

# Making Waste Desirable

“Waste is a design flaw.”

Mass volumes of waste are being generated due to a significant increase in the global population and a rise in the standard of living. Over two billion tonnes of waste is produced each year of which only 15% is reclaimed.

So where is all this rubbish coming from?

Back in the 1950s, the world produced two million tonnes of plastic waste a year, today it has risen to an astonishing 368 million tonnes. Packaging is the greatest source of plastic pollution and it is believed that in the world's oceans there are five trillion pieces of plastic. 14% of plastic waste is from textiles whilst the textile industry produces ninety-two million tonnes of waste a year. Per person on average Europeans use 26 kilos of textiles but will discard 11 kilos, a year. The fashion industry is the second-largest polluter with 87% of clothing discarded in landfills or incinerated. Another large source of waste is food, with an estimated 1.3 billion tonnes of food is wasted each year globally. The construction industry alone is accountable for 38% of all carbon emissions.

It is known that waste is a major driver of climate change and that the issue of waste needs to be addressed, in design, economy, society and environmentally. Designers and architects are heavily implicated in these issues and the way we create, make and produce products needs to be evaluated.

Waste doesn't have to be a damaging by-product of the industry but a resource for future innovations.



Waste/By-product



Ingredient



Material

## What are Bio-based Materials?

A bio-based material is a sustainable and biodegradable material created using biomass. Traditional conventional materials are limited to synthetic threads, plastics and fossil fuel products, these types are produced at a fast rate, at a cheaper cost with high convenience.

Due to environmental issues and climate change, these conventional materials are outdated and energy and outputs are causing significant damage. One time use and cheap materials need to be replaced with sustainable alternatives.

Switching from single-use plastic to reusable, biobased and biodegradable products will convey a positive impact on the environment. This impact will improve waste, pollution and the issues concerning climate change.

To embrace a circular economy system that sustains our own needs without damaging the environment. The aim is to be able to fully trace the material from start to finish.



# CIRCULAR AND REGENERATIVE DESIGN

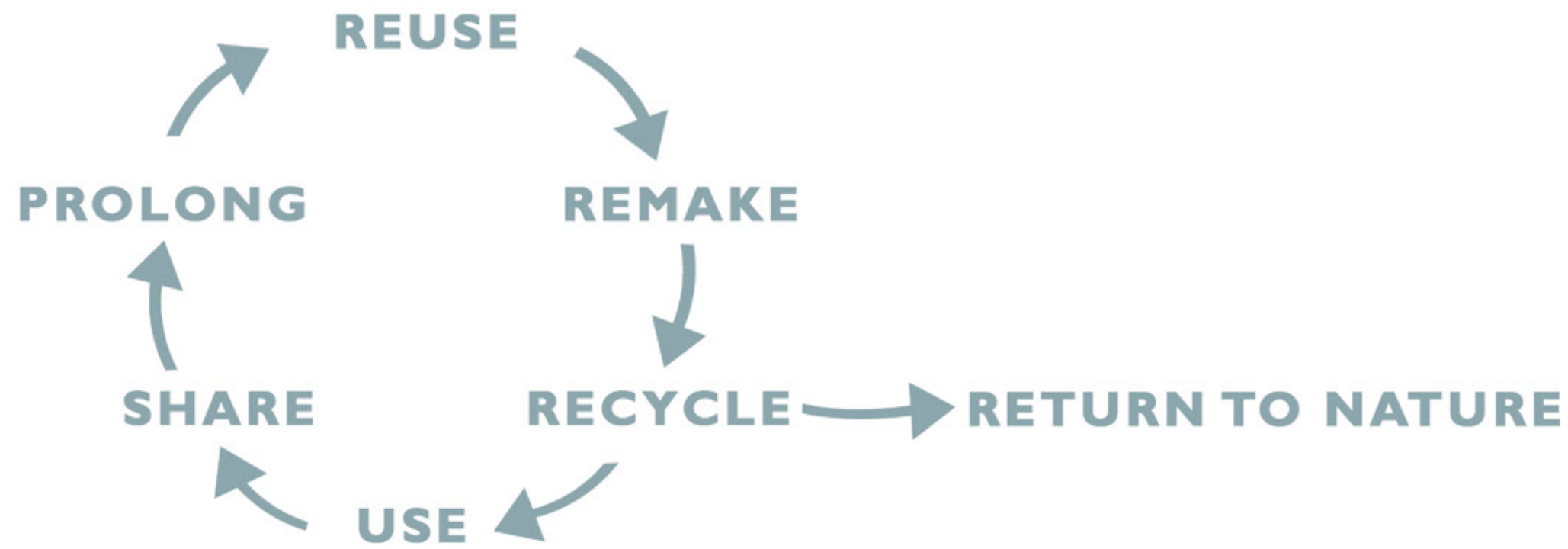
The circular economy model addresses the problems of waste and the polluting economy and is creating the opportunity to redesign the economic model to benefit society, businesses and the environment.

