Use of economic instruments

In a nutshell

Summary overview

It is BEMP to use economic instruments, to steer the behaviour of citizens and organisations generating waste towards more environmentally friendly results. Economic instruments can support:

- reducing the amount of waste generated or reducing the proportion of hazardous waste;
- encouraging preparation for reuse and recycling of waste; decreasing incineration and landfilling;
- improving product design (e.g. encouraging the use of recyclable materials in products).

The economic instruments related to waste management cover both incentives (positive economic signals, e.g. discounts, reward vouchers) and disincentives (negative economic signals, e.g. taxes, fees, penalties) and can take the form of:

- taxes and tax modulation, e.g. waste disposal tax, landfill tax, incineration tax;
- product levies (e.g. on plastic bags or construction aggregates);
- waste pricing, such as unit-based pricing and pay-as-you-throw (PAYT) schemes;
- deposit-refund schemes;
- extended producer responsibility schemes;
- others, e.g. tradable permits, recycling subsidies, VAT exemptions.

Waste management area

Cross-cutting	MSW - strategy	MSW - prevention	MSW - collection	MSW - EPR	MSW - treatment	CDW	HCW

Applicability

The regulatory framework and its enforcement are the main barriers for the application of economic instruments at local level.

In addition, the existence of environmental awareness, good management skills and innovation-driven behaviour at the local government level, with some good accounting practices, are prerequisites for the implementation of local economic instruments, which are complex to manage from the technical, managerial and social perspectives.

Specific environmental performance indicators

- Use of economic instruments at local level to stimulate good behaviour (y/n).
- Share of residents/businesses using a voluntary economic instrument (%).

Benchmarks of excellence

- Economic instruments set at local level in the form of taxes and tax modulation, product levies, waste pricing, extended producer responsibility schemes and deposit refund schemes are systematically implemented as a means to achieve the objectives set in the local waste management strategy.
- For local authorities, a deposit refund scheme for glasses, cups, dishes and cutlery is in place for all festivals and large public events organised in the territory of the local authority.

Description

Aim

This BEMP gathers useful information and practical examples of economic instruments that can be applied by mainly local authorities and, possibly, by waste management organisations, in charge of the introduction of economic instruments, with the main focus on the local scope of its implementation. Although most of the measures described are oriented to municipal solid waste (MSW), there are several existing mechanisms oriented for industrial wastes, represented here mainly by construction and demolition waste (CDW). The term ‘economic instruments’ refers to regional or national policies or regulations. Herein, the term ‘local economic instrument’ is used to refer to an economic instrument applied at local level.

Introduction

As for environmental policies in general, waste management also includes a mix of complementary measures such as regulatory, economic, educational and informative instruments (OECD, 2007; van Beukering et al., 2009). Economic instruments are designed to persuade households and waste producers to strive towards diverting waste from landfills, recycle more waste and optimise the use of resources in order to prevent the generation of wastes, and, at the same time, contribute to financing waste management activities. From the economic point of view, these instruments are preferable to direct regulation due to their greater efficiency. While the polluter pays the abatement cost of the generated impact from waste generation and treatment, the existence of a tax, a levy, etc. is a clear incentive for the polluter to search for new abatement options (van Beukering et al., 2009).

Economic instruments belong to national or regional waste policies, usually responding to their particular objectives, and most of them fall outside the scope of this document. Also, the application of economic instruments is not a textbook solution but a tailor-made set of tools that may result in different performances in different regions or countries. Several approaches, however, fall under the decision-making process of waste authorities in charge of municipal waste, and, only to a certain extent, to private organisations in charge of other commercial and industrial wastes.

The application of economic instruments has been repeatedly recommended (EC, 2003, 2005, 2007, OECD, 2004, 2007). Some of the main applied instruments are detailed below:

- Taxes, e.g.
    - waste disposal tax;
    - landfill tax;
    - incineration tax;
    - product levies (e.g. on plastic bags or aggregates).

- Waste pricing, such as
    - unit-based pricing and pay-as-you-throw schemes;
    - differential and variable rates;
    - variable fee or charge systems.

