



# The Role of Fiscal Incentives in the Transition to a Circular Economy: The Case of Regione Emilia-Romagna

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## Key messages

- Public policies for waste regulation, particularly fiscal levers, can enable transition to a circular economy, but require public acceptance.
- As a result of dedicated policies, climate factors for landfill were reduced by 65 per cent in Emilia-Romagna between 2008 and 2015.
- An additional reduction of up to 25 per cent could be achieved by 2020 following introduction of an innovative regional waste tax in 2015.
- This waste tax is additional to household 'pay as you throw' and incentivises municipalities to develop efficient waste management systems.
- Replicating this model requires effort from municipalities towards shared responsibilities in land-use, resource valorisation and climate.

## Introduction

It is estimated that improving resource efficiency could lead to overall savings of €630 billion per year for European industry.<sup>1</sup> In addition to such economic gains, making the transition to a circular economy would have many social and environmental benefits.

Emilia-Romagna is a region in northern Italy where approximately 4.4 million people live within about 300 municipalities. In 2015, the gross domestic product for the region was more than €146 billion (€33,200 per capita), with a high export share of 37.5 per cent. That year, Emilia-Romagna

introduced a fiscal system to reward municipalities for good performance in waste management. This fiscal lever was additional to the 'pay-as-you-throw' (PAYT) mechanisms applied at household level and, like most changes in fiscal policy, required a high level of public acceptance to ensure its success.

This *Insight* presents the research activities undertaken by the University of Bologna, an Italian Climate-KIC partner, to examine urban waste systems in Emilia-Romagna prior to the introduction of this novel waste tax. This region was chosen because it is an example of good practice within Italy regarding the use of fiscal levers for environmental purposes. To facilitate the replication of similar mechanisms elsewhere

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in Italy and Europe, this case study reflects the socio-political aspects of transforming Emilia-Romagna's waste management system and how the scheme gained public acceptance.

## Waste management in Emilia-Romagna

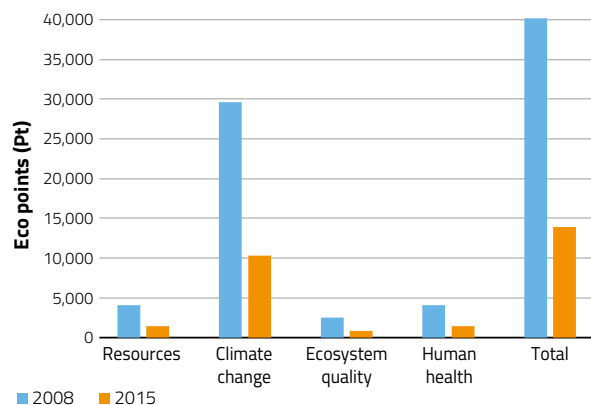
Between 2008 and 2015, some municipalities introduced voluntary, separate collection of organic waste, plastics and other packaging, in addition to the standard collections of paper and glass. This system helped to increase the weight of separate waste collected from 45 per cent to about 61 per cent of total waste. In addition to the change in the collection system, the increase was due to appreciation among the municipalities of the economic advantages of recycling and a rise in public awareness of the negative impacts of existing waste disposal systems.

By 2015, regional urban waste management cost approximately €1 billion per year for around 3 million tonnes of urban waste, including collection, preparation for recycling and disposal. Figure 1 illustrates the trend towards a reduction in unsorted waste and amount going to landfill.

## Assessing the climate factors of the region's waste systems (2008–2015)

Using a streamlined life-cycle assessment (LCA), the team assessed the environmental impact of the reduction in landfill waste between 2008 and 2015, and inferred the potential effects of the waste tax introduced in 2015. LCAs are used widely by decision makers in the context of integrated waste management;<sup>3</sup> for example, Emilia-Romagna used LCA in its waste plan to evaluate different combinations of incinerators and landfill before implementing the new system. LCA could also be used elsewhere to motivate replication of such schemes.

**Figure 2. Damage categories related to the overall urban waste production, computed by a streamlined LCA in Eco points, for 2008 (blue bar) and 2015 (orange bar)**



Source: Eco-indicator 99 and IMPACT2002 systems (see box)

