

Developing biobased and circular materials is necessary in the fight against the impending shortage of raw materials

Biobased and circular is the obvious path to the future of materials for (interior) architects, product and industrial designers. This path is not only necessary to protect the environment and the changing climate, but also because of the impending shortage of raw materials. This is stated by Leonne Cuppen, curator responsible for the twenty Young Talents and the ten start-ups, studios and designers who receive support from the Innovation Fund to participate in MaterialDistrict 2024. This impending shortage was predicted more than fifty years ago by the Club of Rome, and it is becoming increasingly visible. Cuppen: “That is why it is even better if materials are regenerative - if you can return them to the earth after use, so that natural resources are ultimately strengthened through a cycle instead of depleted.”

'The Limits to Growth' was the title of the Club of Rome report published in 1972, more than fifty years ago. In addition to problems with the environment and food, this group of entrepreneurs and scientists mainly pointed out the danger of depletion of raw materials, especially due to the rapid increase in the world population. Not only oil and gas would run out between 2020 and 2050, but also many other ores and materials that took Mother Earth hundreds of thousands or even millions of years to form.

Wouter van Dieren, founder of Milieudefensie, among others, is a member of this still existing Club of Rome. Despite the criticism of the models used at the time, he notes that the predictions still come true. Raw materials will even form the bottleneck for the much-needed transition to a sustainable economy, he now states. Van Dieren recently initiated the think tank Resource Wende - analogous to the German movement Energie Wende - to put the impending scarcity of raw materials on the agenda, increase awareness about this issue and come up with solutions. He is also working on an institute that should focus entirely on this theme.

Fertilizer and phosphorus

“The impending shortage of raw materials is starting to become evident,” says Leonne Cuppen. “The earth is simply becoming exhausted. We increasingly hear about rare metals that are needed for solar panels and wind turbines, but also for smartphones, batteries and medical devices and aids – from lithium to tungsten and from neodymium to titanium. It is not without reason that the EU has drawn up a list of 34 critical metals and minerals and that the Netherlands recently introduced a National Raw Materials Strategy, because it has become

a geopolitical issue: China and the United States are also dealing with this topic strategically. And see the discussion about the extraction of manganese nodules from the bottom of the sea (which contain, among other things, nickel, cobalt and copper) – yet another dilemma between economy and ecology.” But the impending shortage of raw materials goes much further than rare metals and minerals, Cuppen emphasizes. “The invention of fertilizer has resulted in enormous growth in food production, but it also meant the end of circular agriculture. Phosphorus, an essential raw material for fertilizer, is widely mined and ends up unusable in the sea. That supply of phosphorus will also come to an end, according to some experts within a few decades.”

Difficult or impossible to obtain

And it doesn't stop with high tech and agriculture. Cuppen: “The (interior) construction industry has also experienced what it means when raw materials become scarce. If only because of a disrupted supply due to corona, a large container ship getting stuck in the Suez Canal or rebels disrupting an important shipping route. Even 'ordinary' materials such as some types of wood and plastics are now much more expensive than before, and sometimes even difficult or impossible to obtain.”

Together with Wouter van Dieren and many other experts, Cuppen is convinced that the impending shortage of raw materials is becoming or even already is a serious problem, and that we must therefore act on it now. “Recycling is a must, we can no longer consider anything as waste and we must make optimal use of all the resources and materials we already have. In addition, it is important to develop new, more efficient methods for extracting raw materials and invest in alternative technologies, processes and products that are less dependent on critical raw materials.” For many materials - especially in (interior) construction, the domain of MaterialDistrict - she believes the solution lies in identifying and devising alternatives. “Biobased and circular, of course. And if possible, regenerative – so that natural resources are ultimately strengthened through a cycle instead of depleted.”

Broad forms of cooperation

Especially in the latter - identifying and devising alternatives - Cuppen certainly sees a role for young designers. After graduating from the Design Academy Eindhoven (in 1991), she co-founded Yksi, a design agency in Eindhoven with a gallery and exhibition space where recently graduated designers could present themselves. In that role she has searched for young talent for more than thirty years. “I am pleased to see that the new generation of designers is concerned

with sustainability and circularity and does not shy away from experimenting in the search for new materials.”

Cuppen also sees more and more broad forms of collaboration emerging between designers and other creatives, companies and universities and research centres.” As an example, she mentions Biobased Creations, a network of designers, researchers, artists and storytellers whose main driving forces are Lucas de Man and Pascal Leboucq. They surprised at the Dutch Design Week in 2020 with an installation of a 1:4 scale model home made entirely from bio-based materials and circular methods. From eggshell floors and hemp stones to volcanic mussel shell laminate, from self-healing mold paint and fruit leather chairs to a toilet made from sewage waste. A year later, a complete full-scale home was on show, following the same principles, supplemented with stimulating stories about how building biobased and circular homes not only changes construction but can also lead to new value chains and system changes in healthcare, agriculture, and in the neighbourhoods of the future. This project (The Exploded View Beyond Building) was subsequently shown at Floriade Expo in Almere in 2022 and in Antwerp in 2023. Biobased Creations will be present at MaterialDistrict for the first time this year with a stand and a significant contribution to the lecture programme.

Biophilic design

“I think another good example of network formation is the Biophilic Design Academy, founded by Lianne Bongers,” says Leonne Cuppen. Biophilic design is a design philosophy that aims to strengthen the connection between people and nature in the built environment. Research shows that the systematic application of elements such as plants, wood, water and natural light has a positive effect on the well-being and health of residents and users. Bongers, an interior designer based in Eindhoven, together with a number of designers, architects and artists, forms a knowledge platform and online learning environment where biophilic enthusiasts, experts, interested parties, suppliers and the curious can meet and inspire each other. In this way she also wants to raise awareness of biophilic design in the Netherlands and take it to a higher level.

With her current agency Yksi Connect, Leonne Cuppen actively contributes to the formation of networks and building bridges between young designers on the one hand and the business community and (semi)governments on the other. For example, she is currently closely involved with designer, strategic advisor and writer Marijn van der Poll in the design of a project commissioned by Rijkswaterstaat. On and around a farm near Oirschot, close to Eindhoven, designers and young professionals from all walks of life (government,

education, science, business) are given the space to focus on social issues together.

New business

Miscanthus, or elephant grass, will be sown on a number of hectares at the farm this spring. This crop is already used as a raw material for bioplastic, concrete or paper, in sustainable noise barriers or pressed into briquettes and pellets. After harvesting, students from various design courses get to work to see what is possible with this biobased material. Cuppen: “Biobased Creations is also involved in this project. As they already showed with their fully biobased and circular home, whole new value chains are emerging. Especially for agriculture, which will also be provided with alternatives to make a transition.” It is always about crises and problems, but the transition to a biobased and circular economy also offers many possibilities and opportunities for new business, says Cuppen. “There is far too little attention for that positive side. Look at the Netherlands and the threat from water. We have converted that danger into a wide range of innovations and solutions: from dams and dikes to the construction of polders, from dredging methods to smart flood defences. We now market all these discoveries worldwide.”