
Law 6/2009, of 28th December, on fiscal measures in Cantabria	Fees for waste landfilling	Waste disposal & Treatment	General Waste

Law 6/2013, of 13th December, on tax policy measures for the promotion of economic activity in the Region of Extremadura; Law 4/2012, of 28th December, on financial and administrative measures of the Region of Extremadura	Fees for waste landfilling	Waste disposal & Treatment	General waste, except mining waste
Law 10/2012, of 21st December, on fiscal and administrative measures of Generalitat Valenciana.	Fees for waste landfilling	Waste disposal & Treatment	General waste (hazardous and non-hazardous waste and CDW) except household waste.

Table 8 - Economic Instruments in Spain analysed for the present deliverable

3.2.5. Sweden

Sweden has bans on the landfilling of sorted combustible waste and organic waste. Due to a lack of alternative capacity in 200, when the first ban was introduced, municipalities and landfill operators could apply to regional authorities for permits to landfill banned waste. Such permits were granted relatively freely in the first years of the ban but Sweden's landfill tax, introduced in 2000, made landfilling increasingly expensive and so encouraged largely private investment in incineration capacity. Swedish landfill tax is raised since January 2000. Landfill site operators are responsible for transferring the tax to the authorities. Municipalities or disposal contractors pay the tax to operators upon delivery at the landfill site. The standard rate in 2000 was SEK 250 (approx. 27 Euro) per tonne. Then it has gradually been increased, to about € 50 (435 SEK) per tonne as from January 2006. It has been the combination of landfill taxes and bans that has driven the shift away from landfill in Sweden.

Sweden's Extended Producer Responsibility system lays down producer obligations for: packaging, tyres, newsprint, vehicles and electric and electronic products. Generally, the collection and processing costs are passed on to consumers in the price of the product. Sweden Planning and Building Act implements an extended producer responsibility principle, applying it to the process of granting permissions for construction and demolition activities. Builders are responsible to deploy a control plan, including an inventory of waste arising from demolition and a plan for sound disposal of hazardous CDW. Swedish regulatory framework intervenes at the level of CDW sorting and collection processes with the Waste Management Plan 2012-17, which requires that contractors develop methods for source-sorting and identify solutions for reuse, and with the Building Code (2010), which prescribes monitoring plans for management of combustibles CDW.

Environmental concerns about resource scarcity pushed Sweden to introduce a mix of measures in gravel, to preserve water quality and landscape. A permit licensing scheme for the extraction of gravel is set up which obliges the extraction company to provide a study that analyses the need for a quarry and also provides a plan of how to restore the gravel pit or quarry at the end of the extraction period. Furthermore, the Swedish government introduced a gravel tax in 1996, with fees

rates of 0.53€/tonne, (roughly a 10 % price increase on raw material costs). The fees rose up to €1.38/tonne in 2006.

Key legislation	Instrument	Focus	Type of waste
Law (1999:673) on waste tax of 1999	Flat tax for waste landfilling	Waste disposal & Treatment	General waste entering landfill facilities is taxed, while material removed from the facility qualifies for a deduction
Law (1995:1667) on taxation for gravel	Taxation on natural aggregates extraction; combined with ban for extraction	Raw Materials & Products	Gravel
Ordinance (2014:1073) on producer responsibility for packaging	Producer responsibility schemes for packaging	Raw Materials & Products	Packaging as defined by the Swedish ordinance (2014:1073) and constituted of materials such as metal, glass, paper and wood
Decree 152/06	Producer Responsibility scheme	Raw Materials & Products	Mineral spent oils; vegetable and animal spent oils

Table 9 - Economic Instruments in Sweden analysed for the present deliverable

It has been observed that the landfill tax is not the sole reason for the reduction of landfill amounts (from 22% in 2001 to 1% in 2010). However, it is the landfill bans on combustible and organic waste working in tandem with the landfill tax that has reduced landfilling.

The influence of the producer responsibility scheme for packaging seems to have a small influence on the CDW as this scheme does not play a major role in the sorting of waste. And also the share of packaging waste in CDW is insignificant. However, the possibilities and allied infrastructure related to source-sorting are influential in increasing the recycling potential of valuable metals and plastic that otherwise land up in the blended waste fraction. It can be inferred that only materials with an established system of recycling and a market for the recycled products could be tied up to a producer responsibility scheme.

3.2.6. United Kingdom

Waste legislation in the UK applies to all types of waste. No specific pieces of legislation or regulation are exclusively related to CDW. There have been three new national environmental taxes in the UK in recent years: on landfill (the landfill tax introduced in 1996), on industrial energy use (the climate change levy introduced in 2001), and on the extraction of aggregates (the aggregates levy introduced in 2002). Extraction of aggregates was already declining before the aggregate tax was introduced in 2002, in part because of the introduction of landfill taxes and shifts to use of glass and metal in building construction.

The Landfill Tax applies to the disposal of waste in landfills. It was introduced as an environmental tax in 1996 by the UK Government to increase diversion of waste from landfills. The cost for this is

currently £84.40/tonne standard rate and £2.65/tonne lower rate. The lower rate is paid on "inactive waste" such as rocks or soil. The tax seeks to ensure that the price of landfill fully reflects the impact that it has upon the environment. It provides an incentive to reduce the waste sent to landfill sites and to increase the proportion of waste that is managed at higher levels of the waste hierarchy. Year upon years, the landfill tax has been forced up to levels that may be economically hard to justify, in an attempt to meet externally imposed targets set under the 1999 European Landfill Directive (Zakar, 2008). To help meet those targets, the Landfill Allowance Trading Scheme (LATS) has also been introduced. This allocates a landfill tonnage (for biodegradable municipal waste) to each local authority in England up to 2020.

The aggregates levy is a tax that applies to the commercial exploitation of aggregate (digging, dredging or importing rocks, sand or gravel). It was introduced as an environmental tax in 2002 by the UK Government to encourage the recycling of aggregate, and to reduce environmental externalities associated with quarry activity. The levy is charged at a flat rate of £2 for every tonne of aggregate extracted. Comparing to other aggregates levies in Europe (mainly in Sweden and Italy), the United Kingdom introduced an exceptionally high tax rate of 20 % of the price of the materials. Companies subject to the levy were granted a reduction in National Insurance contributions to make the policy revenue neutral. Revenues are also recycled through an Aggregates Levy Sustainability Fund (ALSF) aimed at delivering local environmental benefits to areas subject to the environmental costs of aggregates extraction. The first objective of the ALSF is to reduce demand of primary aggregates through promoting the greater use of recycled and secondary aggregates.

The extraction of primary aggregates was declining well before the introduction of the Aggregates Tax in 2002. According to the EEA, some of the driving forces behind this decline have been a general downturn in road-building since 1990 and a more efficient use of aggregates in construction works. Aggregates extraction rates in UK fell notably since the 1996 Landfill tax, and the trend of a progressive delinking of aggregates input and construction output. Earlier studies show that the impact of the aggregates tax has been most significant in reducing the demand for low quality crushed rock, and the demand for recycled aggregates (and other non-taxed minerals such as shale, slate and china clay) has increased slightly (Söderholm, 2011).

It is the combination of policies that have given a signal to producers of the need to change production methods and practices. The aggregate levy forms an important component of the policy package (which includes the ALSF and landfill tax); and it is the multi-level approach that creates strong incentives to which the aggregate industry has responded.

Key legislation	Instrument	Focus	Type of waste
The Landfill Tax (Amendment) Regulations 2016 (Statutory Instrument 2016 No. 376) Landfill Tax (Scotland) Act 2014 The Scottish Landfill Tax (Standard Rate and Lower Rate) Order 2017	Fees for waste landfilling	Waste disposal & Treatment	All types of waste deposited in licensed landfill sites.
The Aggregates Levy (General) Regulations 2002 (Statutory Instrument 2002 No. 761)	Taxation on natural aggregates extraction,	Raw Materials & Products	Rock, sand and gravel

The Aggregates Levy (General) (Amendment) Regulations 2010 (Statutory Instrument 2010 No. 642)	flat rate on tonne of aggregates extracted

Table 10 - Economic Instruments in UK analysed for the present deliverable

3.2.6.1. Case study - Aggregates taxation in the UK and Sweden

Aggregates extraction activities are generally characterized by a negative environmental effect. Although the negative impact varies with typologies of materials and extraction processes, every extraction activity leads to a certain level of disturbance of land, air, and water ecosystems. A comparative analysis of UK Law on taxation for gravel (1995:1667) and the Swedish Aggregates Levy (Statutory Instrument 2002 No. 761, amended with Statutory Instrument 2010 No. 642) is useful to assess effectiveness of taxes on raw materials.

Taxation on aggregates can give an important signal about public authorities' efforts to impact on producers and consumers behaviours. EEA reports how aggregate companies and communities affected perceived benefits from the aggregates tax in UK, which revenues have been used at least partially to correct market failures (e.g. funding training activities dedicated to lorry drivers involved in transport of aggregates).

Swedish gravel tax was born with a different approach, having a primarily environmental focus aimed at the protection of water quality. In Sweden gravel has a great value for its function of reserving groundwater aquifer material, and filtering/purifying drinking and sewage waters.

According to a recent EEA report (European Environment Agency, 2008), the substitution of aggregate input materials has been strongest in Sweden where there has been a significant shift in the use of crushed rock replacing gravel. This trend preceded the introduction of the natural gravel tax. The United Kingdom has also seen a modest substitution towards the use of recycling and secondary aggregate materials, although there is not yet sufficient data to show whether this has been caused by the introduction of the aggregate levy. The UK approach of applying two policy levers (aggregate tax and ALSF) to correct market failures contrasts to the methods adopted by other EU Member States, which have typically introduced the tax instrument in isolation.

A recent study realized by ECORIS (Rademaekers, Laan, Smith, Brueghel, & Pollitt, 2011) states how aggregates levies are understood to have had some positive environmental impacts, though this is not always clear. The most important lesson comes from the UK where use of the tax revenues to reduce labour costs for firms is believed to have supported economic growth, evidencing a potential double dividend.

In Sweden, the reduction in the consumption of gravel after it being liable for taxation has in turn increased the crushed rock consumption. However, the crushed rocks reported back in 2003 are speculated to include certain amounts of gravel. The challenge with furthering the use of crushed rocks is that it faces large production costs from quarrying and additional costs of transportation. The cost of gravel has increased by 25% from 2002 onwards because of its low availability. The cost of gravel is predicted to rise with the increasing demand.

