01. Contextualizing Circularity in the Architectural Discourse

The relation of circularity to sustainability

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TU Delft is currently transitioning to being carbon neutral, climate adaptive and circular, whilst also realising a biodiverse and liveable campus. I see these as paramount challenges for the nearby future to establish a sustainable society: carbon neutrality, climate adaptivity, circularity, biodiversity, quality of life. So, I see circularity as an element of sustainability.

Defining Sustainability

But what does sustainability mean? The term *'sustainable'* is referring to *something that can be continued without obstacles or limitations*. South-Africans use the term 'volhoubaar', which Dutch people immediately understand. Although 'to sustain' was already existing as a normal English verb, it got its strong present-day meaning through the UN Committee led by *Gro Harlem Brundtland*, who *introduced 'sustainable development' as* the desired future for humankind: *"a development that meets the needs of the present without comprising future generations to meet their needs"*. As *Jón Kristinsson*, one of my masters, put it: *"sustainable is everything future generations want to inherit, use and maintain".*

Sustainability includes a lot. *John Elkington* dissected the term *'sustainable'* in three parts: *people, planet,* and profit, later replaced by *prosperity*. Nowadays, when we talk about sustainability, most people think of technical solutions. But as Elkington put it, it has a social, ecological, and economic component. The first and the last should not be forgotten. Technical solutions are part of the ecological component.

Defining Circularity

A big chunk of the technical aspect in ecological sustainability is related to essential flows: energy, water, materials, nutrients… and that brings me to *circularity*, because that essentially *is the closing or continuation of cycles of resources: energy, water, materials, and nutrients.* Nowadays, in architectural debates, circular design seems to always refer to the use of building materials, but originally it includes more cycles. In fact, *cycles of different resources can be interconnected:* (waste) materials and waste water can become energy, or nutrients; water can become part of materials and food (nutrients). The so-called food – energy – water nexus, presented by Andy Jenkins in this series, demonstrates how circular systems can function in connection and synergy with each other.

As the Ellen MacArthur Foundation presented it, circular systems are either finite, metal, mineral and plastic materials used infinitely through reuse, repair, repurposing, remanufacturing or recycling, or biobased material from biological origin, which should be grown and maintained in a sustainable

manner, so that they are replenished in a natural way. Both are good in the eyes of a circular designer, but plant-based materials generally cost less energy to produce, and they bind carbon during growth. Reusing biobased materials (instead of felling a new range of trees) will help to get to a positive carbon balance, meaning that there is more carbon dioxide absorbed than emitted. In this example, it becomes clear how circularity links in with climate action.

The many faces of circularity

Urban mining is a form of the circular technical cycle. In this case valuable materials are reclaimed from buildings and other products, in order to reprocess them into new products or buildings. A little different from *recycling* because the latter usually refers to reprocessing of the same resource, whereas urban mining deals with a complex product (a building is one of those) from which potentially many valuable resources are drawn.

Other forms of circularity in the built environment deal with *products as a service*. Deposit systems and arrangements with suppliers and manufacturers, who remain the owners, take back old products and reprocess them. I think this should be the norm in the near future: companies remaining responsible for their products and having to reprocess these themselves. This will naturally lead to a circular economy.

The final example I want to give connects circularity again with a wider set of sustainability goals: the question of *renovation (or transformation) versus demolition* and new construction. When confronted with an old building that no longer complies with modern demands or desires, a tendency has been to demolish and replace it with a sustainable new building, possibly energy neutral, possibly built in a circular way. However, directly reusing the old building, and then restoring, renovating or transforming it, generally leads to a much smaller use of virgin materials, to much less energy use, and subsequently, smaller carbon emissions. In this case, it is not the way of constructing (or renovating) that is most impactful, but the decision to retrofit or construct anew.