Global warming

After reading Patrick Bedard's article "*An inconvenient truth: SOS from Al Gore*" in CARandDriver September 2006 issue I felt, as a theoretical scientist, I would like to back up his statements with some scientific facts.

Researchers in some fields often try to scare us with doomsday forecasts and prophesies in order to secure funding for research by using statistics and hypotheses that lack concrete proof or exact mathematical solutions to back up their claims. It is easy to bend the truth with statistics. Remember the Nuclear winter threat where greenhouse gases would make us freeze to death, or the y2k scare with its catastrophic consequences. Some politicians borrow doomsday science for their agenda and political gain. However, there is a silent group of scientists that we usually don't hear from, who are not convinced one way or the other because of the absence of irrefutable scientific proof and I believe I speak for them, so here is my challenge to global warming caused by the greenhouse effect:

The best way to establish the Earth's temperature is from outer space using satellites and by measuring the amount of radiation emanating from the Earth. The reason for this is that the surface temperature of a body is directly related to the amount of radiation it gives off and there is a well established physical law and formula for this, namely "Stephan-Boltzmann's law of radiation".

Therefore, if we measure the average amount of radiation given off by the Earth we can very accurately determine the global temperature and here is what basic science tells us: The amount of radiant heat given off by the Earth has to equal the amount of radiation received from the Sun. This is called the global radiation energy budget and I am sure most scientists are aware of this (see the diagram below). By the way, the amount of heat or radiant energy per second received from the Sun and radiated away by Earth is 178,000 million, million watts. This averages 349 watts per square meter when spread out over the entire Earth's surface (1 square meter is about 3 by 3 feet). Using Stephan-Boltzmann's law we can now convert the radiation of watts per square meter to temperature and determine that the 349 watts per square meter equals an average global   temperature of 7 degrees Celsius or about 45 degrees Fahrenheit.

Here now is the problem: How can the Earth, according to global warming buffs, radiate more heat than it receives. It is like putting a potato in the oven and claim it can reach a higher temperature than the oven itself. This is just as impossible as to lift yourself by the hair. Why can't the potato get hotter than the oven, or why can't the Earth deliver more heat than it receives from the Sun? It has to do with the fact that heat, or radiation, flows like water. One can compare the heating of a body, such as the Earth or a potato, to a certain temperature by filling a glass with water. Once the glass is full just as much water will run off as it receives. In science we would say that it has reached an equilibrium where the incoming flow equals the outgoing flow (see the diagram) and temperature equals flow, flow of energy. Once the flow of radiant energy stops there is no temperature to be measured. The fact that temperature is a measure of flow of energy (watts) and not some kind of bulk material that can be stacked up like a pile of bricks and increased in strength is, perhaps, the hardest part to understand and why so many of us are fooled. Think about a water wheel, as long as there is a flow of water the wheel is energized and will turn, but stop the flow and the wheel will stop, even though it is still immersed in a pool of water. In other words, it is not the water that contains the energy, it is the flow of water that creates the energy.

What about the greenhouse effect?   There are millions of greenhouses being heated around the world and we know that when a greenhouse is subject to direct heat from the Sun it can become quite hot, much hotter than its surroundings. So how does a greenhouse work?   The greenhouse prevents the Sun's heat from being removed by convection and air circulation and distributed in the atmosphere throughout the world so heat collected in a greenhouse means heat robbed from somewhere else, but on the average the global temperature or global energy budget will stay the same.

How hot can a greenhouse get?   When the Sun shines on the Earth it sees the Earth as a disk, but the heat collected has to be distributed over the whole globe including the night side. Since the surface area of a globe is four times larger than that of a disk with the same diameter, then the solar heat which is concentrated on the day side, has to be distributed over a four times larger area. This is accomplished by convection and circulation of the air in the

atmosphere and by the fact that the Earth rotates like a chicken in a rotisserie. Therefore, the Sun has to deliver 1396 watts per square meter, or four times more energy per square meter, in order to maintain the average of 349 watts per square meter of radiation leaving the entire global surface. A solar radiation of 1396 watts per square meter corresponds to a temperature of 123 degrees Celsius or 253 degrees Fahrenheit. Theoretically, (disregarding reflection and absorption of radiation by clouds in the atmosphere) one should under the Sun, at the equator, be able to reach such a high temperature in a greenhouse where no convection or air circulation will remove the heat but at the cost of heat elsewhere. In practice, however, a normal greenhouse might reach only half the above temperature.

The principal argument by the proponent of greenhouse warming is that greenhouse gases reflect the heat back to the Earth's surface again and by some strange mechanism, makes the surface hotter. This implies that the reflected radiation has to be stronger or hotter than the source of radiation, namely the Earth's surface, which I cannot accept. Moreover, I cannot see how greenhouse gases would stop convection and mixing in the atmosphere which is the principal mechanism distributing the heat from the Sun around the globe.

