SUPPLEMENTARY MATERIALS

Table S1. The literature screening forms with the references that passed the final screening criteria. The screening forms contain the type of reference with titles, author, year, and information of references.

No.1	Journal	Cleaner Environmental Systems
	Title	Life cycle assessment for PET-bottle recycling in Brazil: B2B and B2F routes
	Author	Luciano Antonio Gileno * and Luiz Felipe Ramos Turci
	Year/Region	2021/ Located in Poços de Caldas, Minas Gerais State, Brazil
Goal and Scope	Goal	Comparison between bottle-to-bottle and bottle-to-fiber
	Functional unit	1 t of post-consumer recycled PET resin (bottle-to-bottle)
	System boundary	Cradle to gate
Inventory analysis	Software	GaBi Education 8.7 and GHG Protocol
	Data source	A post-consumer PET bottle recycling unit installed in the South of Minas Gerais State, Brazil

No.2	Journal	Advances in Civil Engineering
	Title	Life-Cycle Assessment of Recycling Postconsumer High-Density Polyethylene and Polyethylene Terephthalate
	Author	Khaled M. Bataineh
	Year/Region	2020 / Jordan
Goal and Scope	Goal	LCA quantifies the energy consumption and environmental emissions for PET/HDPE
	Functional unit	1 t of PET flake
	System boundary	Cradle-to-grave
Inventory analysis	Software	N/A
	Data source	LCA databases, scientific publications, governmental publications, and personal communication

No.3	Journal	Science of the Total Environment
	Title	Potential trade-offs between eliminating plastics and mitigating climate change: An LCA perspective on Polyethylene Terephthalate (PET) bottles in Cornwall
	Author	V. Kouloumpis, R.S. Pell, M.E. Correa-Cano, and X. Yan
	Year/Region	2020/ Cornwall, England
Goal and Scope	Goal	To evaluate the potential environmental consequences of substituting all the PET bottles used by households in Cornwall with glass ones
	Functional unit	2468 t of PET bottles to households in Cornwall
	System boundary	Cradle-to-grave
Inventory analysis	Software	GaBi
	Data source	Ecoinvent 3.5

No.4	Journal	Environmental Research
	Title	Plastic (PET) vs bioplastic (PLA) or refillable aluminium bottles – What is the most sustainable choice for drinking water? A life-cycle (LCA) analysis
	Author	Elena Tamburini *, Stefania Costa, Daniela Summa, Letizia Battistella, Elisa Anna Fano, and Giuseppe Castaldelli
	Year/Region	2021 / Italy
Goal and Scope	Goal	To examine the environmental impact of production, use, and end-of-life of PET and PLA bottles in comparison to aluminum bottles in a time frame of 1 year.
	Functional unit	1 year of use: 1095 bottles of PET
	System boundary	Cradle-to-grave
Inventory analysis	Software	OpenLCA™ v.1.8
	Data source	Ecoinvent

No.5	Journal	Packaging Technology and Science
	Title	Life cycle assessment of bottled mineral water for the hospitality industry in Northern Italy
	Author	Viviana Grisales, Camilla Tua, and Lucia Rigamonti
	Year/Region	2022/ Italy
Goal and Scope	Goal	To identify the impact contribution of the main stages of the system
	Functional unit	The distribution of 100 L mineral water
	System boundary	Cradle-to-grave
Inventory analysis	Software	SimaPro
	Data source	Ecoinvent 3.5

No.6	Journal	South African Journal of Science
	Title	Life cycle assessment of single-use and reusable plastic bottles in the city of Johannesburg
	Author	Kunle I. Olatayo, Paul T. Mativenga, and Annlizé L. Marnewick
	Year/Region	2021/ South Africa
Goal and Scope	Goal	To comparatively analyze and quantify the resource consumption and environmental impacts associated with the use of single-use PET bottles
	Functional unit	10 single-use 0.5L PET bottles
	System boundary	Cradle-to-grave
Inventory analysis	Software	SimaPro
	Data source	EcoInvent 3.0 and scientific literature

No.7	Journal	Resources, Conservation & Recycling
	Title	Assessing scaling effects of circular economy strategies: A case study on plastic bottle closed-loop recycling in the USA PET market
	Author	Geoffrey Lonca, Pascal Lesagea, Guillaume Majeau-Bettez, Sophie Bernard, and Manuele Margni
	Year/Region	2020 / USA
Goal and Scope	Goal	To assess whether increasing rPET use within plastic bottle production leads to higher material efficiency and better environmental performance
	Functional unit	2.78Mt PET bottle in the USA
	System boundary	Cradle-to-grave
Inventory analysis	Software	OpenLCA
	Data source	Ecoinvent v3.3, UN Comtrade, IBIS World dataset, and NAPCOR (2017)

