



Earth's Radiation

Brainstorming Questions

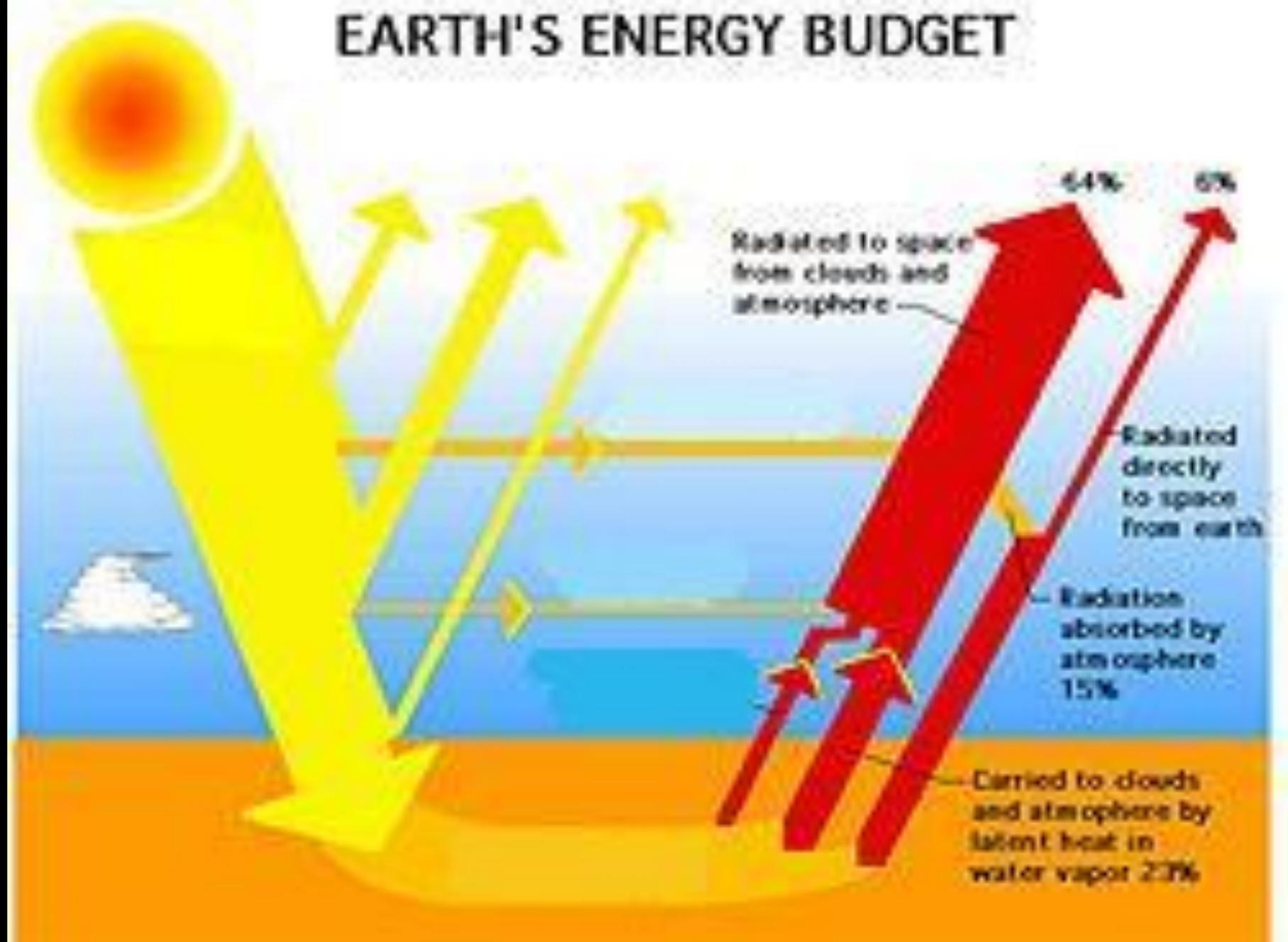
- Where do we get our energy? How many kinds of radiation do we get from the sun?
- What are the 3 ways heat can be transferred?
- How do we get seasons?
- <https://www.youtube.com/watch?v=p0wk4qG2mlg>

Earth's Radiation Budget



- Almost all the energy used on Earth to sustain life and cause our changing weather systems comes from the Sun. Just enough energy is retained by the Earth's atmosphere to maintain an average temperature of 15°C

EARTH'S ENERGY BUDGET



Earth's Radiation Budget

- Conclusion: About $\frac{1}{2}$ of the Sun's energy makes it directly to the ground and the oceans.
- https://www.youtube.com/watch?v=D_Qmue54W14

Radiation Notes

- Did you know??? Without an atmosphere, we'd be boiling over in daytime and yet be very cold at night. This is due to the atmosphere/hydrosphere's ability to allow for a slower and gradual release of energy re-radiated from the Earth's surface.

