

Tuesday Afternoon, November 5, 2002

Advancing Toward Sustainability Topical Conference Room: C-210 - Session AT-TuA

Benign Manufacturing, Climate Change, International Trade and World Economy, and Theological Considerations of Sustainable Development Moderator: P. Maroulis, Air Products & Chemicals Inc.

2:00pm AT-TuA1 A Framework and Practices for Advancing Toward Sustainability, *L.G. Heine*, Zero Waste Alliance/International Sustainable Development Foundation **INVITED**

There is currently a movement, gaining momentum worldwide, toward what is commonly called sustainability or sustainable development. A generally accepted definition of sustainability is that which meets the needs of the present without destroying the ability of future generations to meet their own needs. While few would disagree that this is an imperative, there is confusion as to how to achieve this goal. Green Chemistry is often held up as a tool for chemists, chemical engineers and others who design materials to help move society towards the goal of sustainability. Green chemistry is the design of products or processes that reduce or eliminate the use and/or generation of hazardous substances. The focus of green chemistry is on design because it is at the level of molecular design that decisions are made that impact how the material will be processed, used and managed at the end of its life. A framework for sustainability called The Natural Step (TNS) has emerged from Sweden as a mental model of what sustainability might look like at the global level. In The Natural Step, four System Conditions are defined that characterize how humans can engage with the natural world in a way that will not lead to progressive deterioration. This model is helpful in defining what sustainability is NOT, but it is not prescriptive for how sustainability can be achieved. This presentation looks at the System Conditions as defined in The Natural Step along with the principles and practices of Green Chemistry, and ideas taken from frameworks for ecologically sound manufacturing and product design such as "zero waste" to illustrate how some businesses are positioning their companies to become more economically competitive through sustainable business practices.

2:40pm AT-TuA3 Chemical Plant Safety After 9/11: Reducing Risks Associated with the Use of Organo/chlorinated Solvents in Degreasing Operations, *C.A. LeBlanc*, Toxics Use Reduction Institute **INVITED**

The mission of the Surface Solutions Laboratory (SSL) is "to identify, develop and promote safer alternatives to hazardous materials such as chlorinated and other organic solvents." These materials are often used in industrial processes such as surface preparation, coating, cleaning, rinsing, drying and analysis in the production of manufactured goods. Located at the University of Massachusetts Lowell, SSL is a division of the Toxics Use Reduction Institute (TURI), established by the Commonwealth in 1989. Chemical advances are typically accompanied with advances in equipment, in this case, degreasing operations. This talk will focus on the lessons learned and the progress made in working with well over 100 companies in solvent-substitution projects during a five-year period. These firms range from high-tech (for example, semiconductor) to low-tech (for example, machine shop) enterprises. The events of September 11 may serve as a catalyst to improve plant safety, as local, state and federal agencies, as well as businesses contend with the prospect of deliberate chemical misuse. Attendees to this session will better understand how successful technical diffusion and technical transfer occurs. The role that 'disruptive technologies' play in these endeavors will be discussed as time allows.

3:20pm AT-TuA5 Global Warming: How Much is Too Much?, *J.B. Smith*, Stratus Consulting Inc. **INVITED**

The Earth's climate warmed about one degree Fahrenheit during the 20th century. Most of the warming in the last half of the century was the result of greenhouse gas emissions from societal activities. Should emissions continue increasing without a concerted effort to control them, projections are that temperatures could increase about 3 to 10°F by 2100. Policy makers are struggling to control the growth of greenhouse gas emissions. While initial efforts such as the Kyoto Protocol will at best slow the rate of emissions growth, ultimately concentrations of greenhouse gases need to be stabilized. What is an appropriate target for stabilizing atmospheric concentrations of greenhouse gases? The United Nations Framework Convention on Climate Change, which the United States ratified, states that concentrations of greenhouse gases will eventually be stabilized at a level that is not dangerous. This talk, which is based on a recent report by the

Intergovernmental Panel on Climate Change, addresses different ways in which policy makers may be able to determine what is a safe (i.e., not dangerous) level of climate change. Five "reasons for concern" about climate are addressed: 1) impacts on unique and threatened systems; 2) effects of change in extreme weather; 3) inequitable distributional effects of climate change; 4) total (aggregate) impacts of climate change; 5) risk of major changes in the climate system. The literature on climate change impacts was surveyed to determine what a dangerous level of climate change may be for each reason for concern.

