

ART 2640, Building Systems of Interior Environments

Fall Semester 2020

Tuesdays & Thursdays 10:30-11:50

Online

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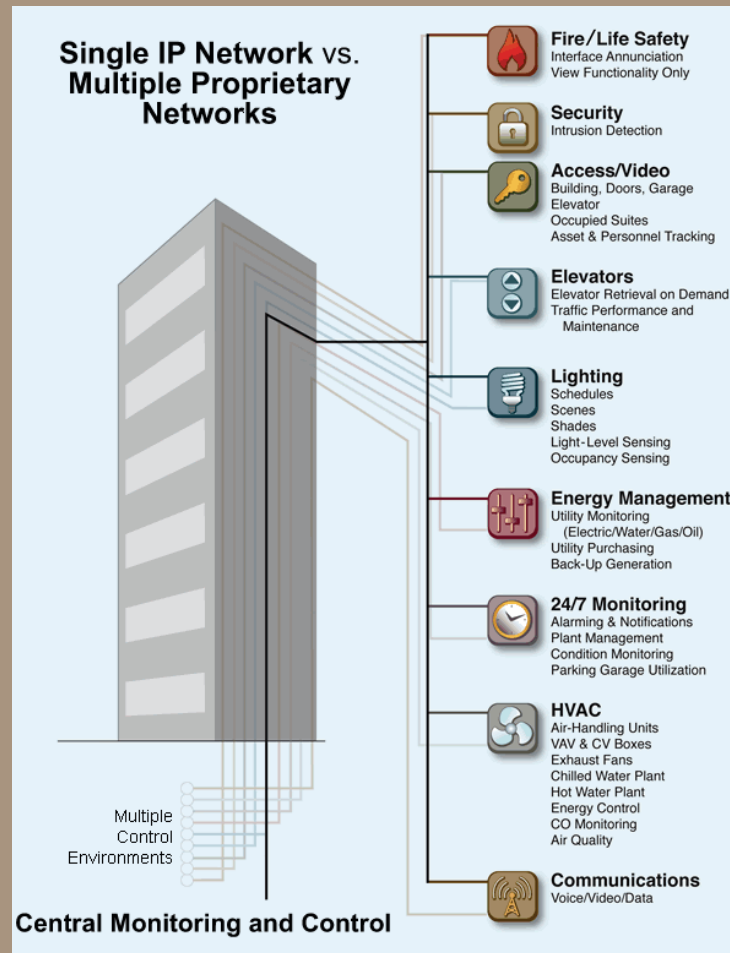
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Course Introduction

