

# Single-use Plastic Products vs. alternatives: what Life Cycle Assessments tell us

INC2 Webinar 4: Control measures for sustainable consumption and production

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Response to [UNEA 4 Resolution 9](#): Addressing single-use plastic products pollution

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[www.unep.org](http://www.unep.org)

[www.lifecycleinitiative.org](http://www.lifecycleinitiative.org)

# Single-use Plastic Products vs. alternatives

## Knowledge products on SUPP from a Life Cycle perspective

Responding to the request by Member States at the 4<sup>th</sup> session of the **UN Environment Assembly (UNEA 4/9)**

### Life Cycle recommendations available for the following Single-use Products:



# ADDRESSING SINGLE-USE PLASTIC PRODUCTS POLLUTION USING A LIFE CYCLE APPROACH



## Findings on SUPP from an LCA perspective

- It is the **single-use nature** of products that is the most problematic for the planet, more so than their material.
- Cleverly designed products should be **durable**, and the **lighter** a product's weight, (normally) the **lower its environmental impact. (Weight PER USE)**
- Member States are encouraged to promote actions that lead to **keeping resources at their highest value**, by **replacing single-use plastic products with reusable products.**
- There is **no one single solution to plastic products pollution.** It is context and country-specific but taking a **life-cycle approach** can help in taking the right decision.
- (if in doubt **#ChooseToReuse**)



# LIFE CYCLE ASSESSMENTS OF BEVERAGE CUPS: WHAT THE SCIENCE TELLS US

## Single-use or reusable beverage cups depending on waste management context and behavioural considerations

This matrix helps countries, regions and cities to identify the closest scenario and current most appropriate options for their context. The content of the matrix is simplified, and the suggested preferences are indicative. Please refer to the full narrative of the meta-study for details.



### Eco- or cost-conscious Consumer



### Indifferent Consumer



#### Considerations of geographical and technological context



**EFFICIENT WASHING** during use-phase (energy efficient dishwasher or hand wash in cold water)



**CUPS REUSED** many times



**UNLIKELY TO LITTER /** likely to recycle or compost



**INEFFICIENT WASHING** during use-phase (Hand wash in hot water)



**INSUFFICIENT REUSE** of cups (Little consumer awareness)



**LIKELY TO LITTER /** unlikely to recycle

#### NO FORMAL WASTE MANAGEMENT & POOR RECYCLING SUPPORT

unsanitary landfill, open dumps, open burning, no policy support for recycling and/or composting

**Reusable** regardless of energy mix

**Reusable** Ceramic; glass; stainless steel; bamboo

**Reusable** Ceramic; glass; stainless steel; bamboo

**Reusable** in case of renewable energy mix

**Single-use** Wax-, PE- or bioplastic-lined paper

**Reusable** Ceramic; glass; stainless steel; bamboo

**Single-use** in case of carbon intensive energy mix

**No clear preference** in case of carbon intensive energy mix

**Reusable** Ceramic; glass; stainless steel; bamboo; PP

**No clear preference** between reusable and single-use (EPS) If incineration with energy recovery and **importantly** if single-use are being collected and managed.

**Single-use** in case of carbon intensive energy mix

**Single-use** EPS; wax-, PE- or bioplastic-lined paper

**Reusable** Ceramic; glass; stainless steel; bamboo

**Reusable** in case of renewable energy mix

**No clear preference** in case of renewable energy mix

#### FORMAL WASTE MANAGEMENT BUT POOR RECYCLING SUPPORT

sanitary landfill, incineration with energy recovery, but no or low policy support for recycling and/or composting

**Single-use** in case of carbon intensive energy mix

**Reusable** especially recyclable materials such as PP, glass, and stainless steel

**Single-use** PE- or bioplastic-lined paper; rPET

**Single-use** regardless of energy mix

**Single-use** PE- or bioplastic-lined paper; rPET

**Reusable** PP; ceramic; glass; stainless steel; bamboo

#### FORMAL WASTE MANAGEMENT & RECYCLING INFRASTRUCTURE

sanitary landfill and/or incineration with energy recovery

**Reusable** in case of renewable energy mix

**Reusable** especially recyclable materials such as PP, glass and stainless steel

# BOTTLED WATER AND ITS ALTERNATIVES: WHAT ARE THE BETTER OPTIONS BASED ON LIFE CYCLE ASSESSMENTS



**Considerations of geographical and technological and policy context**

- NO FORMAL WASTE MANAGEMENT**  
unsanitary landfill, open dumps, open burning, no policy support for recycling and/or composting
- FORMAL WASTE MANAGEMENT BUT POOR RECYCLING**  
sanitary landfill and/or incineration with/without energy recovery, weak policy support for recycling
- FORMAL WASTE MANAGEMENT WITH HIGH RECYCLING AND RECOVERY**  
strong policy support for recycling



