

Supplementary Materials

Table S1: Questionnaire

A) City characteristics	
<i>Question</i>	<i>Answer Type / Options</i>
1) Name of the city & country you are based in.	Open
2) Indicate the institution(s) responsible for your city's waste management (for administration, collection and processing).	Matrix: Waste administration, (Bio-)waste collection, Bio-waste processing/ Department of the city, City districts, Company owned or shared by the city, Private company, Other
3) Please indicate any national or regional legislative frameworks that are relevant for your (bio-)waste management practices such as waste collection and waste charges. Please provide weblinks to websites if applicable.	Open
4) Does your city have separate collection and recycling processes of bio-waste in place? As a reminder: the EU Waste Framework Directive (2018/851) requires all member states to have implemented bio-waste separate collection or separation and recycling at source by 31 December 2023.	Yes/No + Open Explanation
B) Bio-waste collection system	
1) Please describe how bio-waste collection is organised in your city, addressing the following aspects. - Type of bio-waste collected (e.g. kitchen and garden waste from households, food waste from businesses, green waste from gardens and parks) - Type of collection system (e.g. door-to-door, street containers, bring points) - Collection frequency	Open
2) Generally, is separate bio-waste collection mandatory or voluntary for households and businesses? Please explain in case of exemptions i.e. only households with gardens are required to collect bio-waste separately.	Mandatory/Voluntary + Explanation
3) What percentage of households and businesses participate in separate bio-waste collection?	Numeric (%)
4a) What is the quantity of bio-waste produced and collected per year? (tons per year)	Numeric (t/a)
4b) What is the quantity of residual waste produced and collected per year? (tons per year)	Numeric (t/a)
5) Following separate collection, how is your bio-waste treated subsequently? Please indicate in what kind of facilities bio-waste is processed and what percentage of the collected bio-waste is treated there.	Open
6) Do you measure the quality of your collected bio-waste? If yes, please indicate your quality assessment method and an average value of the quality measured (e.g. in percent of impurities).	Open
C) Waste charging system	
1) Please describe your city's waste charging system for households (and businesses) in detail. Provide details for both residual waste and bio-waste, considering the following: - Type of waste charge (e.g. flat fee, tax-based, variable fee based on weight/volume/frequency, basic fee depending on property	Open

<p>size, household size etc.)</p> <p>- Is there a separate charge for bio-waste? If so, how is it calculated?</p> <p>If you are unsure how to describe your waste charging system, please consider the table in the Appendix listing the most common attributes of waste charging systems.</p>	
2) Are there financial incentives for home composting? Please describe.	Open
3) Are there any other financial incentives to improve (bio-) waste separation and/or overall waste reduction? Please describe.	Open
4) Is it possible to enforce financial penalties in case of misbehaviour? If yes, please describe what kind of penalties and when they are applied.	Open
5) According to your legal outline: Who is liable for the waste charge to be paid (e.g. houseowner, property owner, tenant)?	Open
D) Costs	
1a) What is the total cost of bio-waste management (collection & processing)?	Numeric (€)
1b) What is the total cost of residual waste management (collection & processing)?	Numeric (€)
1c) If you cannot share information on the costs incurring for waste management, please indicate the proportion of bio-waste costs versus residual waste costs, i.e. whether they are higher or lower, at a ratio of 1:x	Ratio or Open
2) How is your bio-waste management financed (i.e. through bio-waste fees, partly through residual waste fees, income through the sale of products made from bio-waste etc.)?	Open
E) Conclusion	
1) How effective would you rate your waste charging system in promoting separate bio-waste collection at satisfactory quality? Please answer on a scale from 1 (not effective) to 5 (extremely effective)	Scale 1–5
2) Please explain your rating by considering the following: - Which aspects of the charging system are working particularly well? - Which aspects need improvement?	Open
3) Are there any mechanisms that you consider to be equally or more effective than waste charging systems in promoting high-quality biowaste separation? (i.e. education and awareness campaigns, citizen involvement etc.)	Open
Would you be willing to participate in a short follow-up interview with a particular focus on sections C and E about your city's opportunities and challenges regarding high-quality bio-waste collection and waste charging systems?	Yes/No

