SEI Stockholm Environment Institute

Transformational change through a circular economy

SEI discussion brief

Traditional industrial manufacturing approaches have led to unsustainable levels of both production and consumption. This system – marked by a high rate of natural resource extraction, processing, distribution, use and disposal – is commonly called a linear economy. Linear economies result in natural resource over-exploitation, unsustainable mass production and environmental degradation. These outcomes, particularly environmental damages, indicate that the linear economy is obsolete and no longer a feasible path for businesses or consumers. This business-as-usual approach will stall production processes and lead to continued resource depletion, polluting the soil, air, and oceans and, in turn, destroying essential ecosystem functions.

Figure 1: Current Linear Economy

To address this, we must transform all elements of the current linear take>make>waste system into a system where waste is reused as raw materials and completes the resource circle. A circular economy, using a circularity approach, is an economic system aimed at drastically reducing waste through the continual repurposing of resources for sustainability. Circular systems employ recycling, reuse, remanufacturing and refurbishment to create a closed system, minimizing the use of virgin materials and the creation of waste along the producer-to-consumer continuum. A circular economy works best when based on the following principles:

- Waste segregation, with composting of biodegradable products
- Reuse and repurposing of non-biodegradable products
- Use of non-recyclable products for energy generation by incineration or biodigestion
- Establishment of a sharing economy system through product rental as opposed to the sale of new products
- Replacing non-renewable fuels with renewable energy and biofuels
- Integration of a product's environmental impacts throughout its life cycle through polluter-pays systems
- Establishment of an industrial organizational method that optimizes management of stocks and flows of materials, energy and services: for example, using downstream wastewater as a coolant for the upstream process

Moving a system towards circularity requires a collective effort from all sectors and stakeholders: businesses, governments and the general public, within a wide range of fields such as industry, agriculture and energy production. Policy stakeholders at different levels have introduced circular economies with varying degrees of success.

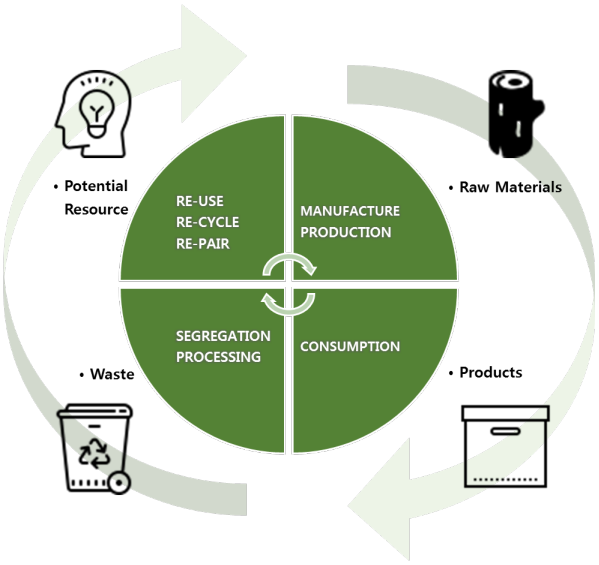

Figure 2: Circular Economy

What are the benefits of Circularity?

- Reduction of greenhouse gas emissions
  A product's greenhouse gas emissions are much higher during its extraction, processing and overall production phases than during its eventual use.

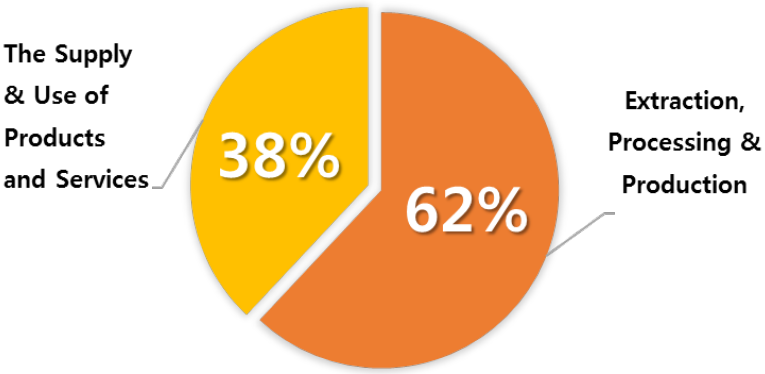

Figure 3: Global greenhouse gases emissions

- Conservation of the environment
  The excessive extraction of raw materials and the dumping of untreated waste has devastating effects on natural systems such as rivers, lakes, soils, etc. A circular economy reduces waste. That, in turn, reduces stress on existing natural reserves. Land degradation costs an estimated USD 40 billion annually worldwide. The higher the land productivity – achieved through systemic change – the less waste in the food value chain. The resulting return of nutrients to the soil will enhance its value and the value of the land.

