How buildings get hot and not....

We all know how to keep a building warm in winter. Imagine a bucket with a hole in it. We must replace enough heat to make up for the heat that is leaking out. In the summer we have the opposite problem. **Too much heat** gets into a building and we need to remove it.

So how does heat get into a building? Well, in the summer we may actually experience **sunlight in Oregon**. The sun heats the surface of a building and is conducted through the shell into the interior. Sun entering the building as light through windows is trapped and converted to heat. There are other heat gains, however. In an office building "internal loads" are often more of a factor than outside conditions. These gains come from all the equipment, lighting and body heat in the building. Anything that uses energy will lose some of that energy in the form of heat. Artificial light turns into heat just like sunlight. **Incandescent lighting is the *worst***, because 90% of the energy turns into heat and only 10% into usable light. (Great if you need to **incubate an egg**, but not so good for seeing things.) On top of that a person just sitting there puts out about 400 BTU/hr. If you are moving you produce even more heat!

So what do we do during a **scorcher of a summer**? Sitting very still in a dark cave sounds good. And actually some of the elements of that idea are useful. The best situation is to **prevent heat from entering** the building. Insulation works just as well to keep heat out as in! A well insulated building stops the heat from getting through the walls. Insulated windows keep some heat out. Include an overhang for shading on south-facing windows and you will keep direct sunlight from getting to the glass in the summer (yet still allow the low winter sun in).

On the east and west the best solution is to shade the whole window on the **outside.** Once the light gets through the glass it's too late--the heat is in your building!! Better yet is to **minimize any glazing on the East and West**. Also **planting deciduous trees** on the East and especially the West side helps a great deal. They provide shelter from the harsh sun, cool the air by evaporation and then drop their leaves at the perfect time to maximize the rare winter sun!! **Turning off any unneeded lights and equipment** will also help reduce heat gain.

In some of our buildings we are able to bring in outdoor air when it is cooler outside than in. When all else fails and we have a build-up of heat inside a building, well, we do have mechanical cooling in many cases. Of course, sitting quietly and drinking a cold glass of lemonade might work too...