## Traditional Linear Model

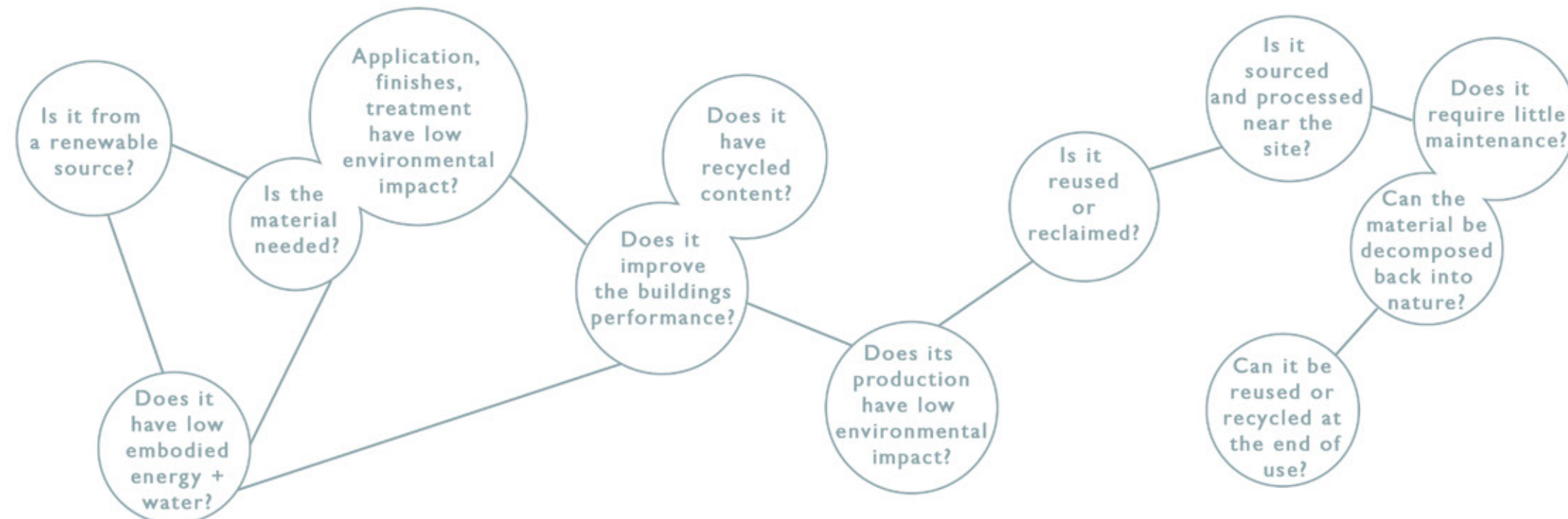
**TAKE** → **MAKE** → **DISPOSE**

To move away from the traditional linear model, products need to be designed to increase use and reuse resulting in nothing becoming waste and everything has a value. To change mindsets and to create products and processes that regenerate and restore by design.

## Circular Economy Model



## Sustainable Considerations



The previous research and experimentation have landed itself to finding three possible theories of material applications. These new biomaterials aim is to create less waste throughout the whole process from source to end life. They are an alternative that reflects the retail interior lifespan whilst also projecting the brand or amenity the waste has come from.

Circular Design is a mission-led practice of design based on principles of a circular economy and systems thinking. The conventional linear system of take-make-discard is outdated and has no benefits to the environment or consumer.

The new circular design system takes the whole process of a product into account creating truly sustainable products with its end life is thought about from the very beginning.

An understanding of waste reduction and utilisation needs to be established. This includes investigating in depth the circular system and creating a truly sustainable process of materials.

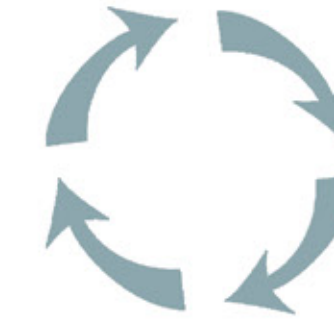
Then Ellen Macarthur foundation has derived three key principles which follows the circular model.

## Eliminate Waste and Pollution



This principle represents the whole system from source to manufacture to end of use. The aim is to use safe, recycled and renewable materials and to create zero manufacturing waste.

## Circulate Products and Materials



The aim is to create products which last and to reconnect people and their products. A "take back and repair" system would continue the use of these products and materials. Data and information should be readily available to the consumer to understand how to get the best life out of their products and materials.

## Regenerate Nature



To create a system that is regenerative as well as renewable. A product which is good for the environment, community and economics.



## Natural Rose Dye Pigment:

Once flower petals have reached their end of life they can be dried out and crushed into a fine powder to create a natural pigment dye for biomaterials.



# ISSUES WITH CONVENTIONAL MATERIALS

## Understanding the lifespan of retail interiors and how conventional materials impact the environment.

Throughout the research of materials, interiors and the retail environment there are many flaws within the design system. Conventional materials such as plastics, leather and ceramics are usually chosen due to cost, aesthetics and wear, these materials have a long life span and can last 100s of years. However, the issue remains the turnover of these materials through trends, remodelling and restyling that the materials are not getting their full life. Instead, these materials are used for up to five years in a retail environment and if not reused end up being disposed into a landfill.

