An Interactive Tool for Designing Sustainable Packaging

Designed and launched as part of the EU-funded UNIDO SwitchMed project in collaboration with Afeka Institute of Circular Engineering and Economy and the Israel Packaging Institute

– The tool is relevant only to Israel –

switchmed

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UNIDO

מכון האריזה והעיצוב הישראלי

PACK-TECH EXPERTISE

Afeka Institute of Circular Engineering and Economy

A Sustainable Packaging Design Tool

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A Sustainable Packaging Design Tool

This tool aims to provide a guide for designing plastic packaging suitable for recycling in Israel. While there are other materials recycled in Israel such as tin, paper and glass, this tool deals only with plastic packaging.

The tool is suited to the recycling capabilities in Israel. Recycling capabilities vary globally, so if the product is intended for export, it must conform to the importing country's guidelines. However, most of the parameters meet global recycling capabilities.

The tool can be updated periodically in order to adapt it to new recycling capabilities in Israel.

We recommend that along with designing packaging to be recyclable, the design process should also consider reducing the use of resources, while preserving the contents of the packaging and its shelf life. It is very important to validate and ensure that along the product's entire value chain, its packaging is suitable to adequately fulfil the needs of the products and users.

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Packaging and Circular Economy

Unlike a linear economy, a circular economy strives to maintain the value of its resources throughout the product's entire value chain.

There are several approaches to achieving packaging suited to a circular economy:

Reuse – There are several types of reuse:

- Reuse in industry, such as returning plastic crates or pallets to the manufacturer
- Reuse by the consumer in a number of ways:
  Refill at home
  Refill at the point of sale
  Returning the package
  Using the packaging for other purposes

Biodegradable packaging – In these cases, make sure that the packaging is composted and does not end up in the recycling bin as it may interfere with the recycling process

Packaging from renewable sources – mainly bioplastic and paper

Recycling – recyclable packaging and the use of recycled materials

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The Recycling Process

In order that a package be recycled, it must go through the following steps:

Rinsing – The package's content must be completely removed, so it is advisable to design the packaging in a way that allows for the convenient removal of its contents. Chemical-based contents can be problematic, such as oil in PET bottles. Additionally, different components must be separated. If the package's components are made of different materials, quality separation must be ensured, either during rinsing or at the end of consumers' use.

Material processing – adaptation to recycling systems.

Upgrade – In many cases the products are upgraded according to their intended use

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Collection – The packaging is collected, both for the materials recycled in Israel and for the materials sent abroad for recycling. The collection is done in the various bins. It is advisable to label the packaging regarding which bin it should be placed in. For details regarding the packaging to be collected for recycling and the relevant labelling – click here

Sorting – This is a critical step in the process, since it determines whether the packaging will be recycled. The more accurate this step, the higher the quality of the recycled material will be. Packaging design must be adapted to the existing infrastructure and sorting technologies that exist in the country. For details on current sorting technologies – click here

About the Sustainable Packaging Design Tool

The tool assists in designing recyclable plastic packaging based on the following parameters:

- Type of packaging
- Packaging dimensions
- Composition of the packaging – using recyclable materials, and ensuring compatibility between the various materials. Compatibility is based on *Recyclass* protocols and can be updated according to additional protocols
- Extra decoration for packaging
- The packaging components, and the ideal combination between them

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Sustainable Packaging Design Tool

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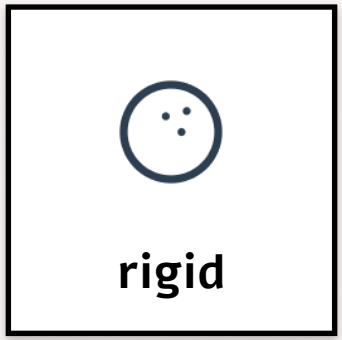
Is the packaging flexible or rigid?



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Flexible Packaging

Today, only PE bags and sheets are recycled in Israel, as there is currently no capacity in Israel to sort other flexible packaging. To be recycled, the packaging must meet the following criteria:

- Must be larger than A4
- The sheets must be made from monomaterial
- No handles or additional components from different materials
- Preference of transparent sheets without added colors
- Future technologies may allow the sorting of flexible packaging, in which case flexible packaging will be able to be recycled in a similar process to rigid packaging
- Some countries have the capacity to sort flexible packaging, so if the waste is exported there it may be recyclable.

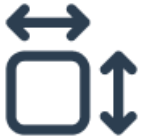
Does the packaging meet the criteria?

no

yes

Is the packaging larger than 40 mm in at least one of its dimensions?

no



yes

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Packaging smaller than 40 mm

The drum of the sorting process is perforated with holes, and any material that is smaller than 40 mm will drop through, while only the larger particles will stay inside the drum and be sorted.