The UK Government assumed that the Aggregate Levy would increase the market price of aggregates used in construction by an amount in line with the levy and hence provide recycled aggregate producers with a margin to cover the costs of making recycled aggregate from CDW.

However, buyers (i.e. construction companies) of aggregates were well aware that the levy was not applied to the recycled aggregates and therefore expected their price to be lower than that of virgin aggregates. Analysis undertaken by the Quarry Products Association (QPA) shows that the impact of introducing the aggregate levy has been most marked in reducing sales of low quality crushed rock. This has resulted in the substitution of lower quality taxed aggregates by waste streams from other non-taxed extracted minerals such as shale, slate and china clay.

Impact	Scale - SE	Scale - UK
GDP	-0.001%	0.02%
Employment	-0.001%	0.02%
Household expenditure	-0.001%	0.01%
Exports	0.00%	0.00%
Imports	-0.002%	-0.03%
Inflationary effects	Negligible	Up to +0.15% (construction), +0.05% for the whole economy
Main sectors affected: Construction	(-0.004%)	(-0.05% initially but recovers to zero)
Non-metallic minerals	(-0.3%)	(-0.5%)
Other mining	(-0.05%)	(-2.5%)
Distributional effects	None	None

Table 11 - Percentage difference in real terms from a counterfactual case with no policy, in 2010.
Sources: E3ME, Cambridge Econometrics.

3.2.7. Summary

This table summarizes the economic instruments detailed in the previous sections.

	Czech Republic	Germany	Italy	Spain	Sweden	United Kingdom
Taxation on natural aggregates extraction; combined with ban for extraction					√	√
Deposit-Refund scheme based on CDW generated volume				√		
Selective subsidy	√					
Extended producer responsibility scheme	√	√				
Producer responsibility scheme;			√		√	
Pay as you throw scheme			√			
Fees for waste disposal and treatment	√	√				
Waste Disposal Regulations/Restriction		√				
Fees for waste landfilling, gate fees and bans			√	√	√	√

Table 12 - Comparative table of economic instruments in sample countries

Every country analysed has implemented fees for the end of the waste hierarchy – landfill – but only a few on the prevention side – extraction.

3.3. Definition of the main policy options

Ideally, to assess different economic instruments mix, two elements need to be available: a set of criteria and data. For the set of criteria, it could be pertinent to assess:

- **effectiveness of the economic instrument**: the degree to which a financial incentivise from the government contributes to the behaviour of a citizen, business or organisation. For example, by introducing economic instruments such as a landfill tax, x% of industrial businesses invest in the treatment of waste before landfill
- **effectiveness of waste management**: the extent to which measures that affect the waste help to improve the condition of the resource
- **social efficiency of waste management**: the extent to which the social benefits of resource management exceed these costs
- **current principles**: the degree to which the instrument is in line with the Polluter Pays Principle and the Cost Recovery Principle

- **justice**: the extent to which the polluter or user pays for its use and the extent to which the user that benefits, pays for these benefits
- **other**: i.e. legal, technical and financial issues.

This set of criteria could be used to assess economic instruments (Witteween en Bos, 2010).

As previously highlighted in the present deliverable (section 3.2 Waste management plans and strategies review - Sample countries framework related to CDW), only few evaluations of the instruments are available.

However, after general literature review and analysis of some case studies, some conclusions have been dawned at the end of this deliverable.

4. MAIN CONCLUSIONS

This conclusion aims at assisting policymakers in choosing an effective environmental policy package that will address the target Construction and Demolition waste management challenge. In addition to drawing conclusions from the present report, this chapter also borrows from a report of UNEP (UNEP (2004), The Use of Economic Instruments in Environmental Policy: Options and Challenges). Four phases are critical in the choice and implementation of the final policy package:

- Phase 1: Data assembly
- Phase 2: Development of initial policy proposals
- Phase 3: Stakeholder consultation
- Phase 4: Policy implementation and evaluation.

4.1. Phase 1: Data assembly

In phase one, the decision maker or analyst gathers all the relevant information that is available with respect to the problem being focused upon. This should be done in a way that makes the analysis easy and helps to identify information gaps. In addition, the problem should be defined and the interests of various stakeholder groups considered carefully.

The most important barrier is that the **available information is insufficient** to define the baseline of the waste management hierarchy for construction, demolition, and deconstruction in Europe.

The data collection does not have to be limited to a region or a country but often policymakers need to take care of the situation in their neighbourhood. For example, **tax distortions across country borders need to be considered** when deciding the appropriate rate of the tax. A "one size fits all" aggregate tax rate can lead to unintended effects, particularly where regions of a country have borders with tax differentials. This can lead to significant flows of illegal trade in aggregate materials, which become costly to monitor and enforce.

4.2. Phase 2: Development of initial policy proposals

With the information gathered in Phase 1, policymakers or analysts are able to develop a shortlist of policy options that can solve the defined problem most cost-effectively given the existing baseline conditions.

At this stage, it is important to encourage the use of instruments that ensure waste generators face incentivises in line with the waste hierarchy, which aims to shift waste management upwards towards prevention, reuse and recycling. Most of the policies reviewed in this deliverable impact on only a small part of the waste hierarchy and so a **range of policies are required to promote the full waste hierarchy**.

There **is no easy and straightforward way to increase waste prevention**. In theory, many instruments have the potential to trigger a waste prevention effect, but there are often many factors that may prevent the results from being seen in practice. At the same time, instruments have an impact on many other elements of the economy and society, and can often cause unintended side effects.

Taxes on virgin materials will change the relative price between virgin and recycled materials, and in this way influence waste disposal behaviour. Theoretically charges on waste disposal would be the optimal policy in this case, but the transaction costs involved in controlling such non-point source emissions may make second-best policies more attractive. For the above reasons, many environmental economists (Turner, Pearce, & Bateman, 1993) promote the **use of virgin material taxes as an efficient method to encourage the use of recycled materials** (and ultimately reduce waste and emissions).

It should be noted that whilst many countries implement disposal taxes, it is more difficult – politically – to implement policies which support recycling through best instruments first (since for many countries, primary materials are imported, and their impacts would, ideally, be captured by implementing instruments in the country of origin) (Hogg., 2006).

In literature, it is recommended to consider an economic instrument only as a part of a larger package of instruments for waste prevention. An appropriate balance needs to be struck between **regulatory, economic and communicative instruments**. Therefore, to assess economic instruments one by one is not relevant to tackle the CDW challenges. The different instruments are often interdependent. Legal instruments can depend on economic incentivises such as fines but they can also depend on communicative instruments that make sure stakeholders are well informed.

On the same topic of taxes, it is worth mentioning the **fundamental shift in taxes from labour to the use of natural resources** (Groothuis & Damen, 2014). Levels of taxation should better reflect the effects of value creation and value extraction, by applying the "polluter pays" principle. Such a tax shift creates incentivises to save natural resources and to bring materials in a closed loop, empowering the circular economy. Raising taxes on natural resource use causes both challenges and opportunities for businesses.

For example, in the UK case study, the Aggregate Levy has acted as a stimulus towards environmental improvements. However, it would be unfair to attribute the entire effect to the Aggregate Levy in isolation. It is the combination of policies that have given a signal to producers of the need to change production methods and practices. The Aggregate Levy forms an important component of the policy package (which includes the ALSF and landfill tax); and it is the **multi-level approach** that creates strong incentivises to which the aggregate industry has responded. The overall effect has been to encourage the substitution of primary aggregates for recycled construction and demolition waste, which creates a much lower environmental impact from energy use and carbon dioxide emissions. The **combination of a tax with other policy levers (e.g. permits, quality standards, etc.)** introduced as a package of interventions is often more effective in delivering environmental improvements. The tax on its own may not be enough to correct the market failures, such as the environmental harm, caused by aggregate extraction.

The case for using taxes or cap-and-trade mechanisms to counter environmental externalities is strong (Zakar, 2008). Using the price mechanism in this way can lead to firms and consumers internalizing the costs they are imposing on others and can result in a more efficient outcome than regulation. The government can use the revenues that arise to reduce the distortionary effects of other taxes. While this need not give rise to a 'double dividend', the welfare gain associated with efficient reduction of the externality justifies the tax. The **choice between taxes and cap-and-trade**

is not straightforward. In principle, they can achieve the same outcome, so long as permits are auctioned in the cap-and-trade case so that the government captures the rents created. When there is uncertainty about abatement costs, the case for a tax may be stronger if there is a risk that the costs of achieving a particular level of abatement may be very high. The case for cap-and-trade is stronger if the costs of not meeting a particular level of abatement are high. **A hybrid system that places a floor and/or ceiling on prices in a cap-and-trade system may have particular attractions in these circumstances**.

4.3. Phase 3: Stakeholder consultation

Phase 3 involves engagement of various stakeholders in the process of evaluating and refining the shortlist of policy options developed in Phase 2. The process of stakeholder engagement pays particular attention to whom to involve and how to structure their input.

The European Commission has developed "Stakeholder consultation guidelines (European Commission, 2014)". It can be read in this document that "**Consultations can take various forms and use different tools**". The type of stakeholder consultation required and the consultation intensity will thereby differ depending on the proposal under consideration.

As for every participatory process, the civil servants need to master the subject and have behavioural competences. It is why the **empowerment of government staff** to seek opportunities for implementing new economic instruments is critical.

4.4. Phase 4: Policy implementation and evaluation

The choice of the most appropriate policy option given the local conditions, the problem to be solved and stakeholder feedback is the central decision of this phase. As the chosen policy package is being implemented, measurement is needed to evaluate progress, assess policy modification requirements, and to learn from the ongoing process. The monitoring and enforcement programme should be as simple as possible for success.

Learning by doing is the way forward since many instruments will not be perfectly designed. "An imperfectly designed instrument does not, in general, create any long-term problems. Where the instrument is flawed, it is likely that the public reaction, as well as the reaction of industry, will soon let the government know that the instrument needs to be amended. And so, imperfection is certainly **more tolerable** in the process of implementation **than no action**" (Cointreau & Hornig, 2003).

4.4.1. Environmental effect

Regulatory instruments provide a greater degree of certainty of outcome than other types of instruments. For example, a landfill ban will have a more certain result than a landfill tax.

According to a FÖS (2010) study (Schlegelmilch, Meyer, & Ludewig, Economic instruments in the waste management sector. Experiences from OECD and Latin American Countries, 2010), in principle, municipal waste charge schemes that include a variable rate depending on the quantity or weight of the collected waste can set incentivises for the minimization of overall waste

production or better separation of recyclable materials and biodegradable waste from general household waste.