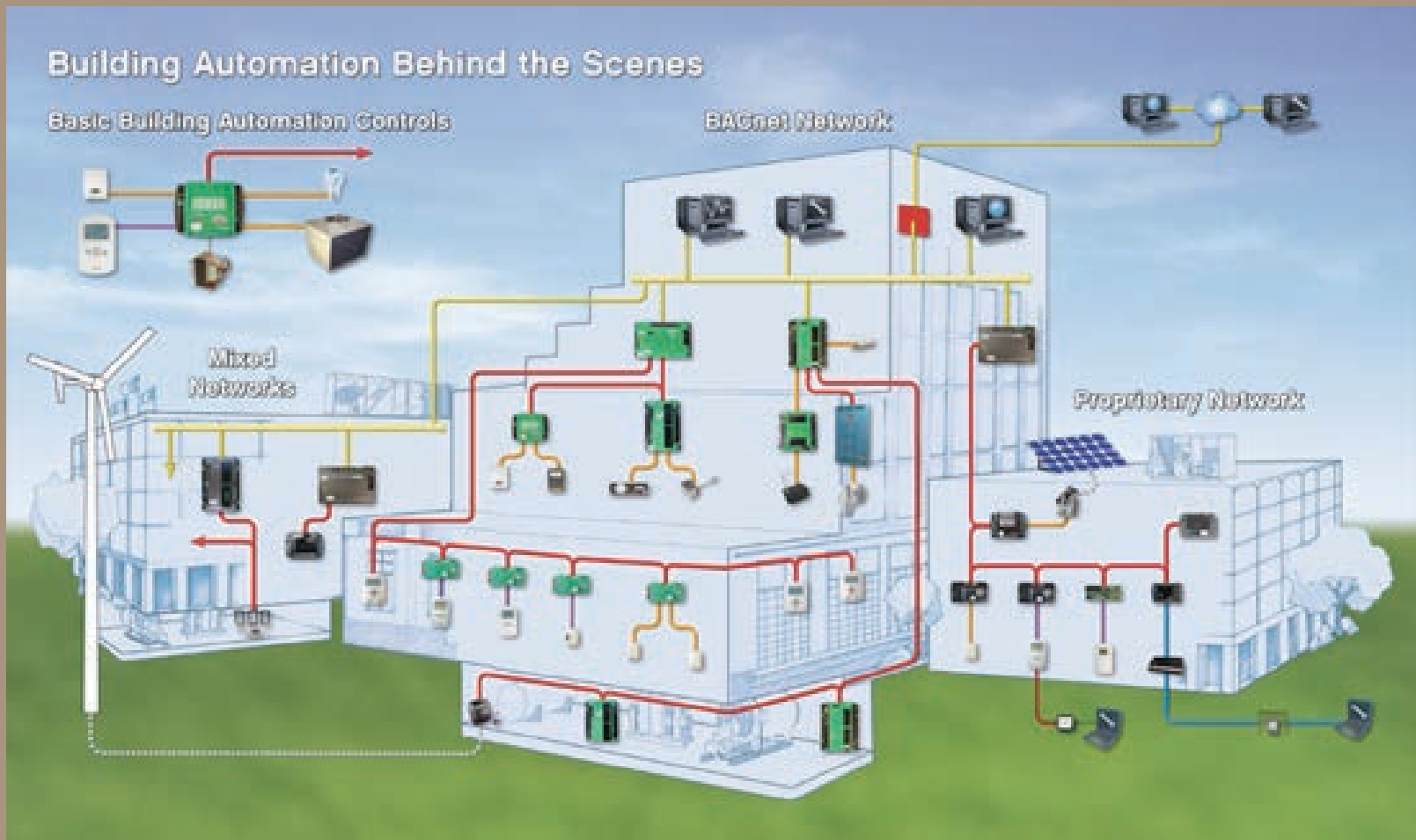
Hidden Elements: Building Systems

- This course presents and explores the systems that are involved in supporting interior building environments
- The systems that we will explore are: HVAC, Plumbing, Electrical, Structure, Acoustics, Lighting, Transportation.
- Each of these systems consists of physical components that in turn have an impact on the experience of interior spaces.
- This short article provides an excellent overview of why interior designers need to understand the systems and the components that they are made up of in a building context.
- [The Backbone for Interior Design – Building Systems](#)

