



03. Definition

From Linear to Circular: An introduction

Dr.-Ing. Olga Ioannou

Assistant Professor, chair of Building Product Innovation

Department of Architectural Engineering + Technology (AE+T)

Linear economy is our current economic model, and is based on three key activities: *take*, *make*, and *waste*. Let's take a moment to think what this translates into. Raw materials are usually mined in some location, then transported from the mine to a production facility. Then the materials are processed to become standardized products. The degree of the processing may vary, however, for many of the products these processes require massive amounts of energy. Final products are afterwards transported once again, to their final destination before they are ultimately used in construction and are incorporated in buildings.

So what about food production? Industrial agriculture uses mostly chemical fertilizers, irrigation systems, and pesticides to artificially increase agricultural productivity. Advanced technologies have allowed the growth of soybeans even in tropical climates: entire forests are being torn down in countries like Brazil to accommodate the new crops. Similarly, industrial farming requires large amounts of feedstock or grazing pastures and water.

However, long-term grazing contributes to soil erosion and in turn to reduced fertility and carbon sequestration capacity of the soil. According to a recent United Nations report, an estimated *20% of the Earth's land area was degraded between 2000 and 2015*, resulting in a *significant loss of services*

essential to human well-being. That estimate is relatively conservative given the underlying sub-indicators, which only represent three variables: changes in land cover, land productivity and organic carbon in soil. In all regions, except Europe and Northern America and Northern Africa and Western Asia, the extent of degradation covered 22.4 per cent to 35.5 per cent of land area, directly impacting the lives of over one billion people.

What we also fail to recognize as a direct consequence of how we go about our businesses is the amount of waste we produce: what happens after products reach their end of service life? They will either be incinerated or most likely end up in a landfill. Depending on what that product is, the landfill can even be situated in another country. That calls for yet another round of transportation. Enormous piles of clothes are now covering parts of Atacama Desert in Chile whereas electronic waste is usually transported in Ghana. Considering that most waste facilities and landfills are usually located where the more deprived and economically vulnerable social groups reside, waste becomes a source of environmental and by consequence social injustice.

In May 2000 geologists Paul Crutzen and Eugene Stoermer published an article claiming that the impact of human activities upon the earth and atmosphere were reason enough to even rename



Circularity for Educators

our geological epoch. They called this new epoch, the *Anthropocene*. The name signifies that *humans are no longer mere participants of the planet, but they have now become its dominators*. As such they now control the fate of the planet: current climate emergencies and depletion of resources, however, clearly suggest that the linear model is problematic.

So, what is the problem with this model? First and foremost, its *addiction to growth*. Linear economy is fixated on progress, growth and extraction regardless of the physical limits of the planet and its incapacity to regenerate the resources we consume in life cycles relevant to human ones. Second to that, our *consumerist habits*: we are not only consuming more than we need, we have also grown apart from the processes responsible for the production of the artefacts we buy. And finally, there is another reason which is inherent in the first two: an ever-growing tendency towards *individualism* and the pursuit of happiness through personal achievements, away from any ethical considerations about otherness.

Circular thinking and by extent what we now call circular economy, *is primarily born out of the necessity to decouple growth from material use by reusing materials as much as possible with as little processing as possible*. This thinking, however, as we shall see, also challenges our habits and our values.