

REGISTER BY JULY 3, 2009



WORKSHOP

22–24 July 2009 | Ecole Polytechnique Fédérale de Lausanne | Lausanne, Switzerland

Engineering Solutions for Sustainability: Materials and Resources



Who Should Attend

The event will be of benefit to those working within the engineering sector globally and to those involved in infrastructure and general development projects across developing and developed nations.

The committee also welcomes representatives of nongovernmental and governmental organizations as well as mineral resource professionals and those involved in education and research.

Committee Members

Chairperson:

Kamel Bennaceur
Schlumberger/IEA

Chairperson:

Brajendra Mishra
Colorado School of Mines

Carol Russell

U.S. Environmental Protection
Agency

Ian Sadler

Miller Centrifugal Casting Company

Dayan Anderson

Micon International, Ltd.

Diran Apelian

Worcester Polytechnic Institute

Richard LeSar

Iowa State University

Serge Rueff

Society of Petroleum Engineers
(SPE)

Deborah J. Shields

Colorado State University

Dick Wright

American Society of Civil Engineers
(ASCE)

Darlene Schuster

The American Institute of
Chemical Engineers
(AIChE)

The American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) and the AIME Member Societies' (the Society of Petroleum Engineers (SPE); The Minerals, Metals, and Materials Society (TMS); the Society for Mining, Metallurgy, and Exploration (SME); and the Association for Iron and Steel Technology (AIST)) are hosting this international event, in conjunction with the American Society of Civil Engineers (ASCE) and the American Institute for Chemical Engineers (AIChE).

With impending and burgeoning societal issues affecting both developed and emerging nations such as India and China, the global engineering community has a responsibility and an opportunity to truly make a difference and contribute. This workshop will focus on what materials and resources are integral to meeting basic societal needs in critical areas such as

- Energy
- Food and Water
- Transportation
- Recycling
- Housing
- Health

Presentations will focus on the engineering answers for cost-effective, sustainable pathways, the strategies for effective use of engineering solutions, and the role of the global engineering community.

Workshop Objectives

- Share perspectives on the major engineering challenges that face our world today
- Identify, discuss, and prioritize engineering solution needs in each area
- Establish how these fit into developing global-demand pressures for materials and human resources

AIChE

**institute
for sustainability**
An AIChE Technological Community

ASCE
American Society of Civil Engineers

www.spe.org/aime

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Wednesday, 22 July 2009

0830-0900 REGISTRATION AND COFFEE

0900-0945 WELCOME AND INTRODUCTIONS BY AIME

The shift to a sustainable development path requires engineering advancements in a variety of fields. In turn, these advancements require material, mineral and energy resource inputs that must be obtained from primary and secondary sources. Technologies of the future must be designed to facilitate materials recycling and re-use where practical while primary materials must be extracted in a sustainable manner. This workshop will spark an international dialogue to address how to engineer for the changes necessary to meet the resource requirements of a sustainable society.

0945-1030 KEYNOTE ADDRESS

Sustainable Engineering in the Anthropocene

“Continued growth of consumption in developed countries combined with rapid economic growth in developing countries, especially Brazil, Russia, India and China, has created explosive demand for resources. Engineers have responded by designing more energy and material efficient products and infrastructure. History, however, suggests that a single-minded focus on engineered systems must be augmented by a far better understanding of the potential implications of emerging technologies.”

Braden R. Allenby, Professor, Engineering and Ethics, Civil and Environmental Engineering, and Law, and Director, Center for Earth Systems Engineering and Management, Arizona State University, USA

1030-1100 COFFEE BREAK

1100-1300 PARALLEL SESSIONS & PANEL DISCUSSIONS

TRANSPORTATION

Engineering Solutions for a Sustainable Shipping Industry

John Spencer, Director, National Transportation Safety Board, and former President, American Bureau of Shipping, USA

Remarks by

Dianne Chong, Vice President, Boeing, and President, ASM International, USA

Hydrogen-fueled Carbon-free Transportation

Salvador Aceves, Lawrence Livermore National Laboratory, USA

Materials Challenges for a Sustainable Automotive Industry

Alan Taub, Executive Director, Research and Development and Strategic Planning, General Motors, USA

