World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletters 2009 - 2015

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World Federation of Engineering Organisations

The Committee on Engineering and the Environment

April 2009

Making Our Voices Heard At the U.N. and Beyond

By Darrel Danyluk, P.Eng.

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment.

> "United Nations gatherings are places where the voices of engineers not only should, but also *must* be heard."
>
> *D. Danyluk, Chair, World Federation of Engineering Organizations Standing Committee on Engineering and the Environment*

It is important to be heard. Therefore, I am pleased that we again are publishing the CEE newsletter after a 18-month break while the Committee developed its strategic plan. The newsletter serves as a communication vehicle within the CEE and WFEO, and for wider audiences.

By training and disposition, engineers are inclined to focus on technical matters, while often leaving to others issues of communication, diplomacy and international politics. In adopting such an approach, we may be side-stepping our professional duty and obligations to society.

United Nations gatherings are places where the voices of engineers not only should, but also *must* be heard. There are increasing signs that this is happening. For example, in May 2008, our Federation President Barry Grear, accompanied by the chairs of the WFEO Standing Committees on Energy, Capacity Building, and Environment, presented views on world engineering to the UN Commission on Sustainable Development (UN-CSD). This was the third year in a row that WFEO has participated in the UN-CSD. I participated in the Feb. 9 preparatory meetings and look forward to the CSD-17 session in May 2009. Significantly, the UN-CSD remains receptive to expert presentations from the engineering community on identified issues.

The June 2008 gathering of the UN Framework Convention on Climate Change (UNFCCC) in Bonn, Germany, provided another venue to raise the WFEO and CEE's profile. CEE Member Paul Jowitt (president-elect of the Institution of Civil Engineers) of the United Kingdom joined me at our "side event". The latter provided UNFCCC delegates and others a better understanding of our interest in climate change, with specific reference to adaptation of infrastructure and the PIEVC Protocol. Later, the WFEO received observer status allowing participation in future UNFCCC sessions.

The UN-CSD and UNFCCC both report to the UN Economic and Social Council (ECOSOC). I had the pleasure of leading the WFEO delegation at ECOSOC's July 2008 meeting. At a breakfast with attending ministers, I briefly summarized WFEO activities and seemed to strike a chord with the diplomatic audience by calling the WFEO the "UN of Engineering".

Effective communication entails repeating the message as often and on as many fronts as possible . The engineers' message may not have got through everywhere, but it is on its way at the UN and elsewhere.

CEE Strategic Plan To Serve as Roadmap

WFEO's Standing Committee on Engineering and the Environment held an in-person meeting in Brasilia, Brazil, in December 2008.

Following one year's consultation, the World Federation of Engineering Organizations (WFEO) Standing Committee on Engineering and the Environment (CEE) has ratified its strategic plan.

CEE Chair Darrel Danyluk, P.Eng., sees: "The strategic plan is providing us with a roadmap and signposts to guide the Committee through our four-year mandate."

CEE formally approved the plan on Dec. 1, 2008, during a meeting held in Brasilia, Brazil, as a prelude to the World Engineers' Convention. The ratified document now has been forwarded to the WFEO Secretariat.

Besides spelling out a WFEO-CEE vision and mission statement, the plan outlines the CEE's mandate, a key component of which entails: "Identifying and documenting national and international trends in engineering practice related to the environmental impacts of major engineering projects and infrastructure development in developing countries, climate change adaptation and disaster risk management."

Also specified is the CEE's role in organizing international workshops and seminars, particularly ones relating to major engineering projects. The plan further underlines the CEE's responsibilities in connection with United Nations initiatives and conferences.

The document's operating principles call on the CEE to "fulfill a facilitating role among its national members and the WFEO community."

Significantly, the strategic plan delineates six broad themes within which CEE will focus its activities. Reporting to the CEE chair, a CEE member will lead each theme area. The themes (with the respective chairs in brackets) and key objectives of each theme are:

1) Environmental Impacts of Major Engineering Projects for Summer and Winter Olympics (Engr. Spyros Papagrigoriou, Greece) – building on the experiences of recent large-scale Olympic sporting events and communicating these experiences to future organizing committees.

2) Engineering and Climate Change Adaptation (Darrel Danyluk, P.Eng., Canada) – understanding the relationship of a changing climate and existing infrastructures, and developing tools for engineers to use in assessing the impacts.

3) Disaster Risk Management (Dr. Yumio Ishii, Japan) – introducing or recommending basic concepts, effective structural and non-structural measures, and technologies for risk management of water-related and earthquake disasters.

4) Sustainable Development (Professor Paul Jowitt, United Kingdom) – on engineering matters related to sustainability.

5) Environmental and Sustainable Engineering Practices for Engineers (Darrel Danyluk, P.Eng., Canada) – developing an international guideline on the environment and sustainability for engineers.

6) Infrastructure in Developing Countries (Cdr Arvind Poothia (Retd), India) – working towards ensuring a proper infrastructural development in developing countries.

WFEO-CEE Upcoming Events

Theme 2 – Climate Change Adaptation
12-15 May, 2009, Hamilton, Canada
2nd Climate Change Technology Conference (www.cctc2009.ca)

Theme 3 – Disaster Risk Management
21-24 June 2009, Toronto, Canada
19th World Conference on Disaster Management
Canadian Centre for Emergency Preparedness www.wcdm.org

22-24 June 2009, Instanbul, Turkey
Earthquake & Tsunami
World Council of Civil Engineers,
European Council of Civil Engineers and Turkish Chamber of Civil Engineers
www.imo.org.tr/eqt2009

3 Sept. 2009, Fukuoka, Japan
3rd Joint International Symposium on Disaster Risk Management

WFEO Meetings and Events

1 Nov. 2009, Kuwait City, Kuwait
WFEO-CEE Face-to-Face Meeting No. 2

2-6 Nov. 2009, Kuwait City, Kuwait
WFEO General Assembly

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Putting Farmers First With Engineers' Support

By Darrel Danyluk, P.Eng.

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Engineers are keenly aware about teamwork ï whether within or across engineering disciplines, or working with other professions and societal groups. Such teamwork occurs through WFEOôs contributions to the United Nations Commission on Sustainable Development (UNCSD), a body that follows up on the 1992 UN Conference on Environment and Development, the Rio de Janeiro ñEarth Summitò

Specifically, the WFEO, with the International Council for Science (ICSU), represents engineering and science through the Scientific and Technological Community (S&T). S&T is one of nine major groups, which also include Business and Industry; Women, Children and Youth; Indigenous Peoples; Local Government; Labour, NGOs and Farmers. Each group provides direct input as the UNCSD, in two-year cycles, addresses specific themes. Recently, the major theme has been sustainability of agriculture, rural development and land, as well as drought and desertification, with specific reference to Africa. These topics were central at UNCSD meetings in February and May in New York, where WFEO, led by Jorge Spitalnik, the Chair of the Standing Committee on Energy, had observer status as did the Standing Committees on Engineering and the Environment, and Capacity Building.

The S&T Community teamed up with the Industry and Farmers Major Groups in the Farmers First, a joint call to action that urges a broad-based, knowledge-centred approach to sustainable and socially responsible increases in agricultural output.

Farmers First aims to:
1. Safeguard natural resources
2. Share knowledge
3. Build local access and capacity
4. Protect harvests
5. Enable access to markets
6. Prioritize research imperatives.

Science and engineering are critical to reaching these goals. For example, applying engineering technologies to gathering, movement and warehousing of crops can vastly improve sustainability and standards of living. During the May UNCSD meeting, CEE and the Energy and Capacity Building Committees, organized a side-event on *Capacity Building – Words Into Action* ï *Infrastructure … Engineering…Quality of Life…how do they fit?* The event attracted 71 delegates from more than 20 countries and featured a roundtable highlighting issues and recommended actions. They included rural job-creation to discourage migration to urban centres, and extension of education and technology, particularly to rural women.

Some specific recommendations touch on engineersôrole in providing and building infrastructure that would reduce food-loss by means of abattoirs and storage facilities, improve access to open-source technologies and funding to transfer proprietary technology, enhance electrical reliability and safeguard ecosystems. All are valuable messages that we will continue to share with the UNCSD in coordination with WFEO team members and ICSU colleagues.

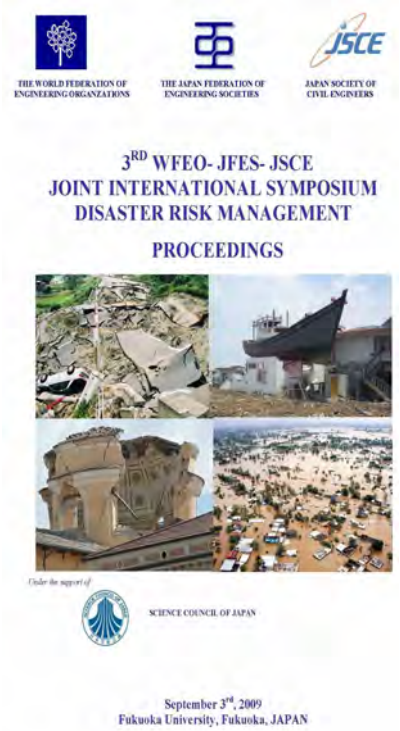
October 2009

"Farmers First urges a broad-based, knowledge-centred approach to sustainable and socially responsible increases in agricultural output."

3RDWFEO-JFES-JSCE Symposium: Disaster Risk Management, Sept. 3, 2009

By Dr. Nguyen Son Hung, P.Eng.

Speakers and WFEO-CEE/DRM members participating in the Symposium where 17 papers were presented.