Finish

Is the packaging monomaterial?

If there are several separate packaging components, each component should be examined separately

no

yes

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Multi-Material Packaging

Multi-material packaging is unsuitable for recycling in Israel.

Finish

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Monomaterial

Recyclable materials in Israel include:

- PP, PE, PET
- Biobased PE, Biobased PP

Is the packaging made from one of these materials?

no

yes

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Other Materials

At present, packaging made from other materials other than PP, PE and PET is not recycled in Israel.
If chemical recycling or other recycling infrastructure will be introduced in Israel, additional materials will be recycled.

Finish

Does the packaging include fillers or additives?

no

yes

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Fillers and Additives

The fillers and additives do not change the substance's specific weight.

For PET, choose the relevant option:

Bio-/oxo-/photodegradable additives; Nanocomposites	UV stabilisers; Acetaldehyde (AA) blockers; Optical brighteners; Oxygen scavengers	For containers other than bottles: Silicone surface coating (on coating area); Antiblocking masterbatch (max 3%)

For PP and PE, choose the relevant option:

Additives changing the material density > 1 g/cm³; Flame-retardant additives, plasticizers; Bio-/oxo-/photodegradable additives	Mineral fillers ($CaCO_3$, talc) not increasing density more than 0,97 g/cm³	Additives that are unavoidable in processing (stabilizers, antioxidants, lubricants, nucleating agents, peroxides) and density remains < 0,97 g/cm³

The data is based on SUEZ Circpack test protocols

Are additional materials used for barriers?

no

yes

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Barriers

For PET, choose the relevant option:

PA-MXD6 multilayer with >5wt% PA or tie layers; Monolayer PA blend; EVOH	For bottles: Carbon plasma-coating; PA-MXD6 multilayer with For containers: PET based oxygen scavenger with limited yellowing effect after EPBP oven test	For bottles: SiOx plasma coating For containers: PET based oxygen scavenger without yellowing effect after EPBP oven test

For PP and PE, choose the relevant option:

EVOH > 1% with any other tie layers; PA; PVDC; Aluminium	EVOH > 6.0% wt + PE-g-MAH tie layers with MAH > 0.1% wt and EVOH:tie layer ratio ≤ 2; EVOH	EVOH < 6.0% wt + PE-g-MAH tie layers with MAH > 0.1% wt and EVOH:tie layer ratio ≤ 2; Enkase (fluorination)

The data is based on SUEZ Circpack test protocols

Is the packaging transparent?

no

yes

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Colors

For PET, choose the relevant option:

Opaque and fluorescent colors	Light colors	Transparent colors

For PP and PE, choose the relevant option:

Carbon-based black not readable in NIR, fluorescent and metallic colors	Non-carbon-based black readable in NIR	All other colors, preferably transparent

Is the packaging printed?

no

yes

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Direct Printing

It is preferable to produce packaging without a print. However, if printing is required, laser printing is the preferred method.

If the packaging has color printing, then non-toxic ink that meet EUPIA guidelines should be used.

Processes for removing printing ink (deinking) are currently being developed, which will make it possible to treat printed packaging similarly to non-printed packaging in the future.

Does the coloring meet the requirements?

no

yes

Is there additional decoration on the packaging beyond direct printing?

no

yes

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Packaging Decoration

Maximum coverage of packaging decoration:

- For packages larger than 500 ml – coverage up to 70%
- For packages smaller than 500 ml – coverage up to 50%

Packaging decoration materials:

- For PET packaging – decoration made of materials with a specific gravity of less than 1 g / cm^3
- LDPET, EPS, OPP, PP, PE, foamed PET
- For PE-PE packaging – decoration from materials with a specific gravity greater than 1 g / cm^3
- For PP-PP – decoration from materials with a specific gravity greater than 1 g / cm^3
- For packages smaller than 500 ml – coverage up to 50%

Adhesives:

- For PET packaging, use adhesives that are soluble in alkali or water at a temperature below 60-80 degrees Celsius
- For PP and PE packaging, use adhesives that are water-soluble at a temperature below 40° C

IML

- The IML label must be made from the same material as the packaging

Does the decoration meet the requirements?

no

yes

Non-decorative components such as caps, handles etc.

Does the packaging include other components?

no

yes

Each component should be examined separately.