Overall, a decline of overall amounts of waste being landfilled can be detected in all countries surveyed, which have implemented a landfill tax. Landfill taxes do provide a continued economic incentivise for local authorities and large industrial companies to reduce the amount of waste going to landfills.

Generally, deposit-refund systems can have a significant impact on collection and recycling rates, if the products or materials concerned are charged with a sufficiently high deposit.

4.4.2. Market effect

Researchers of FÖS have analysed in which way the implementation of the economic instruments influences competitiveness of specific sectors. It could be summarised that:

- Landfill tax costs are generally assumed to be passed on to the consumer either through the municipal waste charges or through increased prices as businesses pass on costs associated with waste disposal to consumers.
- Deposit-refund Systems: Additional administrative burden for affected industries, No significant competitiveness issues, as deposit is usually also mandatory for import products.
- Advanced Recycling Fees: No negative competitiveness effects observed; Advanced Recycling Fees are effective in creating new markets for recycling
- Financial incentivises (subsidies and tax credits): As with other policies, incentivise programmes must be carefully designed to avoid perverse market effects.

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6. ANNEX – TABLES OF REVIEWED ECONOMIC INSTRUMENTS

6.1. Czech Republic

Name of instrument	Financial support for waste collection, sorting and treatment facilities
Date introduced	May-16
Nature of the scheme	Financial support for 390 projects
Scope	The funding has been given to implement the proposal of a law on support of recycling. This law obliges regions to separate and use at least 50% of waste and is expected to enter into force in January 2018.
Description	Ministry of Environment approved to allocate about 78 mil euros from EU funds among representatives of cities, municipalities, districts and companies.
Targets of the scheme, including planned future targets	The main priority is to continue cost reductions for municipalities in connection with last year introduced a new duty to sort commodities such as metals and organic waste thus avoiding posting new fees for garbage to citizens. It aims for municipalities and citizens to allow for easier sorting of waste, which, is believed, will contribute to reducing the amount of waste that will end up in landfills.
Extent of coverage	Support for 390 projects dedicated to building or improving facilities for collecting, sorting and utility of waste, deleting of old ecological burden and flood control measures.
Target group	Municipalities, cities, urban complexes, districts or waste treatment companies
Is it mandatory/legislative or voluntary?	Voluntary
Type of waste/product for which it applies	Biowaste, metals, residual waste and other household waste
Current level or range of tax/fee/payment and structure	N/A

Exemptions or discounts	N/A
How has it changed over time?	N/A
Plans for future levels of the tax/fee/payment	N/A
Critical analysis: problems, solutions, lessons learnt	N/A
Means of implementation	Operational programmes of Ministry of Environment
Is it led /funded by producers or the government?	Government/EU
Perceived costs of the instrument, both financial and administrative	N/A
Key legislation	EU directive on waste setting target to achieve by 2020 of 50% re-use and recycling of certain waste materials for household and other origins similar to households.
References (please add hyperlinks, if possible)	http://www.mzp.cz/cz/news_160504_OPZP_odpady_povodne

Name of instrument	**Waste Disposal Charges**
Date introduced	May 15, 2001
Nature of the scheme	Fees for waste disposal and treatment

Scope	Waste disposal charges are used to prevent the production of excessive amounts of waste by obliging individuals to pay for the landfill of the waste they produce.
Description	This economic instrument obliges waste owners to pay specific charges for waste disposal.
Targets of the scheme, including planned future targets	The goal of the instrument is to demotivate individuals from producing excessive amounts of waste.
Extent of coverage	This measure deals with both non-hazardous and hazardous waste.
Target group	Waste owners, waste producers
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	All (except waste used as technological material to secure the landfill)
Current level or range of tax/fee/payment and structure	500CZK - 6200CZK (€18.5 – €230)
Exemptions or discounts	There are no charges for waste used as technological material to secure the landfill (the amount of such waste cannot exceed 20% of total waste disposed at a landfill in one year)
How has it changed over time?	Basic waste disposal charges & Hazardous waste disposal charges (additional charges) see tables below
Plans for future levels of the tax/fee/payment	N/A
Critical analysis: problems, solutions, lessons learnt	N/A
Means of implementation	• The operator of a landfill collects charges for the waste disposal. In case a waste owner does not pay, regional office is responsible for collecting these charges. • Collected charges are revenues of both Regional Office and State Environmental Fund of the Czech Republic. • If operator of a landfill fails to deliver charges to the Regional Office and to the State Environmental Fund of the Czech Republic, Regional Office has an obligation to collect these charges with interest.
Is it led /funded by producers or the government?	Yes

Perceived costs of the instrument, both financial and administrative	Administrative supervision and enforcement
Key legislation	Waste Act no.185/2001
References (please add hyperlinks, if possible)	http://business.center.cz/business/pravo/zakony/odpady/cast8.aspx

Name of instrument	**Packaging take back**
Date introduced	2001
Nature of the scheme	Extended producer responsibility scheme
Scope	By taking back packaging, the waste production is reduced.
Description	If an individual who brings packaging onto a market cannot prove that this packaging did not become waste, he is responsible for taking back the packaging.
Targets of the scheme, including planned future targets	Waste prevention
Extent of coverage	All products containing packaging
Target group	Any entity that puts into circulation any packaging or packaged products – mainly those who produce, import or sell
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	Packaging
Current level or range of tax/fee/payment and structure	Failure to comply with this law might result to a fine up to 10 million CZK (€370 000)
Exemptions or discounts	• Several packaging are exempted from the list of packaging (e.g. tea bags). • Companies that do not exceed 300kg of packaging waste per year, are exempted from the obligation to take back
How has it changed over time?	N/A

Plans for future levels of the tax/fee/payment	N/A
Critical analysis: problems, solutions, lessons learnt	N/A
Means of implementation	Czech Trade Inspection Authority, Czech Environmental Inspection Authority or Customs may inspect the compliance with this law
Is it led /funded by producers or the government?	yes
Perceived costs of the instrument, both financial and administrative	N/A
Key legislation	Act No. 477/2001 Coll., on Packaging
References (please add hyperlinks, if possible)	https://www.zakonyprolidi.cz/hledani?text=477%25

6.2. Germany

Name of instrument	**Waste Framework Directive (Abfallrahmenrichtlinie)**
Date introduced	1972 federal law for disposal, 2012 'closed loop recycling management' after EU guidance
Nature of the scheme	Fees for waste disposal and treatment
Scope	5 stages of waste hierarchy: Prevention, preparation for reutilization, recycling, other recovery like "thermic" or backfill, clearance
Description	Waste owners are obliged to pay specific charges for waste disposal.

Targets of the scheme, including planned future targets	The goal is to prevent waste generation by making waste owners pay for the disposal. The overall goal is climate and resource protection.
Extent of coverage	The fees deal with both non-hazardous and hazardous waste.
Target group	Waste owners, waste producers
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	CDW, domestic waste, industrial waste
Current level or range of tax/fee/payment and structure	The fees are made on a communal base. There are also commercial collectors that have to undergo the same guidelines. Prices are measured by weight. When disposing little amounts the volume applies. Prices go from 5€/t to 350€/t.
Exemptions or discounts	Discounts apply when waste is sorted in common CDW categories like metals, waste wood, synthetics, glass, PU foam cans. When not sorted the highest priced material to dispose is announced for the whole charge.
How has it changed over time?	There have been added restrictions and regulations.
Plans for future levels of the tax/fee/payment	N/A
Critical analysis: problems, solutions, lessons learnt	Waste treatment is a market. The price depends on the market and the utilization of the machines. Only communal collectors have controlled prices and rules for what they accept and from whom; Thermic recovery plays a big part of the 'renewable' energy system nowadays. News 2017: A clause that allowed the thermic recovery of

	waste of a thermal value with at least 11.000kJ was dropped. (Heizwertklausel)
Means of implementation	The instrument is applied when bringing waste to the disposing companies.
Is it led /funded by producers or the government?	It is led by the government.
Perceived costs of the instrument, both financial and administrative	No information
Key legislation	Closed Substance Cycle and Waste Management Act; (Kreislaufwirtschafts- und Abfallgesetz)
References (please add hyperlinks, if possible)	http://www.gesetze-im-internet.de/bundesrecht/krwg/gesamt.pdf

Name of instrument	**Waste Disposal Regulations/Restriction**
Date introduced	2016
Nature of the scheme	Regulates temporary or long-term regulations for different kind of waste
Scope	National Regulation
Description	The incineration was declared to produce toxic gases.
Targets of the scheme, including planned future targets	Target was not to blow toxic gases into the air. The future target could be to find new ways to reuse or recycle the material.
Extent of coverage	Germany
Target group	Especially the client because he is the owner of the waste
Is it mandatory/legislative or voluntary?	The restriction is mandatory
Type of waste/product for which it applies	EPS insulation with HBCD (fire protection)

Current level or range of tax/fee/payment and structure	During the restriction the prices were 40 times more than before. Only specialized incineration plants had permission to dispose.
Exemptions or discounts	The Federal Government paused the law for one year to find a firm solution for the disposal.
How has it changed over time?	The restriction was only valid for a couple of months and is currently paused until the end of 2017 to find better solutions.
Plans for future levels of the tax/fee/payment	It is not sure how the waste is going to be disposed in the future.
Critical analysis: problems, solutions, lessons learnt	The boards were stacked because there was no disposal solution. Then they paused the restriction. Lesson learnt: you cannot stop the disposal before not having found a different concept.
Means of implementation	Disposal companies were not allowed to accept and process the material.
Is it led /funded by producers or the government?	It is led by the government, EU
Perceived costs of the instrument, both financial and administrative	No information
Key legislation	HBCD: worldwide production and utilization ban because it was declared as highly toxic (2013).
References (please add hyperlinks, if possible)	http://www.mdr.de/nachrichten/wirtschaft/bundesrat-erleichtert-entsorgung-daemmstoffe-polystyrol-styropor-hbcd-100.html

Name of instrument	**Regulation on the prevention and recycling of packaging waste (VerpackV)**
Date introduced	June 1991, latest update for 2019
Nature of the scheme	Extended producer responsibility scheme
Scope	Taking back packaging reduces the waste production
Description	Still 50% of the supposedly reused packaging is going to incineration. Latest update intends to raise the recycle quotes.
Targets of the scheme, including planned future targets	Waste prevention, compliance of all market participants with prescribed recycling quotes for their packaging
Extent of coverage	All packaging material, independently from its material used for trade, commerce, industry or private households
Target group	Producer or sales people

Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	Glass, tinplate, aluminium, paper, cardboard, combinations
Current level or range of tax/fee/payment and structure	N/A
Exemptions or discounts	N/A
How has it changed over time?	The aim is to rise the quotes of recycling from around 60 to 90%
Plans for future levels of the tax/fee/payment	The law is planning to strengthen reusability and recycling. The latest update is negotiating between the communes and private waste collectors and disposal. The question is who is in charge for recycling of raw material.
Critical analysis: problems, solutions, lessons learnt	Since the law has been issued there has been loopholes for the producers. New regulations are trying to make it impossible for producers to avoid the law.
Means of implementation	Product Responsibility (Produktverantwortung) is also applied to batteries, electric devices, waste oil and scrapped cars.
Is it led /funded by producers or the government?	The government leads it. The law caused the producers to form a network.
Perceived costs of the instrument, both financial and administrative	N/A
Key legislation	Packaging Regulations; Directive 94/62/EG oft eh European Parliament
References (please add hyperlinks, if possible)	https://www.gesetze-im-internet.de/verpackv_1998/BJNR237900998.html

6.3. Italy

Name of instrument	**Eco-tax**
Date introduced	1996 (with the 1996's Financial law)
Nature of the scheme	Landfill taxes, gate fees and bans
Scope	To reduce waste production and foster material and energy recovery.