- Deposit refund schemes.
- Extended producer responsibility systems.
- Others, such as:
    - tradable permits;
    - recycling subsidies;
    - VAT exemptions;
    - extension of depreciation periods;
    - positive incentives.

In general, economic instruments aim at:

- reducing the amount of waste generated;
- reducing the proportion of hazardous waste;
- improving product design;
- encouraging recovery, reuse and recycling of wastes;
- decreasing incineration and landfilling;
- minimising adverse environmental impacts related to solid waste collection, transport, treatment and disposal systems;
- encouraging the use of recyclables in products; and
- generating revenues to cover costs.

In any case, the economic instruments are implemented to link the cost of waste treatment charged to the waste generator (the citizen or the organisation) with the real amount of waste generated, i.e. by charging per unit of waste, charging for the consumption of avoidable products, and rewarding desirable practices.

Economic instruments applied to commercial and industrial wastes are essentially different from those applied to municipal solid waste. For example, unit-based pricing per type of treatment is a standard practice by waste service providers for CDW and HCW. However, MSW fees from public authorities are constant in many cases, independently of the amount generated by each citizen, due to the high dispersion of a large number of producers.

Local instrument for the management of MSW

Pay-as-you-throw (PAYT). In terms of municipal waste treatment, the economic instrument that works best is the pay-as-you-throw scheme. A specific BEMP on PAYT for MSW can be found in this report.

Recycling incentive schemes. Formally speaking, financial incentives include both rewards (to be described here as recycling incentives) and charges (defined here as pay-as-you-throw, and deposit refund schemes). But it is commonly accepted that recycling incentives schemes are essentially different from PAYT schemes. They consist of payments or rewards given to the users to encourage people to recycle more, typically with vouchers for individuals, vouchers for communities or payments to individuals (Holmes et al., 2014). In addition to direct incentives in the form of vouchers, an

effective recycling incentive is also the reduction of waste fees for residents willing to separate more waste at source (e.g. accepting a new more advanced waste collection system) or when waste recycling targets at local level are achieved. Most of the examples that are applied in Europe are pilot schemes or partial coverage schemes implemented after the success of the pilot trial. Of these, some selected case studies are described in this document. It is important to note the following:

- Legal regulation at local level is a key factor for their implementation. While recycling incentive schemes are usually acceptable, PAYT has certain legal connotations that make its implementation difficult in particular regulatory environments. This is the case of the UK, where the debate is ongoing.
- Behavioural aspects need consideration. PAYT addresses the whole range of awareness levels, while reward schemes are generally oriented to recyclers. The study by Holmes et al. (2014) showed that “regardless of the reward type, personal or community, the majority of respondents claimed they already recycle as much as possible”. However, a greater proportion of householders are likely to recycle more when rewarded individually.
- They tend to be self-funded. Some schemes are applied along with other measures to increase their efficiency. For instance, the 'Cash for Trash' scheme in the Netherlands applies increased charges to the final users, which is believed to have a significant impact on the results (OECD, 2015).

Given the right conditions (see applicability), recycling incentive schemes can be considered a best environmental management practice, due to their performance and costs. It is, however, difficult to benchmark such a system against PAYT, as their scope and applicability differ.

Local deposit refund schemes. A deposit refund scheme consists of a 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, 2014). In the understanding of Ferrara (2008), deposit refund schemes are generally identified as the most effective option to improve the rate of recycling and they have been successfully applied to beverage containers, so their use is considered a best environmental management practice (Hogg et al., 2010; Schoenberger et al., 2013). However, their implementation goes beyond the municipal or county level, the usual geographical scope for the techniques described in this document. Municipalities, however, can run their own deposit refund schemes or impose the use of one. Some examples are shown below:

- A deposit is charged for portable batteries by the local government of Osthamar, Sweden (OECD, 2014), achieving a capture rate close to 100 %.
- Police regulation, e.g. City of Schwäbisch Gmünd (2005), Germany: mandatory deposit of at least EUR 2.00 for glasses used during the city festival.
- Waste management statutes, e.g. City of Nuremberg (2009), Germany: § 7 of the waste management statutes prescribes for all events in public institutions and on any parcel of land belonging to the city of Nuremberg, including public transport areas, the use of reusable containers and reusable cutlery, supported by a deposit.
- Participation conditions/city market rules, e.g. City of Reinheim (2012), Germany: participation conditions/regulation for Christmas market: prohibition of single-use tableware, mandatory use of reuseable glogg cups, mandatory deposit of at least EUR 1.00, or City of Graz, Austria: charge of EUR 1.00 per beverage containers in football stadiums to limit littering.
- **Construction and demolition waste and healthcare waste**