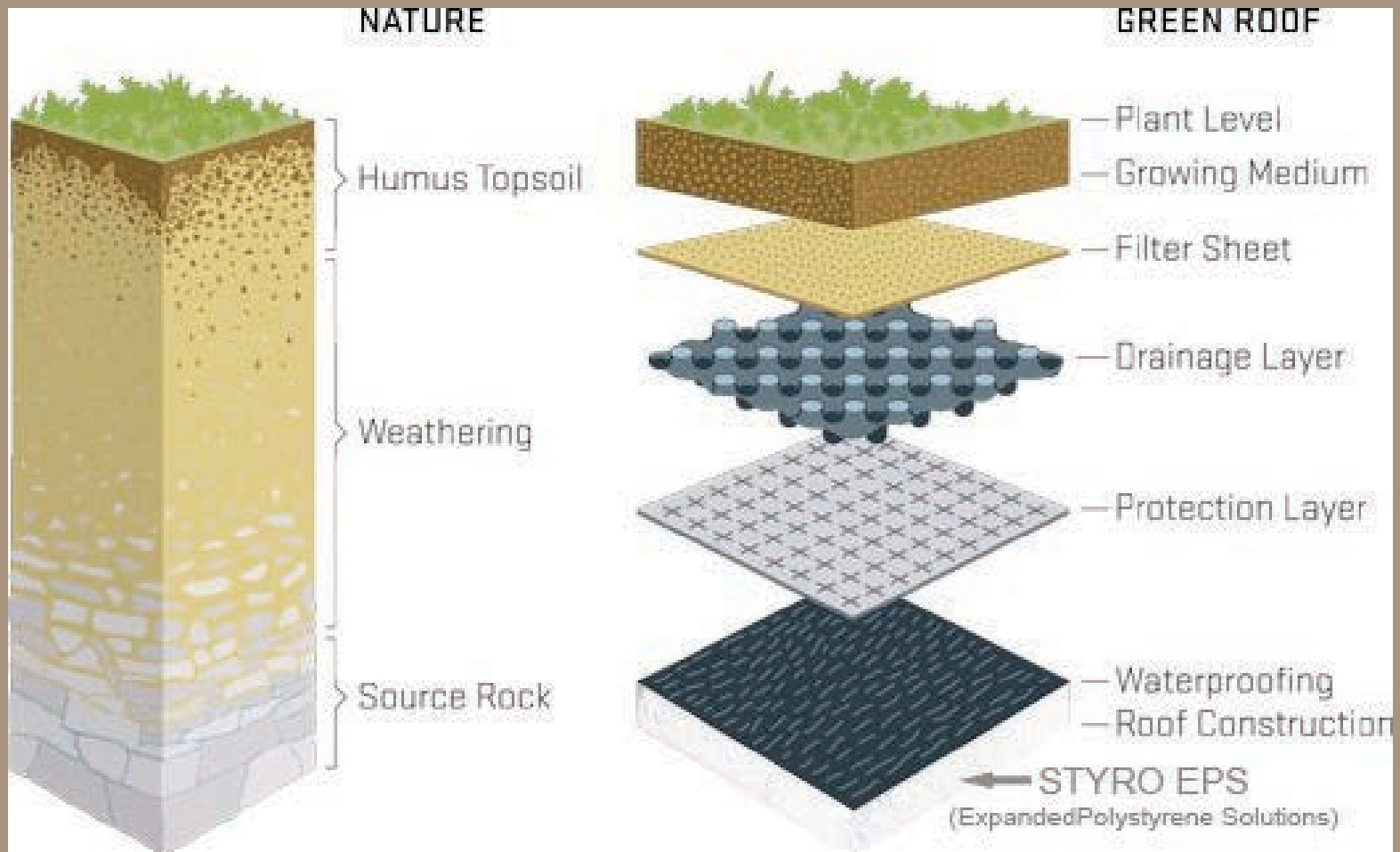
Buildings contain and make use of many different systems. Each system consists of many individual components.