Description	In Italy the landfill tax was introduced with the 1996's Financial law, based on Law 549/1995 and following amendments intended to reduce waste production and foster material and energy recovery. The Law, which defines the upper and the lower level of the tax, is applied at a regional level. The tax is directly paid to the regions by landfill operators. The regions also decide the destination of the tax revenues. The tax has an environmental dimension as regions can spend up to 20% of the revenue on improving the waste management system, financing regional environmental protection agencies or protecting natural areas (see for this EEA, 2009, Diverting Waste From Landfill). The instrument mirrors the system of the EU Landfill Directive and categorises waste. The levels of the landfill tax are adapted to these categories. • Landfill ban implemented: According to the Landfill Directive Combustible waste CV > 13 MJ/kg from 1st January 2012
Targets of the scheme, including planned future targets	It set the following targets for separate collection of municipal waste to be achieved at ATO level (percentages are related to municipal waste generation): • 15 % by 1999 • 25 % by 2001 • 35 % by 2003
Extent of coverage	National (managed at regional level)
Target group	Landfill taxes: charged by public authorities (at regional level) for the disposal of waste in a landfill site, usually with an environmental purpose in mind, and where the revenue is accruing to the body responsible for the levy. Gate fees: charges set by the operators of the landfills for the provision of the service (i.e. waste disposal) and which are designed to cover their costs and profit.
Is it mandatory/legislative or voluntary?	Legislative
Type of waste/product for which it applies	Solid waste and semi-solid sludge (MSW, inert, other waste)

Current level or range of tax/fee/payment and structure	The heterogeneity in the tax levels applied by regions is quite high, ranging, as an average between 1998 and 2008, from EUR 5.2 per tonne in Campania to EUR 25.8 per tonne in Piemonte (ETC/SCP, 2012). **Landfill tax in €/t** VAT 10% • 1–10€/t inert waste • 5–10€/t other waste • 10–25€/t MSW, depending on Region • Average net price: 79 – 94€/t • Total price: 88-104€/t **Gate fee** (range per tonne): 60-120 € **Gate fee** (typical per tonne): +90 € **Maximum charges per tonne for non-MSW** (inert): 1-10 €
Exemptions or discounts	One of most important provisions is that according to Decree 22/97, the eco-tax should be increased or diminished as a consequence to Recycling rates achieved in each District.
How has it changed over time?	The landfill tax is the main environmental tax in Italy and generated around €185 million in revenue in 2010. This amount has decreased consistently over time from a peak of €360 million in 1997. It represents around 38% of total tax revenue. The reduction in tax revenue is related to the decrease in landfill. However, what is of interest is whether this change in waste disposal is due (even in part) to the imposition of the tax. Regions were required to implement landfill taxes under national Law 549/1995; however, the timing of the introduction varied across regions. Most fulfilled the requirements of the national law to impose the new tax within 12 months. However, it took seven years for Valle d'Aosta, Molise and Puglia to implement regional laws.
Plans for future levels of the tax/fee/payment	NA
Critical analysis: problems, solutions, lessons learnt	• Landfill is still the major treatment method in Italy (>50%) • Problem that pre-treated waste has to be classified as EWC 19 and thus may not be accepted at landfills without testing anymore (Industry) • Huge financial burden if the complete financial guarantee for after care has to be delivered at start of the operational phase • Major problems with enforcement and practical application of acceptance criteria decision • Different requirements as concerns sampling, analysis and compliance testing (acceptance criteria decision leaves room for regional authorities to specify requirements in permits issued)

• Difficulties to meet specific limits (DOC, TOC) for non-hazardous and hazardous waste landfills for certain waste types
• Difficulties to meet limits for chlorine, sulphate, antimony, molybdenum and selenium
• Lack of appropriate analysis methods for DOC and hydrocarbons; strong confounding interferences with other components
• Lack of treatment possibilities for sludge's (decreasingly accepted in agriculture) and asbestos (not acceptable at inert waste landfills)
• Inconsistent setting of landfill classes and subclasses by regional authorities (different subclasses in category B)
• Difficulties in interpretation of EU requirements concerning pre-treatment of waste
• Differences between EU and national legislation on landfill of waste (e.g. technical standard for geological barrier and sealing system)
• National limits for soil reclamation allow higher contamination than EU limits for disposal of hazardous waste
• Huge regional differences in Italy (extremely poor progress in Campania, Sicilia, Molise and Basilicata; even though a lot of infrastructural measures have been financed)
• Lack of clarity in definition of bio waste
• Acceptance criteria decision requirements are only enforced in landfill with permit according to new legislation
• Lack of activity (education, information) at local level
• No clear planning as concerns construction of new waste treatment facilities
• Amounts of inert waste used as secondary raw material for construction works in landfills exceed needs and thus have to be regarded as fake measures to avoid payment of landfill taxes
• Majority of landfills got permit before implementation of the landfill directive requirements, thus can be expected to be not compliant to a large extend
• Lowered limits for inert waste landfills compared to previous law and soil legislation, new restricting limits for inert wastes, whereas on the other hand inert wastes can be sent to non-hazardous waste landfills, without corresponding restrictions, highly subjective characterisation requirements for inert wastes
• Diverging requirements for compliance testing
• Important problems with acceptability of wastes at hazardous waste landfills (high investment costs low revenues),
• Important differences in DOC limits for B subclasses between provinces
• Diverging conditions for financial guarantee.

Means of implementation	The landfill tax has contributed to the diversion of waste from landfill, although the effect may have been less than hoped because the tax is quite low and may not provide sufficient incentivise to choose an alternative to landfilling. Decree 152/2006 foresees an increase of the tax in cases where provinces do not meet the targets on separate collection. There may also be a need to monitor how the revenue from the tax is used to ensure that it realises improvements in the waste management system.
Is it led /funded by producers or the government?	Producer
Perceived costs of the instrument, both financial and administrative	NA
Key legislation	EUROPEAN LEGISLATION Concerning the disposal of waste in landfills, the **Directive 1999/31/EC on the landfill of waste** and the **Decision 2003/33/EC** on acceptance criteria set standards for the authorisation, design, operation, closure and aftercare of landfills. ITALIAN LEGISLATION **Law 549/1995** and following amendments.
References (please add hyperlinks, if possible)	• http://ec.europa.eu/environment/waste/landfill_index.htm • Organisation of awareness-raising events concerning the application and enforcement of Community legislation on landfills – Final report, Ref. 070307/2007/481226/MAR/G4, European Commission (pages 23-24) • Municipal waste management in Italy, European Environment Agency, February 2013 • Diverting waste from landfill, Effectiveness of waste management policies in the European Union, EEA Report No 7/2009 • Landfill taxes & bans, CEWEP, October 2016 (http://www.cewep.eu/information/data/landfill/index.html) • Waste management in spatial environments, Edited by Alessio D'Amato, Massimiliano Mazzanti and Anna Montini (pages 9-20) • USE OF ECONOMIC INSTRUMENTS AND WASTE MANAGEMENT PERFORMANCES, Final Report, 10 April 2012, Bio Intelligence Service

Name of instrument	**Pay-as-you-throw (PAYT) scheme**
Date introduced	The tariff was introduced in the Italian fiscal system in 1997
Nature of the scheme	PAYT

Scope	Reduction of total waste and increase of selective waste collection
Description	Since 1994, the twenty administrative regions of Italy have delegated the responsibility of waste management to the office Ambito Territoriale Ottimale (Optimal Territorial Scope, ATO), which sets targets for the landfilling of biodegradable municipal solid waste and the separate collection of sorted waste. Districts/provinces are responsible for meeting the targets established by their ATO, but are free to implement a waste management system of their choosing. Frequently, this is realised through the creation of waste consortia, which determine waste management policy.
Targets of the scheme, including planned future targets	In each territorial partition, the objective of selective waste collection is 65% to be reached by the end of 2012. The Municipalities whose bad performances don't allow to obtain this result are subject to a financial penalty consisting in an addition of 20% on the special tax on the price paid for the final disposal of waste. [art. 205, D.lgs. 152/2006]
Extent of coverage	National (at local level)
Target group	Households and other producers of urban waste
Is it mandatory/legislative or voluntary?	The tariff is not compulsory, but it can be enforced voluntarily by the Municipality.
Type of waste/product for which it applies	MSW – Municipal Solid Waste
Current level or range of tax/fee/payment and structure	In Italy the law in principle stipulates to split the fees into a fixed part and a variable part. The variable part is calculated according to the quantity of waste produced, which can be based on volume, exact weight but also on estimations according to specific statistical methods. The latter method seems to be the most widely applied, which hampers initiatives to prevent waste as there is no "real" link between fees and de facto produced waste. The fee as such is called Tariffa Igiene Ambientale and covers waste collection/treatment and the cleaning of streets. As one example, the statutes for the calculation of the variable part of the tariff in the Florence area (Tuscany), say that the variable part of the fee refers to the quantity of separately collected or mixed waste. Where the local authorities have no experience with individual calibration techniques, they can apply a presumptive model, taking as reference the average waste production per person in the municipality. Basis for the calculation of the variable part for commercial waste is often the dimension (m^2) of a commerce (shop, installation). Also for households the dimension of a household plays a role.