If the life of the material is only limited to its desirability and not the full extend of its life then we treat these materials and products as disposable.



### Ceramic Tiles (Interior)

A ceramic interior tile is one material which needs improvement on sustainability and end of use. It is known that ceramics can take a million years to biodegrade, so in some respects it's a very long lasting material however due to trends and change of use they are not used for a long amount of time. A ceramic tile usually lasts a user between 3-20 years and shower tiles only 3-5. So its properties are long lasting and hard wearing however once discarded they will become a part of landfill. Some tile brands are now incorporating recycled content however on average it is only between 20-40%, which is an improvement however its end life still remains the same.



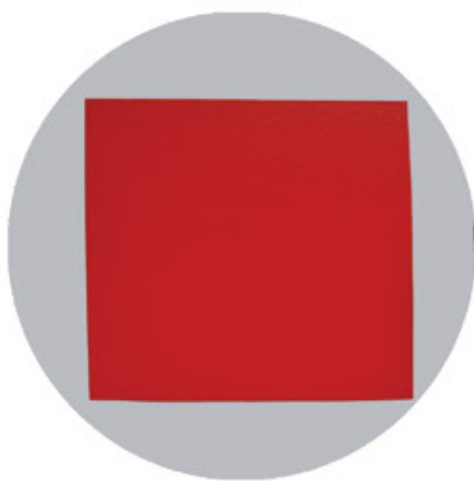
### Faux Leather (Upholstery)

The high mixture of plastic materials that go into making this product makes it near to impossible to separate. The complexity of the material with also a high plastic base content will contribute to landfill after end of use. Depending on quality a faux leather fabric can last between 4-20 years before it reaches its end of use life. The material itself will last a very long time which is great when its actually in use but has a drastic contribution to the damage on the environment.



### Non-Woven Wallcovering

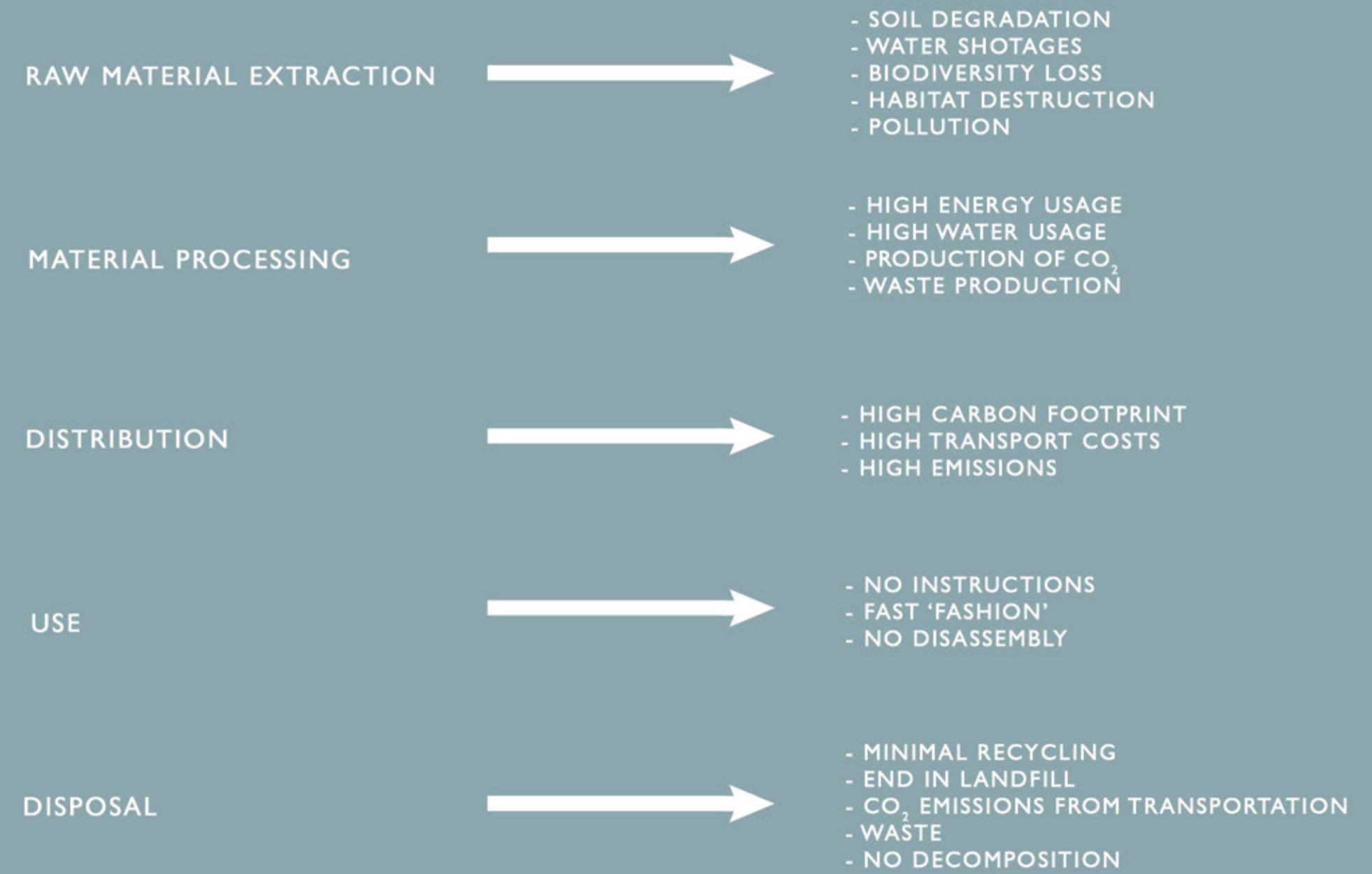
A non-woven wallcovering is a mix of synthetic and natural fibres in the material. It is known most non-woven wall-coverings are coated with vinyl. These wallpapers have a large amount of plastic based fibres in them, with high pressure and heat to allow the paper and vinyl to stick together. Unlike regular paper, wallpaper is unsuitable to recycle as the coatings that are applied cannot be processed. Wallpaper can last up to 15 years however marks and tears are common, also due to trends and keeping interiors up to date a wallpaper could be changed on an annual bases. So even though the life of wallpaper is quite long the actual life span of use is short. Finally it cannot be recycled or decompose so will end in landfill.



