

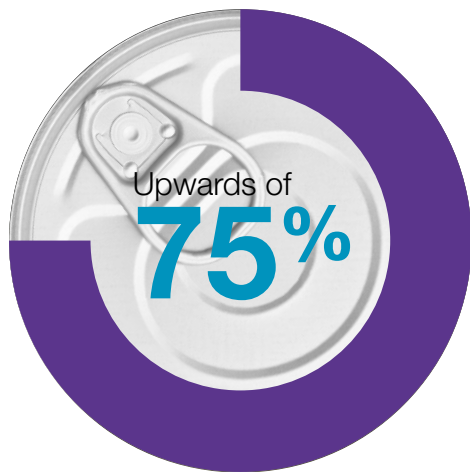
# MATERIAL CONCERNS

Limiting the challenges and consequences of transitioning to Bisphenol-Free cans



**AkzoNobel**

# Summary



**European packaging volumes estimated to be impacted by the new legal requirements.**

The European Food Safety Authority (EFSA) caused some concern at the end of 2021 with its conservative stance on products – and specifically metal food packaging – that feature Bisphenol A (BPA) as a coating in their internal can lining. The proposed threshold for BPA is so low its use in any metal packaging of food products is effectively banned. Current estimates suggest the new legal requirements will impact upwards of 75% of European packaging volumes.

Scientists from the EFSA have decided that coatings containing BPA – and indeed all similar chemicals that fall under the Bisphenol class of materials – are materials of concern (MoCs), however they are designed due to the potential detrimental effect on a consumer's health and safety. Legislation to that end is probably two or three years off, and an outright ban may not be implemented before at least 2026. Alternatives to Bisphenols, however, already exist and are being widely used so that in itself is not the challenge.

The challenge the industry faces, is in minimizing the economic impact of the EFSA's desired conversion to a Bisphenol-Free world, and the speed with which alternative technologies can be integrated into the commercial mainstream. It also faces a challenge over talent. There is a shortage of experts to support food producers and packaging manufacturers transitioning to a new world in a way that is commercially and economically viable and does not create serious issues in the supply chain or impact on consumers.

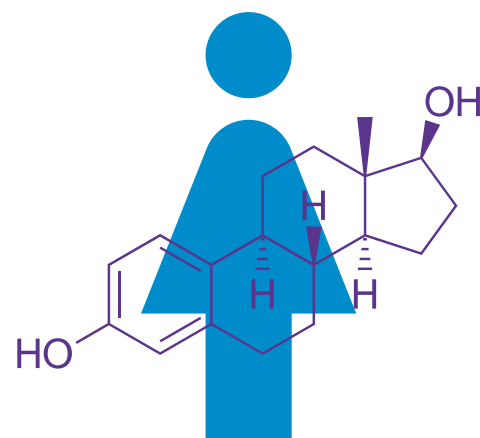
# Background and context

Epoxy resins based on the Bisphenol class of materials have been a mainstay of the food and beverage sector for many decades. Packaging linings have helped transform the humble metal can into a container that is essential to preserving what's inside for months and sometimes years after the food has been processed or the drink has been made. The coating inside creates a barrier between the food and the can itself, which in turn prevents the food becoming in any way altered (i.e losing flavour, taste, etc) or going bad, and potentially putting consumers at risk. Indeed so successful is the can in ensuring the quality and nutrition content of the foods it contains that there has not been a single report of food-borne illness from the failure of metal packaging for more than 40 years. (Source: CMI).

Widely used within and beyond the can packaging industry (for example in cash register receipts, polycarbonate containers, epoxy tanks and pipe linings), the possible harmful effects of BPA were first called into question as long ago as the 1930s when it was found it could mimic

the female hormone estrogen. Since then, more evidence has emerged of its potential impact on health, including an increased risk of breast cancer, diabetes and obesity, and hyperactivity in children.

In 2016, the EU listed BPA as a REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) candidate for a Substance of Very High Concern (SVHC). But even before then, organisations – including AkzoNobel – had been exploring and commercializing alternative chemistries and new generations of products that are not only BPA and in some cases also free of all other Bisphenols and similar analogs. The challenge has been to develop new materials that can deliver the corrosion resistance and adhesion and inert performance they need to protect food from spoiling. The challenge also has been to develop alternatives that are commercially viable and can easily integrate with existing production processes.



