

Circular plastic value chains

Business case:

Increasing the recycling rate of flexible plastic packaging Israel

Baseline analysis and challenge

In Israel, flexible and rigid packaging are recycled together. According to a waste survey conducted by UNIDO in 2023, only about 25% of collected flexible plastic packaging is efficiently sorted for further recycling in Israel.

Two main challenges contribute to this low recycling rate. The first challenge is related to the widespread use of flexible packaging composed of multi-material, involving a mix of polymers, thus making it difficult to sort and often diverting it to incineration.

The second challenge is related to the flexible packaging size. Packaging smaller than A4, even if the composition is mono-material, cannot be automatically sorted by Israel's existing waste sorting technology. Instead, small flexible packaging is directed to the Refuse-Derived Fuel (RDF) facilities. Only packaging that meets both size and mono-material composition criteria is recognised by the Near-Infrared (NIR) technology and is sorted for recycling.

The scope of the pilot project

Since 2019, the United Nations Industrial Development Organization (UNIDO) has, within the regional EU-funded SwitchMed Programme, focused on improving the circularity in Israel's plastic value chain. Together with industry associations, government institutions and sector experts, UNIDO has engaged local stakeholders to demonstrate a business model that can reform the handling of plastic packaging in Israel.

In this context, a pilot project was launched in collaboration with the Packaging Recycling Organization in Israel (TMIR), packaging producers and Israeli R&D institutions to identify opportunities that can increase flexible packaging recycling rates and facilitate open-loop recycling schemes.

The pilot project aimed to assess the flexible packaging market in Israel and simulate recycling scenarios with high ratios of flexible material while promoting mono-material packaging adoption and developing recommendations for upscaling the results.

The results and key takeaways

The flexible packaging market in Israel

During 2023, waste samples were conducted in three major cities, covering southern, central, and northern Israel.

The waste survey revealed that flexible packaging represents 12% of the High-Density Polyethylene (HDPE) and Polypropylene (PP) plastic waste stream, but due to size and composition limitations, only 51% of the flexible HDPE and PP packaging is recyclable.

Lab tests for recycling flexible packaging

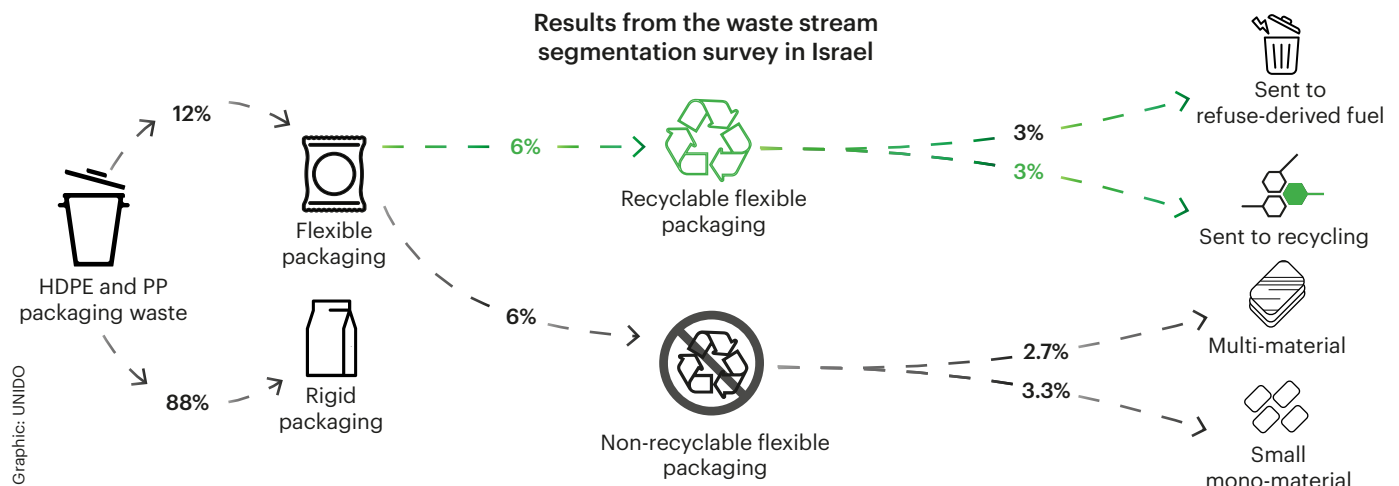
In collaboration with the Israel Plastic & Rubber Center, lab tests were performed to check recycle chemical and mechanical properties with different ratios of flexible/rigid plastic compositions to produce recycled rigid packaging for non-food grade applications.

