

Urban mining and the circular economy at Empa NEST

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Abstract

Building and infrastructure construction account for a large fraction of the global material demand. Once a building is torn down because it became obsolete or reached the end of its life span, most of its materials end up either in a land fill or waste incineration plant. Some materials can be recycled, but typically at a much lower quality and economical value. This enormous consumption and waste of material is not sustainable, leading to scarcity of precious raw materials and a massive environmental impact.

The concept of urban mining aims to drastically reduce material consumption by considering the built environment as a source of materials and components that can be reused, repurposed, recycled or composted when a building is torn down or refurbished. This enables a circular economy, where materials are taken from the biological or technical cycle, temporarily used in a building and then returned into the cycle again. This imposes certain constraints on how a building has to be constructed: Building elements have to be tucked, clamped or screwed, to allow for type-sorted recycling at the end of a use-cycle. As a result, the application of chemical coatings, hardening foams or glue has to be avoided.

At NEST, a modular research and innovation building located at the Empa campus in Dübendorf, Switzerland, these concepts are demonstrated in the Urban Mining & Recycling Living Unit, which was designed and established in collaboration with Werner Sobek GmbH and the Karlsruhe Institute of Technology. As a result of this conceptual emphasis, the Urban Mining & Recycling Living Unit functions simultaneously as a materials laboratory and a temporary material storage. At the same time, the unit demonstrates how a responsible handling of our natural resources can go hand in hand with appealing architectural form and aesthetics. The unit has been inhabited by several tenants since its opening in February 2018, which enables the evaluation of the concepts and their implementation in a real-life residential environment. As an active demonstrator, it will serve to advance the construction industry's transition to a recycling economy.

Keywords: *Urban Mining, Buildings, Construction, Circular Economy*

Biography

Reto Largo obtained a Master's Degree in Computer Science from ETH Zürich and holds an MBA from the University of St.Gallen. He has broad experience in technology development and in sales. He is a serial entrepreneur and has led international large-scale projects and business units. Since 2014, he has been managing director of the research and innovation platform NEST at Empa in Dübendorf, Switzerland.

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