The Joint Symposium on Disaster Risk Management, held September 3, in Fukuoka, Japan, was the third organized by World Federation of Engineering Organizations (WFEO), Japan Federation of Engineering Societies (JFES) and Japan Society of Civil Engineers (JSCE), with the support of the Science Council of Japan as part of the international program of JSCEôs National Assembly Congress. The first and second symposiums were held in 2007 and 2008. The Task Group on Disaster Risk Management of the Standing Committee on Engineering and the Environment in WFEO (WFEO-CEE/DRM) was a main secretariat of these symposiums, which received enthusiastic support from the JSCE and JFES secretariats.

The latest symposium brought together a keynote lecture and 16 papers on the philosophies, policies and practices on seismic and water-related disasters. It attracted more than 65 participants from 15 countries (Algeria, Bangladesh, Canada, India, Indonesia, Japan, Korea, Mongolia, Myanmar, Nepal, Philippines, Taiwan, Thailand, Turkey and Sri Lanka).

Prof. M. Hamada, JSCEôs Past President, titled his keynote lecture ñ*Global Increase of Natural Disasters and the Recommendations by the Science Council of Japan for the Creation of a Safe and Secure Society*ò Prof. K.Takeuchi, Director of International Center for Water Hazard and Risk Management (ICHARM), under the auspices of UNESCO, presented ñ*Potential Contribution of Asia to New Science Program: Integrated Research on Disaster Risk*ò Eng. U Than Myint, Immediate Past President of Myanmar Engineering Society, introduced ñ*Policies, Disaster Mitigation Measures and Infrastructure Development in Disaster Risk Management of Myanmar*ò Prof. B.M. Pacheco, Chairman, Committee on DMAPS and DQRP, Philippine Institute of Civil Engineers, presented ñ*Disaster Risk Management Philosophies in Coping with Earthquakes or Floods".* In addition, the state-of-the-art technologies in architecture were also showcased in Prof. A. Wadaôs presentation titled ñ*Integrity, Strength and Deformability in Seismic Design of Multi-story Structures*ò The proceedings are posted on WFEOôs website and can be downloaded.

After the symposium, a meeting was held to introduce and report WFEO-CEE/DRMôs activities, and some new members joined. The recent symposium brought together more papers, speakers and participants than the previous two. It is expected to serve as a positive catalyst for larger-scale, joint symposiums in the future involving WFEO and other organizations from around the world to focus on disaster risk management issues of global interest.

WFEO-CEE/DRM's Activities and Release of Guideline for Water-Related Disaster Risk Management

By Dr.Yumio ISHII, P.Eng.

WFEO-CEE/DRM Now and in the Future

WFEO-CEE/DRM is a Task Group on Disaster Risk Management (TG-DRM) established by the Standing Committee on Engineering and the Environment (CEE) at WFEO's 2007 General Assembly, New Delhi, India. The group's main purposes are:

(1) Introducing or recommending important philosophy and basic concepts, effective structural (hard) and non-structural (soft) measures, traditional and high technologies and good examples for risk management of water and earthquake-related disasters to engineers and policymakers;
(2) Promoting the exchange of information and opinions on the above-mentioned disaster risk management; and
(3) Merging and introducing knowledge and experiences to avoid disasters, and promoting sustainable and sound development to offset inappropriate human actions related to residing and living, and developing infrastructure etc.

TG-DRM is composed of two subsidiary task groups, one dealing with water-related disasters (WDRM) and one with earthquake-related disasters (EDRM). I have chaired DRM and WDRM and Prof. Kazuhiko Kawashima, Tokyo Institute of Technology, EDRM. At present, DRM has about 35 members from 15 countries. The TG-DRM's main activities in the last two years were:
(1) Annually holding two Joint International Symposiums on DRM with WFEO in Japan. (proceedings can be downloaded from the Japan Federation of Engineering Societies website http://www.jfes.or.jp/activitie/iac-en.html);
(2) Holding a Panel on DRM with the American Society of Civil Engineers at WEC2008, Brasilia, Brazil; and
(3) Releasing a draft framework of Guideline for Water-related Risk Management (Fundamentals, Floods, Tsunamis, Storm Surges and Droughts) at WEC2008. Three drafts, on Fundamentals, Floods and Tsunamis will be released at the coming WFEO Kuwait GA for discussion and review. (See also following article, on next page.)

As disaster occurrences have recently increased around the world and disaster risk management has became a crucial issue in achieving the UN's Millennium Development Goals, TG-DRM strongly expects WFEO members to support upgrading the task force to a standing committee at the coming WFEO Kuwait GA. This would allow extension of the task force's activities, notably by:

(1) Continuing to hold the annual Joint International Symposium on DRM with more collaboration by other disciplines, such as architecture, and mechanical, information and medical engineering etc., plus other international organizations;
(2) For WDRM, reviewing and updating the released guideline draft and preparing the guideline draft for Droughts and Storm Surges; and preparing technical documents for Seismic Retrofit Technology for Buildings and Infrastructure, Seismic Isolation Technology and Construction Methods for Earthquake-proof Structures;
(3) Cooperating with other international organizations to hold seminars or workshops to introduce and disseminate the guidelines, technical documents, and experiences on disaster risk management around the world, particularly, in developing countries; and
(4) To achieve the mentioned goals, keenly welcoming new members and ideas from around the world, particularly from WFEO member countries. We also plan closer collaboration with other standing committees in WFEO, such as CEE, CIC, CCB and WIE, to further enhance synergy of activities in WFEO.

Draft Guideline on Water-Related Risk Management Prepared for Review

With the cooperation of CTI Engineering Co. Ltd., the Secretariat of TG-DRM prepared a three-part draft, covering Fundamentals for DRM, DRM for Floods, and DRM for Tsunamis of the Guideline for Water-related Risk Management (WDRM). At the coming WFEO Kuwait GA, the drafts will be released for review in 2010 by TG-DRM members and other researchers and engineers in WFEO. The final draft will be completed and released at WEC2011, Geneva, Switzerland. After the GA, the draft will be posted on the websites of WFEO or JFES for downloading. We keenly welcome your comments and opinions.

The Fundamentals Draft covers important basics for WDRM and consists of three sections: (1) Current Situation and Trend of Global Water-related Disasters, (2) Importance of WDRM and Its Basics and (3) Key Points of Main Components of WDRM. Section 2 focuses on crucial and basic key points for WDRM and briefs on climate-change adaptation strategies to cope with WDRM. Section 3 highlights indices for WDRM and their evaluation, key points of prevention/mitigation, preparedness, response and recovery.

The DRM Draft for Floods is composed of eight sections: (1) Current Situations and Issues of Flood Disaster Risk Management, (2) Strategic Flood Disaster Risk Management, (3) Assessment of Flood Disaster Risks, (4) Flood Disaster Risk Prevention/ Mitigation, (5) Preparedness Measures for Flood Disaster Risk (Building Communities Resilient to Flood Disaster), (6) Emergency Response, (7) Recovery and Rehabilitation, and (8) Climate Change Adaptation Strategies to Cope with Flood Disasters.

The DRM Draft for Tsunamis consists of three sections: (1) Tsunami and its Disasters, (2) Mitigation of Tsunami Disaster Risk, and (3) Assessment of Tsunami Disaster Risk. Section 2 focuses on basic concepts of mitigation, structural and nonstructural measures, and responses just after tsunamis.

The draft is primarily material for discussion and will be gradually revised into a final draft that is expected to be useful for engineers and policymakers around the world. Your collaboration and that of other members is needed to make it happen.

WFEO Meetings and Events

2 November 2009 Kuwait City, Kuwait – WFEO-CEE Face-to-Face Meeting #3
1-6 November 2009 Kuwait City, Kuwait – WFEO General Assembly, Executive Council and Standing Committee Meetings

WFEO-CEE Upcoming Events

Sustainable Infrastructure and Built Environment in Developing Countries, 2-3 November, 2009 – Bandung, Indonesia www.sibe-2009.org

Society for Sustainability and Environmental Engineering, 2009 International Conference, 23-24 November 2009 Melbourne, Australia www.sustaintheplanet09.com

UN Framework Convention on Climate Change – Conference of the Parties #15
7-18 December, 2009 Copenhagen, Denmark www.unfccc.org

International Disaster Risk Conference 2010, 30 May – 3 June 2010, Davos, Switzerland www.idrcdavos2010.org

WFEO International Conference on Climate Change – April 2011 (date TBC), Calgary, Alberta, Canada

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Meeting the Olympic and Environmental Challenges

April 2010

"The Vancouver Games also will be remembered for being environmentally friendly and building lasting infrastructure legacies that will deliver future benefits."

By Darrel Danyluk, P.Eng.

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Earlier this year, millions of eyes around the world turned to Vancouver as the Canadian city and nearby Whistler hosted the Winter Olympic and Paralympic Games.

It was appropriate that attention focus on athletic competitions. However, the Games also will be remembered for being environmentally friendly and building lasting infrastructure legacies that will deliver future benefits. That aligns with one of the six themes of the World Federation of Engineering Organizations' Standing Committee on Engineering and the Environment. CEE/WFEO Theme 1 focuses on responding to the environmental impacts of Olympic Games. This commitment did not start with the recent Winter Games, as seen in articles in this newsletter by Eng. Spyros Papagrigoriou, the Vice Chairman CEE/WFEO and Task Force Leader for Theme 1, and by Professor Jiming Hao, who writes about mitigating air pollution at the 2008 Summer Games in Beijing.

