



ERJ Elastomers for **TOP 10 SUSTAINABILITY**

The Elastomers for Sustainability (E4S) initiative focuses on projects contributing most to raising the environmental profile of the elastomers/rubber industry.

E4S is designed to highlight significant advances for end-user sectors including:

- Automotive Components
- Construction
- Consumer, Medical and other GRGs
- Industrial Products
- Tires

A new Top 10 will be featured in the May/June 2021 issue of European Rubber Journal.

SUBMIT TODAY!

We invite you to provide your suggestions, along with supporting details, which can include published information.

Entries should ideally involve a product application which has been commercialised within the last 18 months. Materials technologies nearing commercialisation will also be considered.

To enter, email Patrick Raleigh Editor, European Rubber Journal at praleigh@crain.com

Deadline: 16 April 2021

Contact Christine Zernick at czernick@crain.com to discuss E4S sponsorship opportunities.

european-rubber-journal.com/elastomers-for-sustainability

ERJ TOP 10 Elastomers for SUSTAINABILITY

Revised Top 10 ranking of projects contributing most to raising the environmental profile of the elastomers/rubber industry

Position	COMPANY	PROJECT	SCORE
1	EXXONMOBIL, SPECIALTY ELASTOMERS & BUTYL BUSINESS	Higher performance tire innerliners with new specialty elastomer	585
2	JSR ELASTOMER EUROPE	New hydrogenated SBR for ultra-high strength	570
3	ARLANXEO	Sustainable EPDM compounding based on Keltan Eco EPDM rubber	548
4	TRINSEO EUROPE	ISCC certification of synthetic rubber production	500
5	TRINSEO EUROPE	Highly-functionalized Solution-SBR grade	495
6	ETB	Bio-butadiene from ethanol for tire production	490
7	CONTINENTAL	Eco-rubber hose	489
8	KORDSA / CONTINENTAL	Ecofriendly dip technology (Cokoon) of textile tire reinforcement for tires: Based on open source concept	480
9	ASAHI KASEI	New-generation SBR technology	477
10	ISOGRAN	Rice-Husk Silica	470

ABOUT THE TOP 10 TABLE

Since early 2020, companies and individuals have been invited to supply ERS entries via an online link on the ERJ website. From the strongest 20 contenders, the expert judging panel assessed each project on the basis of: Quality of the presentation; level of innovation; USP; Commercial potential; and Contribution to sustainability. Along with ratings for overall strength and weakness, the system allowed for a maximum score of 700 points.

E4S is an industry-first sustainability initiative, designed to highlight significant advances for end-user sectors including automotive, tires, automotive components, construction, consumer, industrial and medical.

1 ExxonMobil Chemical

This new speciality elastomer has been developed to enhance the barrier performance of tire innerliners and, in turn, extend the battery range of electric vehicles.

An alternative to traditional halobutyl/natural rubber blends, Exxpro 3563 is a fully saturated elastomer produced

by the carbocationic polymerisation of isobutylene and para-methyl styrene followed by halogenation.

The fully saturated backbone enables "exceptional" chemical and oxidation stability, while increased chain stiffness and better packing-density with benzylic bromide groups presents a highly effective barrier to oxygen molecules.

Compared to conventional innerliners, the new elastomer delivers: a 20-50% improved air retention; 12% improvement in in-use rolling resistance; On target inflation pressure loss rate (IPLR) of <1.8% for global EV OEM leaders; and an increase of 3-7% in EV battery range.

Judges' comments

Clearly TPMS has helped this sector greatly but this will do more. Pushing the IPLR towards 1.5% is the industry goal. This is a commercial product that is being evaluated for tire introduction already.

2 JSR Elastomer Europe

Through a combination of unique polymerisation and hydrogenation technology, JSR has achieved a "50%" improvement of wear resistance compared to our conventional grade while keeping a good balance between the rolling resistance and wet grip indicator. A key project focus was to increase the durability of tires and reduce road-wear particles.

The hydrogenated polymer can control the number of crosslinking points to achieve a uniform cross-linked structure that improves wear resistance.

The single bond after hydrogenation allows free rotation leading to high polymer entanglement, which contributes to high modulus and enhanced wear resistance.

As for the rolling resistance, the new polymerization technology shows a 30% improvement compared to E-SBR.

Judges' comments

HSBR to improve all aspects of the magic triangle apparently by dispersing the crosslinks more evenly. Would like to see more evidence as to why this approach works and it being used commercially.

3 Arlanxeo

Arlanxeo targeted the development of EPDM compounds based on EPDM rubbers incorporating bio-monomers as well as bio-based processing oils, plasticisers and sustainable fillers such as rice hush ash, carbon black from pyrolysed tires and micro-cellulose.

Now has three commercial Keltan Eco EPDM grades in its product portfolio: one for static profiles and TPV applications; a more amorphous grade for e.g. dynamic profiles; a super amorphous grade eg for sponge profiles.