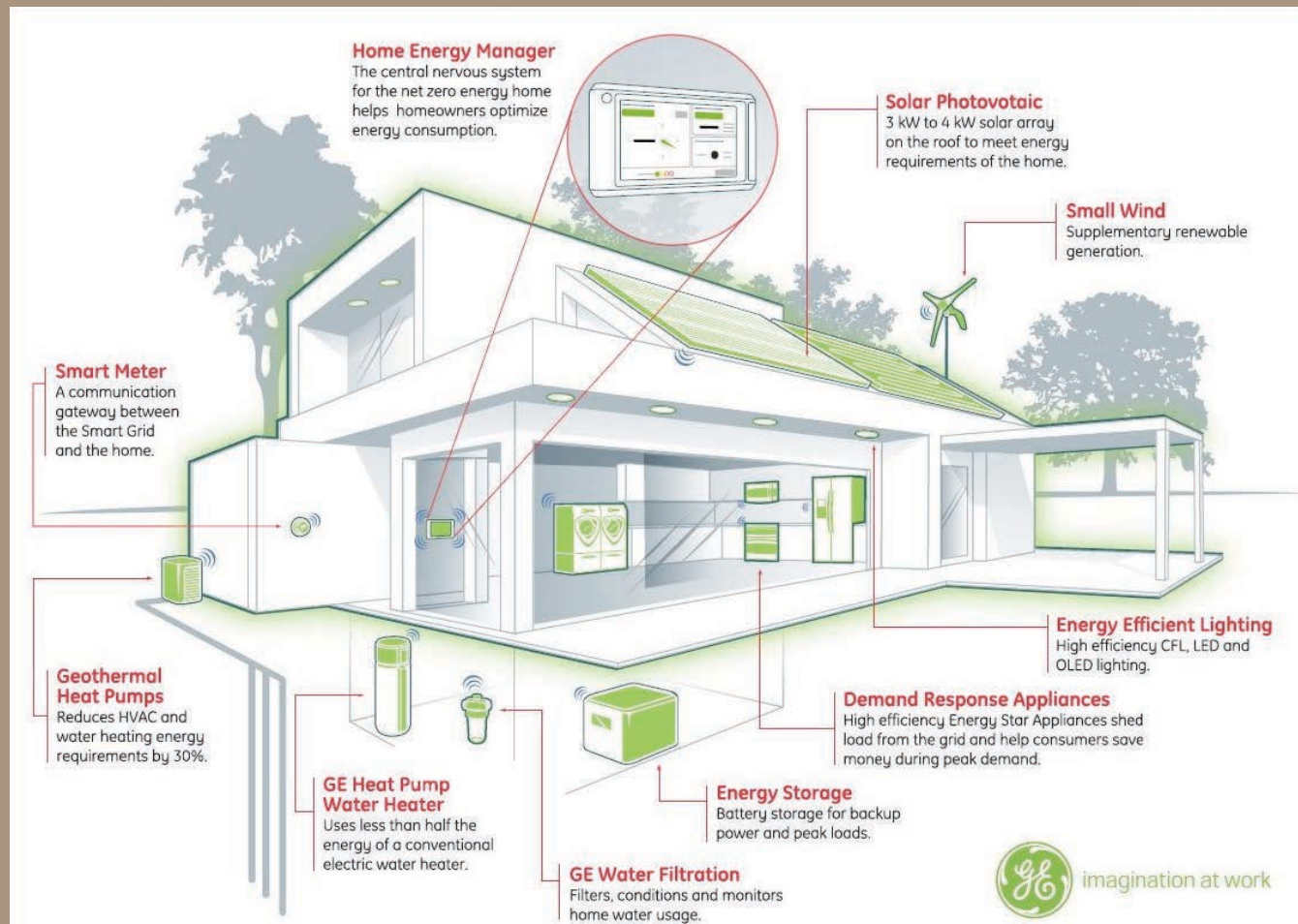
Many of the systems and their components that contribute to building functions are hidden, not obvious to the untrained eye.