- Reduction of processing costs
  Companies that have implemented a circular economy system are proving that reusing resources is much more cost-effective than extracting natural resources. As a

result, production prices are reduced, lowering the sale price and reducing landfill waste costs, thereby providing economic, social and environmental benefits.

- Reduction of processing time and associated costs
  Eliminating waste from the industrial chain by reusing materials leads to production cost savings, less resource dependence, reduction in production time and lower downstream and disposal costs. Circularity in manufacturing could yield net material cost savings of up to USD 700 billion per year.

- Innovation and job creation encouragement
  Adopting circular business models inspires innovation. This applies to, for example, circular design, reverse logistics networks, upcycling to innovative products and more. Unleashing innovative power creates a new generation of green entrepreneurs, in addition to improved materials, labour and energy efficiencies and more opportunities for profit in resource-productive companies. Measures such as waste prevention, eco-design and reuse could save companies 665 billion USD every year and reduce total annual greenhouse gas emissions by 2-4%.

The following are examples of companies using circularity in their systems.

  - Philips: Philips has switched from selling bulbs to providing lighting as a service. The company states that they can reach more customers if they retain ownership of the lighting equipment and customers avoid high upfront costs. This way the company can also ensure sound environmental management of end-of-life lighting equipment.
  - H&M: In 2013, H&M started a collection initiative for reusing and recycling clothing. Collected end-of-use clothing is crushed and re-spun into fibre to make new jeans, replacing 20-25% of raw materials.
  - Trina Solar: Trina is one of the largest solar panel manufacturers in the world and has started developing technologies and standards for recycling end-of-use photovoltaic cells in anticipation of the obsolescence of first-generation panels. Glass will be extracted from the modules and used for other applications, while the electronic control systems will be treated as e-waste. This will allow the company to benefit from the value of secondary material, as well as remain compliant with regulations.

Stockholm Environment Institute circularity projects

- Round table at the Responsible Business Forum
  SEI organizes a round table every year to engage stakeholders involved in or influencing private businesses. The aim is to exchange ideas, insights, tools, and experiences and to encourage collaboration towards innovative solutions that address environmental sustainability, while integrating social inclusion and rights-based approaches. The gathering focuses on circularity and sustainability efforts by businesses, government, researchers and civil society organizations.

- CircPro
  The Smart Circular Procurement (CircPro) project promotes the transition to a more circular economy by increasing the implementation of circular procurements in Europe.

- Closing the Loop
  This project aims to link the informal and formal sectors to strengthen capacity for improving plastic waste management. It has released a policy guidance tool on the circular economy for the Asia-Pacific region.

- ESSENCE
  The ESSENCE project aims to address the challenge of scaling-up circular economy business models by exploring novel business methods and economic policies. It capitalizes on circular-economy opportunities using a three-pronged approach: theoretical modelling, case study analysis and a collaborative participatory process.

- Producer to Consumer Sustainability
  The Initiative on Producer to Consumer Sustainability (P2CS) is an SEI-wide research programme that connects the sustainable production and sustainable consumption agendas. P2CS explores the links and interactions within production-to-consumption systems that include global flows of commodities and the impacts, dependencies and wider dynamics associated with production and consumption, in order to find new opportunities to enhance their sustainability.

Figure 4: SEI as a bridge between sectors

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SEI Stockholm Environment Institute

Published by:
Stockholm Environment Institute
10th Floor, Kasem Uttayanin Building
254, Chulalongkorn University
Henri Dunant Road, Pathumwan
Bangkok 10330, Thailand
Tel: +66 2 073 0040 ~ 44

Author contact:
jaee.nikam@sei.org

Media contact:
rajesh.daniel@sei.org

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