From left to right: Procter & Gamble's Gabriele Haessig talks to Marco ten Bruggencate of Dow and the European Commission's Alexandre Paquot about net-zero carbon strategy and how circularity could help the industry decarbonise

PET players ramp up circular ambitions

The PET value chain gathered at the Petcore Europe AGM in Brussels to discuss the latest topics impacting their businesses. **Dominique Huret** and **Jean Schrurs** report

Europe has made great strides in PET bottle recycling in recent years. Having brought in bottles from the US in the early 1990s in order to learn about depolymerisation, Europe today recycles billions of bottles a year.

These achievements are due in no small part to deposit return systems – in Germany, for example, there is a 97 per cent bottle-to-bottle rate. But they are also due to a longstanding effort by the industry to collaborate on design-for-recycling guidelines, said Petcore Europe's Christian Crépet at his association's annual conference earlier this year.

Crépet recently took on a new role as ambassador and honorary member of the Petcore Europe board of directors and has been helping the association – which is celebrating its 30th anniversary this year – adapt its working groups to suit EU regulatory priorities.

The overall collection rate for PET in the EU and UK is between 55 and 60 per cent, but it is obvious that the beverage industry is spearheading growth in demand for rPET content, up from an average 9 per cent now to a forecast 35 per cent by 2030. Food-grade rPET demand is also expected to demonstrate robust growth, according to Patrick Bouzekri, vice-president of consultancy firm SBA-CCI.

"The demand for non-food-grade rPET for fibre, sheet and strapping will rise by about 10 per cent by 2030," explained Bouzekri, who also expected chemical recycling for PET to triple in use from 160,000 tonnes today to 480,000t by 2030.

Mechanical PET recycling is expected to gain some capacity before remaining stable until 2030 at 986,000t/yr.

"Europe is far ahead in terms of rPET usage for packaging and in terms of technology and expertise," he said. "But the EU needs to rationalise old and non-competitive PET assets and make sure the new capacities are competitive. This is a crucial point for the industry.

"Beverage sector growth this year will be slow, caused by inflation and the economic impact of the Russia-Ukraine conflict, which is setting food and energy prices at an all-time high. EU-based PET producers struggle to compete on price with imports from Asia, so imports of PET – raw and flakes – will remain high across Europe this year."

Raphael Jaumotte, technical manager for Petcore Europe, believes that the figures in the 'PET Market in Europe, State of Play 2022' report (delivered by Plastics Recyclers Europe in partnership with Petcore Europe, Natural Mineral Waters Europe and UNESDA Soft Drinks Europe) speak for themselves.

"In 2020, an estimated 4.6m/t of PET packaging was available for collection in Europe," he said. "The collection and sorting of this rigid PET packaging reached 49 per cent. For PET bottles, this figure reached 61 per cent.

"Seven EU countries that have implemented the deposit system have achieved recycling rates of 83 per cent. There is no doubt that deposit is the right system to rapidly increase the collection of bottles and to stop losing valuable material."

Petcore's Christian Crépet hailed PET's impressive circularity achievements

Delegates discuss the virtues of PET in the bottled water sector

SBA-CCI's Patrick Bouzekri expects chemical recycling for PET to triple by 2030

Refillable PET bottles are washed and refilled in Germany for up to 25 cycles

Left: An arty plastics-dominated display at the Petcore Europe AGM

"A third of the audience says their company has a net zero plan. Well done! We should listen to them"

Alexandre Paquot, European Commission

The National Association for PET Container Resources, the North American equivalent of Petcore Europe, showcased the packaging industry's efforts to reduce its ecological footprint by comparing a Coca-Cola 20oz (591ml) PET bottle from 2009 with one from 2022.

The more recent version of the bottle is 9 per cent lighter, emits 19 per cent fewer greenhouse gases during production, uses 25 per cent less energy to produce, and generates 31 per cent less solid waste.

In terms of carbon dioxide equivalent emissions, PET bottles remain the big winner across a range of sizes, half the level of aluminium and about a fifth that of glass.

"However, for us brand owners, rPET is becoming a sine qua non [a necessity], even at 2022 high prices and with limited availability," explained Koen Stevens, associate director for procurement of plastics primary packaging at Coca-Cola Europacific Partners (CCEP).

"Our packaging ambition at CCEP is to stop using virgin PET in our one-way bottles," explained Stevens. "To do this, we aim to use 100 per cent rPET by 2030. In 2022 we were above 50 per cent. To get to 100 per cent rPET, not just for our bottles but also at scale as an industry, we see the model of the future consisting of 70 per cent recycled material from high-quality mechanical recycling and 30 per cent enhanced [chemically] recycled material.

"To achieve this ambitious goal, we need all the stakeholders here and, of course, the progress of legislation to enable this huge transition."

Labels not left out

PET label liners on the European market amounted to 19,000t per year. Finding a circular economic model for them is the ▸▸

objective of one of the working groups led by the Circular Economy for Labels coalition.