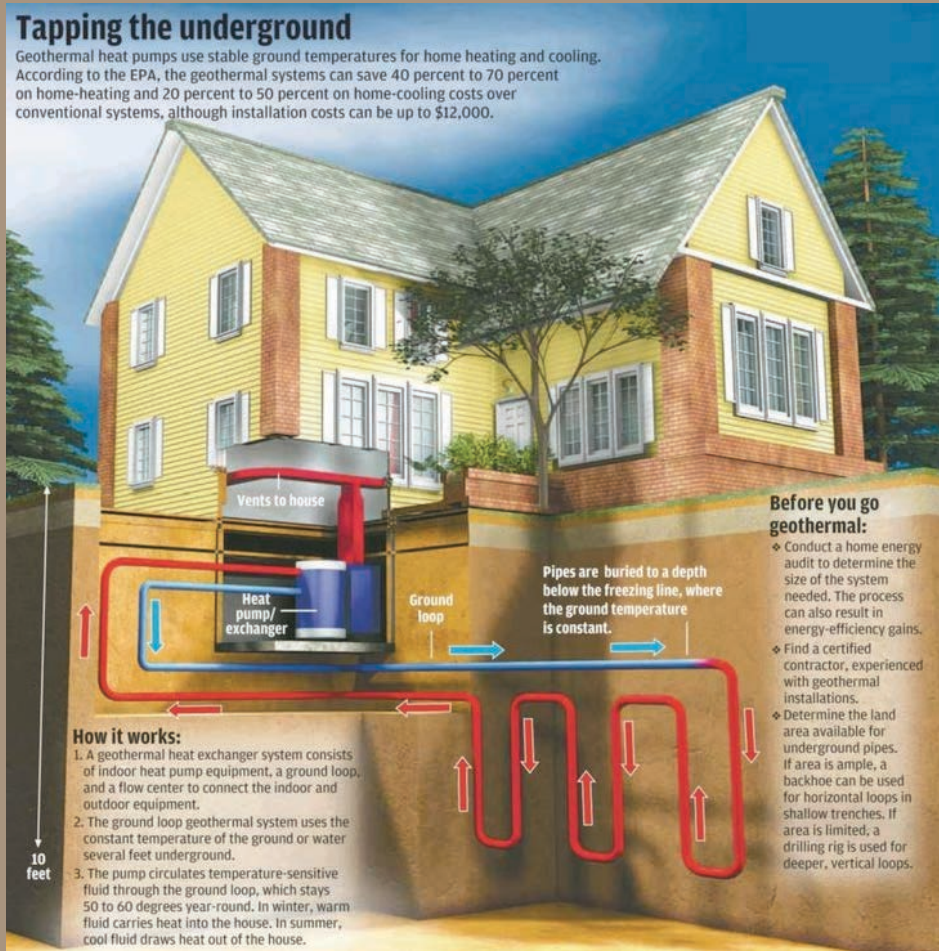
Natural systems, unlike most man-made things, are all symbiotic and produce zero waste.



