



# ENERGY NEWS

of the Southeast Florida Chapter of the Association of Energy Engineers

September 1998 • Volume 11 • Number 7

## The Enhanced Greenhouse Effect, Part I

by Robert Farmer, ©1998

*The following has been adapted from the author's presentation to the Annual Meeting of the Florida Engineering Society, August 1998.*

Easy to overlook in the confusing rhetoric of the climate change debate is the fact that there is no uncertainty about the *Enhanced Greenhouse Effect*. Why is that significant? We're all familiar with the concept of cause and effect. The disease and the symptom. The *Enhanced Greenhouse Effect* (EGE) is a subtle yet pernicious atmospheric disease. Global climate change is its symptom. It is the *enhanced greenhouse effect* that we need to mitigate.

Fortunately, or unfortunately, depending on how you look at it, we know for certain how dangerous the EGE really is. We've known about its effects for about 200 hundred years, but it was the middle of the 19th century when the Irish physicist John Tyndall placed the knowledge on sound scientific footing. He *measured* the absorption of infra-red radiation by carbon dioxide and water vapor, and confirmed that certain gases trap the sun's reflected heat.

One hundred years ago the first calculations for the EGE began to emerge with the work of Swedish chemist and Nobel laureate, Svante Arrhenius. He showed that the atmosphere allowed short-wave sunlight to pass freely to the Earth's

surface but trapped the long-wave, infrared radiation re-radiated by the Earth. His model included what became known as a "feedback loop". Rising atmospheric temperatures cause increased water evaporation which, in turn, provides additional water vapor for the absorption of heat. A self-perpetuating cycle.

Interestingly, in the 1960s the Venus probe Mariner II measured the surface temperature of Venus at about 660°F—600°F warmer than Earth. More recent Russian probes have found temperatures of 970°F on the surface of the planet! Venus' atmosphere is almost entirely carbon dioxide—sort of a super greenhouse, if you will.

For 60 years there was general agreement in the scientific community that the oceans, with their large capacity to store carbon, would absorb almost all carbon dioxide emitted into the atmosphere, and little further work was done on the *Enhanced Greenhouse Effect*.

But in 1957, Roger Revelle and Hans Suess of the Scripps Institute of Oceanography reported that the ocean had *not* absorbed as much carbon dioxide as everyone had previously assumed.

*Next month:* David Keeling measures atmospheric carbon dioxide levels and scientists confirm the bad news—rising CO<sub>2</sub> levels are caused by deforestation and the burning of fossil fuels.



Robert Farmer is an energy planning engineer and energy policy specialist. A comprehensive resource on technologies, issues, and policies, he offers clients strategies, briefings, and presentations on planning a sustainable energy future.

His technical expertise includes large scale to small scale power generation, combined heat and power (CHP), marine and surface transportation, and alternative fuel applications.

A Florida resident since 1984, Robert was a member of the Energy Advisory Committee of Governor Chiles' Commission for a Sustainable South Florida.

He is a Regional member and Market Development Chair of the Gold Coast Clean Cities Coalition (a U.S. Department of Energy program), and a member of the Southeast Air Coalition for Outreach (SEACO, an initiative of the Florida Department of Environmental Protection).

He is a member of the international Association of Energy Engineers (AEE) and since 1992 has served on the Board of the Southeast Florida Society of Energy Professionals, the local AEE chapter. He is a member of the Sound Science Initiative of the Union of Concerned Scientists, and a member of the United States Association for Energy Economics (USAEE).

He is also a member of the Board of Directors of the Tallahassee-based law firm, Legal Environmental Assistance Foundation, Inc. (LEAF), and of Third Planet, a Fort Lauderdale-based public charity.

He graduated as a Planning Engineer with Bristol-Siddeley Engines/Rolls Royce Gas Turbines Ltd. in the United Kingdom and has over 30 years engineering, sales and service management experience in the engine power industry in North America.

robertfarmer@conceptcommuniques.com  
CONCEPT COMMUNIQUÉS INC.  
5200 N Federal Hwy Ste 2  
Fort Lauderdale FL 33308  
(954) 493-8127

[www.conceptcommuniques.com](http://www.conceptcommuniques.com)