

BUILDING INNOVATIONS

Green materials can transform the construction industry

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Transparent Wood. Invented by Swedish researchers, wood can now be treated and compressed to become a transparent material. [Transparent wood is created by compressing strips of wood veneer in a process that is similar to pulping.](#) This removes the lignin and replaces it with the polymer, making the wood 85% transparent.

Buildings that breathe. EcoLogic Studio has invented an algae-based 'cladding' system, called [PhotoSynthetica](#). Large panels are attached to new, or old, buildings which 'suck in' unfiltered and polluted air from the street that then rises up through the panels. The algae capture the CO2 and other pollutants and releases photosynthesised oxygen back into the street or the building interior. The company claims that two square metres of PhotoSynthetica panels can absorb as much CO2 as a mature tree.

Super-hydrophobic Cement. Scientists in Mexico have discovered that changing the microstructure of cement can make it absorb and reflect light, creating [super-hydrophobic cement, also known as luminescent cement](#). The cement is able to absorb and reflect light, offering an alternative to street lighting as the ground would be lit up using this luminescent cement.

Breathe Bricks. Acting as a secondary layer of insulation, [these pollution-absorbing bricks](#) can remove 30% of fine particles and 100% of coarse particles, making air within office spaces and public buildings healthier to breathe. This is particularly useful as a way to improve air within buildings in areas with poor air quality. This is a cost-effective way to reduce air pollution, as it requires no further maintenance once installed.

Super Wood. Scientists have now discovered a way to add strength to wood by boiling it in a solution of sodium hydroxide (NaOH) and sodium sulphite (Na2SO3) before it is compressed. [The compressed wood is far stronger and more durable than wood in its natural state](#); therefore, it can be used in a greater range of construction projects. The wood is so strong it can stop bullets, but is far lighter than comparable materials of the same strength.

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Technologies that will change our buildings

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Generative design maximises sustainability in construction through technology. [Combining algorithms with AI technology](#), designers can input their goals into the software along with parameters such as materials, manufacturing methods and cost constraints, to be presented with thousands of potential solutions. It also allows for thorough testing before construction, reducing material wastage. Whether it provides better solutions than a human designer remains to be seen.

Pee power converts urine into electricity. Urine passes through a series of Microbial Fuel Cells (MFCs). The microbes feed on the organic materials found in urine, releasing electrons and generating electricity. The [PEE POWER® system](#) was developed at the University of the West of England (UWE Bristol) and has been used to provide some of the power at Glastonbury Festival for the last four years.

Additive Manufacturing has gained a lot of publicity for projects such as the [3D printed house that can be built in one day at low cost](#) - which start up business ICON wants to use to print affordable houses for families living in slums across the world – and [Arup's collaboration with CLS Architects](#) in Europe. Future developments mean that houses will likely move from concrete to advanced hybrid materials.

Buildings as Materials Banks. [By repositioning buildings within a cycle of value](#), BAMB aims to reduce waste and virgin materials. Using high quality, reusable materials with easy-to-disassemble components suitable for reuse means they can be dismantled and returned to manufacturers at the end of the building's life. "Leasing" these materials may become the future of sustainable construction.

Solar glass technology makes use of [a photovoltaic coating that can offer several degrees of transparency and that transforms solar power into electricity](#). [New Energy Technologies](#) (USA), which has developed an almost invisible photovoltaic liquid that can be spread over any transparent surface. Together with photovoltaic graphene paint, photovoltaic glass might very well prove to be a game changer in the generation of energy.

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