sustainable Plastics

MAY/JUNE 2023

SustainablePlastics.com

# Racing towards the mobility transition


**Also in this issue:**

# Popularity of polyurethanes grows as automotive industry looks to accelerate sustainability

**The use of advanced chemicals and materials, such as polyurethanes, is crucial to the success of next-generation drivetrains and the delivery of continued improvements in the sustainability of modern transportation. Irina Bolshakova, global marketing lead for automotive polyurethanes at Huntsman, explains the different ways in which polyurethane providers are helping automotive manufacturers and their suppliers reduce the carbon footprint of their vehicles.**

Between 65 to 80 percent of the life cycle $CO_2$ equivalent emissions that an automobile generates originate—at least according to a 2020 McKinsey report entitled *The zero-carbon car: Abating material emissions is next on the agenda*—from exhaust emissions. The remainder is mostly linked to the embodied carbon in materials used throughout the vehicle value chain.

Conscious of the sector's impact on the environment, automotive manufacturers in all regions have already started to instigate a discernible shift away from vehicles that are powered by the combustion engine to electrified alternatives.

In 2021, nearly 10% of global car sales were battery-powered, according to the IHS March 2023 market review. That same review predicted that this number would reach around 50% over the next decade, which would represent a significant advance. However, more work is needed to reach this goal and supporting the switch to electric drivetrains is just part of the story.

With the shift away from high tailpipe $CO_2$ emissions already in progress, there is now a bigger focus on material embodied impacts—and it's here that companies like Huntsman are now channeling their efforts to support their customers and their overall carbon reduction ambitions.

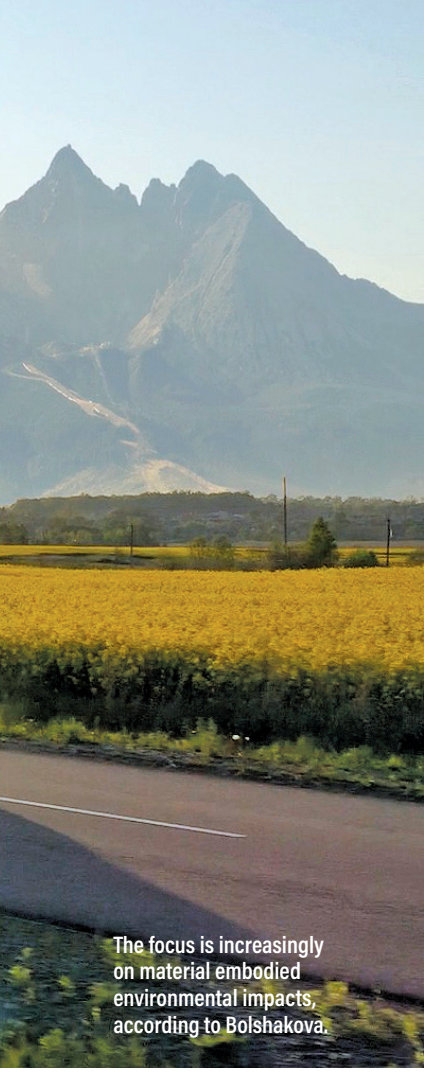
Continuing to develop materials that will accelerate the overall transition to electric vehicles remains key for companies like Huntsman. Obvious areas of innovation include light but strong polyurethane composites used for battery housing applications and seating and acoustic polyurethane foams made with recycled raw materials. However, material manufacturers also need to work hard to increase their use of carbon-neutral energy throughout their production value chain; use non-fossil-based raw materials and secondary feedstocks with a lower carbon footprint; and find end-of-life recycling options that can reduce waste and increase the time valuable resources are circulating within the manufacturing economy.

When it comes to increasing the use of carbon-neutral energy throughout the value chain, material manufacturers need to take a holistic approach—looking at how they can reduce their own scope 1 (direct) and scope 2 (indirect) emissions, and what their material and energy providers are doing. In the production of methylene diphenyl diisocyanate (MDI)—the precursor to polyurethane—steam and electricity represent about 11% of emissions while for the base polyol it is about 3% (see Dominance analysis in ISOPA eco-profiles). This means that with a complete flexible foam system, before foaming and moulding—used in an automotive seating application—about 6% of the GWP100 (Global Warming Potential) would come from the precursor's production energy use, while 94% would come from the purchased raw material embodied carbon footprint.

At Huntsman, one of the things we are doing to reduce our scope 2 emissions is to buy certified green electricity to power our MDI production site in Rotterdam. In addition to tackling our own operational emissions, we are engaging our key suppliers and service providers in an attempt to reduce emissions throughout our value chain. Our aim is that our suppliers establish their own carbon-neutral goals by 2027, at least for our European sites.

Material manufacturers also need to put more effort into raw material selection to ensure a reduction in the product carbon footprint of the solutions they are delivering. The main way to achieve this is to develop solutions that incorporate significant amounts of bio and recycled content into their materials.

Previously, there were concerns that incorporating bio-based content into a polyurethane foam system would have a detrimental impact on performance, specifically on emission and odour levels, but that's no longer the case. It's now possible to make polyurethanes that provide up to 25% bio/recycled content with minimal impact on material performance. We've recently achieved this in flexible


The focus is increasingly on material embodied environmental impacts, according to Bolshakova.


Irina Bolshakova

foam and acoustic applications, and we're continuing to push the boundaries in new areas and with higher volumes.

The third part of the puzzle is developing materials that can be used beyond their original application—once they reach the end of their life cycle—to help minimize waste. In this area, we have ongoing dedicated research programs exploring various recycling options for end-of-life foam in automotive applications and engaging with OEMs globally to enable 'developed for recycling' concepts in interior comfort applications.

The main challenge here is in assessing, quantifying and communicating a product's environmental performance, especially when using bio-based or recycled materials as feedstocks. Manufacturers need to make sure their methodology choices are transparent, understood and in line with the rest of the value chain's expectations. The lack of life cycle assessment data for new bio-based or secondary feedstocks and the variability between different LCA databases and methodologies can make this tricky.

As well as taking a segregated bio- and recycled-based feedstock approach, the chemical sector's transition to circular economics is seeing large-scale manufacturers of key chemical building blocks adopt chain of custody models such as the mass balance approach certified by ISCC+ or REDCert2.

ISCC PLUS is a global sustainability certification system that makes it possible to track the amount and sustainability characteristics of circular and/or bio-based content in the value chain and attribute it via the mass balance approach based on verifiable bookkeeping. With ISCC PLUS certification, companies can offer MDI based on mass balance principles, which can help reduce the attributed carbon footprint of automotive products and the drive to more sustainable forms of mobility. We've recently been through this process at Huntsman.

Lastly, across all the industries we serve, automotive is one of the most demanding for products that are bio-based, that are linked to renewable feedstocks and can contribute to a circular economy. Throughout our business, we're taking steps to transform our portfolio and lower the impact of our manufacturing. With the amount of plastics used in the transport sector expected to triple, according to the OECD, by 2060—and the need to hit net-zero targets becoming ever more pressing—getting all of these elements right has never been more important.

polyurethanes_eu@huntsman.com
www.huntsman.com