## Reuse possible



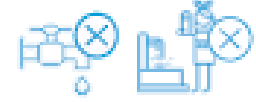
## Reuse not possible



**TAP WATER safe to drink**



**TAP WATER NOT safe to drink; but availability of water dispensers/bulk water points**



**TAP WATER NOT safe to drink and NO on-the-go options available (not possible to avoid using bottles)**

**BOTTLES REUSED MANY TIMES\***

**BOTTLES USED FEW TIMES**

**Tap water in reusable bottle/cup**

Tap water is preferred to water in single-use plastic bottles even if tap fitted with an in-home water purifier (reverse osmosis device) or if boiled in pot on stove

**Water in reusable bottle/cup reused many times**

Water dispenser and supply is efficiently maintained

**Reusable aluminium, stainless steel, plastic or glass**

**Insufficient evidence for preference between**

Single-use (cartons possibly lowest-impact single-use alternative), and Reusable aluminium, stainless steel, plastic or glass

**Reusable aluminium, stainless steel, plastic or glass**

**Single-use**

Bio-based PET made from agricultural residues; Bio-based PET where sufficient water and land is available for biomass production; or Fossil-based PET with energy recovery at end-of-life

**No Clear preference between**

Single-use with high recycled content (rPET), and Reusable aluminium, stainless steel, plastic or glass

**Single-use PET with high recycled content (rPET)**

■ Returnable container preferred    
 ■ Single-use container preferred    
 ▲ No clear preference for returnable or single-use container



# LIFE CYCLE ASSESSMENTS OF NAPPIES: WHAT THE SCIENCE TELLS US

## Single-use or reusable nappies depending on waste management context and behavioural considerations

This matrix helps countries, regions and cities to identify the closest scenario and current most appropriate options for their context. The content of the matrix is simplified, and the suggested preferences are indicative. Please read in conjunction with the text box below and refer to the full narrative of the meta-study for details.



Eco- or cost-conscious Consumer



Indifferent Consumer



Considerations of geographical and technological context



EFFICIENT WASHING & LAUNDERING PRACTICES (wash below 60°C, line dry, fully filled machine)



REUSABLE NAPPIES RE-USED ALSO ON 2<sup>ND</sup> CHILD OR CHILDREN



APPROPRIATE DISPOSAL OF NAPPIES (no littering, flushing or contamination of recyclables)



INEFFICIENT WASHING & LAUNDERING PRACTICES (wash above 60°C, tumble dry, partially filled machine)



REUSABLE NAPPIES USED ONLY A FEW TIMES



INAPPROPRIATE DISPOSAL OF NAPPIES (littered, flushed or disposed of with recyclables)

NO FORMAL WASTE MANAGEMENT & POOR RECYCLING SUPPORT  
unsanitary landfill, open dumps, open burning

Regardless of nappy type



If low-carbon electricity



FORMAL WASTE MANAGEMENT BUT POOR RECYCLING SUPPORT  
sanitary landfill and/or incineration with energy recovery



If poor laundering practices, high carbon electricity and/or low number of uses



Especially nappies with lightweight designs



Especially nappies with lightweight designs



ADVANCED WASTE MANAGEMENT & GOOD POLICY SUPPORT AND INFRASTRUCTURE FOR ADVANCED WASTE TREATMENT\*  
(e.g., recycling, industrial composting, anaerobic digestion)



Slight preference for single-use if nappies are recycled\*



Potential for bio-based nappies



Potential for bio-based nappies



■ Reusable nappies preferred   
 ■ Single-use nappies preferred   
 ■ No clear preference for reusable or single-use nappies

Full report available at:  
<https://www.lifecycleinitiative.org/library/single-use-nappies-and-their-alternatives/>





# Considerations for policy makers

A **MARKET SHIFT TO REUSE** provides biggest opportunity to reduce plastic pollution

- Need for integrated approach, systems change
- See UNEP (2023) Turning off the Tap (intro [webinar](#) on **17<sup>th</sup> May, 15-16h CEST**)

Geographic context can strongly influence results:

- Waste management infrastructure; Recycling rates
- Energy mix; Source and type of raw materials

Cultural context is equally important:

- Acceptability of reusable alternatives – social norms
- Use behaviour (washing, laundering, changing etc.)
- Access to waste management – likelihood of littering
- Cost

# What can we do?

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Consumers have significantly more control over the environmental impact of reusable products than they do of single-use products.



The most important thing we can do to address plastic pollution is to **consume less** and **choose to reuse**.

More information:

<https://www.lifecycleinitiative.org/single-use-plastic-products-studies/>



Hosted by:



Life Cycle Initiative

# Thank you!

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