## Results of streamlined LCA (2008–2015)

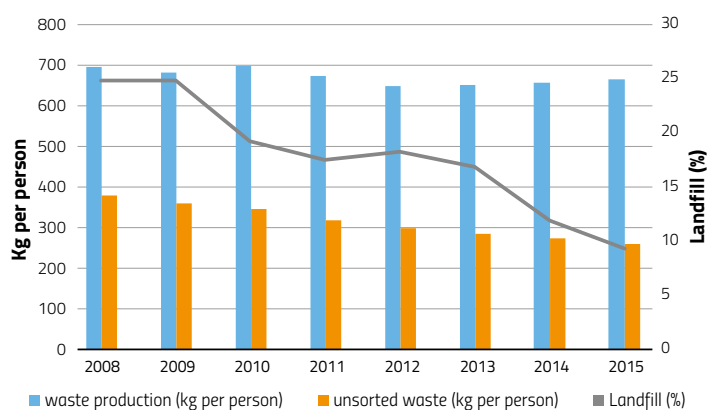
Between 2008 and 2015, the weight of urban landfill waste reduced from 720,000 to 250,000 tonnes. There was a remarkable reduction in environmental impacts, as shown by a 65 per cent reduction in all damage categories (see Figure 2 and box on page 3). Among these, the category of climate change is particularly worth noting, since the increase in recycling avoided more than 3 million tonnes of CO<sub>2</sub> equivalent emissions.

To complement the LCA, the authors analysed the land use implications of the waste produced between 2008 and 2015, since land is a non-renewable resource and is affected directly by waste management choices. Land use management and transformation<sup>4</sup> are important issues for Emilia-Romagna, a densely-populated region where land is a valuable economic, social and environmental commodity. Land analysis, assuming average values for landfill depth and density, suggested that 30,000 m<sup>2</sup> of land was saved during this period and therefore available for agricultural or other purposes.

## New fiscal mechanism introduced in 2015

Despite the progress made between 2008 and 2015, Emilia-Romagna introduced an innovative fiscal lever at municipal level (including rewards and taxes) in the form of a regional law<sup>5</sup> to further reduce waste disposal. The municipalities are assessed on the amount of unsorted waste per equivalent inhabitant, which takes into consideration tourists and commuters. The reward is based on a fund of about €11 million, including €5.5 million to reward municipalities where residual waste is below the

**Figure 1. Urban waste production (blue bar), unsorted waste production (orange bar) and use of landfill (grey line) in Emilia-Romagna, 2008–2015**



Source: Adapted from data in Report of ARPAE<sup>2</sup>

## Impact factors used in streamlined LCA and corresponding damage categories

We chose the following four impact factors because of their link to climate change and relevance to waste disposal.

- Non-renewable energy sources represent the additional greenhouse gas emissions produced by burning fossil fuel, expressed in megajoules (MJ).
- Global warming potential (GWP)<sup>6</sup> represents the greenhouse effect of main pollutants for 20, 100 or 500 years and is expressed in CO<sub>2</sub> equivalent emissions.
- Terrestrial eco-toxicity represents the potential impact on soil caused by chemical agents released into air, water, and soil, expressed in amount of equivalent triethylene glycol per kg of soil.
- Respiratory inorganics represents the health hazard caused by inorganic pollutants released into the air, expressed in kg of particulate matter of diameter 2.5 microns or less (PM 2.5).

Each impact factor corresponds to the four damage categories illustrated in Figure 2, normalised in Eco points (Pt), according to EU assessment standard methodologies as Eco-indicator 99 and IMPACT2002 systems. These systems are 'damage oriented' impact assessment methods and evaluate the effects of any kind of activity, process or service in terms of natural resources depletion, climate change, ecosystem degradation and human health risks.

average; €4.5 million for waste reduction projects; and €1 million for reuse centres, available to all municipalities. The fund structure represents a trade-off, but reflects the fact that Emilia-Romagna's municipalities are at different stages in their improvement journey. The fund is financed partly by a landfill tax (40 per cent of the fund) and partly by a contribution divided equally between all the citizens in the region.

Results thus far are promising; in 2016, 75 municipalities (about 22 per cent) were rewarded, since their production of unsorted waste was 70 per cent below average. The reduction in unsorted waste ranged from €3 to €8 per capita with the weight of unsorted waste per equivalent inhabitant ranging from 65 to 100 kg for some pioneering municipalities, in contrast with the current average unsorted waste for municipalities within the region, which is closer to 90 to 165 kg per equivalent inhabitant. It is anticipated that within ten years, the waste tax could reach its target of substantially reducing the average unsorted waste weight per equivalent inhabitant. If this is achieved, landfill could be non-existent by 2026, with accompanying incineration reduced to 675,000 tonnes per year. The streamlined LCA assessment of the waste system (2008–2015) discussed above would also suggest that all damage categories could be reduced by a further 26 per cent.

## Implications and guidance

Fiscal levers are an effective tool to support the transition to a circular economy; however, since altering fiscal policies can result in unpredictable changes in the socio-economic context, it is important to ensure positive public acceptance.<sup>7</sup> The idea of a specific tax on waste came originally from local communities and environmental associations, who signalled that there was an appetite for more progressive change. They realised that voluntary reductions in landfill waste had almost reached a maximum, and that there was growing awareness of the negative impacts of waste disposal on land and human health.

