

Lesson plan using STEAM method of teaching
Topic: How to build a house?

Part 1.

- 1) Introduction: Presentation different types of houses all over the world.

Igloo, Canada



What an igloo looks like doesn't need to be explained to anyone. For years, such domed houses made of snow blocks served as a temporary shelter for hunters, but there were also those who treated them as a place of permanent residence. Today, igloos can be found in in Canada's Baffin Island, as well as in other snowy parts of North America.



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Yurts, Kyrgyzstan

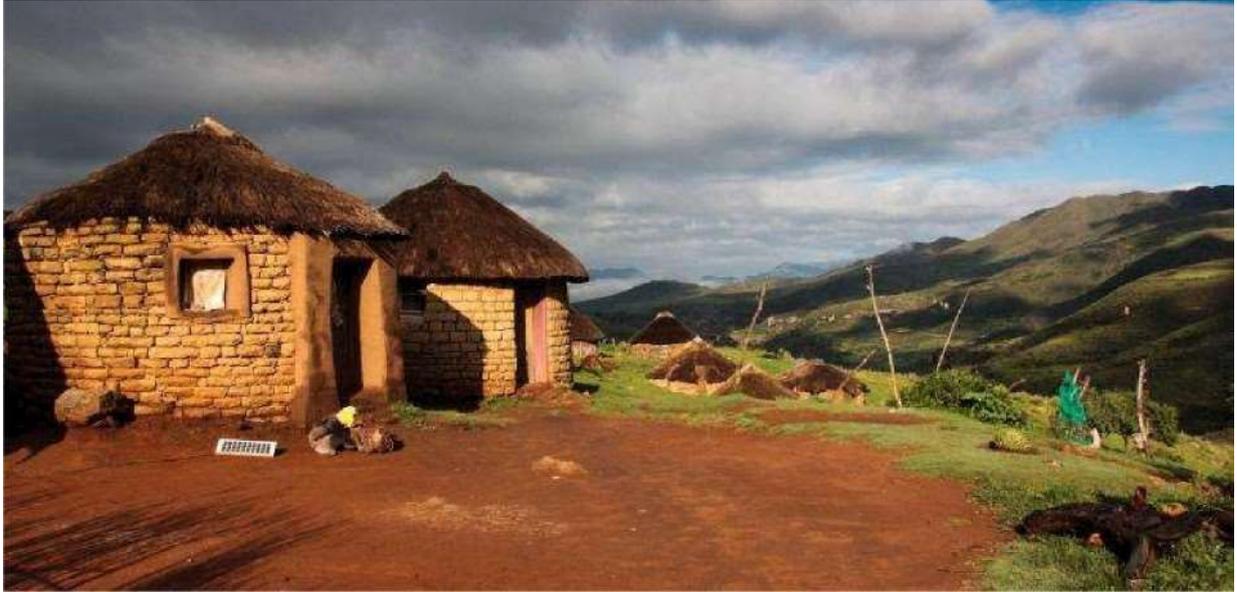


Yurts are round, portable tents, used by nomads from Central Asia since the Middle Ages. Although in the past these structures served as temporary shelters, modern construction methods allow them to be used for permanent residence.

Rondavel, RPA



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Rondavelas are round, one-room huts, popular primarily in the southern part of Africa. The houses are valued mainly because they can be built entirely from natural, locally sourced materials.