The sector has committed to reducing its waste by three-quarters by 2025. To achieve this, the identification of recyclers is underway, as is the establishment of a European network to share knowledge and conduct technical tests. Led by Avery Dennison, the pressure-sensitive label group is urging recyclers and the washing industry to start testing its prototype solutions.

With an average annual growth rate of 6.2 per cent, sleeve labels need to be compatible with the sorting and recyclability of PET bottles, added Sleever International's Pierre-Yves Linot, who heads the floating shrink sleeve labels working group. The industry is participating with the tests currently in force but Linot insists on the importance of drafting guidelines to anticipate developments and guide brand owners.

The label working group is currently developing the first fully recyclable wraparound label in addition to inks that do not bleed into the recycling streams. PepsiCo, meanwhile, has put fully recyclable shrink sleeves on the market after several months of testing.

"We are challenging ourselves to think differently about carbon dioxide"

Craig Twyford, CCEP Ventures

Moving target

The PET sustainability agenda continues to move forwards at a fast pace as it transitions from recycling to circularity. For Petcore Europe's Christian Crépet, the progress must continue with the creation of even more loops featuring mechanical recycling and the depolymerisation of PET.

Indeed, Crépet highlighted several recent European industrial capacity announcements. These include Eastman completing a public consultation in November 2022 for a 160,000t/yr unit that will take hard-to-recycle polyester waste and sort, depolymerise and produce rPET at a single location. Meanwhile, Loop Industries is reviewing locations for a 70,000t/yr depolymerisation unit for low-value waste PET and polyester fibre, including bottles and packaging.

Carbios completed a permit deposit in December 2022 for an upcoming 50,000t/yr enzymatic (depolymerisation) PET biorecycling plant, and Axens is moving ahead with a 80,000t/yr site for its Rewind PET process, which involves a glycolysis-based PET depolymerisation combined with purification steps to remove all organic and inorganic compounds present in waste PET. This includes colourants and pigments. The end-product is a purified bis(2-hydroxyethyl) terephthalate monomer.

"We also need to coordinate our global objectives, first of all in Europe," Crépet explained. "Then, we must not neglect the countries of central and eastern Europe, which are geographically far from Brussels, in order to keep them informed of progress. After that, there's the rest of the world. Africa deserves our attention. The needs are enormous, both logistical and financial. Finally, an interest group should represent the PET industry in the General Assembly of the UN."

Another focal area for brands is the potential conversion of captured emissions into packaging materials. CCEP Ventures, the investment arm of CCEP, is partnering with Spain's Universitat Rovira i Virgili and the University of Twente in the Netherlands to fund research into the use of carbon capture technology.

There are expectations that the R&D projects will develop new carbon capture technology that can be applied on-site. Synthetic fuels to power CCEP's factories, and sugar to add to its soft drinks are other expected applications.

"We are challenging ourselves to think differently about carbon dioxide, which is so often only seen as a dangerous waste product," says Craig Twyford, head of CCEP Ventures. "What if we could not only take carbon dioxide out of the atmosphere, where we know it's causing harm, but also turn it into something useful? Then, we could start thinking of it as a valuable resource.

"Funding these projects is an exciting opportunity for us to be at the forefront of scientific discovery and innovation. We think it has the potential not only to significantly impact our operations, but it could also be rolled out across different industries to reduce greenhouse gas emissions and make better use of the carbon in our atmosphere."

CCEP has a similar collaboration currently underway with the University of California, Berkeley to develop scalable methods of converting captured carbon dioxide into sugar. EP

Germany's reuse system

In Germany, refillable PET bottles are used by bottlers for carbonated beverages and mineral water products. Once consumed, the bottles are returned via a deposit return system to be washed and refilled by bottlers for up to 25 cycles.

- There are many regional and local producers: 1,350 breweries, 180 mineral water bottlers, and more than 400 soft drink and fruit juice producers.
- There is a diverse and specialised retail structure for beverages: 3,500 wholesalers and 12,000-plus specialised beverage retailers.
- In 2020, 15.4 per cent of the mineral water market and 13.3 per cent of soft drinks were in PET reusable bottles.
- At the core of the reuse system is the German Wells Cooperative, or Genossenschaft Deutscher Brunnen (GDB), which is the purchasing cooperative for mineral water companies.
- GDB supplies the mineral water springs with everything they need to operate – from bottle caps to forklifts.
- In addition, GDB manages the reusable pools with more than 1 billion bottles and 100 million crates.
- Furthermore, GDB advises its members on technical issues, from practical questions about filling to strategic issues in container development
- Standardisation, which is not the same as uniformity, is one of the complexities of the system.

Ammal De Paul Bulhosen (left), senior regional sales manager for BritAS Recycling-Anlagen, discusses the PET value chain with Paul Corens, polyester chain Europe leader at Mitsui & Co