Exemptions or discounts	
How has it changed over time?	Legislative Decrees 22/1997 (Decreto Ronchi) and 152/2066, introduced a new tariff, TIA (Tariffa Integrata Ambientale), which replaces the old "TARSU" (Tariffa Ambientale sui Rifiuti Solidi Urbani). However, the TIA has been implemented in only a small share of municipalities, and from 2013 was replaced by a new municipal tax on waste and waste services – "TARES" (Tassa sui rifiuti e servizi, Legislative Decree 201/2011).
Plans for future levels of the tax/fee/payment	
Critical analysis: problems, solutions, lessons learnt	The best results and performances are achieved with a combination of: • PAYT based on the quantification of real urban waste produced and given by each rate payer; • door to door collection; • communicative campaigns which should be made every year; • domestic composting of organic waste.
Means of implementation	National Program for Waste Prevention (2013): implementation, where the catchment areas and collection systems will be available, of punctual charging mechanisms for the disposal of municipal waste (in function of the volumes or quantities conferred)
Is it led /funded by producers or the government?	
Perceived costs of the instrument, both financial and administrative	
Key legislation	• Legislative Decree 22/1997 (Decreto Ronchi) • Legislative Decree 152/2006 • Decree 201/2011
References (please add hyperlinks, if possible)	• USE OF ECONOMIC INSTRUMENTS AND WASTE MANAGEMENT PERFORMANCES, Final Report, 10 April 2012, Bio Intelligence Service • Use of economic instruments and waste management performances, Umberto Gianolio, E.R.I.C.A. soc. coop.

Name of instrument	**Shared responsibility for packaging waste**
Date introduced	1997
Nature of the scheme	Producer fee scheme (Packaging) / Individual and collective scheme.

Scope	(Decree 22/97 and the subsequent Decree 152/06) With regard to packaging waste, the Decree established the National Packaging Consortium (CONAI), with the aim to coordinate the activities of six material consortia for the recovery of aluminium (CIAL), glass (COREVE), paper (COMIECO), plastic (COREPLA), steel (RICREA) and wood (RILEGNO).
Description	CONAI, National Packaging Consortium, is a private consortium of firms working towards the recovery and recycling of packaging issued for consumption on national territory, with the aim of meeting statutory targets. CONAI says to guarantee target achievement at the lowest economic cost of all the European consortia, working as a market subsidiary. CONAI collaborates with ANCI (national association of Italian municipalities).
Targets of the scheme, including planned future targets	Statutory targets At least 60% are recovered, between 55% and 80% are recycled, for the following streams the following recycling standards apply: 60% glass, 60% paper and card, 50% metals, 26% plastics (only regarding the plastics part), 35% woods. The Decree (and its following amendments) provided for more stringent packaging waste targets than the Community ones for plastic (26 % instead of 22.5 % stipulated in the Directive) and for wood (35 % instead of 15 % stipulated in the Directive) to be reached by 2008.
Extent of coverage	National
Target group	Packaging Producers (companies that produce packaging and/or raw material for the production of packaging, along with importers of "empty packaging", i.e. packaging not containing goods) and Users (companies that use packaging to pack their products or that sell packed goods).
Is it mandatory/legislative or voluntary?	Legislative
Type of waste/product for which it applies	Packaging (steel, aluminium, paper, wood, plastic and glass)

Current level or range of tax/fee/payment and structure	Maximum average fee (latest available data) per tonne of: - Paper: €22 - Glass: €17.82 - Aluminium: €52 - Steel: €31 - Plastic: €140 - Wood: €8
Exemptions or discounts	
How has it changed over time?	See "Key legislation" section
Plans for future levels of the tax/fee/payment	
Critical analysis: problems, solutions, lessons learnt	Low effectiveness in promoting waste prevention policies, and the inability of the system adopted to fully cover the costs of packaging waste management.
Means of implementation	
Is it led /funded by producers or the government?	Producer/User-led CONAI: the system is continuously self-financing, raising funds directly from companies, or rather from the sale of packaging waste materials, by the Producers and Users. Funding takes place through the application of the "CONAI Environmental Contribution" on packaging sold by the last Producer to the First user.
Perceived costs of the instrument, both financial and administrative	
Key legislation	EUROPEAN LEGISLATION The European Directive on packaging and packaging waste (CE/62/94) was drawn up with a view to sustainable development and the definition of the environmental and social responsibilities of business enterprise, public authorities and private citizens. It was later acknowledged by Italian law in 1997 with Decree 22/97, amended in 2006 by Decree 152/06. ITALIAN LEGISLATION With Decree 22/97 and the subsequent Decree 152/06, which amplifies and modifies it, Italy acknowledges the European Waste

	specifically the Packaging and Packaging Waste Directive (Directive 94/62/CE and subsequent updates).
References (please add hyperlinks, if possible)	http://www.corepla.it/conai-dichiarazioni-e-cac

6.4. Spain

Name of instrument	**Construction and Demolition Waste production and management in Spain**
Date introduced	1st February 2008
Nature of the scheme	The construction and demolition waste production and management in Spain is regulated by the Real Decree 105/2008, in force sin the 1st February 2008. Details of the Real Decree are collected in the table below.
Scope	It establishes a jurisdiction on the production and management of CDWs, in order of emphasis, the prevention, reutilization, recycling, forms of recovery and the assurance that all waste is properly treated thus contributing to a sustainable development in the construction sector.

Description	It defines the concepts of the CDW producer and holder. Among the obligations imposed on the producer, it should be highlighted the inclusion of a CDW management study to be carried out in the project, which should include, among other aspects, an estimate of the quantity, generic measures of prevention to be adopted, the intended destination for the waste, as well as an assessment of the costs resulting from its management, which should form part of the project budget. Also, as a special preventive measure, it is mandatory, in the case of demolition works, repair or reform, to make an inventory of the hazardous waste generated, to proceed with its selective withdrawal and delivery to authorized managers of hazardous waste. The holder will be forced to submit to the ownership of the work a CDW management plan in which he will determine how the project management study will be applied, as well as to pay for it and to provide the producer with required for the CDW management. From certain thresholds, the separation of construction and demolition waste is mandatory on site to facilitate its subsequent recovery, although this obligation is deferred from the entry into force of the Royal Decree according to the amount of waste provided in each fraction. The control regime for the production, possession and management of CDW is based on the necessary collaboration between the Autonomous Communities and local authorities in order to comply with the responsibilities assigned to them by waste legislation. However, it is envisaged that a control mechanism linked to obtaining the works license may be established, under the terms provided for in the legislation of the Autonomous Communities, by means of the creation by the producer of a bond or other guarantee Financial equivalent, that responds to the fulfilment of the requirements of the Royal Decree and, in particular, the management of CDW that will be produced in the work.
Targets of the scheme, including planned future targets	One of the difficulties in achieving satisfactory levels of recycling of CDW at present is the fact that most of them are deposited in a landfill at very low cost, without prior treatment and often without fulfilling with the requirements established in the landfill regulations. In order to correct this situation, the Royal Decree prohibits the deposit without prior treatment and demands the establishment of tariff systems that discourage the deposit in a landfill of recoverable waste or that of others in which the previous treatment has been limited to a mere classification.
Extent of coverage	Spanish National legislation
Target group	CDW managers (producers, holders, promoters, etc.)

Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	Construction and Demolition Waste
Current level or range of tax/fee/payment and structure	A deposit will have to be paid to the authorities, which will be returned when proof of lawful disposal/recycling of CDW is provided (details are regulated at regional level, see tables listed below).
Exemptions or discounts	Producers and holders of CDW in minor construction and home repair works, since they have the legal status of urban waste and will therefore be subject to the requirements established by the Local authorities in their respective municipal ordinances.
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Government
Perceived costs of the instrument, both financial and administrative	-
Key legislation	RD 105/2008 Law 22/2011, of 28 July, on Waste and Contaminated Soils
References (please add hyperlinks, if possible)	https://www.boe.es/diario_boe/txt.php?id=BOE-A-2008-2486

Name of instrument	**Deposit-Refund RCD generated. Madrid Region.**
Date introduced	2003
Nature of the scheme	Deposit-Refund RCD generated volume
Scope	-

Description	Deposit amount or equivalent warranty will be proportional to the estimated amount of RCD to be produced and calculated according to following rules: - CDW level II: mainly generated in construction and demolition of private homes: 15€/m3. Minimum amount of 150€ or 0,2% of total project budget. - CDW level I (CDW originated by excavation activities and terrain movement formed by uncontaminated soil. 5€/m3 with a minimum amount of 100€ and a maximum amount of 60.000€.
Targets of the scheme, including planned future targets	-
Extent of coverage	In the case of CDW level I when soils are going to be reused in worksite.
Target group	All starting worksites.
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	RCD
Current level or range of tax/fee/payment and structure	Refund-Deposit
Exemptions or discounts	When soil terrain is reused.
How has it changed over time?	Unknown
Plans for future levels of the tax/fee/payment	Remain similar.
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	Implanted. Mandatory for new working license.

Is it led /funded by producers or the government?	Madrid Regional Government.
Perceived costs of the instrument, both financial and administrative	-
Key legislation	Order 2690/2006, of 28th July
References (please add hyperlinks, if possible)	http://www.madrid.org/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobheadername1=Content-Disposition&blobheadervalue1=filename%3DPLAN_REGIONAL_RCD.pdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1196173051725&ssbinary=true

Name of instrument	**Deposit-Refund RCD generated. Extremadura Region.**
Date introduced	2011
Nature of the scheme	Deposit-Refund RCD generated volume
Scope	-
Description	Deposit amount or equivalent warranty will be proportional to the estimated amount of RCD to be produced and calculated according to following rules: - CDW type I: 1000€/m3 - CDW type II: 30€/m3 - CDW type III: 15€/m3 - CDW type IV: 7€/m3
Targets of the scheme, including planned future targets	New construction or demolition worksites with urbanistic license by local authorities.
Extent of coverage	None
Target group	All starting worksites.
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	CDW
Current level or range of tax/fee/payment and structure	Refund-Deposit

Exemptions or discounts	None
How has it changed over time?	Unknown
Plans for future levels of the tax/fee/payment	Remain similar.
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	Implanted. Mandatory for new working license.
Is it led /funded by producers or the government?	Extremadura Regional Government.
Perceived costs of the instrument, both financial and administrative	-
Key legislation	Decree 20/2011, of 25th February
References (please add hyperlinks, if possible)	http://extremambiente.gobex.es/index.php?option=com_content&view=article&id=2318&Itemid=578

Name of instrument	**Deposit-Refund RCD generated. Navarra Region.**
Date introduced	Year 2011
Nature of the scheme	Deposit-Refund RCD generated volume
Scope	
Description	Deposit amount or equivalent warranty will be proportional to the estimated amount of RCD to be produced and calculated according to following rules: - If CDW < 50m3 = 1000€ - If CDW > 50m3= 17€/m3
Targets of the scheme, including planned future targets	New construction or demolition worksites with urbanistic license by local authorities
Extent of coverage	None
Target group	All starting worksites.

Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	CDW
Current level or range of tax/fee/payment and structure	Refund-Deposit
Exemptions or discounts	None
How has it changed over time?	Unknown
Plans for future levels of the tax/fee/payment	Remain similar.
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	Implanted. Mandatory for new working license.
Is it led /funded by producers or the government?	Extremadura Regional Government.
Perceived costs of the instrument, both financial and administrative	-
Key legislation	DF 23/2011
References (please add hyperlinks, if possible)	http://www.ganasa.es/areas/calidad-ambiental/residuos-suelos-contaminados_oficina_preguntas-frecuentes_residuos-construccion-demolicion.aspx

Name of instrument	**Deposit-Refund RCD generated. Asturias Region.**
Date introduced	2010
Nature of the scheme	Deposit-Refund RCD generated volume

Scope	CDW deposit for management
Description	
Targets of the scheme, including planned future targets	6€/m3 when generation of CDW is separated by type. 10€/m3 if CDW is not separated.
Extent of coverage	Extent of coverage small worksites with license.
Target group	All new construction and demolition worksites.
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	CDW at local worksites.
Current level or range of tax/fee/payment and structure	Regional legislation
Exemptions or discounts	None.
How has it changed over time?	Unknown
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	None.
Means of implementation	Already implemented by local authorities.
Is it led /funded by producers or the government?	Lead by government.
Perceived costs of the instrument, both financial and administrative	-
Key legislation	Decree 72/2010, of 28th October

References (please add hyperlinks, if possible)	http://www.camaracantabria.com/medio_ambiente/descargas/Decreto72_2010.pdf

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of Madrid**
Date introduced	2003
Nature of the scheme	It is a tribute of indirect and real nature that taxes the deposit of waste, with the purpose of protecting the environment.
Scope	
Description	-
Targets of the scheme, including planned future targets	Environment protection
Extent of coverage	Region of Madrid
Target group	• Natural or legal persons and entities without legal personality that deliver the waste in a landfill or leave it in unauthorized places • Owner of landfill sites
Is it mandatory/legislative or voluntary?	Mandatory (Region of Madrid)
Type of waste/product for which it applies	• Industrial waste • Construction and Demolition Waste
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established. 8€/T of hazardous industrial waste 5€/T of non-hazardous industrial waste 1€/m3 of construction and demolition waste Vesting period: quarterly
Exemptions or discounts	Any
How has it changed over time?	-

Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Government of Madrid. Ministry of Economy and finance.
Perceived costs of the instrument, both financial and administrative	Tax benefits not set down under the law Tax revenue (2013): 1.691 thousand euros.
Key legislation	Law 6/2003, on landfill tax
References (please add hyperlinks, if possible)	http://www.madrid.org/cs/Satellite?c=CM_Tramite_FA&cid=1109168966661&definicion=Impuestos%2C+Tasas+y+Precios+Publicos&language=es&pagename=ComunidadMadrid%2FEstructura&sm=2&tipoServicio=CM_Tramite_FA

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of Murcia**
Date introduced	2005
Nature of the scheme	It is a tribute of Indirect and real nature, designed to alleviate the potential impacts of disposal of waste in the landfill, through the promotion of management activities, such as reduction or recovery of materials and energy.
Scope	
Description	• Supplies of waste in public or private landfills • Waste dumping or waste disposal in non-licensed facilities. • The taxable event covered by the tax consists of waste storage both definitive and for periods longer than 2 years for non-hazardous and inert waste. Or in the case of hazardous waste for periods longer than 6 months temporary in licensed facilities without authorisation given by the environmental body.
Targets of the scheme, including	To alleviate the potential impacts of waste disposal in the landfill.

planned future targets	
Extent of coverage	Region of Murcia
Target group	• Owner of landfill sites • Responsible for the dumping or disposal of waste.
Is it mandatory/legislative or voluntary?	Mandatory (Region of Murcia)
Type of waste/product for which it applies	Non-hazardous waste, inert waste and hazardous waste
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established. 15€/T of hazardous waste 7€/T of non-hazardous industrial waste 3€/T of inert waste Vesting period: yearly
Exemptions or discounts	§ Disposal of waste ordered by administrative authorities in circumstances beyond their control, in situations of extreme need or disaster. § The use of inert waste in restoration works, backfilling, etc., duly authorised by the competent authority.
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Government of Murcia. Ministry of Economy and finance.

Perceived costs of the instrument, both financial and administrative	Tax benefits not set down under the law Tax revenue (2013): 4.967,78 thousand euros.
Key legislation	Law 9/2005, of 29th December, on tax measures for the year 2006
References (please add hyperlinks, if possible)	https://www.google.es/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=impuestos+sobre+residuos+en+murcia&*

Name of instrument	**Tax for construction waste disposal in landfills in the Spanish region of Catalonia**
Date introduced	2008 (It was suspended from 1st October 2011 until 1st October 2013 and from 31st January 2014 until 31st December 2015).
Nature of the scheme	Environmental tax
Scope	This economic instrument contributes to the financing of waste management infrastructures and regulates the disposal of construction waste.
Description	-
Targets of the scheme, including planned future targets	Environmental tax that encourages an environmentally friendly behaviour and promotes measures of minimization, reuse, recycling and valorisation of waste material.
Extent of coverage	Region of Catalonia
Target group	Construction waste producers
Is it mandatory/legislative or voluntary?	Mandatory (Region of Catalonia)
Type of waste/product for which it applies	Construction waste
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established. 3€/T of construction waste Vesting period: quarterly

Exemptions or discounts	Waste managed according to article 7.2 of Decree 21/2006. Material coming from the excavation to be reused as backfilling in other authorised construction work.
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Waste Agency of Catalonia
Perceived costs of the instrument, both financial and administrative	Tax benefits not set down under the law Tax revenue (2009): 6.120.231,62 thousand euros.
Key legislation	Law 8/2008, of 10th July, concerning the financing of waste management infrastructures and waste disposal taxes.
References (please add hyperlinks, if possible)	http://residus.gencat.cat/es/consultes_i_tramits_-_nou/canons/

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of La Rioja**
Date introduced	2014
Nature of the scheme	It is a tribute of real nature devoted to finance of programmes and initiatives aiming at the environmental protection of La Rioja.
Scope	It encourages waste recycling and recovery as well as decreases the environmental impact on waste destined for landfill.
Description	-
Targets of the scheme, including planned future targets	Environmental protection of La Rioja

Extent of coverage	Region of La Rioja
Target group	• Natural or legal persons and entities without legal personality that deliver the waste in a landfill • Owner of landfill sites
Is it mandatory/legislative or voluntary?	Mandatory (Region of La Rioja)
Type of waste/product for which it applies	Hazardous, non-hazardous and inert waste
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established. 21€/T of hazardous waste 12€/T of non-hazardous waste 4€/T of inert and non-recoverable waste of treatment plants of CDWs.
Exemptions or discounts	Any
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Government of La Rioja
Perceived costs of the instrument, both financial and administrative	Tax revenue (2013): 2.141 thousand of euros
Key legislation	Law 7/2012, of 21st December, on fiscal and administrative measures for the year 2013.

References (please add hyperlinks, if possible)	http://www.larioja.org/tributos/es/tributos-propios/impuesto-eliminacion-residuos-vertederos

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of Cantabria**
Date introduced	2010
Nature of the scheme	It is a tribute of real and indirect nature devoted to decrease the possible impact of landfill on environment, through the promotion of activities such as the decrease or recovery of materials and energy.
Scope	
Description	-
Targets of the scheme, including planned future targets	To promote measures of minimization, reuse, recycling and valorisation of waste material
Extent of coverage	Region of Cantabria
Target group	• Natural or legal persons and entities without legal personality that deliver the waste in a landfill • Owner of landfill sites
Is it mandatory/legislative or voluntary?	Mandatory (Region of Cantabria)
Type of waste/product for which it applies	General Waste
Current level or range of tax/fee/payment and structure	2€/T Vesting period: quarterly
Exemptions or discounts	• Disposal of waste ordered by administrative authorities in circumstances beyond their control, in situations of extreme need or disaster. • The use of inert waste in restoration works, backfilling, etc., duly authorised by the competent authority.
How has it changed over time?	-

Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Tax Administration Agency of Cantabria, Government of Cantabria
Perceived costs of the instrument, both financial and administrative	Tax revenue (2013): 517,29 thousand of euros
Key legislation	Law 6/2009, of 28th December, on fiscal measures.
References (please add hyperlinks, if possible)	http://www.agenciacantabratributaria.es/informacion-corporativa/normativa/tributos-propios/impuestos-medioambientales/impuestos-vertederos

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of Extremadura**
Date introduced	2012
Nature of the scheme	It is a tribute of real and indirect nature devoted to promote the recycling and waste assessment as well as decrease the possible impact of landfill on environment.
Scope	
Description	Landfill both public and private of the Region of Extremadura and the Dumping or waste disposal in non-authorised centres.
Targets of the scheme, including planned future targets	To promote the recycling and waste assessment as well as decrease the possible impact of landfill on environment.
Extent of coverage	Region of Extremadura

Target group	• Natural or legal persons and entities referred in Art 35.4 of Law 58/2003, of 17 December, that deliver the waste in a landfill • Anyone who dumps or disposes waste in non-authorised centres.
Is it mandatory/legislative or voluntary?	Mandatory (Region of Extremadura)
Type of waste/product for which it applies	General waste except mining waste and that waste devoted to their reuse, recycling and recovery in region of Extremadura.
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established: 18€/T of hazardous waste 13€/T of non-hazardous waste 3,5€/T of inert waste Vesting period: quarterly
Exemptions or discounts	Disposal of waste ordered by administrative authorities in circumstances beyond their control and in situations of extreme need or disaster.
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Tax Administration Agency of Extremadura, Government of Extremadura
Perceived costs of the instrument, both financial and administrative	Tax revenue (2013): 855,09 thousand of euros
Key legislation	Law 8/2016, of 22nd December, on tax policy and fiscal measures of the Region of Extremadura. Law 6/2013, of 13rd December, on tax policy measures for the promotion

	of economic activity in the Region of Extremadura. Law 4/2012, of 28th December, on financial and administrative measures of the Region of Extremadura. Law 2/2012, of 28th June, on tax policy, financial and play urgent measures in the Region of Extremadura.
References (please add hyperlinks, if possible)	http://portaltributario.juntaextremadura.es/PortalTributario/web/guest/impuesto-sobre-la-eliminacion-de-residuos-en-vertedero1

Name of instrument	**Tax for waste disposal in landfills in the Spanish region of Valencia**
Date introduced	2013
Nature of the scheme	It is a tribute designed to alleviate the potential impacts of disposal of waste in landfills. The income collected from this tax is destined to cover the costs associated to the protection and improvement of the environment.
Scope	
Description	Landfill both public and private of the Region of Valencia
Targets of the scheme, including planned future targets	To alleviate the potential impacts of disposal of waste in landfills
Extent of coverage	Region of Valencia
Target group	Natural or legal persons and entities referred in Art 35.4 of Law 58/2003, of 17 December, that deliver the waste in a landfill
Is it mandatory/legislative or voluntary?	Mandatory (Region of Valencia)
Type of waste/product for which it applies	General waste (hazardous and non-hazardous waste and CDW) except household waste.
Current level or range of tax/fee/payment and structure	The tax rate is obtained by applying to the tax base the type of tax established: 5€/T of non-hazardous waste, excluding CDW, suitable for reuse and recovery. 3€/T of non-hazardous waste, excluding CDW, non-suitable for reuse and recovery.