No.8	Journal	Science of the Total Environment
	Title	Comparative cradle-to-grave life cycle assessment of bio-based and petrochemical PET bottles
	Author	Iris Vural Gursel, Christian Moretti, Lorie Hamelin, Line Geest Jakobsen, Maria Magnea Steingrimsdottir, Martin Junginger, Linda Høibye, and Li Shen
	Year/Region	2021/ Europe
Goal and Scope	Goal	To assess the environmental profiles of selected pathways for bio-based PET beverage bottles and compare them with conventional petrochemical PET bottles
	Functional unit	Packaging water in one hundred 0.5L bottles
	System boundary	Cradle-to-grave
Inventory analysis	Software	EASETECH
	Data source	Ecoinvent 3.3, Industry data 2.0 from PlasticsEurope

No.9	Journal	ACS Sustainable Chemistry & Engineering
	Title	Exploring Comparative Energy and Environmental Benefits of Virgin, Recycled, and Bio-Derived PET Bottles
	Author	Pahola Thathiana Benavides, Jennifer B. Dunn, Jeongwoo Han, Mary Biddy, and Jennifer Markham
	Year/Region	2018/ USA
Goal and Scope	Goal	To evaluate the GHG emissions, fossil fuel consumption, and water consumption of producing one PET bottle from virgin fossil resources, recycled plastic, and biomass, considering each supply chain stage.
	Functional unit	One 26g 500mL PET bottle
	System boundary	Cradle-to-grave
Inventory analysis	Software	GREET model
	Data source	N/A

No.10	Journal	Waste Management
	Title	Life cycle comparative assessment of pet bottle waste management options: A case study for the city of Bauru, Brazil
	Author	Eduardo J.P. Martin, Deborah S.B.L. Oliveira, Luiza S.B.L. Oliveira b, and Barbara S. Bezerra
	Year/Region	2021/ Brazil
Goal and Scope	Goal	To assess the environmental impacts of different management options for PET waste by considering several scenarios
	Functional unit	1 t of PET waste
	System boundary	Cradle-to-grave
Inventory analysis	Software	SimaPro
	Data source	Primary data were collected for the energy requirements and material inputs of a sorting cooperative (facility), EMDURB conventional collection, Ecoinvent v3.6

No.11	Journal	Journal of Cleaner Production
	Title	Comparative assessment of the environmental profile of PLA and PET drinking water bottles from a life cycle perspective
	Author	Seksan Papong, Pomthong Malakul, Ruethai Trungkavashirakun, Pechda Wenunun, Tassaneewan Chom-in, Manit Nithitanakul, and Ed Sarobol
	Year/Region	2014/ Thailand
Goal and Scope	Goal	To assess the life cycle environmental performance of drinking water bottles made of polylactic acid produced from cassava in comparison with similar PET bottles produced in Thailand.
	Functional unit	1000 units of 250 ml drinking water bottles
	System boundary	Cradle-to-gate
Inventory analysis	Software	SimaPro
	Data source	Actual sites in Thailand, Ecoinvent, MTEC, and DEDE

No.12	Journal	PACKAGING SYSTEMS INCLUDING RECYCLING
	Title	PET bottle reverse logistics—environmental performance of California's CRV program
	Author	Brandon Kuczenski and Roland Geyer
	Year/Region	2013/ California
Goal and Scope	Goal	To compare the three main end-of-life pathways followed by CRV PET bottles: landfilling, curbside collection, and consumer drop-off.
	Functional unit	1L of beverage to a California consumer in single-use PET bottles during the years 2007–2009
	System boundary	Cradle-to-gate
Inventory analysis	Software	N/A
	Data source	Ecoinvent 2.01, EPA eGrid database, Western Electricity Coordinating Council (WECC)

No.13	Journal	Environmental Progress & Sustainable Energy
	Title	Life cycle assessment of polylactic acid and polyethylene terephthalate bottles for drinking water
	Author	Fausto Gironi and Vincenzo Piemonte
	Year/Region	2011/ Italy
Goal and Scope	Goal	To examine the environmental benefits of bottles made from PLA in comparison with bottles made from PET to draw first raw considerations on the environmental reliability of PLA for the production of bottles for drinking water
	Functional unit	1000U of 500 mL bottles to be used for drinking water
	System boundary	Cradle-to-grave
Inventory analysis	Software	SimaPro
	Data source	Ecoinvent 2.0

