

Sustainable Homes

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Sustainable Home

What is a Sustainable Home?

Sustainable Home is a form of design that builds a home with poor energy. “A sustainable house is a home that has the least possible negative impact on our environment. This means energy efficiency, avoiding environmental toxins, and responsibly using materials and resources while having a positive physical and psychological impact on its inhabitants. (Fontan, 2021)”

How do Sustainable materials and operations influence the environment?

Sustainable materials and operations influence the environment. “Building construction and operations can have extensive direct and indirect impacts on the environment, on society, and the economy, which are commonly referred to as the 3 P's ('People', 'Planet', 'Pocketbook'). The field of sustainable design seeks to balance the needs of these areas by using an integrated approach to create "win-win-win" design solutions. (WBDG, 2021)”

What is the main objective of substantive homes?

Zero Carbon home is the main objective of sustainable homes. “A zero-carbon home emits no net carbon dioxide during its operation, and a carbon positive home produces more renewable energy than the home uses, exporting the excess to the grid. Reducing greenhouse gas emissions (such as carbon dioxide) aims to reduce the rate and impact of climate change. (Pipkorn, 2020)”

Building Materials

Building Materials are useful for construction reasons. “Building material is any material that can be used for construction purposes. It commonly includes wood, concrete, steel, cement,

aggregates, bricks, clay, metal, and so much more. In the olden times, people have been using pure bricks, or wood, or straw. But in this modern age, engineers have learned to mix and match the right materials to come up with higher quality structures. (Pro Crew Materials, 2020)”

Wooden Homes

Wooden Homes is the common building material that exists in the United States. “One of the cornerstones of U.S. culture is their wooden homes. Wooden homes are one of the cornerstones of American culture. From the earliest years up to this day, wood is always the main material used in home construction. Of course, there have been improvements to the design, now including bricks to make houses more durable. (Pro Crew Materials, 2020)”

Wooden Homes is helpful due to its flexibility. “That’s mostly because of wood’s flexibility. The U.S. is a country of convenience, speed, and instant solutions. And this is most definitely reflected in their houses. Working with wood is relatively easier than all other building materials like cement or steel. With wood, many Americans were able to DIY their homes and the idea conceived the industry of DIY house building kits. The package already has everything that an owner would need to assemble a whole house at a very low cost and with only a few people to hire. (Pro Crew Materials, 2020)”

Natural Materials

Materials tried in the construction version as a category in two pieces of research: natural and synthetic. “Natural construction materials refer to those that are not or minimally processed, like lumber or glass. On the other hand, synthetic construction materials are those that are manufactured and go through a lot of human manipulations. Some examples are plastics and petroleum-based paints. (Pro Crew Materials, 2020)”.

Fabrics

Fabrics revealed the popularity of Building Materials throughout its history. “Tents were very popular in the olden times for shade and the home of nomads. We often see historical accounts of Native Americans living in conical or circular turf tents made of fabric. The use of fabric in construction has been in a long hiatus before it was revived as a part of the modern construction technique. With the development of tensile architecture and synthetic fabrics, modern canopies in big buildings are now installed with flexible fabrics supported by steel cable systems. (Pro Crew Materials, 2020)”

Mud and Clay

Mud and Clay are considered natural construction. “As we mentioned earlier, mud and clay are natural construction materials that are still used today. The amount of mud or clay used in construction creates different styles of buildings so if you want flexibility in your design, mud and clay should be used. (Pro Crew Materials, 2020)”

Mud and Clay are helpful for one explanation. “One reason why mud and clay are still used today is because of its right thermal mass. Structures made of clay soil tend to be cool during the summer and warm during the colder seasons. Clay is known to hold heat or cold, acting as a natural HVAC system. (Pro Crew Materials, 2020)”

Rock

Rock brought the Flintstones in Building Materials in ancient history. “The use of rock can be traced back to ancient times. In fact, the entire Egyptian civilization, specifically the pyramids, was made of rock. It’s one of the longest-lasting materials available so even if you won’t see cave-style rock houses these days, rocks are still used as components or other

construction materials. The fact that it is also readily available makes it a less expensive material to procure. (Pro Crew Materials, 2020)"