Some of the contemporary systems that are changing the way buildings function include:



GeoThermal heating and cooling system



What is 'structure' ?

- In general terms, within the domain of interior design and architecture the term 'structure' is used to refer to physical elements, pieces and parts, that are holding up, or holding together, something besides themselves.
- Many interior walls are free standing, and only holding themselves up.
- 'Structure' and 'structural components' should NOT seem mysterious, or be intimidating, to you, as students of interior architecture.
- How to calculate the particular sizes and strengths of structural components, such as steel beams is, for sure, a complex and mathematically driven part of how buildings and interiors are created.

The orange wall is a physical construction that is being used as an interior spatial design element. This wall is NOT holding up anything besides itself. We therefore say that this wall is NOT structural within the context of the building.



However, this orange wall is constructed using physical materials that have to be strong enough to support themselves and the pieces attached to them. The steel studs inside this wall ARE structural in the context of the wall itself.



A building structural system is what holds up the overall building.



These are pieces of steel 'i' section. This is steel, cast, then rolled into this 'i' shape. We often call these 'steel beams', but they are only 'beams' if they are used as beams. We could use them as the base for a glass coffee table.



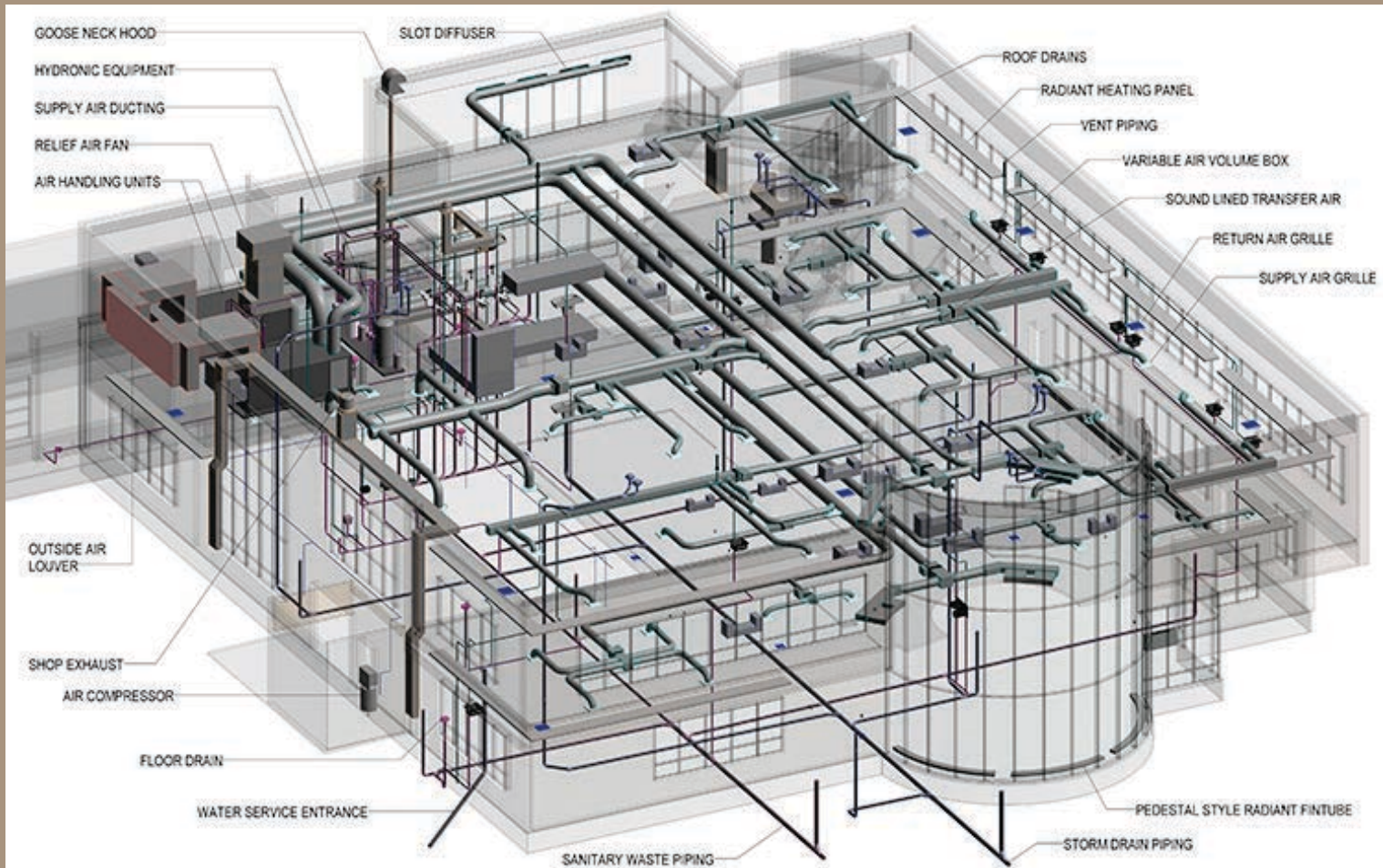
Steel such as this, or the previous, are only 'structural' if they are being used in a structural capacity. A really big strong person could wear this as a necklace pendant in which case it would be jewelry!