Green roofs, Iceland



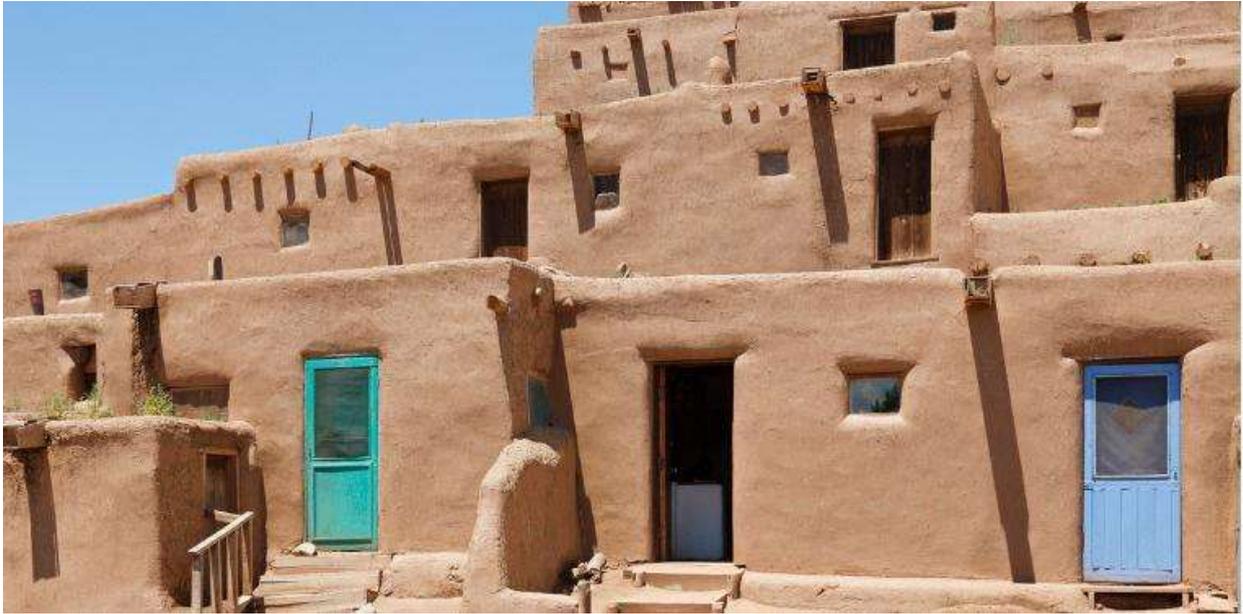
If you happened to visit Iceland, you may remember the characteristic houses with green roofs. This original cover is made of turf, a compact combination of grass and legumes. The houses consist of a stone



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foundation and a wooden frame.

