http://freenet-homepage.de/klima/indexe.htm

Contribution to the discussion about Climate Change:

Greenhouse Gas Hypothesis Violates Fundamentals of Physics

by Dipl.-Ing. Heinz Thieme

Deutsche Version siehe: http://freenet-homepage.de/klima/index.htm

The relationship between so-called greenhouse gases and atmospheric temperature is not yet well understood. So far, climatologists have hardly participated in serious scientific discussion of the basic energetic mechanisms of the atmosphere. Some of them, however, appear to be starting to realise that their greenhouse paradigm is fundamentally flawed, and already preparing to withdraw their theories about the climatic effects of CO_2 and other trace gases.

At present, the climatological profession is chiefly engaged in promoting the restriction of CO_2 emissions as a means of limiting atmospheric warming. But at the same time they admit that the greenhouse effect — i.e., the influence of so-called greenhouse gases on near-surface temperature — is not yet absolutely proven (Grassl et al., see: http—www.dmg-ev.de-gesellschaft-aktivitaeten-pdf-treibhauseffekt.pdf). In other words, there is as yet no incontrovertible proof either of the greenhouse effect, or its connection with alleged global warming.

This is no surprise, because in fact there is no such thing as the greenhouse effect: it is an impossibility. The statement that so-called greenhouse gases, especially CO_2, contribute to near-surface atmospheric warming is in glaring contradiction to well-known physical laws relating to gas and vapour, as well as to general caloric theory.

The greenhouse theory proposed by the climatological fraternity runs as follows: Outgoing infra-red radiation from the earth's surface is somehow re-radiated by molecules of CO_2 (mainly) and also O_3, NO_2, CH_4 in the atmosphere. This backradiation produces warming of the lower atmosphere. To convince the public of the greenhouse effect, composites of temperature measurements since the 19th century are exhibited that show a certain warming. Measurements of the CO_2 content of the air also show a rise in recent decades (Note CO_2). Climatologists then claim that the CO_2 rise has caused the temperature rise (see: http://earth.agu.org/eos_elec/99148e.html).

A second source of misconceptions about the relation between temperature and the CO_2 content of air arises from an erroneous explanation of conditions on the planet Venus. The Venusian atmosphere is 95% CO_2, and its near-surface temperature is approximately 460°C (see also: http://www.uni-erlangen.de/docs/FAU/fakultaet/natIII/geol_appl/klima1.htm). What climatologists overlook is that atmospheric pressure at the surface of Venus is 90 bar, and that it is this colossal pressure that determines the temperature.

Strict application of physical laws admits no possibility that tiny proportions of gases like CO_2 in our atmosphere cause backradiation that could heat up the surface and the atmosphere near it:

1. The troposphere cools as altitude increases: in dry air, at a rate of around 1°C per 100m; under typical atmospheric humidity, by around 0.7°C per 100m. This cooling reflects the decrease of atmospheric pressure as altitude increases. Higher is cooler, both by day and by night.

2. Backradiation of the heat radiation outgoing from the earth's surface would only be possible by reflection, similarly to the effect of aluminium foil under roof insulation. But the CO_2 share in our atmosphere cannot cause reflection in any way. Within homogeneous gases and gas mixtures no reflections occur. As is well known in optics, reflection and even refraction occur only at the boundaries of materials of different optical density, or at phase boundaries of a material or a material mixture (solid-liquid, liquid-gaseous, solid-gaseous). Thus it occurs with suspended water drops or ice crystals, or at the boundary between surface water and air — but never within homogeneous materials, e.g. air, water, glass.

3. If outgoing thermal radiation from the earth's surface is absorbed in the atmosphere, the absorbing air warms up, disturbing the existing vertical pattern of temperature, density and pressure, i.e., the initial state of the air layers. It is well known that warmed air expands and, because it is then lighter than the non-warmed air around it, rises. The absorbed warmth is taken away by air mass exchange. Just this occurs with near-surface air that is warmed by convection from earth's surface, vegetation, buildings and so on. For the same reason the windows of heated rooms are kept closed in winter – otherwise the warm air would escape.

These facts are slowly but surely dawning on climatologists. Grassl and others state (see above) that radiation absorbed by CO_2-molecules will warm the atmosphere ***if no other reactions occur in the physical (in particular dynamic) processes in the earth/atmosphere system***. In these "idealised conditions," they say the greenhouse effect would be inevitable. Such "idealised conditions" must obviously include the proviso that air is stationary. It is really quite absurd that even now something so obvious as that hot air rises is not properly taken into account by the climatological profession. When air is heated up locally, it ascends and the warmth is removed. It also expands with decreasing atmospheric pressure at higher altitude, and cools so that no remaining warming can be observed. The warmth taken over by the absorbing air is transported toward the upper troposphere. The greenhouse effect does not occur.

The same process applies to individual CO_2-molecules that absorb outgoing radiant heat from the earth's surface or from lower layers of the troposphere. These individual molecules remain at the same temperature as their surroundings. Due to the high density of molecules in the troposphere, an immediate exchange of absorbed radiated energy takes place by convection with the surrounding molecules of air. The CO_2-molecules in the air are not isolated and therefore cannot reach a higher temperature than their environment. If energy is absorbed, the molecules in the immediate vicinity will warm up.

4. A prerequisite for any type of heat transfer is that the emitter is warmer than the absorber. Heat transfer is determined by the ratio of the fourth powers of the temperatures of the emitting and the absorbing bodies. Because temperature is uniform within minute volumes of gas in the air, and temperature decreases with increasing altitude, back transfer to near-surface air of radiation from higher CO_2-molecules is impossible. In fact, this is just as impossible as it is to use a to cooler heat radiator to heat up a warmer area.

