

Engineering Environmentally Friendly Buildings

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Bamboo Skyscraper (Tokyo)

- This is an incredible series of skyscrapers that are all made from bamboo.
- Bamboo grows very easily and only takes five years to mature, whereas trees take much longer.
- Bamboo is tough and fibrous but also light.
- This building design connects cross-tied bamboo with steel bracing and supports.



Hyperion Tower (India)

- At thirty-six stories high, this tower complex will be an ecosystem of urban ecology.
- The towers integrate urban farms with special crop rotation and domestic animals for dairy and meat production.
- Agricultural by-products are then used for alternative forms of energy.



Nanyang Technical University (Singapore)

- This structure is five stories high with an abundance of glass windows.
- The effect is highly energy efficient because the building is designed in a swirling semi-circle which minimizes heat loss.
- Lawns completely carpet the tops of the building, blending urban and rural landscapes.
- The lawns are not just there to be attractive--these lawns serve as gathering spaces, insulation for the building, and as sustainable ecosystems.



Sustainability Treehouse (West Virginia)

- It really is a treehouse, soaring up into the beautiful trees of this nature reserve.
- Visitors can learn about eco-conscious stewardship and the principles of ecological architecture--making this one of the best examples of environmental design.



India Tower (Mumbai)

- This building was completed in Mumbai in 2010 and it symbolizes the country's move towards an environmentally friendly future.
- The tower makes use of rainwater recycling, natural lighting, and natural ventilation.



Crystal Island (Moscow)

- Crystal Island is a building project set to open this summer in Moscow.
- It will be the world's largest building with 27,000,000 square foot of floor space.
- The building will feature a 'second skin' which will be a "thermal buffer" for the building.
- The "skin" will open in the summer to increase ventilation and close in the winter.



Cor (Miami)

- It might be a little strange looking, but this building is highly energy efficient.
- The strange bubbles provide enclosures for wind turbines and garden terraces.



BMW Welt (Munich)

- This strange looking structure supports a roof covered in a photovoltaic array, which produces a minimum of 824kWp of energy.
- There are also steel panels that help heat the building using solar energy.



Hobbit House (Mansfield, England)

- Built from durable, recycled high density polyethylene, these hobbit homes are incredibly versatile and can be used for everything from a home office to a garden entertainment space, a bar, or yoga room.
- They have even been used by those in the camping industry as a unique “glamping pod” alternative.



Earthships (Kent, England)

- All energy used in this building is created from sources such as wind and solar power, with small-scale windmills and solar panels.
- All of the food is produced in or around the home and water is harvested naturally from rain or nearby rivers and streams.



Living Roof Houses

- This is an example of a home designed and built to be part of nature.



Solar Powered Houses

- This house has solar powered climate control and fresh air ventilation systems.
- It can be programmed so that the temperature is controlled all year. The system is connected to the solar panels on the rooftops and the extensive use of windows throughout the home.



Natural Light Houses

- With its floor to ceiling glass walls and south facing windows, this eco-home allows for sunlight to warm the house naturally, meaning there is less need for central heating systems.
- The extensive use of glass allows the home to collect heat from the sun and will retain it through the winter.
- While it can get quite hot in summer in these houses, louvres are used on some windows so they open.



Air Tight Houses

- These homes maximize insulation with triple glazed windows, sealed walls and floors and heavy doors.
- The style ensures that heat is not lost in the living spaces so less heat has to be used.
- This air-tight home uses less energy for heating and also keeps cool air in in the summer.



Earth Sheltered Houses

- These homes are very warm and quiet because the density of the soil surrounding it provides a thick outer layer.
- There is no need to worry about the ground freezing in winters or drying and cracking in summer as the house is built using three meters of soil- which is far deeper than temperature change can reach in the ground.
- However, these homes must be very tightly sealed or the rain will seep through.



Prefab Houses

- These 'prefabricated' houses are built at one site and then transported to a selected site.
- The way in which they are pre-made ensures no waste is produced in the construction as all measurements must be exact.



Engineering Task

- **Design** a building with at least two (2) environmentally friendly features. (You may use any of the features that were highlighted in the presentation or even invent your own.)
- **Create** your building using any materials you have at home, draw it on paper, or design in in a PowerPoint presentation.
- **Describe** the building, what it is made from and why you chose these 2 environmentally friendly features.

