**Packaging, Packaging Waste, and Printing Inks: The Impact of the PPWR**

*Last November, the European Parliament approved the EU Packaging and Packaging Waste Regulation (PPWR), which affects the entire packaging lifecycle, with compliance impacting packaging weight and volume, as well as reusability, and recyclability. This regulation also highlights the importance of sustainability in labels and packaging, as well as the inks used in their production.*

*The inks used in packaging and label printing form only a small part of packaging, but they are essential to creating shelf appeal and providing product and traceability information to consumers and brands.*

*Natasha Jeremic, Ink Development Manager, Domino Printing Sciences (Domino), considers the impact of the PPWR on the development of printing inks for packaging and labels and outlines the importance of PPWR-compliant inks in evolving reuse and recycling processes.*

**Reducing ink use**

Reducing the overall weight and volume of product packaging is one of the PPWR’s key objectives, with packaging designers expected to develop more compact and lightweight packaging that fulfils its protective, informational, and promotional functions.

While less ink will be needed to print smaller packaging labels, ‘Designing for a Circular Economy’ (D4ACE) [guidelines](https://guidelines.ceflex.eu/assets/public_docs/D4ACE_guidelines_An_Introduction.pdf) recommend minimising ink use to less than 5% of the total packaging weight to reduce contamination during the recycling process – a figure threshold likely to be lowered in the future.

With both volume and weight at a premium, some brands, packaging developers, and suppliers may consider replacing printed labels with direct-to-shape printing for their labelling needs. Direct-to-shape printing, utilising inkjet technology, such as the application of [QR codes on bottle caps](https://www.domino-printing.com/en/news-and-events/2024/bottle-closure-printing-station-for-labelless-water-bottles?utm_medium=non-paid&utm_source=onlinepublication&utm_content=ppwr-pj&utm_campaign=2024-int-en-ppwr-pj), is expected to become increasingly popular. Use of QR codes powered by GS1 can link to information stored across different online data systems. This helps to reduce the amount of ink needed for packaging and labels, whilst enabling brands to make better use of limited printable space. Consumers can simply scan the code with their mobile phone to access information that would have been traditionally included on the pack – and much more.

**Supporting packaging reuse**

In addition to packaging reduction, the PPWR also imposes reuse targets on different packaging categories. Details of reuse schemes with standardised containers are yet to be agreed, and while it is certain that durable identification of containers for tracking purposes will be needed, how the product will be identified, and how durable the identification will have to be, leaves space for innovation.

Packaging inks will need to be adapted to support packaging reuse, with different formulations necessary to meet the varying durability and deinkability demands. In a dedicated brand reuse scheme, branding, product, and usage information would need to be printed using inks that can withstand the high temperatures used in washing and preparing packaging for reuse. Enhanced durability would also be required for any on-pack information and QR codes that support traceability and product returns.

Conversely, variable data – including that relating to product batches, batch codes, production, and expiry dates – would need to be printed using inks that can be easily removed by de-inking – so that the packaging can be printed with new unit-specific data before reuse. Labels could also be an effective option for applying variable information to packaging, enabling convenient removal and new application of data.

**Optimising for packaging recycling**

The PPWR broadens current on-pack recycling information requirements to include traceability for every single part of the packaging. Materials used, the origin and percentage of recyclate, how to reuse or recycle them, and any substances of concern must now be declared on product packaging.

In addition, new packaging material requirements under PPWR demand a greater proportion of recycled content or alternative fibre-based, compostable materials. With ink performance being heavily substrate-dependent – and therefore variable – these new materials may cause challenges to converters and packaging ink developers. The permeability and ink adhesion properties will differ depending on the material, thereby affecting print quality, durability, and colour intensity in ways that will need thorough testing before use.

Ink and packaging developers will need to ensure they protect the functionality and promotional value of packaging while maintaining consumer safety and product freshness, particularly in food packaging applications. Ink developers will need to consider new functional coatings, ink formulations, and primers to guarantee the performance and safety of packaging inks when printing on new PPWR-compliant materials.

In terms of recyclability, labels, adhesives, and print will need to be removable – without leaving a trace – and de-inking will be of particular significance, as colourant pigments and large areas of UV varnish are known to render recycling processes less effective.

Work to develop processes, materials, and adhesives that will facilitate de-inking and label removal at temperatures lower than the current 65–85°C range has already begun, and efforts are likely to intensify. This will include a strong focus on eliminating hazardous substances on EuPIA’s (European Printing Ink Association) Exclusion List from packaging inks to ensure they don’t enter the recycling stream, contaminating the recyclate and affecting consumer safety.

**Conclusion**

The implementation of PPWR necessitates a new level of collaboration between brands and suppliers of ink, packaging, and label and packaging substrates to ensure that recyclability demands can be met while satisfying brand owner requirements for eye-catching, high-quality packaging and labels.

Over the coming decades, packaging materials and recycling techniques are expected to evolve and change – and printing inks will need to adapt to these developments. The stage is now firmly set for a new age of innovation in ink development and application.

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