

Towards a circular materials economy

MEDIA reports relating to 10 kilograms of plastic found in a dead whale's stomach and Mount Everest being the world's highest rubbish dump have raised awareness about the plastic menace and the urgent need to deal with it.

Pollution aggravated by growing consumerism and waste generation has alarmed people and questions are being asked about the health of our ecosystem. Several countries have pledged to ban single-use plastics.

According to the Singapore Environment Council (SEC), an online survey conducted with the help of global consultancy Deloitte indicates that Singapore uses at least 1.76 billion plastic items a year or almost one item per person per day. Less than 20 per cent of these are recycled.

According to the National Environment Agency (NEA), only six per cent of plastic waste is recycled. SEC's survey refers to the number of plastic items, while NEA's estimates are based on the weight of plastics. In any case, the plastic waste recycling rate is lower than the 30 per cent rate in Europe.

More importantly, they underscore the need for finding and developing circular-material alternatives via research and innovation. Circular materials refer to materials which are easy to recycle, re-



furbish, reprocess and reuse from regenerative resources and are biodegradable. As a superior goal of circular economy, the materials are not to be seen as a disposable commodity but as a valued asset to be tracked and conserved for repeated reuse. Gold and silver are good examples of circular materials.

This has been the practice of civilisations before the emergence of the industrial revolution. Scores of examples can be seen in the non-industrialised areas of India, China and the rest of the world.

During the pre-industrialisation era, the materials were not commoditised, and hence materials and products were maintained, repaired, reused, shared and upgraded. Material efficiency was a well-practised norm.

With the advent of industrialisation, materials were commoditised and led to the culture of use once and discard. The flow of materials through the economy followed a linear path of mine-use-dispose. It is also known as linear economy. Growing concern for nature means changing from linear materials economy to circular materials economy.

Circularity of materials is a broad concept. In order to embrace it fully and evaluate the benefits, it is necessary to develop a measuring system which in-

volves a set of criteria and indicators based on the benefits of reducing virgin materials consumption.

Indicators such as the proportion of recycled materials and renewable materials used, proportion of renewable energy and recovered waste energy used, emissions per output of product, emissions per unit of manufacturing value, waste per output of product, waste collection rates, recycling rates and so on are measurable.

Others such as extension of a product's life cycle and sharing of products are less tangible. Diverse metrics are combined in various weightings to determine the circularity of materials.

Such analysis requires web-based materials databases which are updated automatically and more frequently and easy to access and search.

However, measuring progress towards circularity has many challenges. These include companies unwilling to disclose information, keeping materials inventory and specifications confidential, time-consuming efforts, vagueness of definitions and a lack of universal consensus on metrics and methodologies.

Co-relating circularity indicators to potential risk in relation to business priorities and how it affects other areas of business interests are even more challenging.

In a nutshell, the circular materials economy in near terms is about reducing virgin materials consumption, reduc-

ing waste and improving recycling rates. This involves innovative product designs, improved materials selection, substituting with ecofriendly materials, manufacturing innovations and new business models.

Critics, advocates, researchers, industries, businesses, policy makers and communities have to make more conscious and consensus efforts to formulate sound metrics and robust evaluation methods to measure effectiveness and progress towards a circular materials economy.

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In association