	0,5/m3 of construction and demolition waste. 10€/T of hazardous waste suitable for reuse and recovery 7€/T of hazardous waste non suitable for reuse and recovery.
Exemptions or discounts	-
How has it changed over time?	-
Plans for future levels of the tax/fee/payment	-
Critical analysis: problems, solutions, lessons learnt	-
Means of implementation	-
Is it led /funded by producers or the government?	Tax Administration Agency of Valencia, Government of Valencia (Generalitat Valencia).
Perceived costs of the instrument, both financial and administrative	-
Key legislation	Law 10/2012, of 21st December, on fiscal and administrative measures of Generalitat Valenciana.
References (please add hyperlinks, if possible)	http://www.hisenda.gva.es/web/tributos-y-juego/tributos-normativa-impmedioambientales

6.5. Sweden

Name of instrument	**Tax on landfilled waste**
Date introduced	Announced in 1996, introduced in 2000
Nature of the scheme	A flat tax fee paid per weight of waste disposed. This fee is fixed irrespective the waste type.
Scope	

Description	A tax paid to the government for the landfilling of waste including hazardous waste, for quantities greater than 50 tonnes per year.
Targets of the scheme, including planned future targets	A taxation scheme that follows the polluter pays principle by taxing waste that is landfilled. This scheme aims to encourage the disposer to recycle the waste instead.
Extent of coverage	About 41 types of waste are exempted for this tax. This includes certain mining waste.
Target group	Industrial, CDW.
Is it mandatory/legislative or voluntary?	Legislative
Type of waste/product for which it applies	All wastes excluding combustible and organic wastes unless granted exemption. All material entering landfill facilities is taxed, while material removed from the facility qualifies for a deduction. The tax is paid by the owner of the landfill on the basis of weight.
Current level or range of tax/fee/payment and structure	435 SEK/tonne from 2006
Exemptions or discounts	· Materials consumed in the operation or maintenance of the waste-handling facility (including landfill) is exempted from landfill tax. For example, CDW used in the construction of landfill covers.
How has it changed over time?	It was introduced as 250 SEK/tonne in 2000 and was subsequently increased to 288 SEK/tonne (approx. EUR 31.7) in 2003. Again to 370 SEK/tonne (approx. EUR 40.7) in 2003 and reached 435 SEK/tonne (approx. EUR 47.9) in 2006, resulting in an overall increase of 74 % since its introduction in 2000.
Plans for future levels of the tax/fee/payment	
Critical analysis: problems, solutions, lessons learnt	It has been observed that the landfill tax is not the sole reason for the reduction of landfill amounts (from 22% in 2001 to 1% in 2010). However, it is the landfill bans on combustible and organic waste working in tandem with the landfill tax that has reduced landfilling.

Means of implementation	Usually the tax is calculated as a gate-fee at the waste facility by weighing. The waste operator managing the waste-facility is under the obligation to pay this tax to the government.
Is it led /funded by producers or the government?	Led by the Government and managed by the Swedish Tax Agency.
Perceived costs of the instrument, both financial and administrative	
Key legislation	Law (1999:673) on waste tax of 1999
References (please add hyperlinks, if possible)	Milios, L., Municipal waste management in Sweden ETC/SCP, European Environment Agency, February 2013 https://www.naturvardsverket.se/upload/miljoarbete-i-samhallet/miljoarbete-i-sverige/regeringsuppdrag/2013/deponiskatt/131220-redovisning-deponiskatten.pdf

Name of instrument	**Taxation on natural aggregates (gravel)**
Date introduced	Was brought into force in 1999, introduced in 1996
Nature of the scheme	Taxation on a natural resource
Scope	
Description	The mining of gravel is taxed for all purposes other than when used for the house-hold needs by the land-holder. In this case it is even required that the mining operation has already requested permission according to the procedure stated in the Swedish Environmental code.
Targets of the scheme, including planned future targets	The scheme is aimed to reduce the use of gravel unless in isolated scenario. Gravel is vital for the supply of drinking water and the preservation of ecological resources and nature.
Extent of coverage	
Target group	Persons who are involved in the commercial mining of gravel, they need not always be the land-holder or owner of the quarry.

Is it mandatory/legislative or voluntary?	Legislative
Type of waste/product for which it applies	Applies to gravel or soils that have been weathered by natural agents such as running water or wind. Gravel fractions greater than 0.06 mm will be liable for taxation. Moraine is not liable for taxation however moraine deposits are deemed to consist of gravel.
Current level or range of tax/fee/payment and structure	13 SEK/tonne of gravel
Exemptions or discounts	• In the case of gravel that has already been associated for tax and in cases where there has been a return of purchase. • If the gravel is used in maintenance, operations related to quarrying.
How has it changed over time?	Was increased from 5 SEK to 10 SEK/tonne in 2003.
Plans for future levels of the tax/fee/payment	
Critical analysis: problems, solutions, lessons learnt	The reduction in the consumption of gravel after it being liable for taxation has in turn increased the crushed rock consumption. However, the crushed rocks reported back in 2003 are speculated to include certain amounts of gravel. The challenge with furthering the use of crushed rocks is that it faces large production costs from quarrying and additional costs of transportation. The cost of gravel has increased by 25% from 2002 onwards because of its low availability. The cost of gravel is predicted to rise with the increasing demand.
Means of implementation	
Is it led /funded by producers or the government?	Led by the Government and managed by the Swedish Tax Agency.
Perceived costs of the instrument, both financial and administrative	
Key legislation	Law (1995:1667) on taxation for gravel

References (please add hyperlinks, if possible)	http://www4.skatteverket.se/rattsligvagledning/27571.html?date=2015-01-01#section1-1

Name of instrument	**Producer responsibility schemes for packaging**
Date introduced	1994
Nature of the scheme	Scheme stems from the "Polluter pays principle"
Scope	
Description	The producers who manufacture the packaging have the judicial and economical responsibility to manage the packaging after its use in an environmentally effective manner.
Targets of the scheme, including planned future targets	The goals for 2019 according to FTI are to recycle: - plastic packaging by a minimum of 30% - glass packaging by a minimum of 70% - metal packaging by a minimum of 90% - wood packaging by a minimum of 15%
Extent of coverage	
Target group	Packaging manufacturers, construction sites
Is it mandatory/legislative or voluntary?	Legislative
Type of waste/product for which it applies	Packaging as defined by the Swedish ordinance (2014:1073) and constituted of materials such as metal, glass, paper and wood. Other producer responsible materials related to CDW include bulbs.
Current level or range of tax/fee/payment and structure	
Exemptions or discounts	
How has it changed over time?	With time more materials will be included within the producer responsibility scheme.

Plans for future levels of the tax/fee/payment	
Critical analysis: problems, solutions, lessons learnt	The influence of the producer responsibility scheme for packaging is seems to have a small influence on the CDW as this scheme does not play a major role in the sorting of waste. And also the share of packaging waste in CDW is insignificant. However, the possibilities and allied infrastructure related to source-sorting are influential in increasing the recycling potential of valuable metals and plastic that otherwise land up in the blended waste fraction. It can be inferred that only materials with an established system of recycling and a market for the recycled products could be tied up to a producer responsibility scheme.
Means of implementation	
Is it led /funded by producers or the government?	The organization responsible for the nationwide collection and recycling of packaging is called FTI and comprises of packaging manufacturers from Sweden.
Perceived costs of the instrument, both financial and administrative	Costs incurred in recycling are managed by FTI from the income they earn from selling recycled material. The producers pay towards the recycling by means of packaging fees.
Key legislation	Ordinance (2014:1073) on producer responsibility for packaging
References (please add hyperlinks, if possible)	https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-20141073-om-producentansvar-for_sfs-2014-1073

6.6. United Kingdom

Name of instrument	**Landfill tax**
Date introduced	01-Oct-96
Nature of the scheme	Landfill Tax is an environmental tax (first tax to be introduced by the UK Government with an explicit environmental purpose) paid for the disposal of waste in licensed landfills.
Scope	Reduce the amount of biodegradable waste deposited to landfills.
Description	Landfill Tax is an environmental tax paid on top of normal landfill fees by any business, local authority or other organisation that wishes to dispose of waste in licensed landfills.

Targets of the scheme, including planned future targets	The Landfill Tax is viewed as a key mechanism in enabling the United Kingdom to meet its targets set out in the European Council Directive 1999/31/EC for the landfilling of biodegradable waste.
Extent of coverage	In all four countries of United Kingdom (England, Wales, Scotland and Northern Ireland) and for all types of waste deposited in licensed landfill sites.
Target group	Landfill site operators.
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	All types of waste deposited in licensed landfill sites.
Current level or range of tax/fee/payment and structure	Currently, the standard rate is £84.40 (£86.10 for Scotland) per tonne on "active waste" (such as plastic packing). A lower rate of £2.65 (£2.70 for Scotland) per tonne is paid on "inactive waste" (such as soils, naturally occurring rocks, ceramics, concrete, unused minerals, furnace slags and ash and low-activity inorganic compounds).
Exemptions or discounts	Waste removed from water (dredging), mining and quarrying waste, filling of quarries, waste from visiting NATO forces and pet cemeteries are exempt from the Landfill Tax.
How has it changed over time?	When the Landfill Tax was first introduced, its standard and lower rates were set at £7 and £2 per tonne, respectively. Both rates have been increased steadily since 1999.
Plans for future levels of the tax/fee/payment	Based on the steady increase of the Landfill Tax by the UK Government over the last 17 years, further increases (especially when it comes to the standard rate) are expected to take place in future.
Critical analysis: problems, solutions, lessons learnt	The increase of the Landfill Tax has been a major driver for increased CDW recycling. It made the option of landfilling certain types of waste including CDW more expensive compared to recycling. This generated more investment to the Waste Management, Recycling and Environmental Services industries.
Means of implementation	UK Government Legislation.