Is the component easily separable from the main packaging?

no

yes

Is the composition of the additional component the same as the composition of the main component?

no

yes

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Additional Components

It is preferable to use the same materials as the main packaging, but if this is not the case then in order to be able to separate them in the rinsing process - the additional components must meet the following criteria:

- For PET packaging - materials with a specific gravity lower than 1 g / cm3
- For PP and PE packaging - materials with a specific gravity higher than 1 g / cm3
- If soldered and glued, a separation must occur in washing at temperatures of 40 degrees.

Does your packaging meet the requirements?

no

yes

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Product Labelling

Green Bin
- Non-packaging plastic
- Disposable dishes
- Broken objects and toys
- Food waste
- Hygienic products

Garden waste collection

Deposit or bottle bins
- PET bottle collection

Orange Bin
- Plastic – food packaging, cleaning products, care products, plastic bags
- Metal – sprays, cans, metal boxes
- Drink cartons – milk and juice cartons

Purple Bin
- Glass packaging

Blue Bin
- Paper and newspapers
- Thin cardboard

According to the Ministry of Environmental Protection's master plans, an update is expected in the waste separation systems.
For more details, click here

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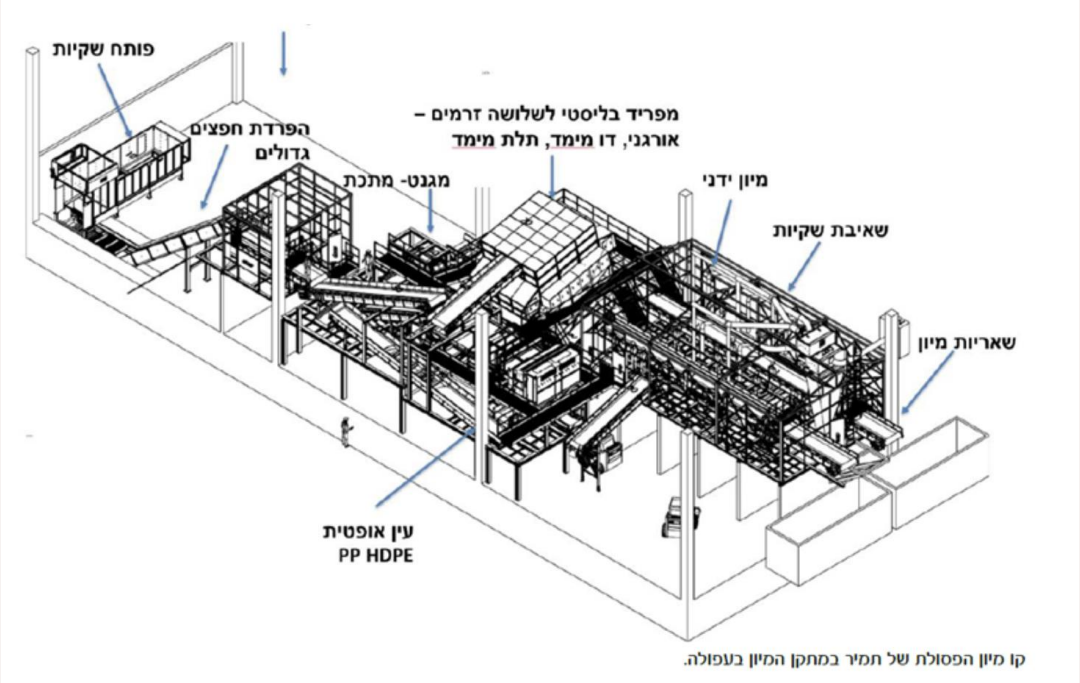
Current Sorting Technologies in Israel



קו מיון הפסולת של תמיר במתקן המיון בעפולה.

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Future Packaging Sorting Technology

Additional sorting technologies in Israel will allow us to sort and recycle more materials, and with higher quality.

For example, Holy Grail 2.0 is a consortium of 85 European companies that are currently testing sorting technologies based on a digital watermark barcode. This barcode will be the size of a stamp, printed on the packaging and will contain relevant information. The sorting-line cameras will be able to read the barcode and send the package to the appropriate sorting-line.

Additional technologies based on image recognition and artificial intelligence are also currently being tested.

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Successfully Completed

You have reached the end of the eco-friendly packaging design. If all of your choices were green, your packaging is fully recyclable.

If some of your choices were yellow, your packaging is partly recyclable.

Back to start

Successfully Completed

You have reached the end of the eco-friendly packaging design. If all of your choices were green, your packaging is fully recyclable.

Back to start

Questionnaire Complete

You have reached the end of the design tool.
Unfortunately, your packaging does not meet the recyclable packaging criteria.