While no explicit public engagement process was established to gain acceptance of the new fiscal mechanism, Emilia-Romagna citizens were involved in the broader consultation process associated with implementing the regional law. Between 2011 and 2014, 27 municipal councils and one provincial council (representing about 25 per cent of the population in the region) discussed and approved the main foundations of the regional law. Following further discussions with all municipalities and the regional government, the regional law was approved in 2015.

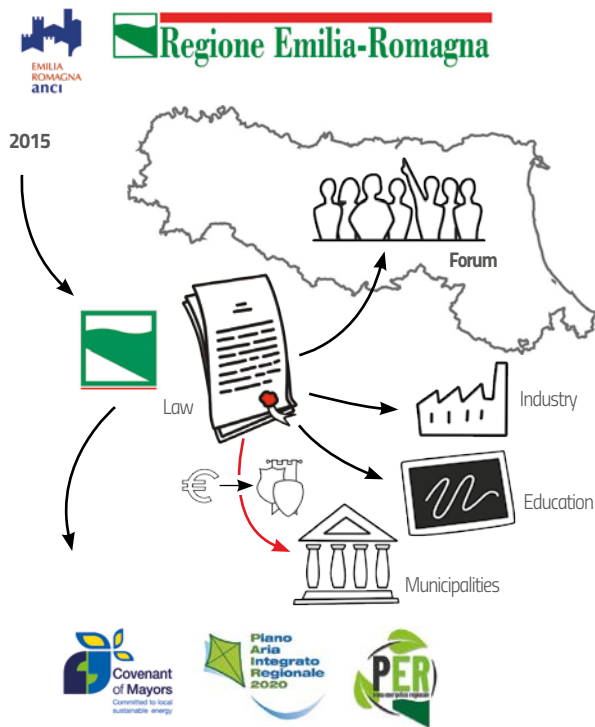
Throughout this process, environmental associations ensured that citizens were kept abreast of proposed changes. They presented the main foundations of the regional law at several public events, and these were reported in local newspapers. Citizens gave feedback on the main foundations of the law by engaging in environmental associations, posing questions to councillors at public events, and writing to directly elected members of municipal councils.

The active participation of citizens was maintained by having a permanent forum including regional government and municipalities, and this facilitated implementation of the waste tax and verified its results. Since the reward fund represented only 1 per cent of the annual waste costs, the overall taxation level did not change substantially. These factors contributed to the lack of public resistance to the fiscal change and helped prevent informal disposal of waste, which thus far has not increased. The participatory process led to the permanent forum being opened up to include stakeholders from industry, environmental associations and education institutions (see Figure 3).

From an economic perspective, there were fears that reducing waste would lead to a loss of jobs. In fact, the dedicated waste tax has indirectly increased sustainable industrial development. Several public and private firms have established facilities to recycle the separated waste, which has increased by around 430,000 tonnes (30 per cent).

A key benefit of the new fiscal mechanism is that it guarantees an increasing quantity of separated waste in the future and this will foster new investment and higher-income

**Figure 3. Regione Emilia-Romagna Circular Economy Stakeholder Network**



Source: ANCI ER<sup>10</sup> and Regione Emilia-Romagna - Creative Commons License.

employment associated with recycling in comparison with landfill management.<sup>8</sup> More than 8,000 job contracts are expected to be created by 2020 within around 1300 regional companies, representing a total annual turnover of €4 billion.<sup>9</sup>

## Conclusion

Retrospective LCA analysis of the evolving Emilia-Romagna waste management practices between 2008 and 2015 illustrated that impacts on land use and climate change were reduced by 65 per cent through voluntary mechanisms. This suggests that suitable practices can significantly reduce the impact of waste management on climate change.

The impact of the new fiscal mechanism introduced in 2015 needs to be monitored and assessed to verify whether Emilia-Romagna's new approach, based on waste taxation and a reward fund, outperforms models implemented in comparative regions based on landfill taxes, PAYT and gate fees only. The new mechanism seeks to foster more proactive behaviour from individuals within communities and municipalities in the region. To replicate this mechanism within other regions in Italy and across Europe will require efforts at municipal level to increase awareness and share

responsibilities among citizens, waste management companies and municipalities towards land-use, resource valorisation and climate change impacts.

## Endnotes


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The University of Bologna is one of the oldest in the world and currently has about 85,000 students in five campuses. An important teaching and research mission relates to developing innovative technologies for environment and climate change, supporting urban resilience and the transition to a sustainable 'low carbon' future.

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