Shoe laces are often structural. They are held in tension, under tensile force, for the purpose of holding the left and right sides of a shoe together.

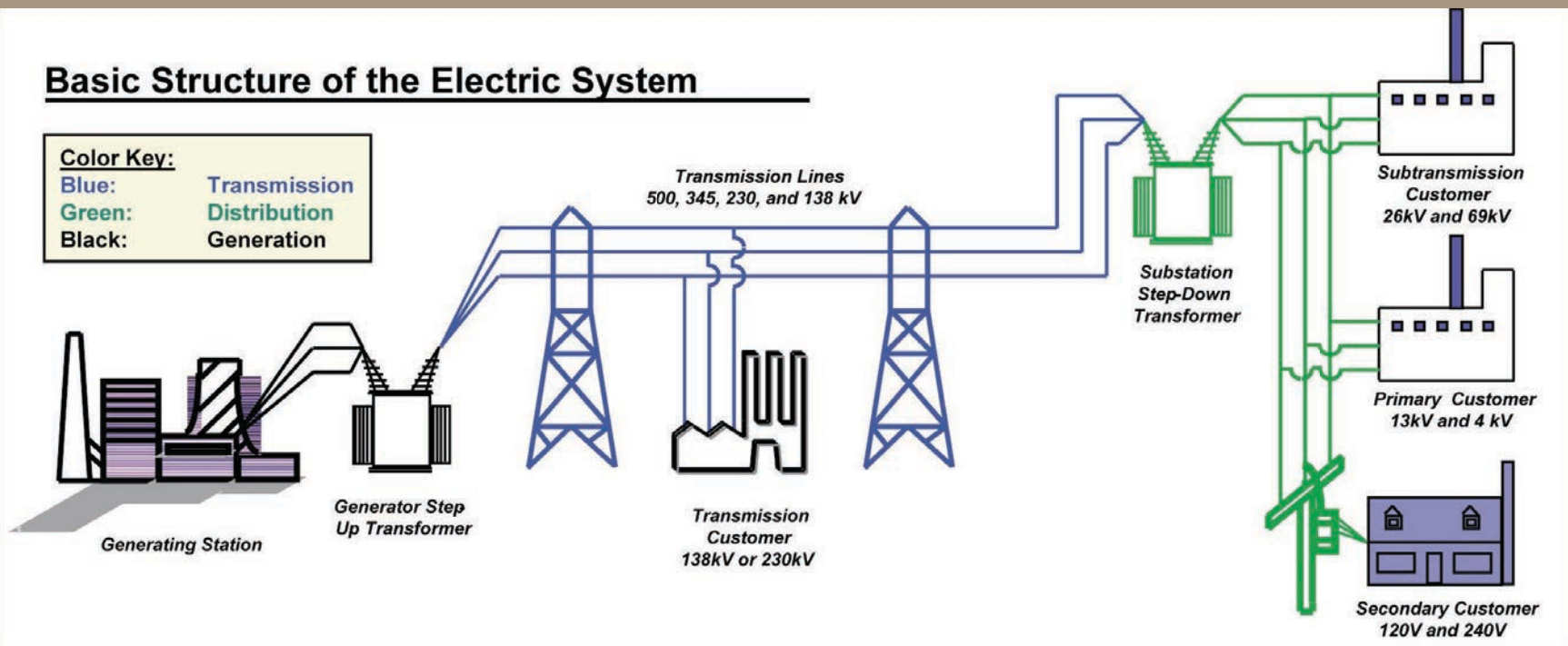


Plumbing and HVAC Systems



Electricity & how it gets to us

Basic Structure of the Electric System



Acoustics for interior spaces: employing a diversity of shape, surface texture, and hard and soft materials.



Lighting for Interior spaces: using diverse light sources to create layers of light



Buildings and Interior Designers

This course is intended to familiarize you with some of the systems that are integral to the good, effective working of an interior environment: an interior architectural environment.

This kind of interior is, always, within, inside of, a *building*.

As interior designers, as designers of *architectural interiors*, buildings are important to us: we cannot do our work without a building.

Buildings are our 'friends'.

Because of this symbiotic relationship, we need to know a good amount about buildings.

Buildings are the site for interior design/interior architecture work.



Buildings are changing in response to contemporary needs and pressures.



Our focus is on commercial interiors

In 2020 a commercial interior is often, if not typically, a very sophisticated environment.

Sophisticated in terms of:

- physical construction
- psychological impact
- environmental control

In this course we will be studying elements of each of these.

This course will address products, techniques and issues related to:

- interior lighting
- heating, ventilating and air conditioning (hvac) systems
- plumbing systems
- electrical systems
- acoustical treatments and strategies
- transportation systems

‘System’: what does this mean?

- “a group of related parts that move or work together”
- “a regularly interacting or interdependent group of items forming a unified whole”

Power is generated by using a source.

Mechanical systems, electrical systems and plumbing systems require power, of some form, to operate.

The U.S. Department of Energy identifies these as energy sources:

bioenergy

coal

electric power

fossil fuels

fusion

geothermal

hydrogen

hydropower

natural gas

nuclear

oil

renewables

solar

wind

1900 vs 2020

- It IS completely possible to build and to live and work in a building that does NOT have or use one of these power sources.
- Many of these power sources and most of the systems and components they support did not exist before 1900.
- Did humans live pleasant productive lives prior to 1900?
- Unfortunately, or not, we live in 2020 and many, if not most, of the interior environments that we spend time in require power to drive the systems and components that make these buildings functional for us.

What systems components do each of these power sources support/power?

bioenergy: (corn, wood, waste products, other organic matter): generation of electricity, (via steam) direct heating, fuel for engines.

coal: generation of electricity, (via steam), direct heating.

electric power: heating, cooling, lighting, motors, engines.

fossil fuels: oil and natural gas: these power nearly everything in our world.

fusion: science research is ongoing.

geothermal: using the temperature of the earth below us: heating, cooling

hydrogen: potential to substitute for fossil fuels.

What systems components do each of these power sources support?

hydropower: electricity, physical motion, millstones.

nuclear: electricity

solar, wind: generate electricity, passive warming or cooling,

19th Century Kitchen Stove (wood burning)



A contemporary Viking stove: natural gas top burners and electric oven



19th Century Gas Lights

A gas line (a pipe) runs directly to the light fixture and the light is produced by a flame.



LED (light emitting diode) Lighting



O-LED (organic led) lighting glowing continuous surface lighting