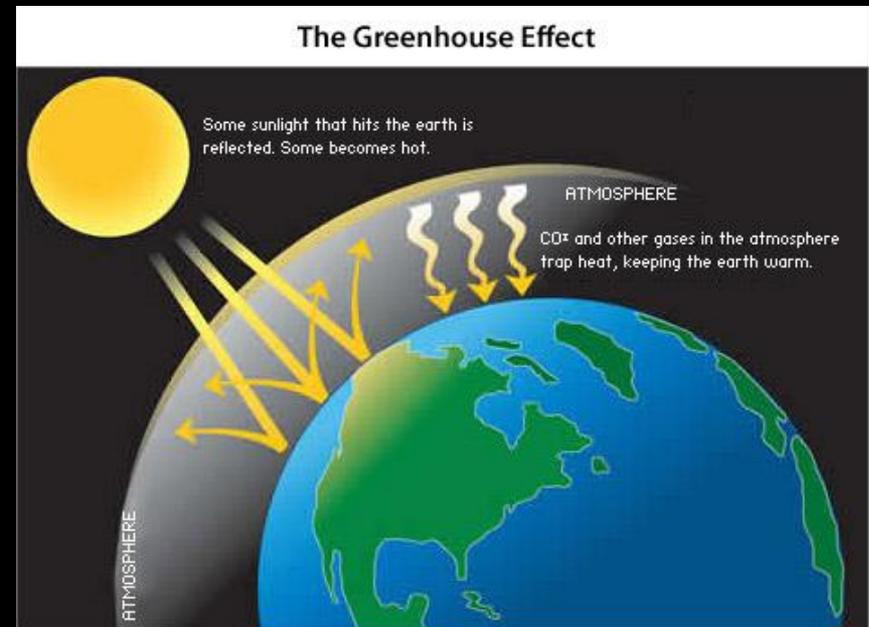
Backlash Radiation



- The energy that gets radiated back to space from Earth's surface encounters atmospheric gases and clouds on the way up. As a result, some of this energy is bounced back to Earth and the cycle continues.

Backlash Radiation

- Depending on the composition of the atmosphere and the large number of clouds, this “Greenhouse Effect” is increased or decreased according to how much heat the atmosphere traps.



Backlash Radiation

- Therefore, cloudy nights are typically milder than clear evenings for this reason, especially in colder seasons.

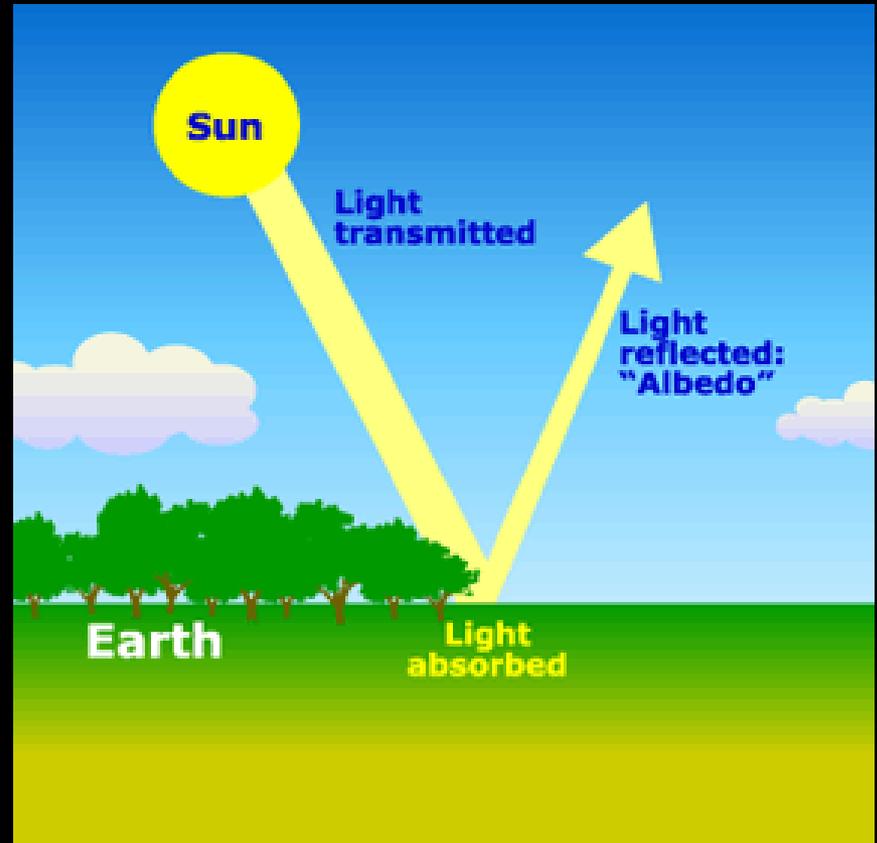


Greenhouse Gases

- Greenhouse gases are natural or polluting gases that have an impact on the heat-trapping properties of the atmosphere. Increased greenhouse gases is presumed to cause an increase in the Earth's surface temperature.
- The main greenhouse gases are:
 - Nitrous oxide
 - Carbon dioxide
 - Methane
 - chlorofluorocarbons

Albedo

- Albedo is the ratio of solar radiation reflected by an object to the incoming solar radiation that falls on the object.
- The more reflective a surface, the higher the albedo



Albedo

- Earth's albedo lies between 29% and 34% (see diagram) which means that $\frac{1}{3}$ of all the Sun's rays are simply reflected back to space by the:
 - Atmosphere
 - Clouds
 - Snow
 - Oceans
 - ground