Dried brick, USA

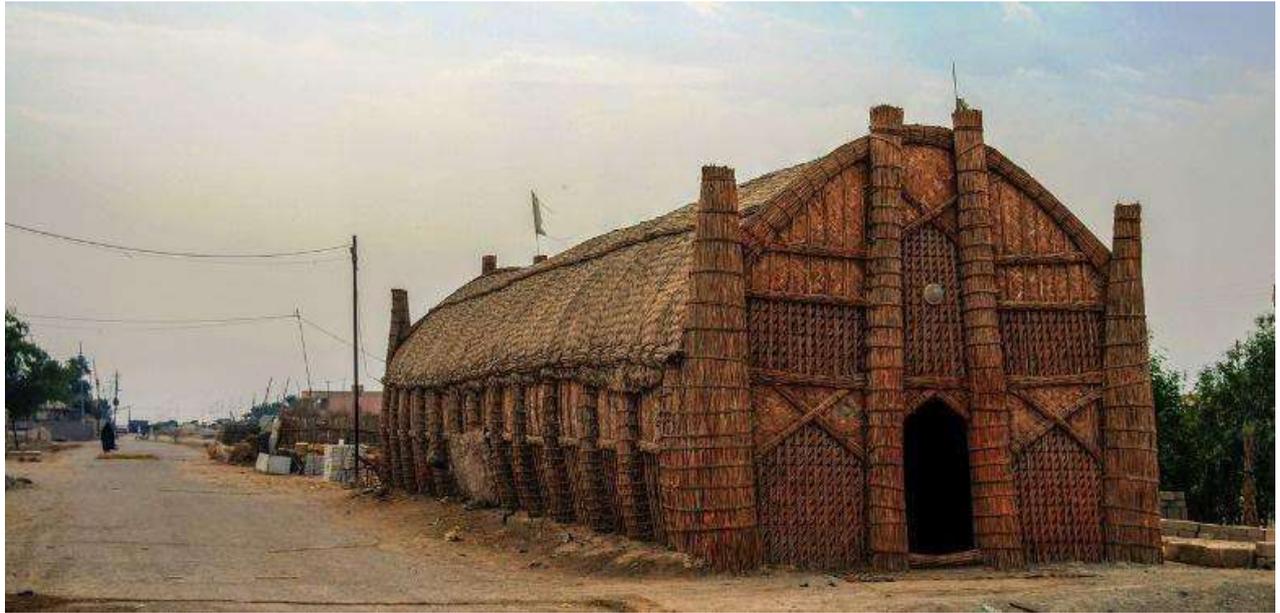


Traditional Pueblo Indian houses can be seen in the settlement of Taos Pueblo, located in the US state of New Mexico. The buildings are made of sun-dried adobe bricks, whose thick walls protect the interior from the heat.

Mudhify, Iraq



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Mudhifi - this is the name of the traditional reed houses, erected by the Madan people (or swamp Arabs) from southern Iraq and Iran. The reeds from which the huts are built come from the nearby swamps.

"Fairy Chimneys", Turkey



The Göreme Valley in central Turkey is a cluster of unique rock formations known as "fairy chimneys". As a result of ancient volcanic eruptions, they took quite unusual shapes - to many people they resemble tall mushrooms. For years, people have carved into the soft rock to create houses and even entire cities.



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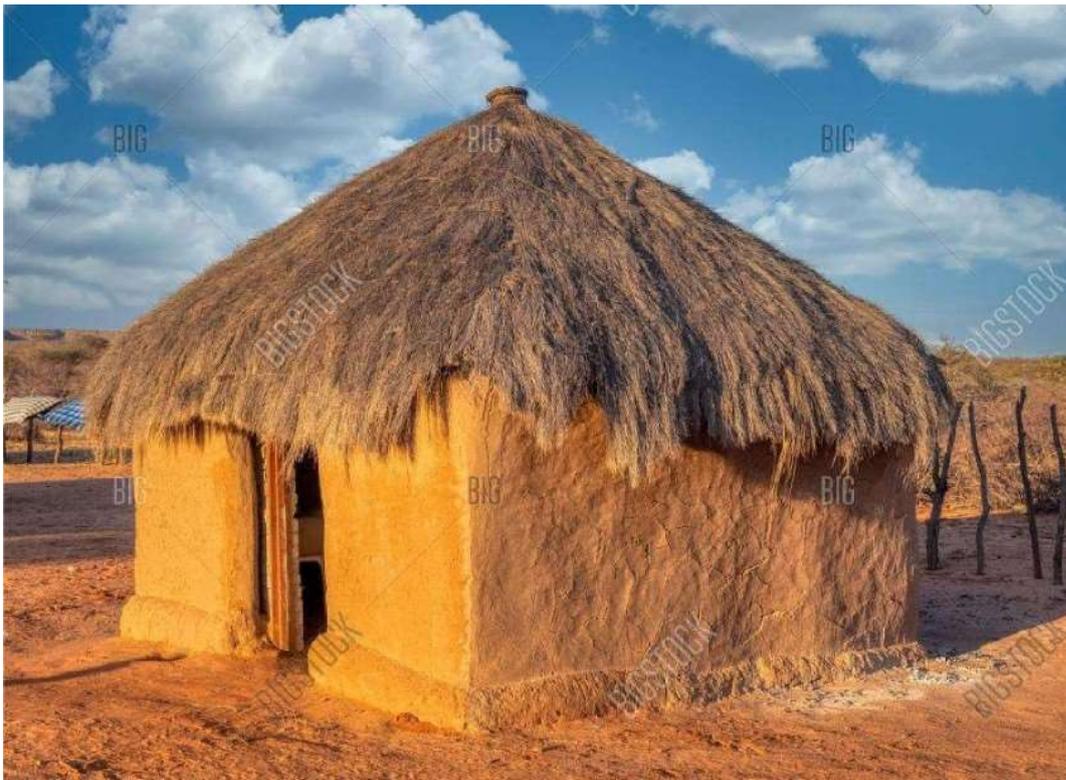
Cave houses, Tunisia



Carved out of sandstone, cave houses are a hallmark of the Tunisian town of Matmata. The buildings are connected by a network of passages and provide residents with thermal comfort throughout the year - they provide protection against both the strong African sun and the cold desert winds.