**It was found that BPA could mimic the female hormone estrogen in the 1930s.**

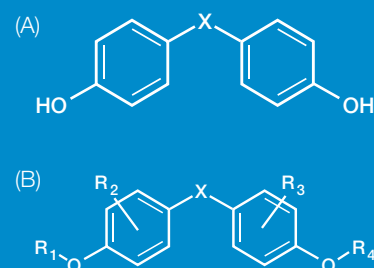
# New product development

The solutions include various acrylic, polyester, and polyolefins as alternatives to Bisphenols that were first launched as far back as 2014. They were preferred because their safety is already well established. Some have proven chemical migration profiles that are even lower than standard epoxy and epoxy mimic coatings, and they are compliant with various EU, US and international regulations.

Other solutions include products that use different members of the Bisphenol family. It is likely, however, that future regulation will ban all Bisphenols as being potentially harmful, and so this short-term gain may end up giving can makers and their customers a longer-term headache.

The multiyear development process of can linings is deliberately intensive to ensure all next-generation linings continue the safety record of canned foods.

## Bisphenols - General Structure



BPX is a term we use to describe all molecules in the Bisphenol family. The X is used as a placeholder for any other functional group such as A, F, S, etc. It also assumes that the phenol group could have extra groups on them as well, such as with TMBPF.

This is further backed up by the REACH definition of Bisphenol, where they state the phenol rings may be additionally functionalized (structure B). These are sometimes called Bisphenol derivatives. However, they do not consider halogenated materials (ex: fluorine or chlorine modified).

# Risks in transitioning to new product technologies



**France banned the use of BPA in all food contact material in January 2015, a rocky transition that took more than four years.**

While EFSA's current proposal focuses on BPA only, regulations and laws are likely to expand to the broader class of Bisphenols. This is especially likely given the growing noise around the use of other Bisphenols in parallel studies and investigations, evidenced by REACH. The implications of removing Bisphenol A and all Bisphenol-based coatings from the food manufacturing and canning process are of a scale and magnitude not previously witnessed by the packaging industry. Conservative figures suggest that anything upwards of 75% of European volumes would need to be converted from its current packaging to Bisphenol-Free packaging in order to be legally compliant. It demonstrates the importance for the committee not to rush into making a decision now that the whole industry might later have cause to regret.

The timing of the transition, therefore, will be crucial, and requires total alignment across the supply chain. We don't want to find ourselves going through a series of expensive transitions or conversions, if the first transition is to a regrettable substitution. Similarly we don't want to find ourselves in a situation of having to take back food from the supply chain unnecessarily, in a world already challenged by sustainability, and where debates around dwindling food stocks are already very loud.

Different regions are already ahead, or behind, in their thinking and progress towards banning Bisphenols. France, for example, decided unilaterally to ban the use of BPA for food contact materials intended for children below the age of three as far back as December 2012. It extended that ban to all food contact materials in January 2015. (This was after the EU banned BPA from infant feeding bottles in 2011.)

Interestingly, according to a report on the Food Packaging Forum (March 24, 2018), the EU actually considered taking legal action against France, describing their actions as 'fully disproportionate' and 'creating legal uncertainty'. Fast-forward four years, and that very same uncertainty has the potential to exist throughout the whole of Europe and indeed the rest of the world!

The lesson to be learned from the example of France, however, is not about its relationship with the European Commission, but rather the challenges it faced in making the switch, and the dangers of rushing a decision without carefully thinking it through. France is a comparatively small market, and yet it took more than four years to transition to a world of food packaging free from BPA. And the transition did not go smoothly.

Some companies were even accused by the French Competition Authority of deliberating making the transition difficult, which perhaps re-inforces the need for decision makers in the EU to be clear about what is required, and allow suitable time for any future transitions to take place.

Within that time, organizations will need to ensure there is full transparency around all substances used in packaging within their own production processes and requiring similar transparency from their suppliers. It means developing a qualification plan and expected timelines for transitioning to new substances and ensuring procurement teams and processes are fully aligned. And it means mapping the commercial impact and being clear in how that impact is communicated with customers, especially when it may mean changes in costs and delivery times. (Source: McKinsey and Company. Navigating regulatory uncertainty in packaging: A new wave of chemical-substance regulations. July 2022).

## The global market

Looking at the global market for cans adds further context, its growth driven hugely by the global food & beverage industry.

The size of the global BPA and BPA<sup>ni</sup> cans market holds a market revenue of \$76.4bn and \$8.0bn, respectively, in 2018. Several key factors such as rapidly growing demand for food and beverage packaging and growing awareness regarding health and hygiene issues of packed food products are anticipated to significantly drive the market for the non BPA cans. It is estimated to expand robustly at a CAGR of 4.73% over the forecast period, i.e., 2020-2027.