The material tested was a mixed waste stream containing rigid and flexible packages sourced from Plastic City, TMIR's recycling contractor. Testing was conducted using waste stream samples that contained 15% flexibles in the HDPE category and 20% flexibles in the PP category (about 2-3 times the flexible ratio in today's recyclate stream).

Lab tests showed that the HDPE mix sample met compliance standards for Melt Flow Index and ash content, but its density was low. Adding 7% Calcium Carbonate Masterbatch improved the density, thus meeting specification requirements. The HDPE material formulation was then fully compatible with the application's specifications. This means that even if the ratio of PE mono material flexible doubles/triples, the recyclates can still be used for closed-loop recycling into new packaging.

On the other hand, despite specific additives, the PP material test results did not produce similar results. Further testing and adjustments are required for the PP material to ensure compatibility with the application's requirements, but these were not possible during the pilot project due to logistical constraints.

Results from the waste stream segmentation survey in Israel



Switching to flexible mono-material packaging

An economic impact analysis was conducted to quantify the financial implications of transitioning to mono-material packaging across the value chain.

Currently, the existing Extended Producer Responsibility (EPR) scheme does not provide sufficient economic incentives for brands to convert all their flexible packaging into mono-material. A simulation was done to calculate different scenarios for introducing market-based incentives, such as eco-modulation fees within the EPR, to assess how the economic benefits will cascade through all actors on the value chain.

Reducing the brand fee contribution to the EPR from the current 247 Euro for multimaterial to 160-118 Euro per ton of HDPE and PP mono-material flexibles will provide an incentive for brands, and TMIR will increase its revenues from the flexible segment by 36-74%. Moreover, the recyclers, such as Plastic City, buying from TMIR the mono-material flexibles can also increase the selling price of the recycle from the current 750 to 900-950 Euro per ton, which is still 55% less than the market price for virgin pellets. The analysis indicates the effective competitiveness of recycled materials in comparison to virgin plastic, thus creating an economically favourable environment for applications of plastic recyclates and increasing close-loop circular schemes in the plastic value chain.

Transitioning to mono-materials presents a compelling economic opportunity. This shift can potentially boost plastic recycling, adding 550-600 tons to TMIR's plastic recycling stream.

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Flexible packaging offers environmental benefits due to its lightweight nature, reducing the use of packaging materials. However, it presents a challenge in terms of sorting and recycling. The pilot demonstrated the feasibility of closing the loop even in such a challenging waste stream, thanks to dialogue and collaboration among all stakeholders in the value chain, including policy makers.”

Ohad Carny- SwitchMed Focal Point
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Recommendations

In Israel, only two standards for flexible plastic products (non-packaging) exist. It is therefore recommended to consider the adoption of relevant international standards for mono-material flexible packages, in particular, ISO standards such as ISO 15988 and ISO 13636 for PET and ISO 17555 and ISO 17557 for PP, that could serve as valuable references and guidelines.

Building upon the Israeli Packaging law established in 2011, which sets the guiding principles of the EPR scheme and considering the potential for revenue increase through the sorting of flexibles not currently recycled, investments in advanced sorting equipment, such as additional NIR sensors for the 2D stream and a suitable ballistic separator for light materials should be considered in the future as the market develops.

Given the results of the economic analysis, adjusting the waste handling fees will be essential to create the proper incentive in the business environment, as will the gradual increase of landfill fees while concurrently promoting recycling and alternative waste management solutions. Disposal fees for waste-to-energy and incineration should be set at a level lower than landfilling fees but higher than recycling schemes.

Additionally, supporting brands, providing grants, subsidizing professional assistance, and directing efforts towards redesigning flexible packaging to mono-material and to match TMIR sorting capacities can significantly enhance flexibles' sorting and recycling rates, initiating a virtuous circle that prolongs the material life cycle of plastic and contributes to sustainable waste management practices.

While increasing recycling rates and sorting capacities are essential, encouraging brands to embrace recycled materials is paramount. The industry's widespread adoption of recycled materials can be achieved through a combination of premium pricing strategies and strategic incentives:

- Manufacturers can highlight the recycled content in their packaging, employing marketing techniques to capture market attention.
- The government can offer incentives in the form of subsidies or tax benefits that encompass supporting the use of recyclable materials in packaging, encouraging the incorporation of post-consumer recycled content.
- Funding initiatives aimed at redesigning packaging to incorporate recyclates, thus fostering an upward trend of flexible packaging maintained in closed loops across the plastic value chain in Israel.

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