RECYCLING

Advanced Sorting and Melting Technologies for Improved Scrap Recycling

David Spencer, Chairman and Founder, Waste to Energy Corporation, USA

Growing Metal Demand, Changing Legislation and Economy, Challenges for the Recycling Industry To Optimize the Resource Cycle

Wijnand L. Dalmijn, Section of Raw Materials Technology, Department of Geotechnology, Faculty of Civil Engineering and Geosciences, Delft University of Technology, The Netherlands

Aluminium Recycling – An Integrated, Industry-Wide Approach

Subodh Das, Former Professor, Center for Aluminum Technology, College of Engineering, University of Kentucky, USA

FOOD & WATER

Bringing engineering to life: safe water, engineering and the human factor

Daniel J. Stevens, Executive Director, Lifewater International, USA

Infrastructure and Governance To Address Sustainable Water Quality, Quantity, and Availability

Julie Zimmerman, Assistant Professor, Environmental Engineering, Yale University, USA

Sustainable Food Security: How Can Biotechnology Help?

C. S. Prakash, Professor of Genetics at Tuskegee University, USA

1300-1400 LUNCH

1400-1600 PARALLEL SESSIONS & PANEL DISCUSSIONS

ENERGY

The World Energy Outlook: Post 2012 Climate Scenarios

Fatih Birol, Chief Economist, International Energy Agency, France

Future Technological Challenges for the Electric Power Industry

Hans “Teddy” Püttgen, Professor and Director, Energy Center, Ecole Polytechnique Federale de Lausanne, Switzerland

The New Energy Mix

Ashok Belani, Chief Technology Officer, Schlumberger Ltd., USA

Engineering Solutions for Sustainability: Materials and Resources

WORKSHOP

Wednesday, 22 July 2009 cont.

HEALTH

Lifestyle and Health: The Modern Challenge for Engineering

Dr. Mikael Rabaeus, Medical Director, Health Management Centre, Clinique de Genolier, Switzerland

Sustainable and Affordable Health: The Roles of Water Engineering and Water Engineers

James K. Bartrum, Coordinator: Water, Sanitation, Hygiene and Health, World Health Organisation HQ, Switzerland

Innovative Technology Solutions for Global Health: PATH's Product Development Approach and Experience

Darin Zehrung, Programme for Appropriate Technology and Health (PATH), USA

HOUSING

An Integrated Community Based Approach to Sustainable Housing in Disadvantaged Communities

Jorge Vanegas, Director, Texas Center for Housing and Urban Development, USA

Energy Efficiency, Durability, and Historic Preservation

William Rose, Research Architect, Building Research Council of the University of Illinois at Urbana, USA

Healthy Cities and Housing: Key Principles for Professional Practices

Roderick J. Lawrence, Professor, Centre for Human Ecology and Environmental Sciences, University of Geneva, Switzerland

1600-1830 BREAK

1830 WELCOME RECEPTION & DINNER

Human Capital Needs for Sustainable Development in the 21st Century: The Role of Engineers, Their Recruitment and Educational Imperatives

"By 2050 the world population will reach over 9 billion and "flattening of the world" will be an understatement. From a societal perspective, engineers have played a major role to enhance the quality of life in our world. World population is increasing at an average rate of 1.4%, and in contrast world energy consumption is increasing at an average rate of 1.7%. Such an imbalance is not sustainable and requires action. Sustainable development in the 21st Century is perhaps the most critical issue we face and the role of engineers for the innovations that we need is pivotal. The image of engineering and the issues we face to recruit the 'best and the brightest' will also be discussed and recommendations will be presented and reviewed."