2010 Olympic Speed Skating Oval

Additional information will be available on the May 26 WFEO-CEE Technical Webinar on "Engineering and Impacts of Civil Infrastructure for Major Sporting Events: The Olympic Games Experience." You can also read more in the Sustainability Reports prepared by the Vancouver Olympic Organizing Committee, available at http://www.vancouver2010.com/more-2010-information/sustainability/reports-and-resources/sustainability-report/

The Olympics are just one area where the CEE maintains watching briefs and provides input to multilateral organizations. Your attention is drawn to two upcoming events.

CEE/WFEO will be present from May 1–11 at the UN Commission on Sustainable Development Meeting No. 18 in New York. CEE/WFEO will deliver a side event on May 4 on "Transport Efficiency and Waste Avoidance – Input for Policy Makers." Engineering insight can increase policy-maker's awareness about the importance of modes of transport and their infrastructures in curbing losses during food transfers. Efficient and effective infrastructures – specifically the three pillars of physical, economic and social infrastructures – are fundamental to sustainability. At the side event, experts from the CEE/WFEO, International Council of Scientific Unions and the American Association of Engineering Societies' International Activities Committee will outline inter-linkages between transport infrastructure and social and economic infrastructures, as well as identify opportunities to reduce/reuse waste.

At the Framework Convention on Climate Change (May 31 – June 11) in Bonn, Germany, the CEE/WFEO side event is titled "Infrastructure Climate Risk Assessment: Principles and Applications." It will present principles of infrastructure climate risk assessment, application and summary results of case studies of infrastructure using a climate risk protocol – followed by discussion to work with the concepts of infrastructure components and climate parameters to determine climate risk.

As with Olympic athletic success, CEE/WFEO has found environmental results demand persistence and on-going commitment.

Theme 1: Environmental Impacts of Major Engineering Projects for Sporting Events (Olympic Games)

By Eng. Spyros Papagrigoriou

Eng. Spyros Papagrigoriou is Vice Chairman of CEE/WFEO and a member of the Technical Chamber of Greece.

The idea of assessing the impact of Olympic Games from an engineering perspective was originally proposed by Greece after the 2004 Olympic Games. The idea was to develop an engineering strategy in planning and designing infrastructure for the Games to enable the assessment of the environmental impacts and how the Games can be a good opportunity to improve the (human and natural) environment as well as the engineering performance of infrastructure to safeguard sustainability and a better quality of life.

The Task Group programme was first presented at the WFEO/CEE meeting in Brasilia in December 2008. Following that, a Task Group, consisting of senior engineers who were involved in planning and constructing major engineering projects for Olympic Games, has been formed by contacting countries that have hosted Summer and/or Winter Olympic Games. The process involved an international workshop (May 2009 Athens meeting of representatives of Olympic Cities Beijing, Athens, Sydney and Barcelona) and webinars among the Task Group members to exchange information and experiences, and document them. It also included communication and outreach activities to create awareness of opportunities and long-term infrastructure legacies that are intrinsic to large-scale Olympic sporting events by focusing on the post-games era and the best utilization of the infrastructure. During the 2009 Kuwait meeting, a detailed Interim Report was presented by WFEO/CEE members and discussed.

The Theme 1 Task Force leader is Eng. Spyros Papagrigoriou, Vice Chairman of CEE/WFEO and member of the Technical Chamber of Greece. Main contributors to the work carried out are: Eng. Zaffar Zuberi, Chairman, The Institution of Engineers, Pakistan; Eng. David Lapp, WFEO/CEE Secretariat, Canada; Eng. Paul Jowitt, United Kingdom; Eng. Michael Sanio, American Society of Civil Engineers, U.S.A.; Eng. Dr. Jiming Hao, Professor and Dean of The Institute of Environmental Science and Engineering, Tsinghua University, China. Contributors and participants in the May 2009 Athens meeting ("Impacts of Olympic Games in Beijing Athens Sydney Barcelona") were the Technical Chamber of Greece and Dr. George Kotzageorgis, ecologist, Greece.

The Main Aims of Theme 1 are:

- Enhancement of the opportunities of the host city and country to combine major city planning changes and new infrastructure with an environmental reform or upgrade in almost all spheres.
- Implementation of the principles of sustainable development to show the whole world that respect for the environment can and must accompany any major and rapid expansions of human-created systems.
- Tailoring of sport requirements to everyday city needs, so that the heavy cost burden of the organization can be better justified and more easily accepted.
- Exploitation of the power of the message to promote and proliferate the principles of sustainability, and to advance environmental standards for a better quality of life that is in harmony with nature. (Continued on next page.)

(Theme 1 continued from previous page)

The main areas of Environmental Interest identified are a) Energy Bioclimatic Design; b) Water Use and Management; c) Soil Waste Management; d) Air Quality; e) Physical Planning Post Games Era; f) Construction Materials; g) Natural Environment Green Areas; h) Environmental Awareness and Education; i) Adaptation to Climate Change and j) Incorporation of Innovation and High Technology. For each area of interest, the basic principles and parameters were set to identify the scope of relevant environmental issues. The roles of engineers in each area are elaborated below.


2010 Olympic Nordic Skiing Venue

The main Stakeholders involved are governments (central, regional or local); the international authority that awards the event (International Olympic Committee, in the case of the Olympic Games); the event's organising body; professional-scientific associations; NGOs and society.

The Methods identified for fulfilling the aims set are as follows:

- Setting Clear Environmental Objectives
- Collaboration between Stakeholders
- Dissemination of International Experience
- Compliance with Legislation
- Strategic Environmental Assessment
- Environmental Impact Assessment
- Monitoring
- Interim Assessment and Reporting
- Communication
- Environmental Evaluation Matrix (EEM)

The main actions to follow are a Theme1 Webinar (May 26, 2010), the elaboration and presentation of the Final Report, as well as the communication of the Final Report according to the WFEO rules and procedures.

WFEO-CEE and Related Upcoming Events

- May 1–11, 2010 New York, U.S.A – UN Commission on Sustainable Development – Meeting No. 18
- May 4, 2010 New York, U.S.A. – WFEO-CEE Side Event at UN-CSD 18: “Transport Efficiency and Waste Avoidance – Advice for Policy-Makers”
- May 26, 2010, WFEO-CEE Technical Webinar #2: “Engineering and Impacts of Civil Infrastructure for Major Sporting Events: The Olympic Games Experience” (See www.wfeo.net)
- May 31–June 11, 2010, Bonn, Germany – UN Framework Convention on Climate Change 32nd Meetings of UNFCCC Subsidiary Bodies
- June 11, 2010, Bonn, Germany – WFEO-CEE Side Event at UNFCCC 32nd Meetings of Subsidiary Bodies: “Infrastructure Climate Risk Assessment: Principles and Applications”
- June 21, 2010, WFEO-CEE Mid-Year Teleconference/Webinar
- Oct. 15, 2010, Buenos Aires, Argentina – WFEO-CEE Face-to-Face Meeting #3
- Oct 18–20, Buenos Aires, Argentina World Engineering Congress and Exhibition: Engineering 2010
- Nov. 29–Dec. 10, 2010, Cancún, Mexico – UNFCCC Conference of the Parties Meeting No. 16

Environment and Major Sport Events: Experiences from the 2008 Beijing Olympics Games

By Jiming Hao

Jiming Hao is Professor and Dean of The Institute of Environmental Science and Engineering, Tsinghua University, China.

Beijing, China's capital, is one of the world's largest metropolises with a population of over 15 million and has more than three million vehicles. Beijing's air-quality problems were characterized historically by high concentrations of particulate matter and sulfur dioxide. In recent years, due to a rapid increase in vehicular emissions, ozone pollution has drawn increasing attention in Beijing. Despite the fact that the number of motor vehicles on Beijing's streets more than doubled from 2000 to 2007, the number of air-quality attainment days has been increasing every year (up from 177 days in 2000 to 246 days in 2007). This is due to many air-pollution control actions that were implemented in Beijing over the years. The actions include closure or relocation of high-polluting industrial facilities; phase-out of numerous coal-fired boilers and domestic stoves; control of wind-blown dust generated from construction sites; implementation of stricter vehicle emission standards, and replacement of older fleets of buses, passenger cars, and trucks with newer and cleaner fleets; and installation or upgrading of stack-emission-control devices for power plants. However, ambient concentrations of common pollutants measured before the 2008 Beijing Olympics were still above health-based standards and higher than typical levels measured in cities of developed countries.

Aggressive Measures Implemented

To improve air quality during the Olympics (Aug. 8-24, 2008), the Chinese government implemented a series of aggressive measures to reduce pollutant emissions in Beijing and surrounding areas for more than two months. From July 1 to Sept. 20, 2008, all vehicles that failed to meet the European No. I standards for exhaust emissions were banned from Beijing's roads. Mandatory restrictions were implemented from July 20 to Sept. 20 for personal vehicles, allowing them on roads only on alternate days depending on licence-plate numbers (odd-numbered vehicles on odd-numbered days and even-numbered vehicles on even-numbered days). As a result, traffic flows in Beijing urban areas were found to have declined by 22% during the Olympics. Power plants in Beijing were required to reduce emissions by 30% from their levels in June when they had already met the Chinese emission standard. Several heavily polluting factories were ordered to reduce operating capacities or to completely shut down during the Games. All construction activities were placed on hold. Emission controls on large industrial sources were also applied in surrounding provinces (e.g., Inner Mongolia, Shanxi, Hebei, Shandong) and in the City of Tianjin. Traffic restrictions similar to Beijing's were instituted in Tianjin during the Olympics.