Concrete

Concrete became useful in the creation of materials in certain types of structures. "Most commercial and industrial structures are now made of concrete. It's trendy because of its strength and longevity. It is a composite material produced usually from aggregate and cement. However, concrete has a low tensile strength. It is typically strengthened by enforcing steel rods or rebars. Hence we have the reinforced concrete structures. (Pro Crew Materials, 2020)"

Metal

Metal is common for modern building materials. "Metal is one of the most essential materials in making modern buildings like skyscrapers. It is also usually used as a wall covering. Different types of metals are employed in construction. Steel, whose major component is iron, is the most common metal used in construction because of its longevity, strength, and flexibility. However, it can be weakened by corrosion. Other metals used as building materials include brass, titanium, silver, chrome, and gold. Titanium and brass can be used in construction, while the more special metals in decorative details. (Pro Crew Materials, 2020)"

Modern Building Materials

The construction business in the modern era made a huge improvement. "The construction industry in modern times has grown into a multi-billion dollar industry. Construction projects are done left and right and with the employment rate growing in different industries until 2026, more constructions are expected to happen. Following this, the building material harvesting industry is also growing and evolving. To meet the standards of modern

buildings, new types of construction materials are being invented. Since environmental concerns are becoming a worldwide concern, natural building materials like wood are limited. If not, they come with the special condition of the industry planting its trees to harvest. (Pro Crew Materials, 2020)”

Insulation

Insulation prevents heat transfer. “Insulation is material used to stop the heat transfer. Insulation helps keep your home’s desired temperature all year round. It protects against heat in summer and cold in winter. A home that is well insulated is also energy efficient. Insulation can also be beneficial in reducing noise transfer. (B&M Insulation, 2022)”

Fiberglass Insulation

Fiberglass is the first part of the insulation. “Fiberglass insulation is made from recycled materials and offers great benefits at an effective price point. It can be used to insulate nearly any space and can be used to reduce sound transfer between spaces. Blown-in fiberglass insulation is effective for attics, garage ceilings, exterior walls and between floors. Combined with air sealing, fiberglass insulation can significantly reduce your energy costs. (B&M Insulation, 2022)”

Cellulose Insulation

Cellulose is the second part of the insulation. “Cellulose insulation is made from newspaper and recycled paper products. Installed as a loose fill product, it is commonly used in open spaces like attics. It can also be dense packed into closed cavities. (B&M Insulation, 2022)”

Spray Foam

Spray Foam is the third part of the insulation. “Spray foam insulation adds R-value and seals air leaks in one step. It expands to completely fill cavities and prevents conditioned air

from leaving the home. It can also prevent the infiltration of pollen and other allergens to help improve indoor air quality. Spray foam insulation comes in open cell and closed cell types.

(B&M Insulation, 2022)”

Building Design that Reduces Energy use

Energy Efficient Building plays an important role in the Sustainable Design. “Global warming has become an incredibly hot-topic issue, and one of the best ways to combat these adverse effects on the environment is to turn to more energy efficient design and construction. By reducing the number of natural resources, land, raw materials, and energy we use in and for creating buildings, we can significantly decrease the number of greenhouse gasses being released into the environment. (AeroSeal Commercial, 2020)”

The Benefits of Building Design that Reduces Energy use

Energy Efficient Buildings performs in a high rank for many reasons. “Energy efficient buildings are still high-performing buildings capable of a lot; they simply use different building methods, materials, and other resources to create a more energy-efficient, and therefore, environmentally friendly structure. (AeroSeal Commercial, 2020)”

Energy Efficiency prevents Money. “Commercial buildings utilize a lot of energy to operate, from the electricity, the heating and cooling, as well as the day-to-day activities that occur. It makes these buildings incredibly expensive to keep open and operating. This leaves more money available for other areas of the business because building owners will be spending less on utility bills and building upkeep. (AeroSeal Commercial, 2020)”