As this BEMP refers to cross-cutting issues, it is worth mentioning the different approaches to several economic instruments for different types of wastes. CDW management contracts include a fee per unit of collected volume, which varies for different fractions, the most expensive being for the mixed waste fraction (up to EUR 100 per tonne) compared to metals or clean concrete (from EUR 5 to EUR 25 per tonne). A very similar approach is observed in the management of HCW: the waste contractor usually charges the waste treatment cost per bin or container in which the waste is collected and stored. So, the healthcare organisation producing the waste may consider the implementation of best practices in its in-house waste management system to reduce costs.

For commercial and industrial waste, the business-to-business (B2B) approach is successfully applied. The existence of a B2B deposit refund scheme is sometimes a common practice for highly reusable packaging, like pallets, construction packaging, drums and others (Lundesjo, 2011; WRAP, 2008), and these practices have extensively reduced the amount of

waste generated, e.g. at construction sites. Although waste managers are not involved in this particular approach, they are key in the management of the required reversed logistics, e.g. in the London Construction Consolidation Centre, partially run by the local government through Transport for London, and operating under a deposit refund scheme (WRAP, 2010).

Some municipalities have applied traceability requirements of CDW in their local licensing. All municipalities in Spain charge a deposit for the estimated amount of wastes reported in the site waste management plan, and it is an essential requirement for the operating licenses. The deposit is repaid to the contractor when “waste management certificates” are submitted to the authority. This deposit system managed by municipalities has the potential to become a BEMP, but its current performance is far from such consideration due to the following reasons:

- It is oriented towards avoiding illegal dumping. Direct landfilling of mixed waste is accepted as a correct management treatment, and is eligible for deposit return; this would not lead to best performance.
- Legally, municipalities do not need to issue permits for their own construction sites. The waste management deposit then becomes voluntary.
- The lack of enforcement affects the performance of the scheme. While large construction companies and contractors were already applying BEMP without the deposit, small producers are still failing to fulfil this practice.

Other successful economic instruments for CDW or HCW are applied at national or regional level. For instance, HCW extended product responsibility schemes, e.g. for waste medicines, or CDW product levies, e.g. adaptation of VAT for natural or recycled aggregates.

Environmental benefits

Municipal solid waste

The performance of several case studies on the application of local economic instruments in municipalities is shown in Table 1.

Table 1. Examples of reward schemes and PAYT performance[1]

Municipality or county	Instrument	Results	Additional comments	Reference
Bracknell Forest, UK	Recycling incentive scheme	Enhanced public perception and wide acceptability of recycling Increase of a total of 1 000 tonnes of recyclables in one year of implementation (around 91 kg per household per year)	Urban, all recyclables	BFC, 2012; BFC, 2015
Torelles de Llobregat, ES	Pay-as-you-throw, unit-based	Increase of separately collected materials from 33 % to 89 %, reduction of mixed waste by 38 %	Urban, all waste streams	OECD, 2006
Landkreis Schweinfurt, DE	Pay-as-you-throw, weight-based plus fixed fee	Total waste collected reduced by 28 %, and mixed waste reduced by 46 %	Urban, all waste streams	OECD, 2006
Ghent and Destelbergen, BE	Pay-as-you-throw, volume- and unit-based	Total waste arisings reduced, but not only attributable to PAYT	Urban, all waste streams	OECD, 2006
Valongo and Gondomar, PT	Recycling incentive scheme at drop-off sites (collection centres)	Paper and cardboard increased by 14 %, plastic 9 %, glass 75 %, batteries 24 % and used cooking oils 74 %.	Urban, waste streams at 2 collection centres	R4R, 2014a
Limerick, Clare, Kerry regions, IE	Pay-as-you-throw, weight system	Reduction of mixed waste from 79 % to 65 %, and increase in collection of recyclables from 21 % to 32 %	Urban and rural, all waste streams	R4R, 2014b
Aschaffenburg, DE	Pay-as-you-throw, weight system	Increased collection of recyclables up to 86 %, decrease of mixed waste disposal costs, reduction of residual costs down to around 50 kg per capita per year	Urban and rural, all waste streams	See best practice on Pay-As-You-Throw

