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The Circular Economy's Time Is Now

by Lauren Kjeldsen

Transformation from linear to circular will be a key part of achieving climate targets. To make it work we need cross-industry cooperation, innovation, and smart policy making, as well as a good balance between the economics, the environment, and quality of life.

A couple of years ago, I was at an industry event here in Europe where we were shown an image of stacks upon stacks of used mattresses in a landfill. It was a disturbing sight and the image has stayed with me. The experience triggered a desire to find a solution. As a chemical engineer, I know that these materials will be around in that form in the environment for a long time unless they are burned. And while burning provides some thermal energy, I am convinced that we can develop innovative ways to get more out of such materials. Today, I am proud to be part of this initiative and responsible for Evonik's global circular plastics program, which is pooling diverse projects and expertise from around the company to drive circularity forward.

Circular economy has enormous potential. Imagine being able to turn trash into a valuable raw material. The world has carbon-based materials in abundance, including CO₂ and the vast majority of plastics. We literally have “valuables” in our bins at home, the used equipment we discard, the cars we once drove. If we can regenerate these materials at the end of their useful lives and give them a new life, we can transform from linear—make, use and dispose, to circular—make, use, repurpose. A fully functioning circular economy would eliminate to a large extent the need to extract fossil fuels and it would reduce the production of CO₂.

This is relevant now. Circular economy is part of the Green Deal, the European Union's plan to become climate-neutral by 2050 and generate economic growth through greater sustainability. Beyond Europe, China's recent pledge to become carbon-neutral by 2060 will include circular carbon solutions. Circular economy will play a key role in fulfilling the Paris Agreement, the international treaty on climate change, which the USA is now rejoining.

EXPLORING NEW WAYS OF RECYCLING
To make circularity a reality we need four things to come together. The first is innovation. Companies like Evonik contribute to this. We have the tools and expertise to ex-

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plore new ways of enabling the recycling of plastics. The second is a level playing field. There can be no discrimination between certain technologies or materials. The challenges are so massive and diverse that we need all recycling methods available. This is where smart policy-making comes in. The third is cross-industry cooperation. The transformation to a circular economy can't be achieved by one company, or even one industry. We need all the players along the value chain. The fourth factor is finding the right balance between the people, the environment, and economic aspects. We can't place one on a pedestal and throw the other two to the wind. It would be great if instead of forgoing things we could develop a circular system that enables quality of life and balances the burden on the planet. We need to weigh up which available solution is best as a whole.

The economic part is important. Many recycling processes are at the fledgling stage and need to become efficient enough to make them attractive. Often it has been too costly to extract carbon materials. And “new” hydrocarbons in the form of oil, coal or natural gas have been cheaper. But smart policy-making can help overcome this cost hurdle. Innovation in chemistry is cutting costs. In fact, our customers are demanding these innovations and we are delivering them. With our current ideas for circular plastics, Evonik estimates additional sales of more than €350 million from 2030 annually. And that is just the start.

But the economics aren't enough on their own. Circularity must be environmentally friendly. By giving plastics a second life, we avoid incineration and preserve fossil reserves. We must come up with sophisticated

recycling methods that don't consume more energy than the production of a new material. That's why scientific life-cycle assessments are needed to measure the environmental impact of a product from beginning to end. The life-cycle analysis goes beyond measuring a product's environmental footprint during its useful life. It includes everything from raw material extraction through manufacture and delivery to the customer.

Besides economics and the environment, there are people, or society. Circular economy solutions need to improve peoples' quality of life. To name just one example, people all over the world need access to transport that will take them from A to B. And just as quality of life is important today, it is important for our children and future generations. Circular economy can help stimulate innovation, create jobs, and boost economic growth in general.

To sum up, the framework we need to make a circular economy work includes innovation, cooperation, and smart policy-making, as well as a good balance between the economics, the environment, and quality of life.

But what about the tools to make plastics circular? Taking a closer look at the recycling toolbox, two promising methods we need to advance are mechanical and chemical recycling. When people think of recycling, they mostly think of old plastic bottles being made back into new plastic bottles. That's an example of mechanical recycling. It's the processing of plastic waste which includes many steps such as grinding, washing, separating, and drying.

Chemical recycling is a process where the polymer chain is converted into chemical building blocks including monomers that are then used again as a raw material in

chemical processes. This type of recycling can even allow plastics to have a second life as a higher-quality substance not limited to one specific plastic application. As a specialty chemicals company, we could make many of our products with raw materials made from waste instead of fossil-based ones.

NEED FOR A POLITICAL FRAMEWORK
We need both mechanical and chemical recycling to fulfill ambitious political goals. Neither of these technologies is inherently better than the other one. In fact, they are complementary and suitable for different waste streams. Chemical recycling would enable the recycling of mixed waste streams that haven't been recycled so far.

Our industry needs a political framework for chemical recycling. The term should be anchored in legislation and chemical recycling needs to be included in recycling quotas of European countries. Like other recycling methods, chemical recycling could contribute a lot to the goal of keeping fossil resources in the ground.

Of course, the best waste is stuff that doesn't become trash in the first place. Products, regardless of the material they are made of, can often be used much longer. Our specialty chemistry helps make our customers' products tougher and more scratch, heat and corrosion-resistant, thus lengthening their useful lives.

But when products really do reach the end of their lives, we can help right along the plastic industry's value chain and enable the transition from linear to circular. When we're talking about elements such as carbon and enabling recycling, the chemical industry is the right address. Chemistry is, after all, our core competence. —