sustainability

SUPPLEMENTARY MATERIALS

S1. Attributional LCI tables

Table 1: Reference scenario

Inputs	Units	Value per FU	Data source
Polypropylene granulate	g	5.00	[17]
Energy consumption	kWh	0.19	Primary data

Outputs	Units	Value per FU	Data source
Incineration	g	1.80	[29]
Landfillig	g	1.50	[29]
PP recycling	g	1.70	[29]

Table 2: PLA-ZnONP packaging scenario

Input	Units	Value per FU	Data source
Electricity consumption	kWh	0.15	Primary data
Zn	g	0,15	[15]
Corn starch transportation	km	9.10E-3	Ecoinvent

Output	Units	Value per FU	Data source
Compost (avoided)	g	0.38	Ecoinvent
Composting	g	1.52	[29]
Incineration	g	1.61	[29]
Landfillig	g	1.34	[29]

Table 3: PP-ZnONP packaging scenario

Inputs	Units	Value per FU	Data source
Polypropylene	g	4.46	[17]
Electricity consumption	kWh	0.17	Primary data
Zn	g	0.15	[15]

Outputs	Units	Value per FU	Data source
Incineration	g	1.61	[29]
Landfill disposal	g	1.34	[29]
PP recycling	g	1.52	[29]

S2. Consequential LCI.

Table 4.: Reference scenario (consq.)

Inputs	Units	Value per FU	Data source
Fresh lettuce	g	174.00	Primary data; [17]
Polypropylene	g	5.00	[17]
Sanitation	l	1.32	[38]
Energy consumption	kWh	0.17	Primary data

Outputs	Units	Value per FU	Data source
Incineration	g	1.80	[29]
Landfillig	g	1.50	[29]
PP recycling	g	1.70	[29]

8 Table 5: PP-ZnONP scenario (consq.)

Inputs	Units	Value per FU	Data source
Fresh lettuce	g	159.00	Primary data; [17]
Polypropylene	g	4.46	[17]
Sanitation	l	1.27	[38]
Electricity consumption	kWh	0.17	Primary data
Zn	g	0.22	[15]

Outputs	Units	Value per FU	Data source
Incineration	g	2.23	Engineering calculatios
Landfill disposal	g	2.23	Engineering calculatios

9 Table 6.: PLA-ZnONP scenario (consq.)

Input	Units	Value per FU	Data source
Fresh lettuce	g	159.00	Primary data; [17]
Sanitation	l	1.27	[38]
Electricity consumption	kWh	0.15	Primary data
Zn	g	0,15	[15]
Corn starch transportation	ktm	9.10E-3	Ecoinvent

Output	Units	Value per FU	Data source
Compost (avoided)	g	1.49	Ecoinvent
Composting	g	4.46	Engineering calculations

10 **S3. Distribution parameters of the uncertain elements of the LCA**

11 Table 7. Definition of the probability distributions of the uncertain LCI elements.

Model parameter	Distribution shape	Distribution parameters	
Secondary bibliographic data	Log-normal	μ: value in LCI σ: calculated usind the pedigree matrix	
Secondary Ecoinvent data	Log-normal	μ: value in LCI σ: calculated by Ecoinvent uncertainty determination [49]	
% packaging incinerated	Triangular	PP scenario	Minimum: 0 Maximum: 100 Mode:
		ZnONP-PP scenario	Minimum: 0 Maximum: 100 Mode: 50
		ZnONO-PLA scenario	Minimum: 0

% packaging landfilled	Triangular	PP scenario	Maximum: 100 Mode: Minimum: 0
		ZnONP-PP scenario	Maximum: 100 Mode: Minimum: 0
		ZnONO-PLA scenario	Maximum: 100 Mode: 50 Minimum: 0
% packaging recycled	Triangular	PP scenario	Maximum: 100 Mode: Minimum: 0
		ZnONP-PP scenario	Maximum: 100 Mode: Minimum: 0
		ZnONO-PLA scenario	Maximum: 100 Mode: -
% packaging composted	Triangular	PP scenario	-
		ZnONP-PP scenario	-
		ZnONO-PLA scenario	Minimum: 0 Maximum: 100 Mode: 0
% Food Loss Probability (reference scenario);	Uniform	Minimum: 11.2[†] Maximum: 21.2	

[†] Calculated by the interpolation of the FLP with SL=6 when adjusting to the first-order kinetic model. (Equation 2). In this case, k_2 holds a value of 0,3608.