Table S2: Pearson's Correlations

Pearson's Correlations

		Pearson's r	p
Population density	- Bio-waste quantity per capita	-0.579	.004

Pearson's Correlations

		Pearson's r	p
Number of inhabitants	- Bio-waste total	0.853	< .001

Table S3: Descriptive Statistics

Descriptive Statistics

	Bio-waste per capita			
	PAYT	Flexible+	Flexible	Flat fee
Valid	7	8	2	6
Missing	0	0	0	0
Mean	125.0	59.60	86.17	25.46
Std. Deviation	62.31	26.48	88.86	16.71
Minimum	41.50	32.56	23.34	0.859
Maximum	199.9	102.3	149.0	44.23

Descriptive Statistics

	Residual waste per capita			
	PAYT	Flexible+	Flexible	Flat fee
Valid	7	8	2	6
Missing	0	0	0	0
Mean	122.2	190.4	192.6	300.5
Std. Deviation	55.18	63.66	138.1	162.7
Minimum	55.18	85.10	94.95	142.5
Maximum	199.9	262.2	290.3	574.4

Table S4: Group comparison of charging systems for bio-waste

ANOVA - Bio-waste per capita

Cases	Sum of Squares	df	Mean Square	F	p
Waste charging type	34,292	3	11,431	5.793	.005
Residuals	37,492	19	1,973		

Note. Type III Sum of Squares

Kruskal-Wallis Test

Factor	Statistic	df	p	Rank ϵ^2	95% CI for Rank ϵ^2	
					Lower	Upper
Waste charging type	10.23	3	.017	0.465	0.220	0.854

Dunn's Post Hoc Comparisons - Waste charging type

Comparison	z	W_i	W_j	r_{rb}	p	p_{bonf}	p_{holm}
PAYT - Flexible+	1.587	17.57	12.000	-0.643	.112	.675	.450
PAYT - Flexible	1.025	17.57	12.000	-0.429	.306	1.000	.721
PAYT - Flat fee	3.199	17.57	5.500	-0.857	.001	.008	.008
Flexible+ - Flexible	0.000	12.00	12.000	0.000	1.000	1.000	1.000
Flexible+ - Flat fee	1.775	12.00	5.500	-0.750	.076	.456	.380
Flexible - Flat fee	1.174	12.00	5.500	-0.500	.240	1.000	.721

Note. Rank-biserial correlation based on individual Mann-Whitney tests.

Table S5: Group comparisons of charging systems for residual waste

ANOVA - Residual waste per capita

Cases	Sum of Squares	df	Mean Square	F	p
Waste charging type	103,752	3	34,584	3.318	.042
Residuals	198,034	19	10,423		

Note. Type III Sum of Squares

Kruskal-Wallis Test

Factor	Statistic	df	p	Rank ϵ^2	95% CI for Rank ϵ^2		Rank η^2	95% CI for Rank η^2	
					Lower	Upper		Lower	Upper
Waste charging type	6.756	3	.080	0.307	0.129	0.747	0.198	0.000	0.683

Dunn's Post Hoc Comparisons - Waste charging type

Comparison	z	W _i	W _j	r _{rb}	p	p _{bonf}	p _{holm}
PAYT - Flexible+	-1.602	7.000	12.63	0.571	.109	.654	.545
PAYT - Flexible	-1.103	7.000	13.00	0.429	.270	1.000	1.000
PAYT - Flat fee	-2.562	7.000	16.67	0.762	.010	.062	.062
Flexible+ - Flexible	-0.070	12.625	13.00	0.125	.944	1.000	1.000
Flexible+ - Flat fee	-1.103	12.625	16.67	0.417	.270	1.000	1.000
Flexible - Flat fee	-0.662	13.000	16.67	0.333	.508	1.000	1.000

Note. Rank-biserial correlation based on individual Mann-Whitney tests.