And many many others:

African



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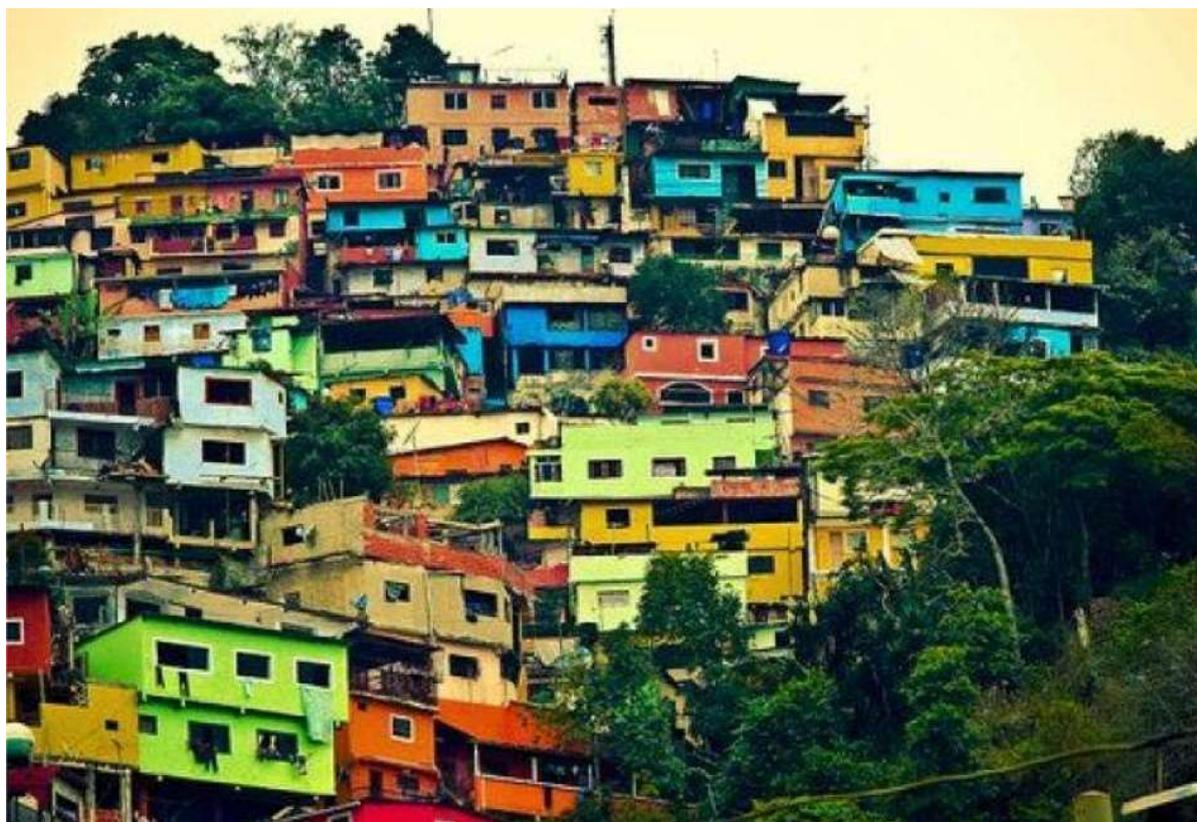
Asian