Table 1. Examples of reward schemes and PAYT performance[1]

Municipality or county	Instrument	Results	Additional comments	Reference
Rotterdam, Barendrecht and Krimpen aan den Ijssel, NL	Recycling incentive system	Increased collection of 24 % (total waste), reduction of mixed waste of 37 %	Called 'Cash for Trash', rewards are cash paid directly back to citizens	OECD, 2015
Bradford, Aire Valley Recycling, UK	Recycling incentive scheme	Increase of 36.5 kg of recyclables collected per participant per year	Urban, all recyclables	Defra, 2013
Bath and North Somerset, UK	Recycling incentive scheme	Increase of 57 kg of recyclables per participant per year	Urban and rural, all recyclables	Defra, 2013
Birmingham, UK	Recycling incentive scheme	Increase of 5.2 kg of recyclables per participant per year	Urban, paper and cardboard	Defra, 2013
Gloucestershire, UK	Recycling incentive scheme	No increase or decrease of recyclables per participant per year	Urban and rural, all recyclables	Defra, 2013
Norfolk, UK	Reuse and recycling incentive scheme	Increase of 99 kg of reusables and recyclables per participant per year	Urban and rural, implemented through reuse shops	Defra, 2013
Student association in Bristol, UK	Recycling incentive scheme	Increase of 57 kg recyclables per participant per year	All recyclables	Defra, 2013
Preen Community in Bedfordshire, UK	Reuse incentive scheme	Increase of 67 kg recyclables and reusables per participant per year	Urban and rural, implemented through reuse shops	Defra, 2013
Westminster, UK	Recycling incentive scheme	No increase or decrease of recyclables per participant per year	Urban, all recyclables	Defra, 2013

Benefits in B2B deposit schemes for CDW

WRAP (2012) studied the environmental benefit of two different approaches for the reuse of three very common packaging items used for construction products: pallets, plastic folding boxes and bulk bags. Deposit refund schemes were used and waste collectors were involved in the application of reverse logistics (i.e. products to be reused are also transported by the waste manager). The results were compared to a hypothetical 100 % recycling scenario for the wood and plastic of the packaging materials, and CO_2 savings were calculated along with the theoretical minimum number of trips required to achieve those emission levels (Table 2). It can be seen that the performance of reverse logistics is significantly better.

Table 2. Greenhouse gas emissions savings and minimum number of trips of reusable packaging compared to single-use packaging (WRAP, 2012)

Packaging	Reverse-logistics		Separate collection and return	
	CO_2e savings	Minimum trips	CO_2e savings	Minimum trips
Trademarked pallets	81 %	2.3	38 %	3.4
Plastic folding boxes	50 %	10	15 %	15
Reusable bulk bags	85 %	1.2	75 %	1.2

[1] The most practical definition of “mixed waste” from the perspective of waste authorities in this BEMP is the remaining fraction of unsorted waste destined for disposal (e.g. incineration), either at the time of collection, or at the time of being sent to final treatment when the waste management company is involved in subsequent sorting (e.g. in sorting plants following co-mingled collection, or in mechanical and biological treatment plants).

Side effects

The risk of illegal dumping increases when applying economic instruments to MSW (van Beukering et al., 2009), but the associated costs of littering management seem to be much lower than the savings that economic instruments could bring. Waste authorities relatively isolated in the application of PAYT in their geographical area for example may have a *waste tourism* effect, i.e. disposing of waste to other neighbouring regions without similar charge systems.

Applicability

The regulatory framework and its enforcement are the main barriers for the application of some local economic instruments described in this section. Some countries, such as the UK or Greece, do not allow (or do not *facilitate*) the implementation of variable waste collection rates based on generated waste per household. For those countries, positive incentives are considered to be the best option.

