CLIMATE CHANGE
SCIENCE BEHIND THE DEBATE

prepared by

Brian W. Doyle, PhD, PE
Doyle Engineering, Inc.
Newberg, OR 503-538-2380
brian@briandoylephd.com

CLIMATE CHANGE - SCIENCE BEHIND the DEBATE

Tuesday November 3, 2009

1:00 pm- 1:15 pm Registration

1:15 pm- 2:30 pm Introduction and Overview
- Greenhouse Effect, the Atmospheric Blanket
- The Greenhouse Gases
- Debated Issues: Science, Politics
- Gas Concentrations and Greenhouse Intensity
- Primary Sources
- Time Scales: Past and Future

2:45 pm – 3:45 pm CO_2 and Methane - Man's Contribution
- Coupling of Carbon and Energy
- Difference Between Fossil and Bio Fuels
- GHG Emission Rates
- Aerosols - Natural and Anthropogenic

4:00 pm – 4:30 pm GHG Control Methods and Technologies
- Fuel and Energy Quantities
- Calculating CO_2 Emissions

Wednesday Nov. 4, 2009

8:00 am – 8:15 am Opening Remarks

8:15 am – 9:00 am GHG Control Methods and Technologies (continued)
- Approaches to Reducing Energy Use
- Carbon Capture and Sequestration
- Technical & Economic Issues of Implementation

9:15 – 10:45 am Climate Change
- Climate History - Ice Core and Fossil Records
- Modeling and Predicting Climate Change
- Probably and Possible Effects
  - Temperatures and Rainfall - Earth's Carrying Capacity
  - Sea Level Rise
  - Tipping Points
  - Ocean Circulation and Possible Catastrophe

11:00 am–11:45 am Limiting Climate Change
- Major International and USA Initiatives
- Barriers and Incentives for Sustainable Energy Use
- Offsets and Credits

Adjourn

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Course Objectives

This course is intended as an introduction and overview of human caused climate change and associated effects. The course includes copies of the graphics used for the presentation and a text with references to help students pursue further research and understanding. Most of the course focuses on the science of climate change - things we know with confidence versus areas of uncertainty. At points of disagreement between established science and skeptics we discuss the arguments using currently available data. Some aspects of climate change - temperature increases and a rising ocean level - were predicted many years ago although the time scales are still uncertain. Other things such as the change in ocean chemistry, the speed of some changes, and the response of natural systems that amplify the effects of human GHG emissions are relatively recent discoveries - discoveries leading credible scientists to use the words "dangerous" and "catastrophic" to describe some future scenarios.

In Perspective

Within the next 15 years humans will have increased atmospheric greenhouse gases (GHG) levels by more than 50% from levels that have prevailed for at least a million years. The rate of increase is unprecedented and substantial further increases are virtually certain. The increases in atmospheric CO_2 and methane will drive changes in the climate and biology of the planet that will inexorably follow the laws of nature (physics, chemistry, biology, etc). Will the resulting climate mirror that of the warmer, ice free earth that existed long ago? How will plant and animal species respond? Scientists in dozens of disciplines are gradually filling in a picture of our future planet. But the future depends on both the GHG already emitted and on the amounts of GHG we emit in the next few decades - and these future emissions depend on the action, or inaction, of governments and society as a whole.

We live at a pivotal time when the collective actions of three or four generations of humans will establish the climactic character of the earth, not just for our grandchildren, but for thousands of future generations. As well as causing the extinction of a substantial fraction of existing species, the emerging planet is likely to have much less capacity to support human populations. The possibility of the ocean changing to an anaerobic body of water emitting large amounts of hydrogen sulfide cannot be excluded. We should all be concerned. The United States will be the leader and key player in whatever effort the global community exerts to deal with climate change. Since a serious commitment by this country is largely dependent on elected officials, it is not an overstatement that the future of the planet is now hinging on American public opinion.