A circular economy of plastics will reduce plastic pollution and slow down climate change

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Plastics have extremely useful properties: they help us keep our food fresh, make it possible to safely operate electrical devices and create

various solutions in the medical field, such as disposable syringes and artificial joints. However, because of inadequate or non-existent plastic waste collection and management as well as the culture of using and discarding plastics, environmentally harmful plastic waste ends up in nature. Additionally, the production and burning of plastic products causes greenhouse emissions that accelerate climate change.

VTT has a vision of the future in which the circulation of plastic material will be ensured through various technological and operational solutions. Plastics will no longer end up in the environment and the production and recycling of plastics will be carbon neutral.

"Plastic is everywhere in our day-to-day lives. It revolutionised our way of life and soon it will do so again. This time, plastics will be modernised through circular economies and ecodesign without compromising their performance," says Vice President Tuulamari Helaja of VTT.

"The creation of real circular-economy solutions requires us to overhaul the handling, use and processing of our raw materials streams—including plastic waste. Here at VTT, we have developed sustainable technologies and materials for the needs of the industry. Around these technologies, we can gather actors from various sectors to develop the circular economy of plastics and simultaneously create opportunities for growth and prosperity," Helaja says.

How can a circular economy of plastics be made a reality?

The most important contributing factors in this transition are ecodesign and circular economy business models. Intelligent waste collection, sorting and separation techniques, various reuse concepts and modern recycling technologies are needed in order to reduce plastic waste. An

easy transition to new technologies and value chains requires sustainable business models, updating legislation and digital design.

Effective sorting and separation of plastic waste is of utmost importance for maintaining the value of the materials. VTT is in the process of developing intelligent mechanical recycling technologies that improve the viability of recycling. Additionally, the lifespans of worn plastic products can be lengthened with techniques that repair their molecular structure.

Waste streams that cannot be made useful through mechanical recycling can be recycled through chemical methods. VTT is currently developing thermochemical recycling technologies to produce monomers (direct components of polymers) and refinery feedstock. With the use of thermochemical methods, recycling rates can be significantly improved.

To reduce the effects that the value chains of plastic products are having on climate change, it is necessary to transition to using renewable raw materials, recycled materials and carbon dioxide as raw materials in plastics. Carbon neutrality also requires a transition to renewable energy.

Alternatives to plastics are also required

The consumption of plastics is predicted to reach as much as four times its current level of 360 million tons by 2050. Even if the consumption of plastic can be successfully limited and an increasingly large proportion of plastics can be kept in use with improved recycling systems and technologies, alternative materials will also be needed.

The transition to a circular economy of plastics is a complex process. The best solutions often have to be evaluated on a case-by-case basis, and their sustainability must be evaluated at an early stage to avoid carrying waste and harmful substances into the following life cycle's

products. Sometimes reuse is the most practical solution. At other times, recycling is the best option from an ecological and economic standpoint.

More information: info.vttresearch.com/article/c … -economy-of-plastics

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