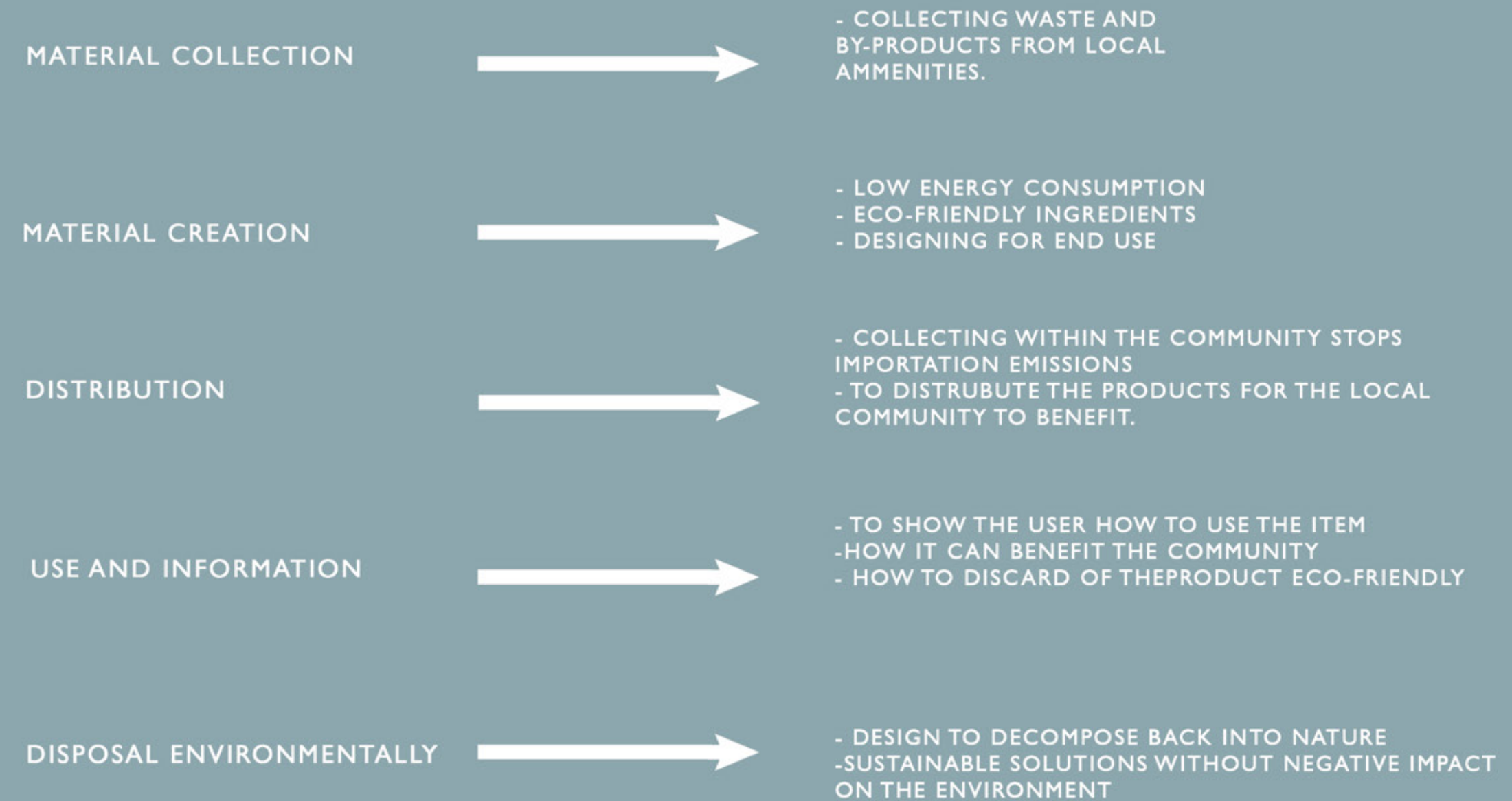
### Plastic Lamination

Plastic lamination is manufactured by laminating types of papers with formaldehyde, it creates a thermoset material transforming the resins to plastic. It forms single rigid laminated sheets which are glued onto timbers as a coating and aesthetic purpose. These are synthetic sheets which means they are not naturally made and usually contain crude oil. Like many plastic based items it can take up to 1000 years to decompose in landfills, this means that it exceeds its use life. On average it is said that a plastic laminate is changed every 2-3 years dependent on usage. However the end life is significantly longer then the use so is not a sustainable material.