Tsinghua University Studied Impact

The Tsinghua University research team estimated that as a result of all the emission-reduction measures, total emissions of NOx, SO_2, VOCs, PM10 were reduced from their levels during the same period in 2007 by 55%, 58%, 59%, and 61%, respectively. These emission reductions are directly reflected in markedly reduced ambient concentrations of common pollutants. Observations at monitoring sites by the Tsinghua University research team showed significant decreases in concentrations of PM2.5, CO, NOx, SO_2, and O_3 during August 2008, relative to August 2007. The relative reductions in their concentrations are 40%, 50%, 53%, 61%, and 26%, respectively. In addition to PM2.5, black carbon (BC) and total carbon (TC) in PM2.5 during the Games were lower by 37% and 45%, respectively, than their average levels before the Games. The mean daytime mixing ratio of O_3 was lower by about 15 ppbv, reduced to 50 ppbv, in August 2008. Studies have shown that the reduction in emissions of ozone precursors associated with the Olympic Games had a significant contribution to the observed decrease in air pollutants during August 2008, accounting for 80% of the pollution reduction in August 2008, verifying the effectiveness of the emission reduction measures implemented in Beijing during the Olympics.

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

October 2010

"The United Nations has established the Millennium Development Goals."

It's Time to Think About the Future

Infrastructure projects vary in their technical sophistication. Here, women work on a United Nations supported project to rebuild a road in Timor-Leste (UN Photo/Martine Perret)

By Darrel Danyluk, P.Eng., FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Every day, in every country around the world, societies function. They are supported by physical, social and economic infrastructures that vary from the extremely sophisticated to the very rudimentary. Regardless of the infrastructure's complexity, these three infrastructure groupings are inter-related and all are evolving.

Standards of Living and Quality of Life reflect this inter-relationship and define the respective societies. Each of these infrastructure groupings requires resources and also impacts the environment at the local, regional, national and global levels. All three infrastructure categories must account for their impacts and work towards sustainability.

The United Nations has established the Millennium Development Goals (MDGs), which strive to address many issues that afflict humanity. To meet those ends, the UN Commission on Sustainable Development (CSD) develops policy statements on sustainability across seven thematic groupings such as mining, transport, chemicals, and waste management, Africa, agriculture, drought, desert-ification and rural development. Each grouping is considered in two-year cycles and revisited every 14 years. A parallel and related commission, the United Nation Framework Commission on Climate Change (UNFCCC), since 1992, has raised the alarm about the catastrophic effects of a warming planet, and is calling on governments to mitigate CO^2 emissions and to develop country adaptation plans to address the impacts of a changing climate.

The important role of engineers and engineered physical infrastructures in meeting the MDGs; at CSD, across these thematic groupings; and at the UNFCCC, by addressing the mitigation and adaptation needs, appears obvious to the engineer. If anything, this import-ance is magnified as policy moves to implementation.

It is less apparent to other societal sectors. This deficiency needs to be addressed by WFEO and its Standing Committees. Our Committee on Engineering and Environment (CEE), in its role as the engineering focal point to the UNFCCC and as a member of the CSD Task Force – led by the Committee on Energy – will enhance our efforts to create this awareness.

As I enter the last year of a first term as Chair of the Standing Committee and complete the initiatives in our Strategic Plan, it's time to think about the future. In October, at our next committee meeting, we will be initiating our planning for the themes for a second term of leadership. CEE welcomes your ideas, your participation and on-going commitment.

Theme 6: Infrastructure In Developing Countries

By Cdr. Arvind Poothia IN (Ret'd)

Cdr. Arvind Poothia is Director General, Engineering Staff College of India. He chairs the CEE Task Force on Theme 6 – Infrastructure in Developing Countries.

The infrastructure sector covers a wide spectrum of services such as transportation (including roadways, railways, airways and water transportation); power generation, transmission and distribution; telecommunication; port-handling facilities; water supply; sewage disposal; irrigation; medical, educational and other primary services.

Some of these services have a direct impact on the working of a business enterprise, while others are more important from a societal point of view. Infrastructure contributes to economic development by increasing productivity and by providing amenities that enhance the quality of life. Its linkages to the economy are multiple and complex. It affects each of the economic activities – such as production, consumption, distribution, trade, etc. – directly or indirectly though positive and negative externalities. The availability of adequate infrastructure facilities is imperative for the overall economic development of a country. Infrastructure adequacy helps determine success in diversifying production, expanding trade, coping with population growth, reducing poverty and improving environmental conditions.

A good infrastructure in the form of improved transport can increase the productivity of workers through better management of time they spend on non-productive activities. Improvements in water supply and sanitation also can have positive impacts on the health of the workers, thereby increasing their productivity. A better infrastructure in various forms helps the poor by allowing them to earn more through their livelihood, and leads to reduction in poverty and inequality.

A strong correlation exists between per capita GDP and availability of certain services such as telecommunications, power, roads, and access to safe drinking water etc. With the rise in per capita GDP, composition of infrastructure changes significantly. Basic infrastructure such as water and irrigation are more important in less-developed countries whereas power and telecommunication play a vital role in developing countries. As the economy progresses, the share of agricultural infrastructure shrinks and other infrastructure takes its place for speedy development of industrial and service sectors.

Bandra-Worli Sea Link, Mumbai

India's first and longest open-cable stayed bridge, the Bandra-Worli link, is the first phase of the West Freeway Sea Link (WFSL) project and links the City of Mumbai with its western suburbs. The project is aimed at upgrading the road transportation network of greater Mumbai.

The Bandra-Worli Sea Link has a total length of 4.7km and dual carriageways of four lanes each. The project comprises:

1. Approach road of 540m
2. 54x2 pre-cast segmental approach spans of 50m length
3. Bandra Cable Stay Bridge on 126m-high, single pylon with 500m clear span
4. Bandra Cable Stay Bridge on 54m-high, twin towers with 150m clear span
5. 811m link bridge
6. 16-lane intelligent toll plaza.

At peak times, the project deployed 165 engineers and staff, and 2,800 workers. The project management team had the requisite experience and skill levels for segmental construction and marine-sub-structural works. The project demanded application of state-of-the art technologies of global standards.

Owner: Maharastra State Road Development Corporation
Designer/Consultant: Dar Consultants India Pvt. Ltd.
Contractors: Hindustan Construction Company Ltd.
Funding: Maharastra State Road

Roads and Bridges Infrastructure – A Snapshot of Indian Developments

The following and the projects featured in boxes in this newsletter highlight some recent infrastructure developments in India.

Size

- India has an extensive road network of 3.3 million km – the second largest in the world
- Roads carry about 70% of the freight and 85% of the passenger traffic
- Highways/expressways constitute about 66,000 km (2% of all roads) and carry 40% of the road traffic
- The Government of India spends about $4 billion annually on road development
- The Government's ambitious National Highway Development Project (NHDP) is at an advanced stage of implementation. Key sub-projects under the NHDP include the Golden Quadrilateral (GQ), 5,846 km of four-lane highways and the North-South & East-West Corridors (NSEW), 7,300 km of four-lane highways
- Program for four-laning of about 14,000 km of National Highways is underway

The Golden Quadrilateral and NSEW projects

Outlook

- Annual growth projected at 12-15% for passenger traffic, and 15-18% for cargo traffic
- Over $50-60 billion investment is required over the next five years to improve road infrastructure

Potential

- Road development is recognized as essential to sustain India's economic growth.
- A large component of highways is to be developed through public-private partnerships.
- Investment opportunities exist in a range of projects being tendered by National Highways Authority of India (NHAI) for implementing the NHDP – contracts are for construction or on a Build-Operate-Transfer (BOT) basis depending on the section being tendered.
- A $5-billion project plans to lay six-lane roads over 6,500 km of National Highways on the Design Build Finance and Operate (DBFO) basis – for high-traffic stretches of over 40,000 passenger car units (PCUs) per day.

Grade Separated Interchange at Junction of NH-45-IRR at Kathipara, Chennai

National Highways Authority of India (NHAI), along with the State Government of Tamil Nadu, programmed to develop access to the Golden Quadrilateral Corridor by providing free-flow facilities in highly trafficked areas in Chennai. The Kathipara flyover involves design and construction of a clover-leaf interchange in the heart of Chennai City. The structural portion involves 600m-long, dual 12.0m-wide decks for the main viaduct spans connecting the inner ring road to the Airport. Four loops of approximately 200m length each connect to the main viaduct from Guindy-Poonamallee Road. All the structural spans are resting on aesthetically shaped piers founded on open footings at 3 to 4m depth.

Voided slab superstructure in PSC and RC have been adopted for superstructure.

Owner: National Highways Authority of India
Contractor: Somdutt and Simplex (JV)
Consultants (Design and Supervision): STUP Consultants P. Ltd.

Pir Panjal Railway Tunnel, Jammu & Kashmir

The Pir Panjal Rail Tunnel project is part of the ambitious, 345km-long Udhampur Srinagar Baramulla rail link that will provide an alternative and reliable transportation system to Jammu and Kashmir (J&K) by joining the Kashmir Valley with the Indian Railways network. The railway line will strengthen available transport facilities to J&K and provide all-weather means for transport in an area that is snowbound for a significant part of the year. Post-completion, it will be the longest tunnel in India, around 11km long and 8.50m in diameter, passing through the most difficult terrains of Himalaya.

The photograph shows the water-proofing membrane provided along with supports to restrict seepage. The work commenced in June 2004 and is expected to be completed in 2011.

Owner: Ircon International Limited

Designer, Consultant, Geoconsultant: Rites JV

Contractors: Hindustan Construction Company Ltd.