In addition, the existence of environmental awareness, good management skills and innovation-driven behaviour at the local government level, with some good accounting practices, are prerequisites for the implementation of local economic instruments, which are complex to manage from the technical, managerial and social perspectives.

Economics

A study from the OECD for pay-as-you-throw, and a Defra study on recycling incentive schemes showed that, in general terms, the social benefit of local economic instruments in the monitored case studies is positive and justify their implementation. However, the studies point out that when the cost of treatment is low (e.g. cheap landfilling), the waste management system running costs are higher than for conventional waste management (see case studies described in Operational data).

Costs of implementation of pilot recycling incentive schemes in the UK

The study from Defra (2013) was performed on several case studies. Table 3 (below) shows the costs of the different systems. Bracknell Forest, shown in Operational data, was one of the funded municipalities but not included in the first reported assessment by Defra. Conclusions from the study and the cost efficiency of the system are to be published by Defra. The costs shown in Table 3 do not include revenues from produced secondary materials; the balance has yet to be assessed and studied. The county of Norfolk and the Bristol students' association case studies refer to reuse shops that also produce recyclable materials.

Table 3. Disclosure of costs for Defra’s pilot recycling scheme case studies in the UK (Defra, 2013)

	Cost breakdown												
Municipality	**Capital cost**	**Opportunity cost**	**Staff costs**	**Rewards**	**Communication**	**Monitoring and evaluation costs**	**In-kind contributions**	**Volunteers**	**Participants**	**Households**	**Total cost (GBP)**	**Cost per participant or household (GBP)**	**Potential cost per participant or household (GBP)**
Bradford, Aire Valley Recycling, UK	0%	0%	57%	8%	14%	12%	2%	5%	-	637	33 144.00	52.03	20.06
Bath and North Somerset, UK	15%	11%	25%	10%	5%	31%	3%	0%	-	3 866	104 116.00	26.93	20.49
Birmingham, UK	24%	0%	23%	6%	8%	38%	0%	0%	-	3 426	63 500.00	18.53	14.46
Gloucestershire, UK	2%	10%	17%	2%	11%	58%	0%	0%	-	7 008	60 343.00	8.61	5.96

Norfolk County, UK	0%	12%	5%	48%	33%	2%	0%	0%	258	-	27 371.00	106.09	
Student association in Bristol, UK	0%	7%	56%	6%	2%	28%	1%	0%	2 710	-	65 338.00	24.11	5.76
Preen Community in Bedfordshire, UK	0%	0%	21%	21%	55%	0%	3%	0%	7 505	-	61 240.00	8.16	5.83

N.B. Opportunity costs are those staff costs involved in the programme but not on a full-time basis. In-kind contributions include also stakeholders' contributions and volunteers unless disclosed in the volunteers column.
Final results and cost efficiency of the scheme yet to be published.

Driving forces for implementation

Cost saving is a main driving force of economic instruments, along with the improvement of performance of waste management systems and the derived environmental benefits. The amount of waste is not reduced through these economic instruments, so waste prevention cannot be considered a driver of implementation, except for those B2B schemes and deposit refund systems applied in the industry. Recycling incentive schemes are also very popular among citizens and tend to give an environmental reputation to the local government.

Reference organisations

Supra-municipal organisations:

- Defra, on the study of the performance of recycling incentives schemes.
- LIPOR, on the application of recycling incentive schemes.
- ACR+, on the study of economic instruments.
- WRAP, on the application of B2B schemes.

Municipalities applying an economic instrument:

- Recycling incentive schemes:
    - Rewards: Bracknell Forest (UK), Valongo and Gondomar (PT).
    - ‘Cash for Trash’: Rotterdam, Barendrecht, Krimpen aan den Ijssel (NL).
    - Reduction of waste tax fee to residents source separating waste: villages in Mallorca.

- Deposit refund schemes at events:
    - Directly applied: Graz (AT).
    - Locally regulated: Schwäbisch Gmünd, Nuremberg, Reinheim (DE).

B2B approaches:

- BEMP: London Construction Consolidation Centre (UK).

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