## Conventional Material Lifecycle



## My Material Method Lifecycle

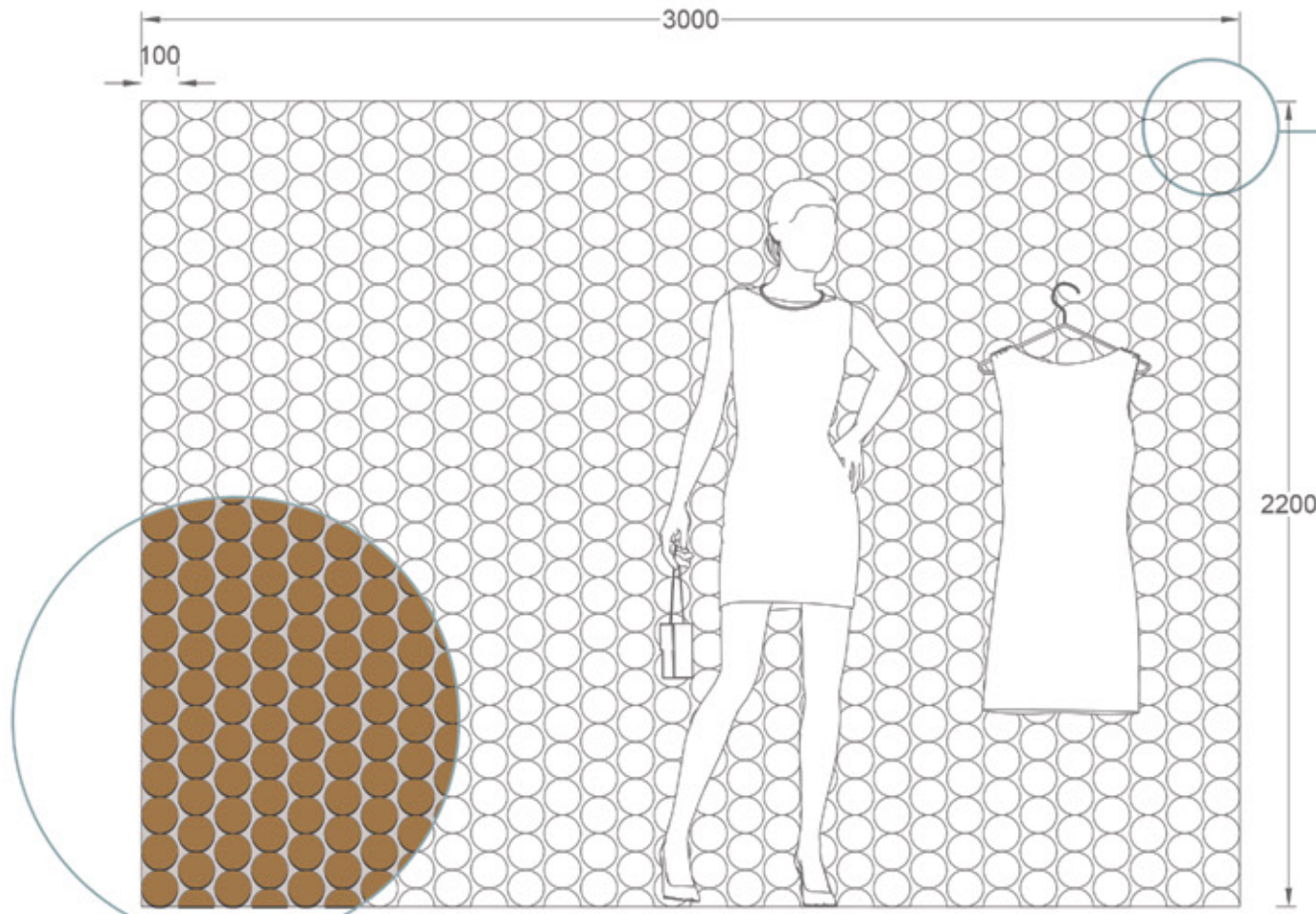


The life cycle assessment will allow me to understand the whole process of creating, making, using and discarding products. This can also be manipulated to show how the biomaterials and its life cycle can be used as a positive alternative to conventional non-renewable materials.