No.14	Journal	Korean Society of Environmental Engineers
	Title	A Study on the Environmental Assessment of Bottled Water using Life Cycle Assessment Methodology
	Author	Jongsek Kim, Chankyu Lee, Noh-Hyun Lim, Yongkyu Han, and Ihnsup Han
	Year/Region	2022/ Korea
Goal and Scope	Goal	To enhance product environmental performance by assessing key impact categories across the entire life cycle of bottled water products and proposing viable alternatives.
	Functional unit	A bottled water PET, 500ml, 1 unit
	System boundary	Cradle-to-grave
Inventory analysis	Software	ezEPD
	Data source	EPD

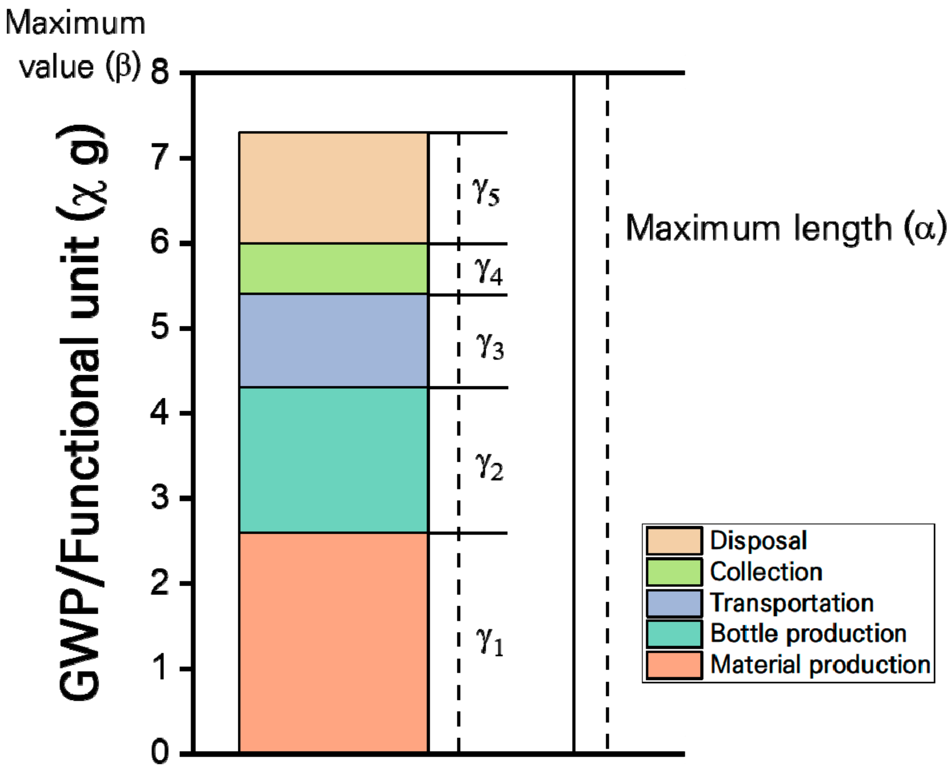

Figure S1. Illustration of how to extract the GWP from a stacked bar chart.

Where

X (g): Functional unit (FU) of study

α: Length of contribution analysis plot

β: Maximum value of contribution analysis plot

γ_i: Length of each life-cycle phase

$$\frac{\beta\gamma_i}{\alpha} \times \frac{1}{x} \times 1000 = \text{Value of } i\text{th-cycle phase per kg of FU} \quad \text{(S1)}$$

