



Swiss Association of Energy Geoscientists  
Schweizerische Vereinigung von Energie-Geowissenschaftlern  
Association suisse des géoscientifiques de l'énergie  
Associazione svizzera geoscientifici dell'energia



**UNIVERSITÉ  
DE GENÈVE**

FACULTÉ DES SCIENCES

Department of Earth Sciences



The Swiss Association of Energy Geoscientists (SASEG)  
in cooperation with the AAPG and SPE  
and the University of Geneva presents  
a seminar by:

## **Ray Leonard**

President at Anglo Eurasia LLC  
Houston, Texas

# **Climate Change, the Future of the Oil and Gas Industry and Geopolitical Challenges**

**Tuesday, 25<sup>th</sup> September 2018, 17h15**

University of Geneva, Department of Earth Sciences, Auditorium 1  
13, Rue des Maraîchers  
CH-1205 Genève

You are cordially invited to attend





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## Climate Change, the Future of the Oil and Gas Industry and Geopolitical Challenges

Ray Leonard & Art Berman

The 20<sup>th</sup> century witnessed the greatest rise in living standards in human history, supported by the energy provided from fossil fuels. Now, however, we face the consequences; the great challenge of the 21<sup>st</sup> century, which may define how we live in the future; how to deal with a changing climate caused in large part by the emission of CO<sub>2</sub> due to the burning of these fossil fuels.

The current atmospheric concentration of CO<sub>2</sub> is at 411 ppm, rising at 2.7-3 ppm/year and by 2050 will be at a level not seen in the past 30 million years. The polar regions are warming at approximately twice the rate of the overall temperature rise. The Arctic Ocean has lost 70% of its late summer ice mass since 1980 and will likely be ice free in late summer months within 20 years, altering the climate in the northern hemisphere in ways that we are only now beginning to experience and understand. A realistic objective at this point is to formulate a plan that will limit the ultimate CO<sub>2</sub> level below 700 ppm, limit overall world temperature increase to below 3.2 deg. C and avoid the eventual melting of Antarctic ice sheet, which would cause catastrophic sea level rise.

There is substantial difference in the amount of CO<sub>2</sub> emissions depending on the type of hydrocarbons burned, with the lowest level of emissions coming from combustion of natural gas and ultra-light oils, including natural gas liquids. The oil and natural gas industries are undergoing a shift in much of the new oil produced due to the technical and economic breakthrough of “fracking” which produces 85% ultra-light (low GHG emitting) oils. Natural gas production is also rapidly rising due both to “fracking” of shales and many supergiant gas discoveries, mostly offshore, that will likely be transported by liquified natural gas (LNG). This makes feasible a scenario where greenhouse gases emitted by hydrocarbons could plateau over the coming decades and then decline after 2040 if coal production is gradually reduced, oil production reaches a peak by 2025 followed by a plateau through 2040 before declining, while continuing the current shift to ultralight production, and gas production increases to fill the energy gap. The gas reserves and transportation (pipeline and LNG) solutions are readily achievable. Meanwhile, the renewable+nuclear share of energy production will need to increase from the present level so that the overall world energy use can continue to grow at the current rate, allowing living standards to rise in developing nations. These targets can be reached with the impetus of a carbon emission tax calibrated to encourage a shift to use of renewables, nuclear and gas for power generation.

The United States is well positioned for this scenario, despite the absence of support or even recognition of the crisis by the current political leadership. Natural gas production is booming, with the greatest increase ever recorded in the past 12 months and set to continue in the coming decade. Meanwhile, oil production has doubled within the past 10 years with virtually all the increase ultra-light (lighter than 40-degree API) oil and natural gas liquids, with this trend to continue for the next several years. Greenhouse gas emissions are declining as lower price gas is replacing coal in power generation.

The nations of the world have only begun to address this enveloping crisis, the latest effort consisting of the Paris Climate Accord, an ineffective document with an unrealistic goal (it is unfortunately 20 years too late for a 2-degree target) and no enforcement mechanism. However, as the situation worsens, the world must finally come to a sensible and workable solution, which is to shift to using the lowest greenhouse gas emitting hydrocarbons for now while supporting development of renewable and nuclear generated energy as quickly as possible. The geopolitical hurdles include countries now dependent on low cost coal accepting rapid transition to energy alternatives, putting aside conflicts to accept necessary cross boundary gas pipelines and commercial arrangements and a worldwide agreement on a carbon emissions tax. The defining question is how far the climate will need to change, with associated negative impacts, before the necessary consensus is reached to conclude an effective and binding agreement.