

SUPPLEMENTARY MATERIAL

Greenhouse Gas Emissions-Based Development and Characterization of Optimal Scenarios for Municipal Solid and Sewage Sludge Waste Management in Astana City

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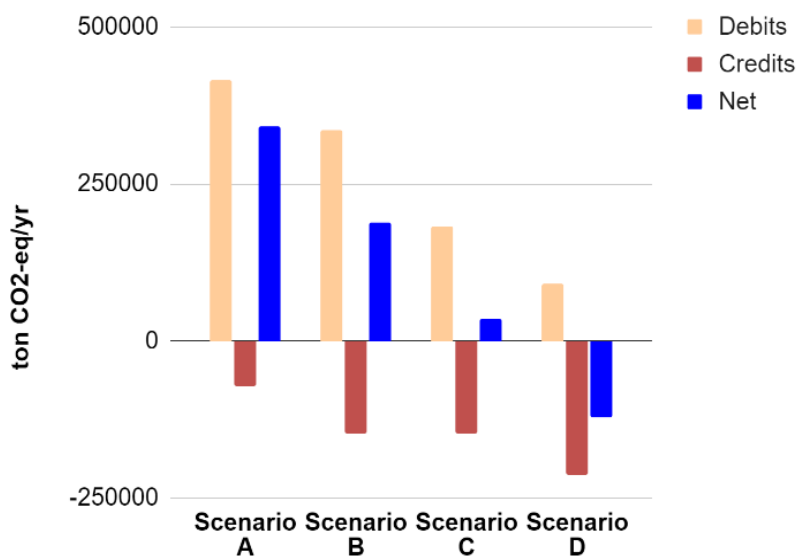


Figure S1. Debits, credits and net GHG emissions in the four MSW scenarios

Table S1. MSW mass balance and cost analysis of the scenarios

	Mass Balance of MSW over different scenarios (t/year)			
	Scenario A	Scenario B	Scenario C	Scenario D
Recycling	65 148	132 057	132 057	132 057
Composting	0	0	0	88 896
Incineration	0	0	0	217 047
Landfilling without gas collection	372 852	0	0	0
Landfilling with gas collection	0	305 943	0	0
BS + landfill	0	0	305 943	0
Total MSW (t/year)	438 000			
Cost (€/year)				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Recycling	325 741	6 602 85	660 285	660 285
Composting	0	0	0	888 965
Incineration	0	0	0	15 193 256
Landfilling without gas collection	1 491 408	0	0	0
Landfilling with gas collection	0	4 895 088	0	0
BS + landfill	0	0	6 118 860	0
Total cost (€)	1 817 148	5 555 373	6 779 145	16 742 506

Table S2. Debits, credits and net GHG emissions

		Scenario A	Scenario B	Scenario C	Scenario D
Recycled waste	Debits	22 805	46 227	46 227	52 028
	Credits	- 72 642	- 147 248	- 147 248	- 153 581
Disposed of waste	Debits	391 438	289 484	137 057	39 667
	Credits	0	0	0	- 58 944
Total MSW treatment	Debits	414 248	335 717	183 290	91 700

	Credits	- 72 642	- 147 248	- 147 248	- 212 525
	Net	341 606	188 469	36 042	- 120 826

Table S3. SS mass balance and cost analysis of the scenarios

	Mass Balance of sludge over different scenarios (t/year)		
	Scenario 1	Scenario 2	Scenario 3
Landfilling	109 500	0	0
Mono-incineration	0	109 500	0
Co-incineration	0	0	109 500
Total SS (t/year)	109 500		
Cost (€/year)			
	Scenario 1	Scenario 2	Scenario 3
Landfilling	4 106 250	0	0
Mono-incineration	0	14 388 300	0
Co-incineration	0	0	10 950 000
Total cost (€)	4 106 250	14 388 300	10 950 000