Diran Apelian, Howmet Professor and Director of Metal Processing Institute, Worcester Polytechnic Institute, USA

Thursday, 23 July 2009

0830-0915 SUMMARY OF DAY 1 SESSIONS

0915-1000 KEYNOTE ADDRESS

Future Global Demand for Minerals: Supply Challenges and Sustainability

"Despite the current economic downturn, global population growth and increases in per capita income in emerging economies remain strong underlying trends. As a result, growth in demand for primary minerals is likely to continue in the long-term. This presentation examines the likely nature of future demand and looks at the considerable supply challenges facing the mineral sector. It also takes a critical look at differing views on the overall sustainability of primary mineral supply."

Andrew Bloodworth, Head of Science for Minerals, British Geological Survey, UK

1000-1030 COFFEE BREAK

1030-1300 TOPICAL BREAK-OUT SESSIONS

Parallel working sessions representing each of the following sectors will be convened: **Energy, Food and Water, Transportation, Recycling, Housing, and Health**. Delegates will explore and identify those technologies likely to play the most instrumental roles in achieving sustainability in each respective sector. In a facilitated dialogue, each session group will be asked to address the following questions:

1. *What does sustainability mean for this sector and why should we care?*
2. *What engineering approaches exist and/or are being used now?*
3. *What advances are feasible within 10-15 years?*
4. *What materials and resources do existing approaches use and what will advances require?*
5. *What advances in environmental, petroleum, marine, mining, minerals, and materials engineering will be required to sustainably produce these resources?*
6. *What happens if we do nothing?*

1300-1400 LUNCH

1400-1500 REASSEMBLY OF BREAK-OUT SESSIONS

1515-1700 SUMMARY OF TOPICAL DISCUSSIONS

(10 minutes for presentation and 10 minutes for discussion per group)

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Friday, 24 July 2009

0900-1200 DELEGATES CONVENE TO DEVELOP ACTION ITEMS & DELIVERABLES PLAN *

Sustainability is not a destination; it is a process that requires societies to make choices about the world they want to live in and leave for future generations. Those choices need to be informed by engineering expertise. Based on the discussions and issues raised during the workshop, delegates will be asked to help develop a path forward that will support societal learning about emerging technologies and the minerals and materials from which they are built. This workshop will lead to a series of three publications, with differing degrees of technical content. Each will be designed to support a wider international and multidisciplinary dialogue about the major engineering, material and resource challenges the world faces today.

SUMMIT PROCEEDINGS

All presentations, keynote addresses and highlights from the break-out sessions will be made available shortly after the workshop.

WHITE PAPER

A formal White Paper will be published, providing a more detailed description of the issues and challenges identified, interim conclusions reached, and research recommendations proposed. This White Paper will identify each of the technologies and engineering advances that were discussed and explored. It will serve as a starting reference point for the research proposal described below, and will inform additional public-private dialogues to be initiated in the coming months among representatives of the engineering and scientific communities, industry, nongovernmental and intergovernmental organizations and government.

RESOURCE REFERENCE BOOK

This workshop will launch a two-year international research proposal whereby delegates and subject matter experts in fields including but not limited to that of electrical, chemical, civil, automotive, petroleum, mechanical, and mining engineering, manufacturing and infrastructure, physical and materials science, geology, mineral economics and public policy will:

- (a) systematically look at selected proposed sustainable technologies,
- (b) identify and quantify the materials and resources required to implement them,
- (c) identify the degree to which that demand can be met sustainably by virgin materials, recycling and material substitution over the next 20 years.

The resulting publication will illustrate, in general layman's terms, how society can bridge the gap between an emerging technology and the geopolitical feasibility of providing the raw and recycled materials necessary to implement those technology solutions in an environmentally and socially responsible manner.

**short coffee break scheduled at 1030*

1200 CONCLUDING REMARKS

Behrooz Fattahi, 2010 SPE President

To register, please visit www.spe.org/events/aime.



Generously supported
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**United
Engineering
Foundation**

AIME Member Societies



**ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE**

Located in full view of the Alps on the north side of Lake Geneva, in one of Europe's most beautiful places, EPFL is one of the two prestigious Swiss federal institutes of technology.

From its foundation in 1853, EPFL has evolved into an internationally recognized institution attracting some of the best intellects in the world, making it the perfect home for this unique event.