Funding: Ircon International Limited

Rajiv Gandhi International Airport

Constructed on a green-field site, approximately 30 km south of downtown Hyderabad, the new Rajiv Gandhi International Airport is built on an area of 5,400 acres and has the longest runway (4,260m) among Indian airports. The airport can handle 12 million passengers and accommodate the world's largest passenger aircraft, the Airbus A380. The domestic and international cargo-processing and storage facility is designed with a clear height of 14m and total built-up area of 10,070m^2. The roof has been designed with a seamless steel roofing system extended up to a length of 72m and a width of about 400mm, cut using special rollers.

Owner: GMR Group in a public-private partnership which also includes the State Government of Andhra Pradesh, Airports authority of India and Malaysia Airports Holdings Berhad.

Contractors: Larsen & Toubro Limited.

Engineering Consultants: Engineering Design and Research Centre (EDRC) of ECC Division, Larsen & Toubro Limited.

Owners Consultants: STUP Consultants P. Ltd in association with Kowi Consult

WFEO-CEE and Related Upcoming Events

- Oct. 16, 2010 Buenos Aires, Argentina – WFEO-CEE Face-to-Face Meeting #3
- Oct. 17, 2010, Buenos Aires, Argentina – WFEO Executive Council Meeting
- Sept. 6 or 7, 2011, Geneva, Switzerland – WFEO-CEE International Session on Climate Change – “Addressing Climate Change Impacts – Infrastructure Adaptation and Capacity Building Opportunities” WEC2011 – www.wfeo.net
- Nov. 29–Dec. 10, 2010, Cancun, Mexico – UN Framework Convention on Climate Change, Conference of the Parties Meeting No. 16 – www.unfccc.org
- June 6–17, 2011, Bonn, Germany – Bonn Climate Talks – www.unfccc.org
- Jan. 4–6, 2011, Singapore – 4th ASCE-EWRI International Perspective on Water Resources and the Environment www.ipwe2011.org
- March 31–April 1, 2011, Bangkok, Thailand – International Conference on Agricultural Engineering – www.kmitl.ac.th
- May 2–15, 2011, New York, U.S.A.– UN Commission on Sustainable Development – Meeting No. 19 http://www.un.org/esa/dsd/csd/csd_index.shtml
- May 19–21, 2011, Climate Change, Agri-Food, Fisheries and Ecosystems: Reinventing Research, Innovation, and Policy Agendas for Environmentally-and Socially-Balanced Growth", Agadir, Morocco. Abstracts deadline Oct. 31, 2010 – ICCAFFE2011 Homepage
- May 22–26, 2011, Palm Springs, CA, U.S.A. – 2011 ASCE-EWRI World Environmental and Water Resources Congress – www.asce.org
- May 2012, Rio de Janeiro, Brazil – United Nations Conference on Sustainable Development 2012 (Rio +20) www.uncsd2012.org

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

April 2011

Civil society trusts that engineers will address the challenges that face infrastructures.

Public Trust Key to Engineers Leadership on Sustainability

Family in Tarialan, Uvs Province, Mongolia, uses a solar panel, a sustainable energy source, to generate power for ger, a traditional Mongolian tent. (UN Photo/Eskinder Debebe)

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

To understand sustainability in the context of current world dialogue, the United Nations Commission on Sustainable Development (CSD) has neatly compartmentalized the scope of human activity into seven broad thematic clusters. So, for example, one of the clusters considers agriculture, rural development, land, drought, desertification and Africa. Cross-cutting each cluster are the basic necessities of life – food, energy and water. By considering each thematic cluster in seven, two-year cycles, CSD develops knowledge and understanding of the subject matter and evolves policies leading to national implementations of recommended actions. Engineering's role in the CSD cluster currently under review – which includes mining, chemicals, waste management and transport – would appear obvious, at least, to engineers. Engineering's role also extends to other CSD thematic clusters and to all infrastructure relied upon by societies worldwide.

What is less obvious is that by setting the focus on these CSD clusters, on the details of each and their inherent infrastructures, it is easy to lose sight of the wider picture. It is paramount that we recognize how the CSD thematic clusters impact on the environment and its degradation, and the longer-term sustainability of the human race.

Civil society trusts that engineers will address the challenges that face infrastructures. This trust depends upon engineers applying knowledge and skills to conceive, design, build, operate and maintain the infrastructures that underpin society, the economy, and the quality of life for society. Whether the changing climate, the aging infrastructures, or the emerging contaminants, engineering solutions exist and can be implemented.

Public trust relies upon an engineering profession that within its practices has imbedded codes of practice and ethics, and environmental sustainability guidelines. It is this trust that empowers and enables engineers to lead. Engineers' decisions and advice, when considered on a global basis, collectively determine the movement towards – or away from – a sustainable world.

Whether recognized by society or not, the burden of this leadership role is clear; on a project level, the engineer must weigh life-cycle and environmental considerations against alternate priorities and select those that limit the impact and minimize long-term negative outcomes. To fulfil that role and maintain public trust, the engineering profession must actively participate in policy deliberations on sustainability.

Theme 5 of the WFEO Committee on Engineering and the Environment's Strategic Plan focuses on the Environment and Sustainability in the Practice of Engineering. In this newsletter, contributors from Australia, the United States, and the United Kingdom write about sustainability initiatives in these countries. I invite you to read on.

What Can a Sustainability Rating Scheme Deliver For the Australian Infrastructure Industry?

By By David A. Hood
FIEAust, CPEng, FIPENZ, FISEAM

Professor David Hood is National Deputy President of Engineers Australia, and the Australian Representative on the WFEO-CEE. He is also Chairman of the Australian Green Infrastructure Council (AGIC).

For the last two years, the Australian Green Infrastructure Council (AGIC) has been driving the development of a National Sustainability Rating Scheme to promote innovation in social, economic and environmental performance in the design, construction and operation of new and upgraded infrastructure assets.

On completion, the National Sustainability Rating Scheme will provide a common metrics framework for sustainability assessment of the Australian infrastructure market.

The development of the rating scheme is being supported by more than 90 member organisations with over 70,000 staff from leading engineering design consultancies, construction companies, and operators to government departments and non-government organisations.

The National Sustainability Rating Scheme comprises a web-based rating tool, a guideline and assessment manual, case study resources, and the formal AGIC assessor and verification process, together with training programs and industry awards and promotion.

The first version of the rating tool will provide the metrics and methodologies to measure performance in areas such as project governance and management; environmental management; community and stakeholder relations; and resource efficiencies.

The rating tool can also be used by all Australian governments to check that project delivery and in-service operation actually meet, or better, particular project approval conditions for sustainability. It will complement existing compliance requirements, driving innovation toward more sustainable outcomes for business, governments and the community.

Rather than add complexity, the tool is designed to encourage stretch performance and create new industry benchmarks. The nominated criteria can easily fit within Key Performance Indicators and reporting frameworks currently in use in the market.

The full Award Scheme is on target for release in late 2011 and nationally appointed category authors have now completed the 60-per-cent authorship milestone and are currently working on the final drafts, with the draft tool to be applied on national project trials beginning in May 2011.

The benefits of the rating tool to stakeholders include:

- Sustainability assessment and scoring designed to encourage innovation
- Common national language, metrics, and understanding of sustainability as it applies to infrastructure projects
- Reduced tendering costs to industry through the application of nationally consistent sustainability elements and performance indicators in Requests for Tender (RFT) (at present RFT sustainability requirements vary markedly from department to department and state to state)
- Equitable tender assessment through an aligned national sustainability assessment framework
- Investment attraction through better risk assessment and asset valuation from the use of rating scheme
- Industry recognition for high sustainability achievements.

Sydney Harbour Bridge, an iconic piece of Australian infrastructure. Photo Erik Flakstad

Climate Change Adaptation First Assessment Category

In 2009 the New South Wales (NSW) Department of Environment Climate Change and Water (DECCW) sponsored authorship and trials of the Climate Change Adaptation (CCA) category, which was the first element of AGIC's rating tool to be developed. The category was trialed on two projects sourced through the NSW Department of Public Works.

Parsons Brinckerhoff was the author of the CCA category, AECOM was the technical reviewer, and GHD project-managed the authorship, reviews and pilot trials. The process was open and collaborative and designed to leverage off the experience from these three leading firms.

Consideration of trends and the potential risks posed by a changing climate have not in the past had the prominence that regulators, operators, owners, and infrastructure design and construction companies are now according them.

Traditionally infrastructure is designed on the basis of models based on historical weather records, and an assumption that the future climate will be the same as in the past. In addition, it is still common to find that we are not heeding the lessons (namely social, economic and environmental costs) from the impact of natural catastrophes on current operating infrastructure in our operations and maintenance plans, nor our long-term strategic thinking.

Responding quickly to this changing attitude, AGIC and DECCW agreed to use this category to develop an accessible guideline on how and when to consider climate change risk and adaptation (go to www.agic.net.au for a copy of the manual).

Flooded area of Brisbane, Queensland, Australia.

Criteria were aligned with key infra-structure planning, design, delivery and operations phases. Benchmarks describing a range of performance expectations, from “do nothing” to “implementing best practice” were articulated, guiding the user as to what, and to what degree the processes and initiatives described should and could be implemented.

The draft guideline was developed and then tested on a recently delivered dam, pump station and pipeline network located on NSW north coast (Shannon Dam), and a planned infrastructure upgrade (roads, drainage and services) to a major wastewater treatment facility located west of the NSW Blue Mountains (Lithgow Sewerage Treatment Plant).