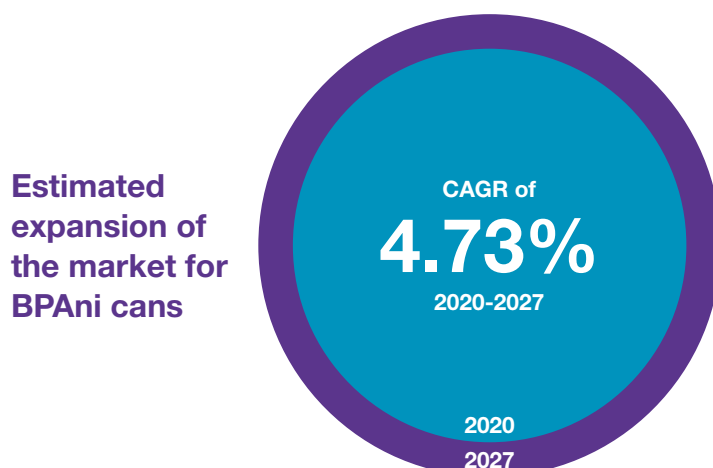
When it comes to regions, the global BPA and BPA<sup>ni</sup> cans market is segmented into North America, Europe, Asia Pacific, Latin America, the Middle East and Africa. The BPA cans market in North America was estimated to hold the highest market share (c.30%) in 2018, which can be attributed to the region's highest per capita consumption of packaging. In the US, some retailers sell almost 40% of their consumer products in BPA cans which ultimately drives demand for BPA cans in North America.

Future growth will be impeded by a number of factors, not least the banning of BPA cans in certain parts of the world in the very near future. But the growth of BPA<sup>ni</sup> cans will be challenged by the current high cost of manufacturing and – as mentioned earlier – the availability of substitutes that are comparable to or less expensive than current BPA solutions.

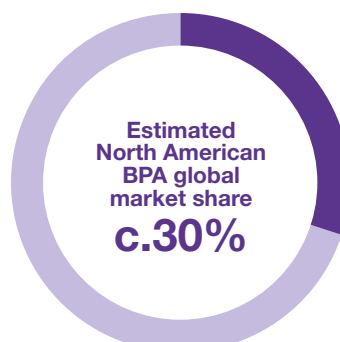
(Source: Research Nester – Global BPA and BPA<sup>ni</sup> Can Market Outlook – Industry Analysis & Opportunity Evaluation 2018 – 2027).



Demand for BPA Cans



Estimated expansion of the market for BPA<sup>ni</sup> cans



Estimated North American BPA global market share c.30%



In the US some retailers sell almost 40% of their consumer products in BPA cans

# Talent shortage and the need for clarity on phasing and scope

“In seeking alternatives to cans, we run the risk of slipping backwards in the sustainability agenda and in creating an unintended consequence.”

Transitioning to a new world free from BPA is clearly not going to be a simple journey. It will be restrained, for one thing, by a shortage of experts with the capacity of helping businesses to convert to new technologies and new lines. Skills shortages within such a specialized field have always been a challenge and will now become even more acute.

It will also be hampered by a real lack of any clarity around phasing, deadlines and scope; whether or not certain food types could be exempted, for example, at least in the short-to medium-term until viable alternatives can be found. It is also not wholly clear whether the banning of BPA specifically – and Bisphenols generally – applies to internal coatings, external coatings, or both. Here the vague definition of ‘food contact materials’ doesn’t help. For an internal coating, it is obvious that the coating will be in contact with the food directly, but what about an external coating, and the contact of your lips when drinking from a can? Surely there is a risk that any form of contact – even holding a can – may be considered a potential hazard? Indeed if we were to take this to the extreme, what about the coating on the cabinet in which the can is stored? Of course that is an extreme in order to make the point that clarity, moving forward, is essential.

That might sound far-fetched but there is already precedent. The world of printing papers, and thermal papers used in cash registers, has been through many of the same issues. Papers are now promoted on the basis of being BPA-free, which required paper mills to make significant changes in their manufacturing processes. Those papers are said to be ‘safer’ for those who have to handle them. However, many of the papers use Bisphenol S (BPS) – effectively swapping out one set of issues for another. The European Chemical Agency (ECHA) Risk Assessment Committee says that BPS has a similar toxicological profile to BPA and is not a suitable replacement. (<https://chemtrust.org/toxicsoup/>)

The lessons learned so far is that any new regulation, legislation or instruction needs to be black and white, without any shade of grey. ‘Grey’ simply leads to short-term decision making and that’s what we call a ‘regrettable substitution’, as in the case of thermal papers.