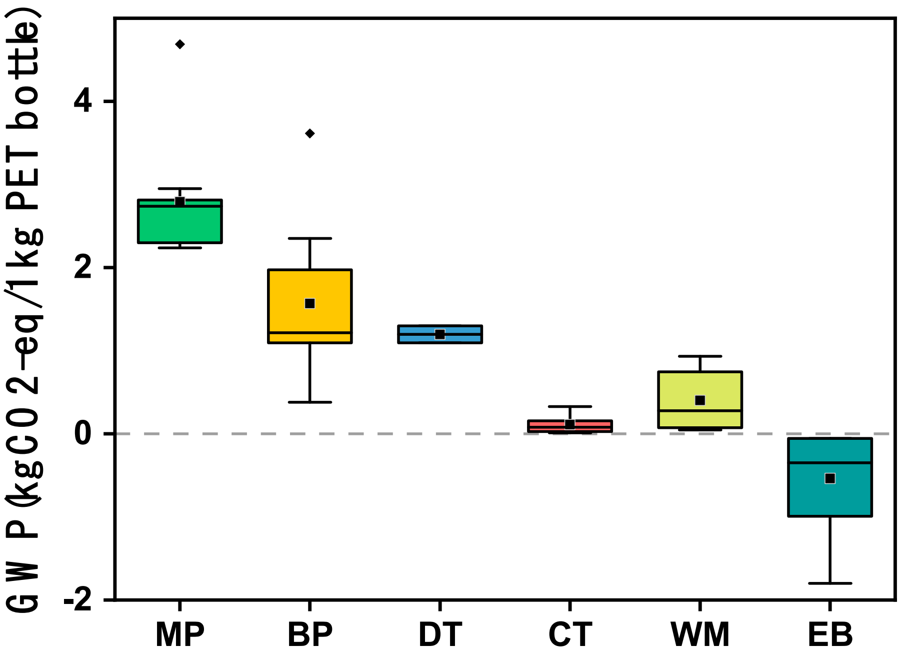

Figure S2. Box plot analysis that encompasses all outliers of GWP values for six phases of the PET bottle system.

Table S2. Organization of capacities and GWP values for Korean EPD products.

Product volume	$kgCO_2eq$ per 1kg	gCO_2eq per 100mL
0.33 L	4.825	22.95
0.33 L	5.225	24.86
0.33 L	4.826	22.96
0.33 L	4.262	20.28
0.33 L	5.502	26.18
0.33 L	5.502	26.18
0.33 L	7.213	32.36
0.5 L	5.780	20.81
0.5 L	4.591	16.53
0.5 L	4.164	14.99
0.5 L	4.141	14.91
0.5 L	4.141	14.91
0.5 L	4.631	16.67
0.5 L	5.601	20.16
0.5 L	3.667	13.2
0.5 L	8.009	28.83
0.5 L	5.364	19.31
0.5 L	5.517	19.86
1 L	3.238	11.43
1 L	4.655	16.43
1 L	6.912	24.4
2 L	4.999	9.5
2 L	6.223	11.82
2 L	5.211	9.9
2 L	5.473	10.4
2 L	5.473	10.4
2 L	5.896	11.2
2 L	8.157	15.5
2 L	5.366	10.2
2 L	7.753	14.73
2 L	5.462	10.38
2 L	5.779	10.98

Table S3. Results of the Games–Howell post hoc test for GWP values of EPD products per 1kg.

Dependent variable: GWP (kg CO_2eq per 1kg)						
Product volume (I)	Product volume (J)	Difference in means(I-J)	Standard error	P-value	95% Confidence interval	
					Lower limit	Upper limit
0.33L	0.5L	0.281	0.508	0.944	-1.1816	1.7443
	1L	0.401	1.127	0.981	-5.9685	6.7714
	2L	-0.645	0.472	0.539	-2.0174	.7281
0.5L	0.33L	-0.281	0.508	0.944	-1.7443	1.1816
	1L	0.120	1.130	0.999	-6.1943	6.4345
	2L	-0.926	0.480	0.249	-2.2724	.4204
1L	0.33L	-0.401	1.127	0.981	-6.7714	5.9685
	0.5L	-0.120	1.130	0.999	-6.4345	6.1943
	2L	-1.046	1.114	0.793	-7.5900	5.4978
2L	0.33L	0.645	0.472	0.539	-.7281	2.0174
	0.5L	0.926	0.480	0.249	-.4204	2.2724
	1L	1.046	1.114	0.793	-5.4978	7.5900

*. The mean difference is significant at the 0.05 level.

Table S4. Results of the Games–Howell post hoc test for GWP values of EPD products per 100ml.

Dependent variable: GWP (gCO_2eq per 100ml)						
Product volume (I)	Product volume (J)	Difference in means(I-J)	Standard error	P-value	95% Confidence interval	
					Lower limit	Upper limit
0.33L	0.5L	6.912*	1.952	0.015	1.2496	12.5740
	1L	7.690	4.043	0.400	-13.9960	29.3760
	2L	13.745*	1.561	<0.001	8.7560	18.7349
0.5L	0.33L	-6.912*	1.952	0.015	-12.5740	-1.2496
	1L	0.778	3.999	0.997	-21.4059	22.9623
	2L	6.834*	1.441	0.002	2.6425	11.0248
1L	0.33L	-7.690	4.043	0.400	-29.3760	13.9960
	0.5L	-0.778	3.999	0.997	-22.9623	21.4059
	2L	6.055	3.823	0.528	-19.0641	31.1751
2L	0.33L	-13.745*	1.561	<0.001	-18.7349	-8.7560
	0.5L	-6.834*	1.441	0.002	-11.0248	-2.6425
	1L	-6.055	3.823	0.528	-31.1751	19.0641

*. The mean difference is significant at the 0.05 level.