Sustainability Support Tools

In addition to development of the National Sustainability Rating Scheme and the Climate Change Adaptation Guideline, AGIC has also released the following supporting resources:

AGIC Knowledge Hub
The purpose of the web-based Knowledge Hub is to act as a directory of information relating to innovation in sustainability in infrastructure. The Knowledge Hub is structured to capture industry case studies that demonstrate innovative sustainability practices occurring in infrastructure design, construction and operation. It is not designed as a marketing resource for companies to simply promote their expertise, but the contributing organisation is acknowledged against the case study. Case studies are peer reviewed by a Technical Support Working Group (TSWG) to ensure authenticity before uploading to the AGIC Knowledge Hub.

Quick Check
The second release was the AGIC “Quick Check” sustainability reference guide. This questionnaire-based spreadsheet with 136 questions allows the sustainability credentials of a new project or existing asset upgrade to be tested within two hours for areas of strength and weakness in relation to sustainability. Quick Check is freely available on the AGIC website (www.agic.net.au) and provides the user with an understanding of the issues that will be covered by the National Sustainability Rating Scheme when fully developed.

Find out more at the AGIC website www.agic.net.au

New Sustainable Infrastructure Rating System Launched in U.S. by ASCE, APWA and ACEC

By Peter D. Binney, P.E.

Peter D. Binney is Director, Sustainable Infrastructure, with Merrick & Company and is based in Aurora, Colorado, U.S.A.

A new, non-profit Institute for Sustainable infrastructure (ISI) has been launched by the American Society of Civil Engineers, American Public Works Association and American Council of Engineering Companies. ISI will provide a rating system for existing and new civil infrastructure projects to assist owners, project teams and interested groups with an objective framework to guide and assess the planning, design and performance of those projects. The new rating system, which is nearing the end of its initial drafting stage and will be available for review and comment through the end of 2011, recognizes that sustainability is not only a solution or a series of more efficient outcomes. Sustainability is also enhanced by strategically considering the planning and overall project delivery cycle, not just the design phase, and catalyzing changes in the way we think of and deliver infrastructure solutions to meet a community's needs.

System Includes Ten Primary Criteria

ISI was formally launched in February 2011 with a conceptual rating system that was developed by a working group from the three organizations and a consulting team that brought best-in-class approaches from throughout the United States and international systems. The rating system includes a series of ten primary criteria and 74 sub-criteria along with a graduated performance-achievement assessment to guide the user through the various elements of a decision and project-delivery process. The criteria include a series of considerations related to the conceptual and planning frameworks along with project management and business strategies to promote effective infrastructure solutions.

A second set of criteria relates to the efficiency of the infrastructure solution and promotes resources, materials, water and energy conservation as well as mitigation of impacts beyond regulatory requirements. In aggregate, the rating system promotes consideration of a broad set of project features that encourage high levels of interaction with communities and stakeholders, balancing investments to provide resilience and broad acceptance of benefits and consequences of the proposed project and increasing the wise use of limited resources – classically termed the “Triple Bottom Line.”

Allows for Customized Solutions

Infrastructure projects range from local public works projects to major regional projects of national significance. They can have nominal, if any, adverse consequences on the environment or community, or they can involve legacy commitments of major natural resource eco-systems or regional population centers. The ISI rating system consists of a series of modules that can independently be applied to these various situations. Those various levels of application will allow the practitioners to focus their approach to the context of their application and customize solutions that are relevant and can be understood by those groups involved in framing and delivering the infrastructure project.

ISI will make these resources available on its hosted website and interested parties will be able to use that material for guidance and self-assessment. In addition, ISI will certify practitioners as Assessors who are trained in the use of the rating system, who can guide owners and project teams in approaches that will lead to more sustainable solutions and who could make application to ISI for project recognition. A third-party verification stage would be used by ISI before formal award and recognition of the sustainable performance of the infrastructure project. Award recognition is scheduled to start in 2012.

For more information, contact ISI at www.sustainableinfrastructure.org

CEEQUAL International to Follow Footsteps Of Similar Sustainability Scheme in U.K. & Ireland

By Roger Venables

Roger Venables is Chief Executive of CEEQUAL in the U.K.

CEEQUAL, the assessment and awards scheme for improving sustainability in civil engineering and public realm, which has become firmly established in the U.K., has launched CEEQUAL International, a version of the CEEQUAL Scheme specifically created for the assessment of projects outside the U.K. and Ireland.

CEEQUAL is a rigorous methodology and question set for assessment of performance across 12 areas of environmental and social concern: Project Management, Land Use, Landscape, Ecology & Biodiversity, the Historic Environment, Water Resources and the Water Environment, Energy & Carbon, Materials, Waste Management, Transport, Effects on Neighbours, and Relations with the Local Community and other Stakeholders. In addition to being used as an assessment tool, with awards presented for different levels of achievement, CEEQUAL is used by project teams as an influencer of their decisions on the environmental and social issues they face.

The Naas By-pass in the Republic of Ireland was assessed under the current version of CEEQUAL for Projects in the U.K. and Ireland.

With CEEQUAL for U.K. projects already having been used on or currently in use on more than £16 billion-worth of projects in the U.K., and with more than 120 Awards having been presented, existing users with international operations last year expressed particular interest in having a version of CEEQUAL Assessments, and delivery of its beneficial influence on performance, anywhere they are working. The launch of the new International Scheme will enable assessment of projects wherever there is demand and response to expressions of interest for its use in the Gulf States, across Europe, South Africa and South East Asia. There is increasing interest from clients, contractors and consultants seeking proven independent assessment techniques to help demonstrate improved sustainability performance.

Through the commitment of many experts working for the benefit of the industry, the resulting Assessment Manual for International Projects is applicable anywhere in the world. As with the extensive use of the U.K. Scheme, its use will reflect commitment to high environmental and social standards, and will yield improvements to projects.

CEEQUAL International Demonstrates Commitment to Sustainability

Using CEEQUAL International can clearly demonstrate a serious commitment to the sustainability agenda in every country in which an organisation operates. It not only improves best practice within each project, it also enhances team spirit as a whole by developing a positive attitude towards the environment.

Tim Broyd, Group Technology and Innovation Director at Halcrow and a Director of CEEQUAL Ltd, says: “Since its launch a few years ago, CEEQUAL has become recognised as the pre-eminent U.K. technique for assessing the environmental worth of civil infrastructure. The introduction of an International Scheme will allow us to deliver the benefits that CEEQUAL brings to add value to our clients around the world.”

Emma Clark, Senior Consultant at AECOM, and a Senior CEEQUAL Assessor, has been piloting CEEQUAL International on a variety of projects. She says: “CEEQUAL is a unique tool which will now provide an opportunity for sustainability credentials to not only be measured but also rewarded, on a global basis. As an active U.K. CEEQUAL Assessor with international colleagues, I am finding this to be an exciting time for the infrastructure industry.”

Based on the same principles as its U.K. counterpart, CEEQUAL International is a self-assessment and evidence-based process carried out by a trained CEEQUAL Assessor – usually a member of the project team. Once the self-assessment has been completed, a CEEQUAL-appointed independent Verifier reviews the project and relevant evidence before making recommendations for a final Award to CEEQUAL. Following ratification, the award is then confirmed. (Continued next page)

(CEEQUAL – Continued from previous page)

Considers Local Regulations and Practice

In the U.K. Scheme, the sections and question scores are weighted to reflect their overall contribution to project performance. With CEEQUAL International, blanket use of the U.K. weightings would be inappropriate because of differences in physical environmental conditions and/or culture. So, a project team using CEEQUAL International needs to undertake a weighting exercise specific to the local area of the project, which CEEQUAL will then use to re-calculate the question scores. The Assessor also needs to take into consideration the local regulations and practice of each country.

In addition to developing CEEQUAL International, the CEEQUAL Management Team has recently been providing paid assistance to the American Society of Civil Engineers and their partners to help them to develop an infrastructure rating system in the U.S.A. (for U.S. developments, see page 4), and providing input to the Australian Green Infrastructure Council (see pages 2 and 3) in their development of their own Scheme for Australia.

For a discussion about how CEEQUAL International could be applied to your projects, or to discuss how CEEQUAL could work with you to develop a locally-focused version, please contact the author at roger.venables@ceequal.com or call +44 (0)20 3137 2379 (Please note the time difference to the U.K.).

For information about CEEQUAL generally, and on how it has been developed, please visit www.ceequal.com. For more information about CEEQUAL International, visit www.ceequal.com/international.htm.

Online Sources of Information On Climate-Change Adaptation

Attention is drawn to the following two online information sources.

1) The summary note of the fourth Nairobi work programme Focal Point Forum is available on-line at: http://unfccc.int/files/adaptation/application/pdf/fpf_summary_note_cancun_2010.pdf

The Forum took place in Cancun during the 33rd session of the Subsidiary Bodies of the UNFCCC.

2) The Nairobi work programme Focal Point Forum (as part of the United Nations Framework Convention on Climate Change Adaptation, Technology and Science Programme) has launched a Facebook page, “The Adaptation Exchange” at www.facebook.com/The.Adaptation.Exchange

The site stimulates and supports collaboration, sharing and networking on adaptation. Participation is encouraged by all NWP partners and their Focal Points in this adaptation initiative. Organizations are encouraged to post, contribute, and discuss adaptation on the page's "wall" and to share stories, information, and views on successes and lessons learned, challenges, solutions and needs.

The Committee on Engineering and the Environment will be posting updates of the WFEO-CEE activities related to Adaptation on this site.