South America

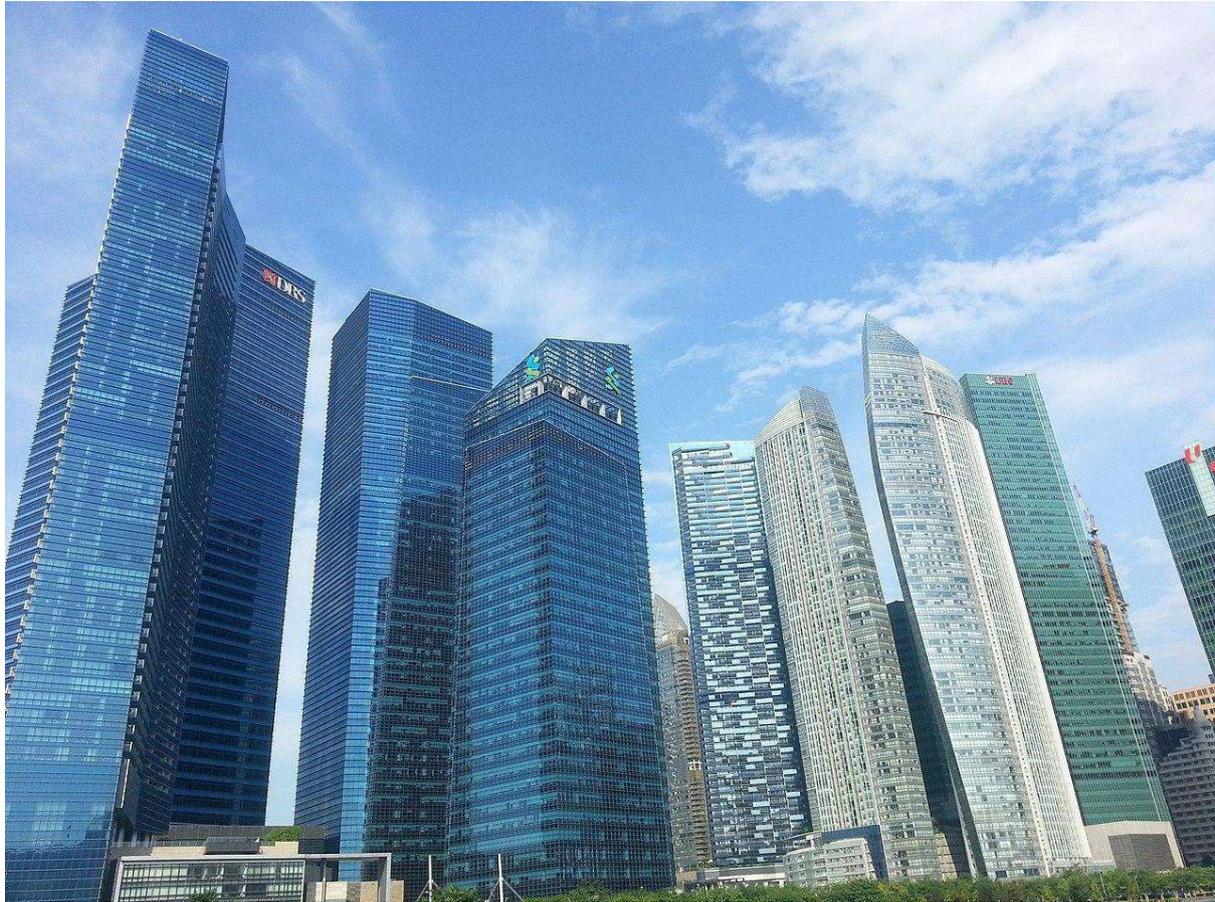


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Skyscraper



- 2) Discussion: What do you think the different types of houses depend on? Let kids answer they ideas.

Because of: available materials, weather conditions, economic conditions, imagination, our needs.

Why because of weather conditions?

For example if we built the house in hot part of the word it have to protect from the sun and we can use photovoltaics technologies.