Energy Efficiency comes with an investment. “The thing that all commercial and office buildings are concerned with is their return on investment or ROI. By creating energy efficient

buildings, building owners are ensuring the building has a longer lifespan and requires less serious repairs over time. As a result, the building will have a much higher ROI, which means should you ever decide to sell your building, you will be able to get top-dollar due to the investment in making it an energy efficient location. (Aeroseal Commercial, 2020)”

Energy Efficient Building Design qualifies special programs, rebates, and incentives. “With this new push for energy efficiency, the government has introduced numerous programs to encourage businesses and building owners to invest in green energy and building. The U.S. Department of Energy (DOE) has a database detailing the various energy efficiency tax credits, rebates, and savings available to commercial businesses and state and local government agencies. There are incentives for virtually every aspect of energy efficiency, from installing solar panels to installing a more energy efficient HVAC system. (Aeroseal Commercial, 2020)”

Energy Efficient Building Design removes additional effects of harmful greenhouse gases. “Greenhouse gases have been proven to be incredibly harmful to the environment, and everyone is looking for ways to limit the amount of greenhouse gases they put into the atmosphere. One way to do that is to limit the amount of carbon output and pollution your building creates. (Aeroseal Commercial, 2020)”

The Idea of Building Design that Reduces Energy use

Energy-Efficient Building Design has the concept to reach its ultimate goal. “To achieve the goal of reducing a building’s carbon footprint and total energy costs while also increasing occupant comfort and satisfaction HMC Architects focuses on improving the building’s envelope efficiency. The envelope is where the effectual passing of energy through a building’s exterior, or membrane, can occur. (Boul, 2019)”

It seeks a way to find its potential. “By reducing the amount of trespass that occurs through the envelope, the internal building temperature is kept more regular and predictable. This results in a more thermally comfortable building and, thereby, more energy efficient-building design. (Boul, 2019)”

Thermally efficient creates envelope is useful to the design of the energy-efficient building. “A thermally efficient building envelope has far-reaching benefits. Not only does it reduce energy consumption and costs, but it also gives building administrators better control over the temperature in spaces, which increases occupant comfort. (Boul, 2019)”

Heating and Cooling

Sustainable Heating Ventilation and Air Conditioning

Sustainable Heating Ventilation and Air Conditioning define the combination of four technologies that influence the environment. “Sustainable HVAC is the collection of tools, technologies, techniques, practices, and methodologies that heat, ventilate, and air-condition buildings with minimal consumption and environmental impact. (Hydes and Fosket, 2013)”

Heating and Cooling involve pros and cons in your house based on the research. “When it comes to eco-friendly heating & cooling for your home, toeing the line between comfort and eco-conscious can be overwhelming. Even though data from the Department of Energy found homes are getting more energy efficient, data shows 48 percent of household energy use is linked to heating and cooling. (Lawrence, 2015)”

Pellet Stoves

Pellet Stoves becomes more flexible than Wood Stoves and it makes your room temperature warmer during the cold season. “As the temperature rises in a pellet stove so does the

temperature in your home during those cold winter days. These stoves are renewable and easy to find and are even considered to be more efficient than wood stoves as their resources can be switchgrass and sawdust etc. Storing pellets does also not take as much space as wood does. (ProudGreenHome, 2017)”

Geothermal Heating and Cooling Systems

Geothermal Heating and Cooling Systems found certain stables to maintain a room temperature. “A home geothermal system uses naturally stable ground temperature to keep your home cool in the summer and warm in the winter. No matter what time of year it is, the underground temperature stays at 55 degrees Fahrenheit. Also, with this system, one unit of electricity creates four units of heat. (Lawrence, 2015)”

Active Solar Heating Systems appears on a sunny day and warmer season. “If you live in an area that gets cold in the winter but is very sunny, active solar heating systems are worth checking out. They capture heat from the sun via a fluid (usually water or non-toxic glycol) and transfer it into the home where it collects in a storage chamber for later use. That heat can be sent through the home through radiators, radiant floor heating setups, hot water baseboards or central forced-air systems. (Lawrence, 2015)”