WFEO-CEE and Related Upcoming Events

- Late June 2011 (date TBC) WFEO-CEE Mid-year Teleconference
- Sept. 4, 2011 Geneva, Switzerland – WFEO-CEE Face-to-Face Meeting #4
- Sept. 8–9, 2011 Geneva, Switzerland – WFEO General Assembly

- May 2–15, 2011 New York, U.S.A. – UN Commission on Sustainable Development Meeting No 19 www.csd.org
- June 6–17, 2011, Bonn, Germany – 34th Session of UN Framework Convention on Climate Change (UNFCCC) Subsidiary Bodies – www.unfccc.org
- June 4–6, 2012 Rio de Janeiro, Brazil – United Nations Conference on Sustainable Development 2012 (Rio +20) www.uncsd2012.org

Meetings Relating to WFEO-CEE Themes

Theme 2 – Climate Change Adaptation

- Sept. 6, 2011 Geneva, Switzerland WFEO-CEE Climate Change Sessions 2011 World Engineers Convention (www.wec2011.ch) www.wfeo.net

Theme 3 – Engineering and Agriculture

- July 29–31, 2011 Chengdu, China – International Conference on Environmental and Agricultural Engineering (ICEAE 2011) www.iceae.org

Theme 4 – Sustainability

- May 22–26, 2011 Palm Springs, California, U.S.A. 2011 ASCE-EWRI World Environmental and Water Resources Congress www.asce.org
- Aug. 17–19, 2011 Ottawa, Ontario, Canada – International Conference on Environmental Pollution and Remediation (ICEPR'11) 4th ASCE-EWRI International Perspective on Water Resources and the Environment http://ICEPR2011.international-ASET.org

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

September 2011

All infrastructures were designed and built to the codes and standards existing when they were constructed and embedded within these codes and standards are climatic criteria that are now being called into question.

Infrastructure Assessment and Adaptation Critical in Responding To Climate-Induced Vulnerabilities

Infrastructures, such as these electrical transmission lines in the Republic of Korea, are interdependent on other infrastructures. For example, water-supply systems may provide water for cooling and generation at power plants, In turn, power grids may supply electricity to pump and distribute water. Understanding such interrelationships is vital when adapting existing infrastructures to climate change. (UN Photo/Kibae Park)

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

The world is facing a serious challenge and it will take our best efforts to understand, quantify and adapt in order to minimize the impact of increasingly severe weather that adversely impacts the delivery and sustainability of infrastructure systems.

Water, transport, power, communications and built infrastructures are all at risk, and a failure of one infrastructure can severely impact our economies, our safety and our way of life.

Climate change, manifested through changes in atmospheric and oceanic conditions, will impose increased and new risks on many natural and human systems – notably through changes in climate variability, and in the frequency and magnitude of extreme climatic events.

The United Nations Framework Convention on Climate Change's (UNFCCC) and the Intergovernmental Panel on Climate Change's (IPCC) conclusion that the world is undergoing Climate Change requires the assessment of the relevancy of the climatic criteria currently used to design all infrastructures. Such assessments are an important factor in determining infrastructures vulnerability to climate-induced failure.

We must note that all infrastructures were designed and built to the codes and standards existing when they were constructed and embedded within these codes and standards are climatic criteria that are now being called into question.

Each Element Needs Assessment

Another fact is that individually, these assessments are not complex but since every element within each infrastructure system needs a vulnerability assessment, enormous numbers of infrastructure components require evaluation. A system fails at its weakest link.

Another consideration is that the life expectancies of public infrastructure are based on present and future climate conditions.

Nevertheless, infrastructure vulnerabilities must be identified, prioritized and adaptive actions implemented.

Knowledge on climate variables and climate change is improving; professionals and the risk-management tools and vulnerability-assessment protocols to identify, prioritize and implement adaptation and mitigation action are available.

Responding actions must be closely linked and coordinated, and not be addressed in isolation.

Actions must be sequenced and coordinated to continually inform subsequent decisions and actions that are economically, socially and environmentally responsive, and sustainable.

Significant to note is that not all changes will be detrimental.

Within each country, those who currently manage, plan, design, operate and maintain the infrastructure are central to carrying out this work and today ensure our societies the best infrastructures that they can afford.

Engineers – with climatologists, risk professionals, infrastructure managers and operators – already use vulnerability and risk assessment protocols, such as the Engineers Canada Public Infrastructure Engineering Vulnerability Committee (PIEVC) Engineering

Continued on back page

Adaptation of Existing and New Infrastructure to Climate Risks

By David Lapp, P.Eng.

David Lapp is Manager, Professional Practice, with Engineers Canada.

Introduction

Adaptation of infrastructure is a necessary strategy to reduce the risks and impacts of extreme weather events in the future. Engineers, planners, managers, operators and other professionals, including climate scientists, are needed to work as a multi-disciplinary team to respond to this risk. While adaptation of infrastructure to the changing climate is a huge problem, with proper assessment and planning, including proper operations and maintenance, it is manageable. The questions are how do we adapt infrastructure to climate change and where do we start? The answer to both questions is risk assessment.

Engineering vulnerability/risk assessment forms the bridge to ensure the changing climate is considered in engineering design, operations and maintenance of civil infrastructure.

Engineering vulnerability/risk assessment forms the bridge to ensure the changing climate is considered in engineering design, operations and maintenance of civil infrastructure. Identifying the highly vulnerable components of the infrastructure to climate-change impacts enables development of cost-effective engineering/operations solutions. It is a structured, formalized and documented process for engineers, planners and decision-makers to recommend measures to address the vulnerabilities and risks to changes in particular climate design parameters and other environmental factors from extreme climatic events. The assessments help justify design, operations and maintenance recommendations and provide documented results that fulfil due diligence requirements for insurance and liability purposes.

Currently, climate-change models do not provide the granularity or level of detail required for the site-specific scales used in engineering design of individual infrastructures. Engineering vulnerability/risk assessment provides a recognized methodology that handles the uncertainties that are inherent in climate-change projections. It enables the identification of key vulnerabilities and risks in a form that enables engineers to exercise their professional judgment for infrastructure design, operations and maintenance recommendations.

PIEVC Engineering Protocol

Since 2005, Engineers Canada, the nation-wide professional organization, has partnered with Natural Resources Canada to complete a national engineering vulnerability assessment of existing and planned public infrastructure to the impacts of climate change. A key outcome is a formalized risk-assessment procedure or tool, known as the PIEVC Engineering Protocol ("the Protocol").

Bearspaw Water Treatment Plant in Calgary, Canada – inside the Pre-Treatment Facility (Photo, The City of Calgary, Water Services)

The Protocol outlines a process to systematically review climate information and identify the vulnerabilities or adaptive capacity of the individual infrastructure. Risk is defined as the probability of the climate event times its severity or impact on the infrastructure, given that the climate event has occurred. The probability and severity estimations use a 0–7 relative scoring system that enables higher-risk components and the critical climate parameters to be identified through a higher-risk score. Higher-risk scores indicate the degree of increased climate impacts on infrastructure components (i.e. deterioration, damage or destruction). Risk profiles of the infrastructure components for current climate, as well as future climate, are developed. This information can be used to make informed engineering judgments as to what components require adaptation and how to adapt them (e.g. design adjustments, changes to operational or maintenance procedures). It is applicable to any type of civil infrastructure, including buildings.

Canadian and International Case Studies

The Protocol has been applied to 22 case studies of individual infrastructures in Canada falling within four infrastructure categories, namely buildings, storm water/wastewater systems, roads and associated structures (e.g. bridges and culverts), and water-supply and management systems. In March 2011, Engineers Canada, through the WFEO-Committee in Engineering and the Environment (CEE), completed the first international application of the Protocol in close partnership with the Costa Rica Colegio of Engineers and Architects. (See separate article in this newsletter.)

The following briefly describes an example of the scope of a case study completed in Canada.

City of Calgary Alberta – Potable Water-Supply System

The City of Calgary, a major centre in Western Canada with a population of about one million, is committed to ensuring the long-term sustainability of its water needs and water resources. Factors that significantly impact the water demand include population, employment, economic cycles, and technology, weather and climate, price and conservation programs.

City staff needed to update current infrastructure plans to take into account new population forecasts, climate change, and new initiatives such as low-impact development, water reclamation and regional servicing. Planning of water treatment plants and their associated linear infrastructure need to be integrated to ensure coordinated investment. There is also a need to link water licensing to the water-supply system's capacity analysis to ensure the system is being analyzed as one system from “the river to the tap.”

The Calgary case study conducted a vulnerability risk assessment to identify any components of the potable water-supply system that are at risk of failure, deterioration and damage from any extreme climatic events or significant changes to baseline climate design values for the years of 2020 and 2050. The project scope includes the source watersheds for Calgary's water-supply. The results for this case study are an input to the city's planning, scoping and costing of water-supply infrastructure in the future.

Further information on this and others case studies is available from Engineers Canada. (www.engineerscanada.ca).

Bearspaw Water Treatment Plant in Calgary, Canada – Residuals Treatment Facility (Photo, The City of Calgary, Water Services)

Outreach, Training and Capacity Building

The Protocol and the results of many of the case studies both collectively and individually have been presented at numerous technical conferences and professional society meetings on infrastructure, climate change and asset management in Canada, the United States and elsewhere. Venues have included events organized by WFEO-CEE at the United Nations Framework Convention on Climate Change meetings in Bonn, Germany; the World Bank, the World Engineering Convention in Brasilia, Brazil; and the Pan American Federation of Engineering Societies (UPADI).

Engineers Canada, in partnership with its constituent associations, has delivered one-day training workshops across Canada to over 650 engineers and other professionals. These workshops include a presentation on the local climate as well as the principles of risk assessment that form the scientific basis for the Protocol. Participants also engage in small group exercises to work with the protocol on a case study of an infrastructure.