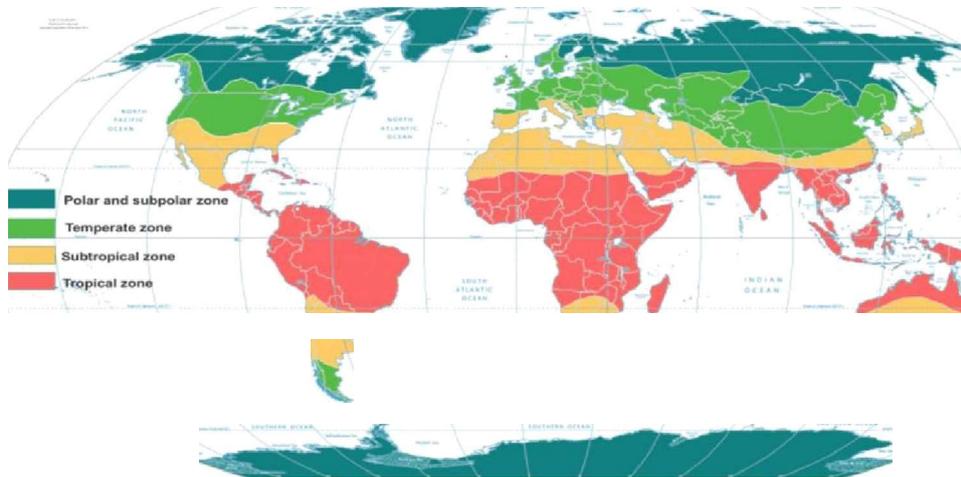
If we built the house in cold part of the word we need to protect it from cold and think about wall insulation.

So, for sure type of house we will built depends of climate zone.



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3) Geography: Explaining what climatic zones are and what they are characterized by



Polar and subpolar zone regions are characterized by a lack of warm summers but with varying winters. Every month a polar climate has an average temperature of less than 10 °C (50 °F). Regions with a polar climate cover more than 20% of the Earth's area.



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Temperate zone - occur in the middle latitudes (23.5° to 66.5° N/S of Equator), which span between the tropics and the polar regions of Earth.¹ These zones generally have wider temperature ranges throughout the year and more distinct seasonal changes compared to tropical climates, where such variations are often small and usually only have precipitation changes.

<https://study.com/academy/lesson/temperate-climate-zone-lesson-for-kids-definition-facts.html>

Subtropical zone - characterized by hot summers and mild winters with infrequent frost. Most subtropical climates fall into two basic types: humid subtropical where rainfall is often concentrated in the warmest months, for example Southeast China and the Southeastern United States, and dry summer or Mediterranean climate where seasonal rainfall is concentrated in the cooler months, such as the Mediterranean Basin or Southern California.



Tropical zone is defined by a monthly average temperature of 18 °C (64.4 °F) or higher in the coolest month, and feature hot temperatures all year-round. Annual precipitation is often abundant in tropical climates, and shows a seasonal rhythm but may have seasonal dryness to varying degrees. There are normally only two seasons in tropical climates, a wet (rainy / monsoon) season and a dry season. The annual temperature range in tropical climates is normally very small. Sunlight is intense in these climates.

