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Viewpoint:
Sustainable Business Decisions

Paul Hodges discusses the challenges that companies should consider on the path to a sustainable future

THIS year sees the petrochemicals and plastics industry heading into a major transformation. As a result, many parts of it will be unrecognisable by 2030. And chemical engineers will be key to making this transformation happen. It's an exciting, if challenging prospect.

The background is the coming together of two major changes at either end of our current value chain:

- **Upstream**, battery electric vehicles raced to an 11% market share in the UK last year, up 76% on 2020. By 2030, sales of new gasoline/diesel cars will be banned.

Refinery closures are therefore inevitable. In turn, naphtha feedstock availability for the petrochemical and plastics industry will be sharply reduced.

- **Downstream**, retailers and brand owners are committing to mandatory targets of at least 30% recycled content for plastics packaging by 2030, in line with consumer and legislative pressure. Trade body PlasticsEurope has also endorsed this move, making it likely that most single-use plastic will soon have to be recycled.

Essentially, therefore, the industry that we know and love seems likely to be moving into an endgame as it is squeezed from both ends of the value chain.

This squeeze highlights why the concept of transformation is critical. The challenge today is to repeat the bold moves made by the industry's visionary founders in the 1950s-1960s, when they transformed it from using coal-based feedstock to oil and gas. That bold move set the scene for decades of growth in revenue and profits. In 2022, we have to focus on repeating this success by moving rapidly to use recycled feedstock.

A circular business model for plastic packaging

This is where the role of chemical engineers will be critical. We know the main technologies that are likely to be needed to make chemical recycling a reality – processes such as pyrolysis, solvolysis, hydrolysis, depolymerisation and gasification. But we don't have much experience in operating them at the smaller scale that will be required to recycle waste plastic effectively on a more local, city-based scale. Consumers and regulators, after all, aren't likely to take kindly to seeing their waste transported across the country, especially when they add in their CO_2 emissions.

Clariant and Linde showed the way last year when unveiling their new ethylene technology. It operates down to 200 kt/y and at process temperatures of 300–400°C – half the traditional level. At the moment, this is targeted at ethane cracking. But it highlights the wider opportunity to develop new technology which will enable waste plastic to be recycled back into usable products on a local scale to create a truly circular economy.

Developing the necessary integration into local polymer production, linked to 3D printing technologies, will then put the final piece of the jigsaw into place, as described in the figure. In turn, this will often require the use of more advanced manufacturing to achieve the quality and cost profile required. Anyone working in the areas of digital, continuous and biotech-enabled technology will likely find themselves very much in demand.

Clearly there is a lot to be done, and relatively little time in which to do it. Refiners are already starting to announce plans for refinery closures. And brand owners, like retailers, are keen to seize the competitive advantage that comes from being a first mover. L'Oréal, for example, has committed to use 50% recycled material in its plastic packaging by 2025.

2022 is therefore likely to prove an exciting, if challenging, time for those prepared to embrace change and new opportunities. As the CEO of Stellantis, the world's fourth-largest auto company has highlighted, "This transformation period is a wonderful opportunity to reset the clock and start a new race." ■

"This transformation period is a wonderful opportunity to reset the clock and start a new race"

Paul Hodges is Chairman of New Normal Consulting (www.new-normal.com) and a Global Expert with the World Economic Forum.