Biodiesel developed two sources to energize four natural materials that could be suitable for the environment. “Biofuels gets produced from natural, sustainable resources, also known as “energy crops,” which comes in the form of wheat, corn, soybeans, and sugarcane. The bio heat blends for heating homes can contain up to 20-percent of biofuel, which gets mixed with heating oil. These fuels can be burned in a conventional oil furnace and will release fewer pollutants into the atmosphere. (ProudGreenHome, 2015)”

Energy Supply

Sustainable energy is a type of energy to impact of the environment. “Sustainable energy is a form of energy that meets our today’s demand of energy without putting them in danger of getting expired or depleted and can be used over and over again. Sustainable energy should be widely encouraged as it does not cause any harm to the environment and is available widely free of cost. (Rinkesh, 2020)”

The Form of Sustainable Energy

Solar energy is a great type of sustainable energy. “This energy manifests itself in two forms. There is the light and the heat. Both of these forms are equally important to us in our day to day living and other forms of life. For instance, the plants need the light to grow and generate food while a man needs the heat energy to maintain body temperature and power their homes and industries. This means that it is the greatest form of sustainable energy. (Rinkesh, 2020)”

Wind energy is the best source of energy. “It is available naturally and can be tapped to produce vast amounts of power that can be used in many ways and places. For instance, sailors tap this energy to help the ship propel through its various directions to distant shores for trading. (Rinkesh, 2020)”

Geothermal energy brings people to catch energy from below the earth's surface. “This occurs by installing geothermal power stations that can use the heat coming out from inside the earth and use it to generate electricity. The temperature below the earth around 10,000 meters is so high that it can be used to boil water. Geothermal energy cannot be harnessed everywhere as the high temperature is needed to produce steam that could move turbines. (Rinkesh, 2020)”

Biomass energy combines four things to form chemicals. “Biomass energy is produced by the burning of wood, timber, landfills and municipal and agricultural waste. It is completely renewable and does not produce harmful gases like carbon dioxide which is primarily responsible for the increase in global warming. (Rinkesh, 2020)”

Gardens

Sustainable gardening recognized as self-sufficient gardening, “is a fancy term for growing fruits, vegetables, grass, and shrubs, in a manner that does not use harmful pesticides, and promotes a continuous harvest that does not damage the environment. (Stuart-Miller, 2021)”

Sustainable gardening plays an important role in the future. “Sustainable gardening is just one aspect of a ‘green’ revolution with the goal of reducing the pollution and chemical hazards associated with many of today’s activities, including the production of food and the operation of motor vehicles and factories. This is important because it establishes the kind of mindset necessary to protect the environment in the future, and to leave the next generation the building blocks to change how we use natural resources. (Stuart-Miller, 2021)”

Your Home

A sustainable garden increases an unexpected influence on your home. “Lowering your air conditioning and heating bills by growing native shade trees, teaching your children about the importance of being ‘green’, giving back to the environment, and helping you reduce food waste through composting. (Stauffers of Kissel Hill, 2020)”

Your Lawn and Garden

Sustainable gardens make the change on the support of your Lawn and Garden. “Planting native plants means fewer invasive species and weeds can thrive, climate-appropriate plants

grow bigger and stronger with less maintenance, and avoiding fertilizers and pesticides makes for a safer lawn and garden for your family to enjoy. (Stauffers of Kissel Hill, 2020)”

Your Local System

The environmental variety of sustainable gardens could not be observable. To develop a sustainable garden, you need to do three things: “Limit the spread of invasive plant species in your community, reduce excess waste in local landfills, and minimize your water usage and water bill. (Stauffers of Kissel Hill, 2020)”

Conclusion

Sustainable homes used certain materials that could lead to a negative impact on the environment. It is a type of design to create a house that does not provide enough energy. Zero Carbon home is the goal to improve sustainability. Building materials develop several items for construction reasons to seek quality structures. Insulation protects the heat transfers. Three forms of insulation provide different items and varieties. Building design reduces energy to benefit the material and to find the purpose of sustainability. Heating and Cooling found several opportunities to increase energy efficiency. The form of sustainable energy wanted to make a huge difference in society. Garden benefits the environment through your backyard, house, and many more to create purpose for future endeavors.

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