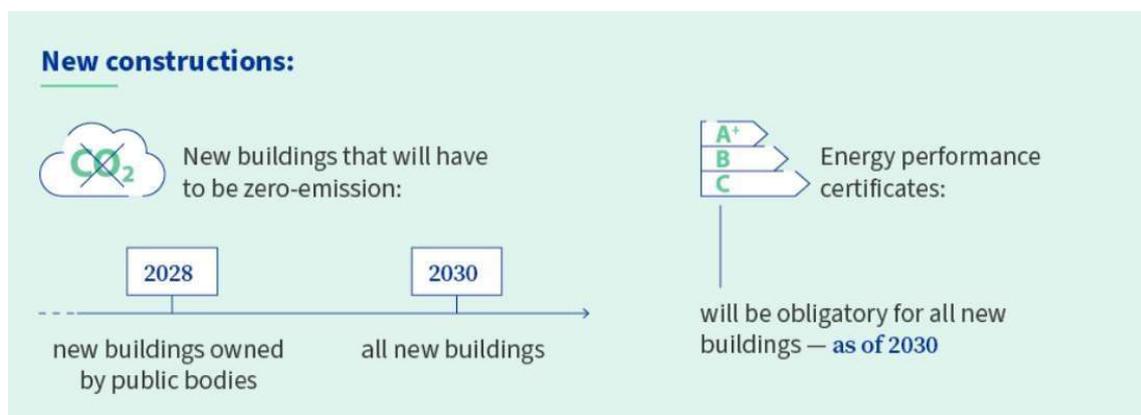


4) EU Regulations regarding building the houses

If we would like to start built our house in the temperate zone, for example in Europe, first we need to get to know with the construction regulations.

Buildings are responsible for more than a third of EU greenhouse gas emissions.

The European climate law makes reaching the EU's climate goal of reducing EU emissions by at least 55% by 2030 a legal obligation. **EU countries are working on new legislation to achieve this goal and** make the EU climate neutral by 2050.



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Existing buildings:

* Non-residential buildings:

Member states to set up minimum energy performance standards = maximum amount of energy that buildings could use per m² annually (based on total building stock in January 2020).

all non-residential buildings will need to be below it by:

2030 15°4 threshold

2034 25°A threshold

2 thresholds representing the national building stock above these thresholds

5) Let's get to know the technologies in which we can build our house:

Canadian houses, popularly known as frame houses.

Unlike brick houses, Canadian houses are made of tree wood of coniferous trees subjected to advanced technological processing, and delivered to the construction site they are in the form of ready-made modules (walls, stop and roof), which you just have to assemble - for this reason, such buildings are also called package houses.



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Modular houses.

These are houses that are built from ready-made elements that are larger fragments of buildings. Such modules are manufactured in the factory, so it is enough to connect them properly at the construction site to create the final structure of the building. Thanks to this, the scope of work on the construction site is limited to a minimum.



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Energy-saving and passive house

An energy-saving house, as the name suggests, is an object with reduced energy demand (compared to the



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standard one). It happens, however, that this term is confused with another very similar one: the concept of a passive house. However, the difference between the two is fundamental! Energy consumption in a passive house is minimized and amounts to less than 15 kWh/(m²/year), which is much lower than in an energy-efficient house, where it is about 70 kWh/(m²/year). For comparison, the energy demand in a standard single-family residential building is 120 kWh/(m²/year).

In addition, it is worth remembering that the energy-efficient house and the passive house also differ in their assumptions. Simply put, an energy-efficient house is one that is built with the least possible energy loss in mind (e.g. through effective insulation). On the other hand, **a passive house** is one whose construction is focused not only on reducing the energy consumed on a daily basis, but also **on obtaining it and reusing it** (e.g. through solar panels or an appropriate arrangement of rooms).

The biggest advantage of zero- and plus-energy houses is **significant savings on operating costs**. In the case of the latter, there is even a surplus that can be used freely, e.g. to heat water or the whole house. According to the idea, the obtained energy can be resold to the electricity supplier, thanks to which, in theory, even individual investors can earn additional money on the resources that their house produces. In order to obtain an energy self-sufficient house, two aspects must first be taken **care of: high-class insulation of the entire building and maximum reduction of heat loss**. If our goal is to raise the standard from energy-saving to passive, additional investment in the form of photovoltaic panels will be necessary. It is worth remembering that there must be enough of them and of sufficiently high power to be able to produce energy to heat and service the entire building. In the case of a 140 m² house with heat recovery and efficient insulation systems, an installation of up to 10 kWp will be sufficient. In this case, the building runs entirely on electricity.



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<https://www.youtube.com/watch?v=wxvHlhiu6wo>



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