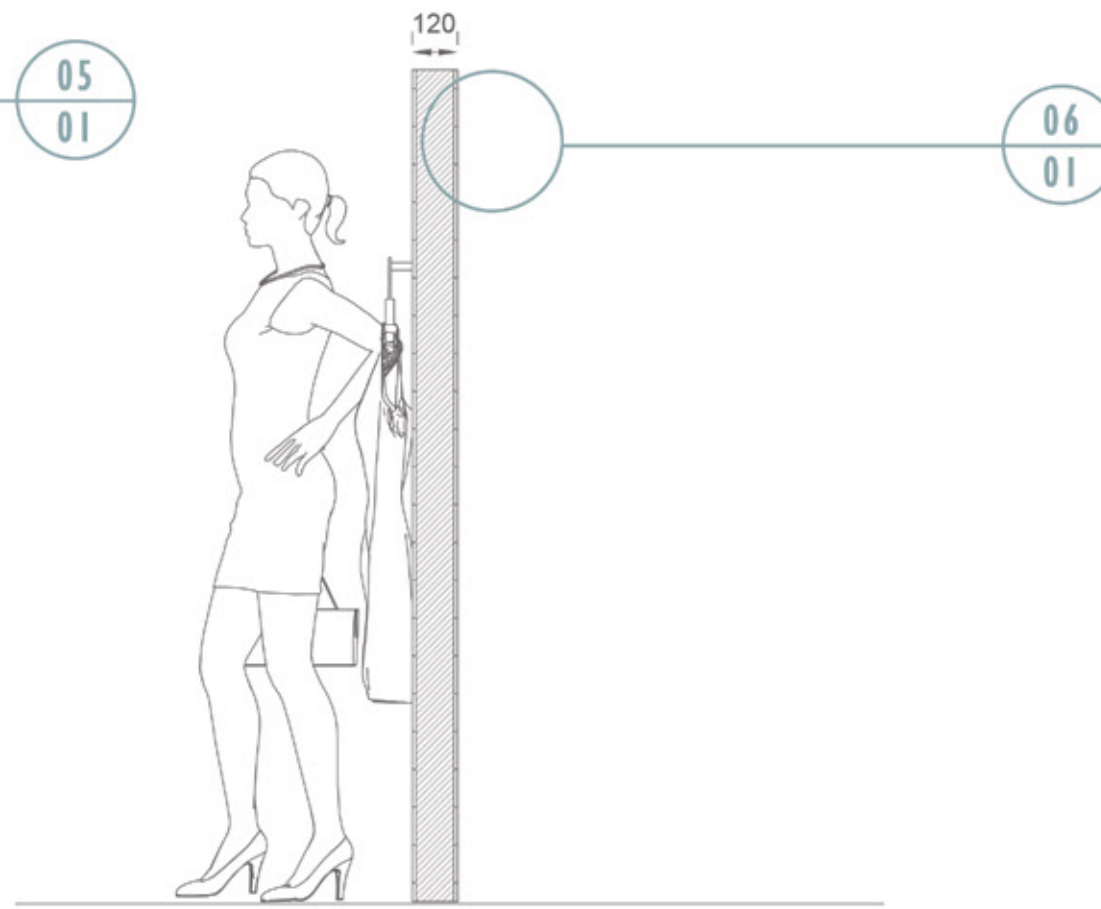
# RETAIL APPLICATION

## BIO-CERAMIC TILE APPLICATION



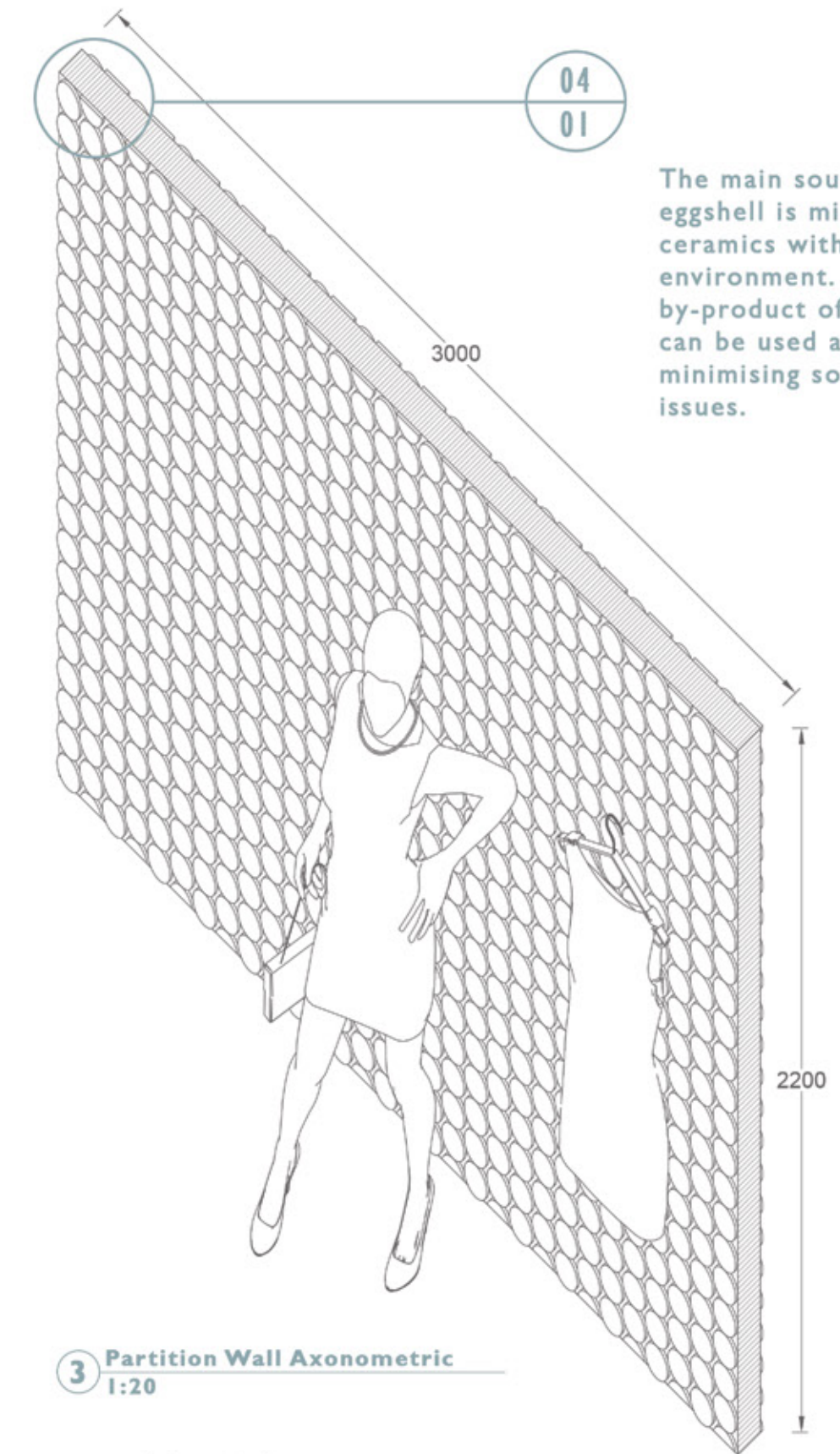
1 Partition Wall Front Elevation  
1:20

Within retail interiors the use of partition walls to add effect to a window display is common. These walls are usually covered