This is the crucial point. When BPA first came to the public’s attention over two decades ago, manufacturers scrambled to find replacement chemicals to use in their products. Many found that the easiest option was to move to another closely related Bisphenol, such as BPS. Researchers are now finding many of these closely related chemicals are present in people’s bodies all around the world; and that they too are potential hormone disruptors.

There are other potentially huge unintended consequences: if, during the transition to cans with BPA coatings, other packaging materials were required to fill the gap, then the only real solution for food packaging would be glass. But glass was substituted in the supply chain decades ago in favour of plastics, because plastics were considerably lighter and safer (with fewer breakages) and therefore much easier and less expensive to transport. They saved the industry millions in freight costs, energy costs and product wastage, and were considered better for the environment.

Now consumers are ditching plastics in their millions, aware of the damage that single-use plastics are causing to the environment, which leaves packaging suppliers and food manufacturers with a headache. Carton-style packaging has been suggested but is unsuitable for a large proportion of foodstuffs and carbonated drinks, and has questionable recycling credentials. Although sold on its environmental benefits, carton-based packaging contains an element of plastic which makes complete recycling difficult. Which circles the conversation back again to glass or – perhaps unthinkable – back to plastic.

The point is a simple one: that in seeking alternatives to cans, we run the risk of slipping backwards in the sustainability agenda and in creating an unintended consequence. It means that in keeping hold of the can, and transitioning to a coating that is free from anything that could be considered harmful to human health, we must ensure we don’t simply substitute one set of difficulties for another and, in the case of BPS for example, one material of concern for another.

# AkzoNobel's point of view

Everyone believes that removing Bisphenols is the right thing to do. We believe there is an opportunity for the industry to shape change together in developing alternative solutions.

Our own particular focus has been on acrylic-based technology, which is already widely used in the packaging industry. It avoids any conversation around Bisphenols of any kind and is already proven in the market. So too polyesters, which are proven to be safe and have a well-defined and well understood safety narrative. But removing BPA from the coating does present challenges from a technical perspective. High-alcohol beverages such as cider or wine, for example, are especially aggressive on the coating, and alternatives are not easy to find that have the same performance qualities. It is not a simple case of swapping one coating for another.

Regardless of these challenges, it is our opinion that state of the art metal can packaging has advanced to the point where bisphenols of any kind are no longer required to create safe coatings. We will continue to sell epoxy coatings when compliant with local regulations, and where there is viable customer demand, but importantly, we will offer Bisphenol-Free alternatives across the globe in line with our sustainability agenda and People, Planet, Paint pledge.

In supporting clients to make the transition to a new world we have – and will continue – to support the current safe use of Bisphenol products according to the guidance from national and international regulatory authorities. We will also take the steps those agencies deem necessary to ensure that packaging technology is safe for the consumer for as long as those products are in circulation.

Our clients will be offered a choice of alternative coating solutions, rather than focusing on a single technology. Different regions are moving at different speeds, even in the absence of legislation, and embracing new technologies. To that end we can already provide most of our European customers with solutions that have established safety narratives – solutions already tested and passed by our own safety checks, verified by third-party agencies. And we continue to improve and refine those coatings, by identifying any gaps and addressing them.

With any regulation, change does not happen immediately and will not happen overnight. Phase out plans will be created, and as we observed with the 2014 French legislation, when the effective date approaches, pragmatic decisions will need to be taken that protect all stakeholders in the supply chain.

Necessity is the mother of invention, and the solutions being developed now will ultimately be safer for the consumer and protect the longer-term interests of can makers and food producers worldwide.

“Our own particular focus has been on acrylic-based technology, it avoids any conversation around Bisphenols of any kind and is already proven in the market.”



We supply the sustainable and innovative paints and coatings that our customers, communities – and the environment – are increasingly relying on. That's why everything we do starts with People. Planet. Paint. Our world class portfolio of brands – including Dulux, International, Sikkens and Interpon – is trusted by customers around the globe. We're active in more than 150 countries and have set our sights on becoming the global industry leader. It's what you'd expect from a pioneering paints company that's committed to science-based targets and is taking genuine action to address globally relevant challenges and protect future generations.

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