I do not doubt that there are long term global climate changes that arise from natural cyclic variations and it is a known fact that the Sun changes its intensity periodically. Do human activities affect the global climate? How much does the burning of fossil fuels in cars and power plants contribute to global warming? If we assume that one billion cars around the world delivering 300 horsepower each (one horsepower=750 watts), were running 24 hours a day around the clock, they would together generate over 200 million, million watts of heat, which would increase the global temperature by about 0.1 degree Celsius or 0.2 degrees Fahrenheit. Power plants probably generate only one tenth of that. If 6 billion cars were running, which equals the world population (every man, woman and child), the global temperature would increase by 0.5 degrees Celsius or one degree Fahrenheit. Not much to worry about.

One more thing. I have always wondered how much heat might be leaking out to the Earth's surface from its red hot interior and how this might contribute to climate changes. So far I have not been able to find any references on that subject. Thermodynamics

is a complicated subject and it touches on quantum mechanics and I do not think that anybody really understands it fully. But simple arithmetic tells us from the diagram below that the Earth cannot produce more heat from solar radiation than it receives from the Sun.

See also http://colutron.com/download_files/climate_change.pdf
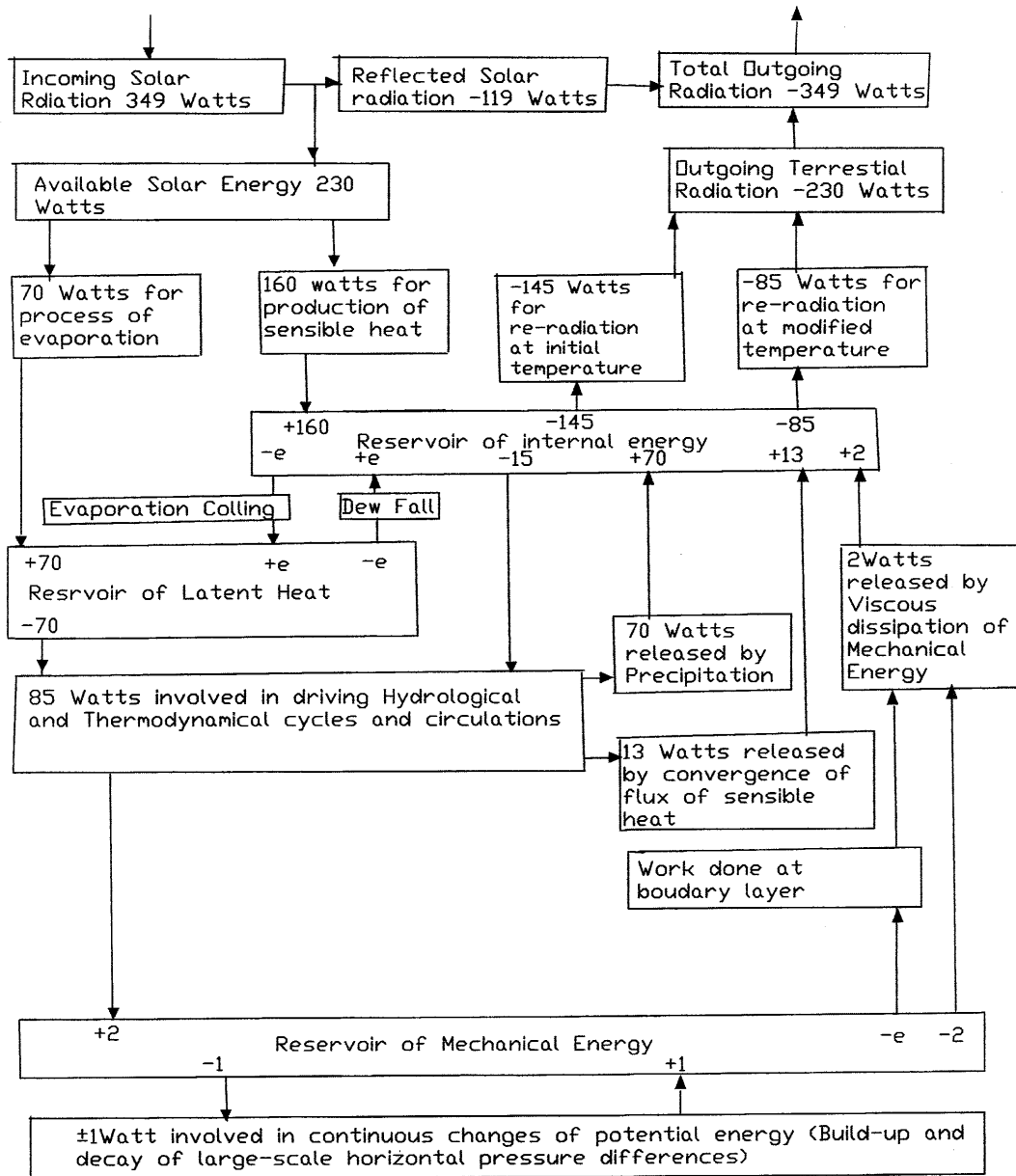
Global energy budget. All numbers are in Watts per square meter. [Lettau, 1954].

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