with vinyl, wallpapers or tiles to add aesthetic effect as a backboard for advertisement.



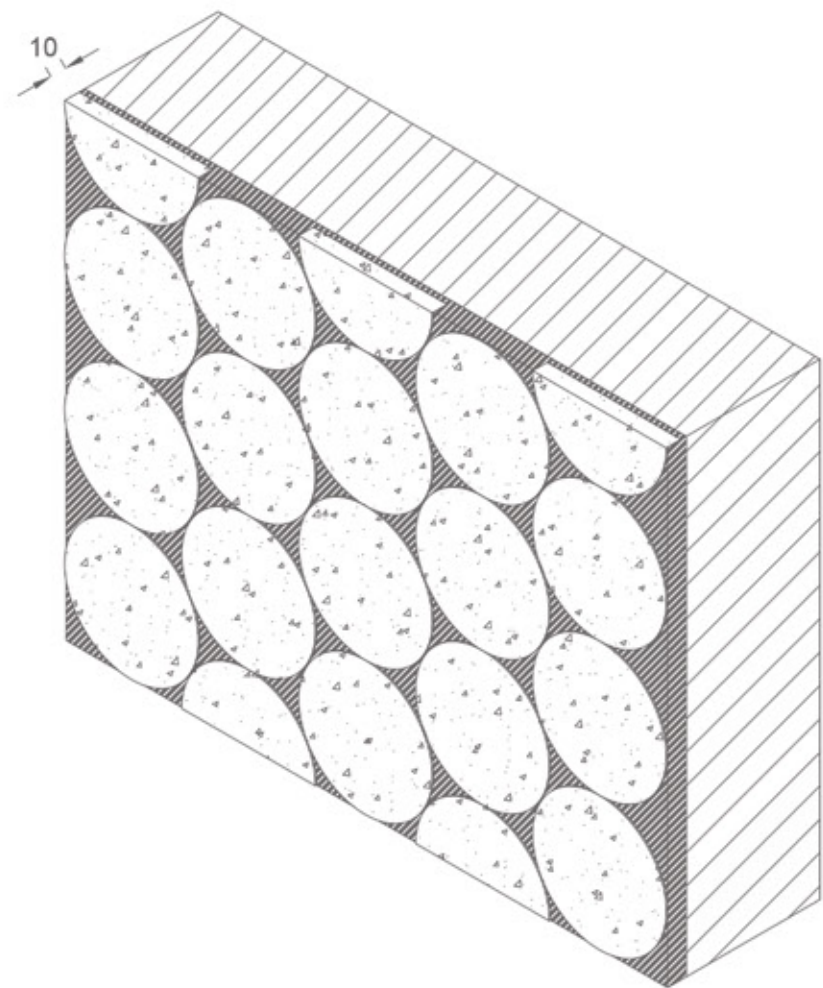
2 Partition Wall Side Elevation  
1:20

These technical drawings demonstrate how a sustainable ceramic tile can be applied to a partition wall for an aesthetic background.