5. The energy discharge from the troposphere takes place at its upper boundary layer, at the transition of the atmosphere from its gaseous state to a state approaching a vacuum. Only in this zone do gases start to emit even small quantities of energy by radiation. The other energy transfer mechanisms - thermal conduction and convection - which at denser pressure are far more efficient than radiation, no longer operate because of the low density of the atmosphere there. But from the surface where man lives and up to 10 to 17km altitude (depending on geographical latitude), gases transfer the small quantities of energy they might acquire from absorbed radiation by convection and conduction — not by radiation.

The climatologists derived the theoretical foundation of the greenhouse hypothesis from the concept of radiative equilibrium over the entire gas area of the atmosphere, right down to the earth's surface. But the fundamental premise of radiative equilibrium - a balance of incoming and outgoing radiation - is correct only as long as it is limited to the vacuum-like zone of the upper atmosphere. In the lower regions of the atmosphere, the heat balance is essentially determined by thermal, i.e., thermodynamic equilibrium, which includes the thermodynamic characteristics of the components of the atmosphere as well as their changes in status.

6. From the upper atmosphere down to earth's surface, air pressure rises continuously. The determinant of atmospheric pressure is the mass and the weight of that part of the atmosphere above the point in question. And as pressure increases, so does temperature. The rise in temperature is caused by the thermodynamic characteristics of the main components of the atmosphere, i.e., N_2 and O_2. Everyone knows that compression causes gases to warm: the effect is noticeable even when inflating bicycle tires. The atmosphere is no different.

The relations between temperature, pressure and volume within the gas area of an atmosphere are determined by the following equations:

General gas equation $$p \times v = R \times T$$

Adiabatic change of state $$p \times v^{k} = \text{constant}$$

or $$T \times v^{k-1} = \text{constant}$$

k = relation of the specific thermal values c_p to c_v

Estimates of the effects of CO_2 concentrations on air temperature are often — as mentioned before — derived from conditions on Venus. If one assumed that the atmosphere of Venus was similar to that of the earth, rather than being 95% CO_2, and that it still had a pressure of 90 bar, then the surface temperature would be about 660°C, i.e., about 200°C more than at present. The difference arises from the somewhat smaller k value for triatomic as against biatomic gases (k Air: 1.4; k CO_2: 1.3).

Thus it would actually be somewhat colder on earth if our atmosphere consisted of CO_2 rather than air.

7. A special feature of our atmosphere is its water content. Water occurs in three states. The solid and liquid forms (clouds) show radiation characteristics completely different from gases: they reflect radiation. Thus only water in its liquid or solid states shows qualities to some extent comparable to a greenhouse (i.e., mimicking, however locally, the effect of fixed and airtight glass or foil). Naturally clouds do not prevent vertical air exchange. Moreover, condensation and solidification of the water in air releases substantial amounts of heat, which largely determines the temperature of the lower atmosphere. By contrast, the heat transport and storage characteristics of trace gases like CO_2 are negligible factors in determining air temperature.

An interesting sidelight is that human life and most human activities add humidity to the lower atmosphere. Examples include the spread and intensification of agriculture; irrigation; hydraulic engineering, i.e., dams and reservoirs; burning of fossil fuels; other water use by humans, e.g. in industrial production processes; as well respiration by humans and livestock. It could therefore be assumed that the water content of the atmosphere has increased over the last 100 years. And the resulting cloudier skies, especially at night, would lead to a measurable increase in near-surface air temperature. But climatologists have largely neglected the possible influence on temperature of changes in the water content of the atmosphere.

Conclusion

Commonly held perceptions of the climatic relevance of CO_2 and other so-called greenhouse gases rest on a staggering failure to grasp some of the fundamentals of physics. Correct interpretation of the Second Law of Thermodynamics and sound appreciation of the necessary physical conditions for emission of radiation by gases lead to the understanding that within the troposphere no backradiation can be caused by so-called greenhouse gases. Therefore it is not at all correct to speak of a thermal effect of these gases on the biosphere.

The thermal conditions in our and any atmosphere are determined by its pressure and the mass of its main components. Higher concentrations of CO_2 in our atmosphere – at least until they reached 2% (a 60-fold increase) and thus became injurious to health – would endanger neither the climate nor mankind. To avoid further misunderstanding, the terms ***greenhouse effect*** and ***greenhouse gases*** should be avoided in describing the functioning of the atmosphere. A more correct term would be ***atmosphere effect***. The operation of this effect is described in "The Thermodynamic Atmosphere Effect" at http://www.geocities.com/atmosco2/atmos.htm**.)**

It is completely incomprehensible and unjustified to imagine that mankind can or must protect the climate by attempting to control trace amounts of CO_2 in the air.

Note CO_2: However, doubts about the preindustrial CO2-level being at at 0,028% (presently it is about 0,038%) arose in a recent publication: "180 years of atmospheric CO_2 gas analysis by chemical methods,"
http://www.ingentaconnect.com/content/mscp/ene/2007/00000018/00000002/art00006

The above article is an adapted translation of articles that appeared in the German periodicals Elektrizitätswirtschaft No. 20/1999 and Fusion No. 1/2000

For more on "Atmospheric Backradiation", one of the presuppositions of the greenhouse theory, see **http://www.geocities.com/atmosco2/backrad.htm**

Also available: "Does Man Influence Climate?" at **http://www.geocities.com/atmosco2/Influence.htm**

You can contact the author at heinz.thieme@gmx.net

Page originally created 16.08.2000, English translation revised by S.Scott, July 2003, recent complement 08.07.2007