

Houston Philosophical Society

639th Meeting

Cohen House

October 21, 2010

Under the leadership of President Herb Ward, the Society gathered for a reception and dinner meeting. Following dinner, visitors and guests were introduced.

President Ward introduced the speaker, Alexander J.B. Zehnder, Director of the Alberta Water Research Institute, Edmonton

INTRODUCTION: Alexander J.B. Zehnder

He is Scientific Director of the Alberta Water Research Institute (AWRI) in Edmonton, Canada, founder and president of *triple Z* Ltd., a consulting company in water and telecommunication, visiting Professor at the Nanyang Technological University, Singapore, former president of the ETH Board and Professor emeritus of ETH Zurich, Switzerland. He is an expert in environmental science and technology, particularly the qualitative and quantitative aspects of water and the relations between water, food, and energy. His work has recently focussed on water policy, the relation between food and water security, virtual water trade, and water infrastructures.

He studied Natural Sciences and earned a Ph.D. at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland and the Swiss Water Research Institute (EAWAG). He became a Research Associate at the University of Wisconsin, Madison, USA, and accepted an Assistant Professorship at Stanford University, Stanford, USA. He was appointed as Professor and Chairman of the Department of Microbiology of the Wageningen Agricultural University, the Netherlands, was Director of EAWAG, and Professor of Environmental Biotechnology at ETH Zurich. From 2004 to 2007, he was president of the ETH-Board, the governing board of the ETH-system comprising two universities (ETH-Zurich and ETH-Lausanne), and four national laboratories (PSI, EMPA, WSL, EAWAG) with an annual budget of two billion US dollars.

He has published several books and over 200 articles in peer reviewed.

He holds an honorary doctoral degree from the University in Nancy, France, is a Member of the Dutch Royal Academy of Sciences, the Swiss Academy of Engineering Sciences, a Foreign Member of the Russian Academy of Sciences and is an ISI Highly Cited Scientist. He is one of the "founding fathers" of the concept of the "2000 Watt Society".

Alexander J.B. Zehnder

Canadian Tar Sands, U.S. National Energy Security and Striving for Sustainability: Is There an Incompatibility?

Tar sands – called oil sands by the Canadians – have been under constant attack from some nongovernmental organizations (NGOs). In recent years high U.S. officials and representatives have also expressed their concern about importing oil from the Albertan oil sands. This issue is not easy to resolve, as Alberta supplies about 20 percent of current U.S. petroleum needs and is the number one external oil supplier. Worldwide, Alberta has the second largest reserve of oil (in the form of bitumen) after Saudi Arabia and can remain the major external supplier for the U.S. for centuries to come. What facts about this petroleum source are essential for understanding U.S. energy security? Since clear, unbiased, easily accessible, and understandable information is still lacking about oil sands.

Oil formed hundreds of kilometers west of Edmonton has been squeezed through the earth's crust and has ended up in Northern Alberta, in much younger geological formations. There, the lighter parts of the oil have degraded and only tar is left. These tar deposits lay under almost pristine boreal forests. The destruction of parts of these pristine areas through mining operations, the pollution inherent in open pit mining, and the considerable quantity of water needed to extract the bitumen from the sand have triggered concerns in environmental movements.

The greater carbon footprint also has been a major target of oil sand critics. If only the environmental cost of extraction is taken into account, it is up to twice as high as the best in Saudi Arabia. However, when the entire life cycle is analyzed, including combustion of the gasoline in cars, the difference is less than 15 percent and very similar to heavy oil

from California or the Middle East. Corn ethanol from the Midwest actually shares the same qualities. The yet unresolved problem is the water used for extraction and the release of polluted water to tailing ponds. Despite much effort in the past, the tailings are still present, and these must be dealt with as soon as possible. Oil sand operations generate wealth and jobs for thousands in both Canada and the USA. If the wealth is used for innovations to reduce energy consumption and to increase the standard of living through more sustainable infrastructures, oil sand activities could in fact contribute to a more sustainable future, thus eliminating an apparent incompatibility.