Life cycle assessment shows that by using the high ethylene EPDM grades, CO₂ footprint reduction of up to 85% can be achieved, compared with fossil-based EPDM.

The project also envisages the development of a bio-propylene for the Keltan Eco production as well as the use of other sustainable oils and fillers – and the potential role of such materials in new mobility, electrical vehicle and new power train technologies.

Judges' comments

The full LCA on this bio-based EPDM versus conventional EPDM is compelling. Three grades on the market already. One has been turned into footballs for the World Cup in 2018.

There are other bio-based polymer lights on the Christmas tree, but the broad scope here is impressive. It is now necessary to move up the stairs.

4 Trinseo Europe

Focused on Trinseo's synthetic rubber manufacturing site in Schkopau, Germany, company will certify the coprocessing of traditional and sustainable feedstock in existing production units under the mass balance approach.

The project promotes the use of more sustainable key raw materials in the manufacturing of synthetic rubber – including increased use of recycled and/or bio-based feedstock.

Mass balance certification for the entire 'chain of custody' is awarded by the ISCC [International Sustainability & Carbon Certification] following third-party auditing.

The pay-back is that companies can keep track of the total amount of sustainable feedstock throughout a complete value chain and ensure an appropriate allocation to the finished goods.

Following a recent audit TÜV Nord and registration through the ISCC certification scheme, Trinseo can now deliver mass balance certified S-SBR and E-SBR synthetic rubber products.

Judges' comments

Important scheme, which could really drive forward the use of renewable and recycled materials in the elastomers/rubber industry

5 Trinseo Europe

Entry in ERJ July/August issue updated with more details of functionalisation process, including the action of the functional groups within the rubber compound. See full details in E4S section under the Events section of the ERJ website: www.european-rubber-journal.com.

6 ETB

Project updated from inaugural E4S ranking in ERJ July/August issue. See full details in E4S section under the Events section of the ERJ website: www.european-rubber-journal.com

7 Continental

Project updated from inaugural E4S ranking in ERJ July/August issue. Continental has built on its development of a bio-EPDM based garden hose, with the new EcoLite Garden Hose, using 100% post-industrial recycled TPV. See full details in E4S section under the Events section of the ERJ website: www.european-rubber-journal.com

8 Kordsa Technical Textile / Continental AG

New tire-cord fabric adhesive system to replace standard resorcinol-formaldehyde adhesive systems. The novel chemical composition is in its early commercialisation period. Standardisation of the materials technology also reduces overlaps in R&D work and approval costs and minimises complexity for tire makers and textile converters.

With an open-source platform and royalty-free patent pool, the technology can be deployed without supply-chain conflicts among producers, customers and competitors.

Continental has produced 250,000 tires with Cokoon dip technology in 2020. Some 24 external companies have signed NDAs and tested dipped cord samples.

Judges' comments

Great project concept, involving a wide

number of suppliers and manufacturers.

Pool approach is innovative and might find followers in other fields or even other industries

Good but needs to describe some aspect of the chemistry in the application

9 Asahi Kasei

Project updated from inaugural E4S ranking in ERJ July/August issue. See full details in E4S section under the Events section of the ERJ website: www.european-rubber-journal.com

10 Isogran

Project centres on the conversion of waste from rice-husk ash to silica and active carbon, particularly for the development of a high dispersible silica (HDS) for tire applications.

The HDS is said to perform similarly to conventional silica but with a carbon footprint of -0.82 kgCO₂e/kg, compared to 2.06 kgCO₂e/kg for the conventionally made product.

The product is commercially available, with the project team now developing a HDS with a surface area of >200m²/g for applications in silicone, health & personal care, agriculture, food & feed, paints and inks.

Judges' comments

Backing of a heavy-hitter in the agriproducts arena to deliver a major-scale production facility could add real impetus.

Interesting project, but needs to explain why it will gain commercial acceptance where other rice husk ash products have not.

E4S JUDGING *The expert panel, which was coordinated by ERJ editor Patrick Raleigh, comprised:*

PROF JAMES BUSFIELD, professor of materials & national teaching fellow director of industrial engagement & head of the soft matter group, Queen Mary University of London.

DR. CHRISTOPH SOKOLOWSKI, lead on 'sustainability' issues within the German rubber industry association the WDK (Wirtschaftsverband der deutschen Kautschukindustrie), based in Frankfurt am Main, Germany.

MARTYN BENNETT, who has recently founded UK-based consultancy Midsomer Science, after a career spanning over 30 years at Avon Rubber plc, most recently as chief scientist and head of its ARTIS consultancy service.

JIRI BREJCHA, head of Brejcha Rubber Consulting, and former materials development specialist at Trelleborg Wheel Systems, and before that Mitas, Prague, Czech Republic.