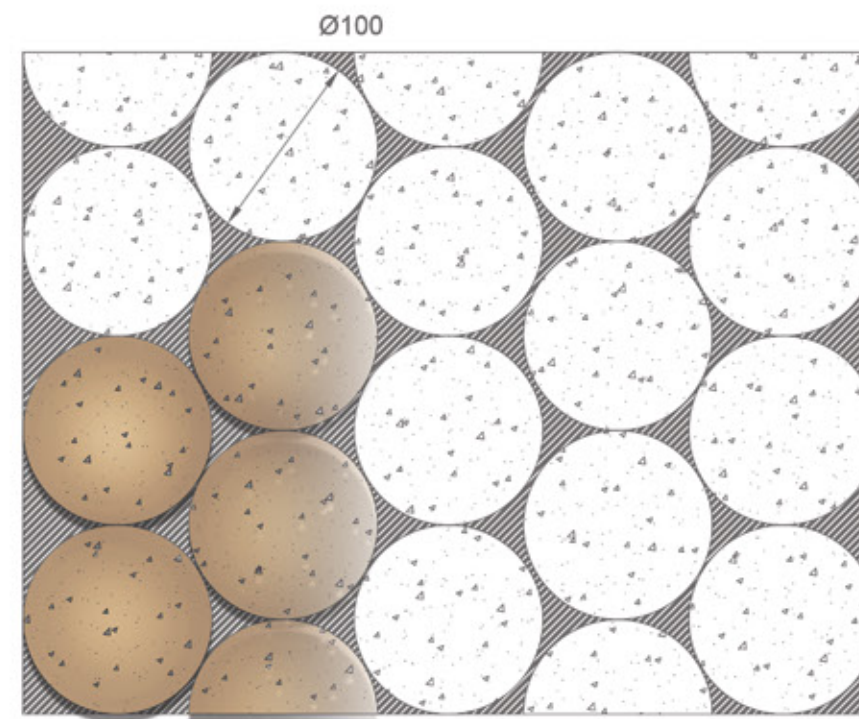
3 Partition Wall Axonometric  
1:20

The main source of the composite is eggshell which mimics the properties of ceramics with less impact on the environment. Eggshell is also a waste by-product of the food industry and can be used as a local resource minimising sourcing and transportation issues.



4 Wall Tile Detail Isometric

The ceramic tiles will be applied to the wall with a grout adhesive which is environmentally chosen. A company for example Litokol creates eco-sustainable building materials with low VOCs to improve the indoor environment from toxic emissions.



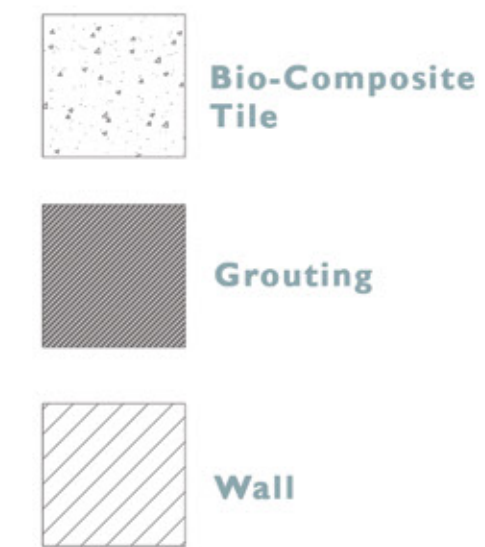
5 Wall Detail Front Elevation  
1:20

The aim of using a sustainable tile with environmentally sourced grout is to improve the indoor quality, reduce waste and be able to discard these materials without harm to the environment.



6 Wall Detail Front Elevation  
1:20

The tiles are butt jointed with grouting in between each tile. The grouting can also be naturally coloured to meet the aesthetic of the interior scheme.



Once they reach their end of use life they can be taken down and composted back into nature with no damage to the environment or contributing to landfill.



# SUSTAINABLE DESIGN SCHEMES

## Display Walls and Tables Visual



The visuals above demonstrate how retail interiors can incorporate biomaterials within design schemes which reduces waste and to create a more sustainable environment. When incorporating biomaterials within an environment other materials need to be considered and sit within the sustainable ethos. To replace the laminate coating on the display stands, podiums and till point will be a bio-plastic. The ceramic tiles could be replaced by a bio-composite tile for both floor and wall applications. The other materials like metals and timbers need to come from a sustainable source including responsibly extracted timbers or recycled or reclaimed metals.

This example materials board shows how you can start to integrate biomaterials into your design scheme. Not only this but also how you can swap some materials like fabrics and timbers for more sustainable choices which includes recycled content, natural materials or that are sustainably and ethically sourced.

Plastic laminates, faux leathers and ceramics tiles can be replaced with more sustainable bio-alternatives which can be composted and decomposed back into nature instead of entering landfills. There is a range of possibilities with these fabrics as natural dyes and moulding allow for a range of colours and textures to suit your scheme.

This is a materials board or the example retail space given previously with contrasting green and orange tones for a warm natural feel.

## Seating and Changing Room Visual

