

# New building materials and their sustainability essay

[Education](#), [Sustainability](#)



## **Answer Question#Z**

Sustainability is a process in which what is consumed or used is again replenished at a different point in the process cycle, so that one ends up with the same conditions at the start or end of the process. For example, the water cycle is a natural sustainable process. Sustainable processes can theoretically go on and on indefinitely. In a society, development of any kind requires infrastructure which is in the forté of the Civil Engineer. Therefore, how can sustainability be defined from the Civil Engineer's point of view?

The American Society of Civil Engineers (ASCE) defines sustainability as “ A set of environmental, economic and social conditions in which all of society has the capacity and opportunity to maintain and improve its quality of life indefinitely without degrading the quantity, quality or availability of natural, economic, and social resources.”(as given in the ASCE website [www. asce. org/sustainability](http://www.asce.org/sustainability)). An ideal example of engineering sustainability is the rolling mill where unusable iron components is recycled by heating them back into the liquid state and then making new steel products out of the molten steel by casting the same in molds.

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## **Answer Question#U**

HMAC has no competitors in road making when it comes to sustainability. This is because of asphalt's recyclable property and its claim to fame as the most recyclable construction material in the US. The National Asphalt Pavement Association (NAPA) says that every year, not less than a million tons of old HMAC (or HMAP) is recycled. Its unique quality of rejuvenation

makes it an economically feasible recyclable material. Moreover, using recycled HMA results in a huge cut in the emission of harmful GHG's (greenhouse gases) thereby reducing the carbon footprint and making it environmentally friendly too. In comparison, Plain Cement Concrete (PCC) and bricks cannot be recycled and can be best used as a filler material, on expiry of their lives. As for gravel and stabilized earth, they can be recycled but the stability that they provide leaves much to be desired.

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### **Answer Question #V**

Considering myself as the retired civil engineer, I will be using rammed cob inside a concrete masonry structure on PCC for foundation to ensure that the house will be firm. Natural timber for columns up to the floor level protected by concrete walls. Engineered wood, modular structure for the super structure. The main area of my concern will be that there should be no damage to the foundation and the timber underneath the ground level. I would wish to state that building the house only 100' from the beach is not a good idea. The engineered wood may also be hardboards so that the load of the superstructure is lightest.

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### **Answer Question # W**

When we think of engineered wood and sustainability, the products which come to mind are ply boards, hardboards and timber. Although much more convenient to use, we aim to be more sustainable here rather than more convenience.

## Various composite products available from

. However, modern building design is frequently going back to engineered wood rather than real wood. This is because of deforestation concerns and economy. The sustainability of natural wood is a complex matter for discussion. This is because wood if kept properly can last longer than other building materials but cannot be recycled so that lengths supporting better designs can be had. Engineering wood can be built with that premise but trees cannot be grown accordingly.

Therefore, engineered wood will be much more sustainable in the case of ceilings and struts for modern designs, as in the design shown below.

Here, the engineered wood has been manufactured keeping the design as a frame of reference thereby making it more sustainable (probably). As for convenience, economy and time, engineered wood is definitely advantageous over natural wood here.

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## Answer Question #X

Among the choices given for replacing Hot Mix Asphalt Concrete (HMAC), the best choice on the sustainability factor is ' Warm Mix Asphalt Concrete. (WMAC)'. This is because WMAC is an improvement over the HMAC. It requires less energy and emits less carbon. It can be used for all roadways and is not meant for a special condition only. It has all the recyclable properties of HMAC. Hence, it is the best substitute.

The worst material which can be used in lieu of HMAC, is Plain Cement Concrete (PCC). This is because it is expensive and cannot be recycled into

the original use (can be used for backfilling).

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### **Answer Question#Y**

As regards Masonry units, among the three types given, clay bricks are the most sustainable considering general structures. We arrive at this by first looking at the compressive strengths of the materials. The relatively inflexibility of the CMU eliminates it from the race. Next we look at the embodied energy content and the carbon content of the remaining two, i. e. concrete bricks and Clay bricks. In both cases, concrete bricks have higher energy content as well as higher embodied carbon. This means less carbon dioxide emission. Moreover, both can be used as filling material but clay bricks are cheaper by far. Hence, we can conclude that clay bricks are the most sustainable.

Note: Please note that Question #Z has been answered first as it is relevant for all the questions.