4:00pm AT-TuA7 The Garden, the Wilderness, and Covenant: Formulating a Theological Mandate for Sustainable Development, *S. Meyers*, Harvard Divinity School

The 20th Century witnessed a debate between paradigms of economic development, namely the State-led and Neo-liberal models. Each have gained ascendancy and "orthodoxy" at different points in time but neither have brought forth their promised fruits to many of the peoples who continue to dwell in abject poverty and both have contributed to worldwide environmental degradation. Yet these economic debates contain theological notions of humanity's relationship to creation which predate them by several millennia. The Hebrew Bible provides three symbols through which humans understand the earth. The first two symbols are found in the beginning of the book of Genesis and are those of the Garden of Eden and the chaos of the wilderness. The third is found later in Genesis as the covenant made between God and all of creation following Noah's flood and in the covenant that formed the People of Israel in the book of Exodus. The Garden of Eden symbol underpins neo-liberal theory which sees the earth as a gift from God to be exploited and, through human ingenuity and God's divine will, never to prove human consumption unsustainable. The wilderness imagery corresponds to state-led development which advocates authoritarian rule, central planning, and an underlying Malthusian belief that the earth can not sustain humanity unless nature can be carefully controlled and subjugated. Both symbols are anthropocentric and can never produce environmental ethics that are not fundamentally related to an understanding of the earth as the object of human dominion. Covenant, however, is a theocentric perspective that recognizes God as the Creator of both humans and all of nature, and denies a natural order that puts humans as the "lords of the earth." Building on Moltmann's Trinitarian process, basic moral axioms can be created that form the basis for reinterpreting humanity's relationship to nature and God and to create a theological underpinning for new paradigms of sustainable development.

4:20pm AT-TuA8 Climate Change Science Economics and Politics, *W. Moormaw*, The Fletcher School **INVITED**

The science of climate change has been studied for over 100 years, but only in the past 15 years has it been a subject of policy and diplomacy. There is now a substantial body of scientific knowledge that demonstrates that certain atmospheric trace gases such as water vapor, carbon dioxide, methane, ozone and nitrous oxide trap heat that keeps the earth's average temperature around 60 deg. F. Human activities have increased each of these gases substantially: carbon dioxide by 30% and methane by over 100%. Temperature measurements on land and in the oceans demonstrate a clear rise in temperature of about 1 deg F during the past century. Measurements several miles above the earth's surface show a smaller increase. Since fossil fuels are associated with both carbon dioxide, methane and some nitrous oxide releases, attention has focused on the energy sector as the major target of mitigation efforts. Modeling of the climate system and the economy with and without climate change show a range of energy intensity have generated an intense debate over what to do. The U.S. has withdrawn from the Kyoto Protocol that would require emissions reductions 7% below 1990 levels by 2012, but remains committed to the Climate Convention that identifies climate change as a problem requiring action. The Kyoto Protocol could be ratified by enough countries to enter into force for a majority of industrial countries even if the U.S. that is responsible for about one-quarter of emissions does not participate. This has major implications for international trade and for industrial design. This presentation will attempt to untangle claims and counterclaims to reveal what is at stake and what are some possible outcomes for planetary systems and for the world and U.S. economy.

5:00pm AT-TuA10 Invited Speakers Panel Discussion with Audience Participation. Title of the Panel Discussion and background information on the panelists will be posted openly at the Symposium.

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