Is it led /funded by producers or the government?	The landfill site operator is responsible for paying the Landfill Tax. However, operators will pass the cost on to businesses and local councils on top of normal landfill fees. In addition, VAT is charged on the landfill fees and the Landfill Tax. In order to counteract the effects of the tax to landfill site operators (LSOs), the UK Government introduced the Landfill Communities Fund (LCF). LSOs can contribute money to the LCF which finances local community projects. LSOs contributing to the LCF are able to claim a credit (4.2% in 2016/17) against their landfill tax liability. The percentage is called the diversion rate and is set each year by Government. The credit LSOs are entitled to is 90% of their contribution to LCF. They then either cover the remaining 10% themselves or can ask an independent third party to make up the difference.
Perceived costs of the instrument, both financial and administrative	The landfill Tax is an environmental tax that has been beneficial in reducing waste impact on environment, changing public and business behaviour towards recycling and boosting the state revenue. However, its steady increase over time, may change its impact on the Waste Management, Recycling and Environmental Services Industries. In addition, there have been unintended consequences from its implementation such as a rise in the number of illegal waste sites, fly tipping and tax evasion [4].
Key legislation	The Landfill Tax (Amendment) Regulations 2016 (Statutory Instrument 2016 No. 376) [1]. Landfill Tax (Scotland) Act 2014 [2]. The Scottish Landfill Tax (Standard Rate and Lower Rate) Order 2017 [3]
References (please add hyperlinks, if possible)	[1]http://www.legislation.gov.uk/uksi/2016/376/pdfs/uksi_20160376_en.pdf [2]http://www.legislation.gov.uk/asp/2014/2/pdfs/asp_20140002_en.pdf [3]http://www.legislation.gov.uk/ssi/2017/23/pdfs/ssi_20170023_en.pdf [4]http://www.ciwm.co.uk/AsiCommon/Controls/BSA/downloader.aspx?iUniformKey=a925a966-a2bb-4800-b654-653cb257461b&iFileTypeCode=PDF

Name of instrument	**Aggregate levy**
Date introduced	01-Apr-02
Nature of the scheme	The Aggregate Levy is a specific one stage non-deductible tax. Unlike VAT, it cannot be reclaimed as input tax.

Scope	Encourage the recycling of aggregates.
Description	Aggregates Levy is an environmental tax that applies to the commercial exploitation of aggregate (digging, dredging or importing rocks, sand or gravel).
Targets of the scheme, including planned future targets	The Aggregate Levy is viewed as a key mechanism in enabling the United Kingdom to meet its targets set out in the European Council Directive 1999/31/EC for the landfilling of rocks, sand and gravel.
Extent of coverage	In all four countries of the United Kingdom (England, Wales, Scotland and Northern Ireland) and for anyone responsible for commercially exploiting aggregate in the UK.
Target group	Anyone who is responsible for commercially exploiting aggregate in the UK.
Is it mandatory/legislative or voluntary?	Mandatory
Type of waste/product for which it applies	Rock, sand and gravel.
Current level or range of tax/fee/payment and structure	The levy is charged at a flat rate of £2 for every tonne of aggregate extracted. It is also applied at a proportional rate for quantities less than a tonne.
Exemptions or discounts	According to HM Revenue & Customs, UK Government [1] Aggregates Levy is not due on any aggregate which: - Is moved between sites under the same Aggregates Levy registration. - Is removed to a registered site to have an exempt process applied to it.* - Is removed to any premises where China-clay or ball-clay will be extracted from the aggregate. - Has previously been used for construction purposes. - Is being returned to the land at the site from which it was won provided that it is not mixed with any material other than water. - Is won by an agricultural or forestry business from its own site and used in an unmixed state for the purpose of that business, on that same site or on land occupied with that site (that is, the same legal entity must be in occupation of both sites). Any aggregate brought in from another source will be subject to the normal rules of commercial exploitation and hence

liable to the levy, as will any aggregate won from the farm or forest which goes to a site other than one occupied by the same legal entity as the originating site. Any aggregate which is mixed with other materials to produce concrete, for example, will be liable to the levy in any event.

*Note: Any aggregate moved to an unregistered site to have an exempt process applied to it may be taxable but entitled to relief.

According to HM Revenue & Customs, UK Government [1] any material, more than half of which consists of the following substances is exempt from the levy:
- Clay, soil, vegetable or other organic matter.
- Coal, lignite and slate.
- Processing waste resulting from the separation of coal, lignite or slate from other aggregate after extraction (but not any other aggregate which was extracted at the same time).
- All spoil, waste or other by-products from any industrial combustion process or the smelting or refining of metal-for example, industrial slag, pulverised fuel ash and used foundry sand.
- Drill cuttings from oil exploration in UK waters, and from land drilling in the UK if licensed under the Petroleum Act 1998 or the Petroleum (Production) Act (Northern Ireland) 1964.
- Material arising from utility works, for example, laying gas or water pipes and phone lines, if carried out under the New Roads and Street Works Act 1991, the Roads (Northern Ireland) Order 1993 or the Street Works (Northern Ireland) Order 1995.

In addition, anything that consists completely of the following substances is exempt from the levy:
- China-clay waste and ball-clay waste (not including the overburden).
- Spoil from the processing after extraction of the industrial minerals.
- Aggregate arising from the ground on the site of any building or proposed building, which is removed exclusively for the purpose of laying its foundations, pipes or cables. It must be lawfully extracted within the terms of any planning consent.
- Aggregate necessarily arising from navigation dredging (for example, material removed from inland waterways such as the bed of any river, canal or watercourse (whether natural or artificial) including material obtained from the banks of canals and rivers. It may also be removed from the bed of any channel in or approach to any port or harbour (whether natural or artificial). It must have been dredged exclusively for the purpose of creating, restoring, improving or maintaining that river, canal, watercourse, channel or approach within the terms of any licence or other planning consent).

	- Aggregate necessarily arising from the ground in the course of excavations to improve, maintain or construct a highway or a proposed highway. (It must be won from the ground along the line or proposed line of the highway. This includes the land take approved by the planning authority, but not borrow pits nearby). - Aggregate necessarily arising from the ground in the course of excavations to improve, maintain or construct a railway, monorail or tramway. (It must be won from the ground along the line or proposed line of the railway, monorail or tramway. This includes the land take approved by the planning authority, but not borrow pits nearby). Notes: If the material is sorted into piles of exempt and taxable aggregate before being commercially exploited, levy will be due on the commercial exploitation of the pile of taxable aggregate. Mixing a quantity of taxable aggregate with a larger amount of exempt material, for example, slag, will not produce an exempt mixture but will mean that the levy is due on the taxable aggregate at the time of mixing. Conversely, mixing taxable aggregate with a smaller quantity of exempt material will not render the whole of the mix liable to the levy. The levy is due on the portion of taxable aggregate at the time of mixing. According to HM Revenue & Customs, UK Government [1] aggregate may be relieved (credit or repayment of levy) from the levy if it is: - Exported from the UK in the form of aggregate. - Used in an exempt process after the Aggregate Levy has been brought to account (but the spoil, waste, offcuts and other by-products resulting from the exempt process are taxable as aggregate if commercially exploited). - Used in a prescribed industrial or agricultural process. - Disposed of as waste in such a manner not constituting its use for construction purposes (this covers aggregate that is returned to its originating site unprocessed, removed to landfill or used for beach replenishment. The relief for disposal or dumping is allowed in these three circumstances only. If the aggregate is used as part of landfill site engineering, however, it would incur the levy unless used unmixed at the same site from which it was won. In addition, in specified circumstances, there may be relief for bad debts
How has it changed over time?	From 1 April 2002 to 31 March 2008 the levy was set at £1.60 per tonne. From 1 April 2008 to 31 March the levy was set at £1.95 per tonne. From 1April 2009 onwards the levy is set at £2.00 per tonne.

Plans for future levels of the tax/fee/payment	Since its introduction in 2002, the rate of the Aggregate Levy was increased twice by the UK Government. Further increases are expected to take place in future.
Critical analysis: problems, solutions, lessons learnt	The UK Government assumed that the Aggregate Levy would increase the market price of aggregates used in construction by an amount in line with the levy and hence provide recycled aggregate producers with a margin to cover the costs of making recycled aggregate from CDW. However, buyers (i.e. construction companies) of aggregates were well aware that the levy was not applied to the recycled aggregates and therefore expected their price to be lower than that of virgin aggregates. In addition, the levy was applied to the producer at the point of production, and not on the buyer at the point of sale. This gave the opportunity to the virgin aggregate producers to view the levy as an operational overhead and decide on how it would be allocated across their product range. Consequently, the market price of virgin aggregates used for concrete or asphalt (which face low levels of competition from recycled aggregates) increased at a higher rate than the levy. On the other hand, the market price of virgin aggregates used as sub-base course in highway construction (which face high levels of competition from recycled aggregates) increased at a lower rate than the levy [2].
Means of implementation	UK Government Legislation.
Is it led /funded by producers or the government?	Anyone who is responsible for commercially exploiting aggregate in the UK must register for Aggregates Levy and account for and pay the levy to the HM Revenue & Customs, UK Government.
Perceived costs of the instrument, both financial and administrative	Please see Critical analysis: problems, solutions, lessons learnt section above.
Key legislation	The Aggregates Levy (General) Regulations 2002 (Statutory Instrument 2002 No. 761) [3] The Aggregates Levy (General) (Amendment) Regulations 2010 (Statutory Instrument 2010 No. 642) [4].
References (please add hyperlinks, if possible)	[1] https://www.gov.uk/government/publications/excise-notice-agl1-aggregates-levy/excise-notice-agl1-aggregates-levy [2]http://ec.europa.eu/environment/waste/studies/deliverables/CDW_UK_Factsheet_Final.pdf [3]http://www.legislation.gov.uk/uksi/2002/761/pdfs/uksi_20020761_en.pdf

[4]http://www.legislation.gov.uk/uksi/2010/642/pdfs/uksi_20100642_en.pdf

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