Engineers Canada/WFEO-CEE training teams have delivered similar workshops in Costa Rica, Honduras, Guatemala and Panama.

Future Work

Over the next four years, WFEO-CEE will pursue training workshops and international case studies to allow other countries to develop their own capacity by learning and applying the Protocol.

Successfull application of the PIEVC Protocol to assess the Sanitary Sewer, the Treatment System and the Submarine Outfall for the City of Limón, Costa Rica.

By Eng. Freddy Bolaños Céspedes

Freddy Bolanos Céspedes is Chief of Department of the Colegio Federado de Ingenieros y de Arquitectos de Costa Rica and Costarican team project leader.

The first application of the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol in Latin America and the United States was conducted for the sewer system and its treatment facility, as well as the final discharge infrastructure of the City of Limón, Costa Rica. This project applied an analysis period of 30 years.

Thanks to a collaboration agreement between Engineers Canada and the Professional Association of Engineers and Architects of Costa Rica, it was possible to conduct the first diagnosis using PIEVC outside Canada to assess the degree of impact on public infrastructure due to climate change. The analysis identified a series of adaptation measures that must be implemented immediately, even if extreme climate events are not present.

The determination of the actions to be implemented was possible due to the application of the protocol developed by the Public Infrastructure Engineering Vulnerability Committee of the Canadian Council of Professional Engineers (Engineers Canada). The Protocol's objective is to evaluate and identify the risks that could be suffered by a given infrastructure due to climate change and therefore, define the specific measures to be implemented to adapt to the new loading conditions.

Increased Temperature and Precipitation Expected

For the Costa Rican project, the institutions involved were the National Weather Agency (IMN), the National Water Agency (AyA), the Professional Association of Engineers and Architects (CFIA), and Engineers Canada.

The City of Limón is located in the Atlantic (Caribbean) coast of Costa Rica. According to the IMN, due to climate change, the region's precipitation is expected to increase by 25% and the temperature to rise by half a degree by the year 2040. These changes will generate a change in the magnitude and the frequency of climate events. Through the application of regional and local models, the probabilities of occurrence for the most important climate parameters are shown in the table below.

Aerial perspective of Limón, Costa Rica, where the PIEVC Protocol was applied for the first time to infrastructure outside Canada.

Risk Analysis Applied

The risk analysis defined the severity for each infrastructure element that was considered for the project. And, even though no element showed high risk, it is important to mention that 32% of the analyzed elements shifted from low to medium risk for the 2040 scenario.

The elements that were identified as medium risks and most probable to be affected by climate change were: sanitary sewer (pipes and pumping stations), treatment facility (infrastructure and micro sleeve units), submarine outfall (concrete anchors) and the wave protection retaining wall.

Parameter	Present Probability	Future Probability
High Temperatures	4	5
Waves	1	2
Marine Breeze	2	3
Lightning	2	2
Flooding Rain	4	5
Overloading Rain	6	7
Hurricane	1	2
Wind	3	3

Used Integrated Approach

All the actions that were determined through the application of the protocol for this specific project did not concentrate only on substitution of infrastructure but a much more integral approach that considered substitution or modification of infrastructure, operational and maintenance aspects, and monitoring in order to provide better adaptation solutions.

The main activities to be implemented for the analyzed system were:

The conclusions of the project were:

Lightning	• Redesign ventilation system at pretreatment station
High Temperatures	• Verify existence of electrical protection of equipment
Flooding Rain	• Install weather station and monitor • Clean and repair gutters • Further engineering analysis replace or install
Overloading Rain	• Program to reduce illegal connections • Installation of weather station to monitor
Wind	• Maintain testing program of FC in areas with no sewer • Verify with wind speed/direction /contamination flume

- The PIEVC Protocol introduces Climate Change in a systematic manner based on a broad climate analysis.
- The best results for the application of the PIEVC Protocol occurred;
  - Where loading capacity was verified against extreme events that did occur
  - Where logs and registering documents were available.
- The application of the PIEVC Protocol allows identification of a loss-in-capacity or an out-of-service condition directly related to a specific climate event.
- The PIEVC Protocol, when used by experienced professionals, can establish a direct link between a specific element of infrastructure and an extreme event of climate change.
- In that sense, the PIEVC Protocol constitutes a powerful tool for planning the actions, and therefore the investments, that are required to adapt infrastructure to the impacts of climate change.
- The Protocol helped determine priorities for adaptation.
- The use of the protocol helped to prioritized research activities through its phase of engineering analysis.

WFEO-CEE and Related Upcoming Events

- Sept. 4, 2011 Geneva, Switzerland, (Centre International de Conférences Genève) WFEO-CEE Face-to-Face Meeting #4
- Sept. 8-9 Geneva, Switzerland (Centre International de Conférences Genève) WFEO General Assembly
- Nov. 2-8, Dec. 9, 2011 Durban, South Africa United Nations Framework Convention on Climate Change, Conference of the Parties Meeting No. 17 www.unfccc.org www.cop17durban.com
- June 4-6, 2012 Rio de Janeiro, Brazil United Nations Conference on Sustainable Development (Rio +20) www.uncsd2012.org
- Joint International Scientific Union (ICSU)-World Federation of Engineering Organizations Rio +20 Forum on Science and Technology – Rio de Janeiro Brazil - Technology Forum – May 28-June 1, 2012

Meetings Relating to WFEO-CEE Themes

Theme 2 – Climate Change Adaptation

- Sept. 6, 2011 Geneva, Switzerland WFEO-CEE Climate Change Sessions 2011 World Engineers Convention (www.wec2011.ch) www.wfeo.net

Theme 3 – Engineering and Agriculture

- Sept. 29-30, 2011 Surfer's Paradise, Queensland, Australia International Conference of Australian Society for Engineering and Agriculture – "Engineering Agriculture - Diverse Challenges - Innovative Solutions" www.engineersaustralia.org.au/seag2011
- Nov. 28-30, 2011 Venice, Italy – International Conference on Agriculture and Natural Resources Engineering www.waset.org/conferences/2011/venice/icanre

Theme 4 – Sustainability

- Jan. 5-7, 2012 Marrakech, Morocco – 5th ASCE-EWRI International Perspective on Water Resources and the Environment ewri@asce.org

WFEO-CEE 2007-11 Summary Report

At the WFEO 2007 General Assembly in New Delhi, India, Engineers Canada began hosting and chairing the Standing Committee on Engineering and the Environment (CEE). A small secretariat provided by Engineers Canada supports Chair Darrel Danyluk, P.Eng. and the committee made up of representatives of 30 countries.

Over the past four years, CEE held four, one-day face-to-face meetings organized in conjunction with the 2009 and 2011 General Assembly Meetings, and the Nov. 2008 and Oct. 2010 Executive Council meetings. From June 2008 through July 2011, four mid-year teleconferences/webinars reviewed progress in the Strategic Plan and received the Chair's report on WFEO and UN activities.

Report on 2008-11 Strategic Plan

The Committee executed a four-year Strategic Plan focusing on six themes summarized in the following table. At the 2009 General Assembly, on the recommendation of CEE, the Disaster Risk Management Theme became its own standing committee and was replaced by the Engineering and Agriculture Theme.

Table 1 – Summary of Themes and Notable Achievements

Theme (and Lead Country)	Key Focus/Additional Background	Notable Achievements
Theme 1 - Environmental Impacts of Major Sporting Events (Greece)	Environmental impact and sustainability issues around recent large-scale Olympic sporting events, and communication with future Olympic organizing committees	Final report accepted for publication in Oct. 2010 and issued in Sept. 2011.
Theme 2 - Engineering and Climate Change Adaptation (Canada)	Assess engineering vulnerability and risks of climate-change impacts on infrastructure. Develop strategies and engineering practices to improve resilience of existing and planned infrastructures to climate change	Project in 2010-11 with the Costa Rica Colegio to assess one of that country's sewage treatment systems by drawing on Engineers Canada's PIEVC Engineering Protocol. (For details, see this newsletter.) Technology transfer and capacity-building sessions in Costa Rica, Honduras, Guatemala, Panama and Brazil
Theme 3 Engineering and Agriculture (Argentina)	Most recently established theme, focuses on engineering and agriculture.	Task group formed to develop action plan for the 2011-15 Strategic Plan.
Theme 4 Sustainable Development Evaluation Framework (United Kingdom)	Sustainable development evaluation	Developed environment and sustainability evaluation framework to apply to engineering projects, policy initiatives.
Theme 5 - Environmental and Sustainable Engineering Practices for Engineers (Canada)	Sustainable Engineering Practices	Drafted international guideline for engineers on sustainable development and environmental stewardship focusing on professional and ethical principles. Results prepared for presentation at the General Assembly.
Theme 6 - Infrastructure in Developing Countries (India)	Developed training and education materials for recommendations arising from the Nov. 2007 international conference held with WFEO General Assembly in New Delhi.	Over the past four years, delivered many training sessions within India.

UN Framework Convention on Climate Change (UNFCCC)

In 2008, WFEO was granted observer status as a Non-Government Organization (NGO) for all UNFCCC meetings, with the Chair of WFEO-CEE as the Designated Contact Person. Since then the Committee Chair and occasionally other Committee members have participated and organized workshops ("side events").

Table 2 – Listing of UN Meetings

UN Organization	Year/Month	Location	Side Event Title
UNFCCC Climate Talks	June 2008	Bonn, Germany	Adaptation of Infrastructure to Address Impacts of a Changing Climate
	June 2009	Bonn, Germany	Engineering Vulnerability of infrastructure to climate change in newly developed and developing countries
	June 2010	Bonn, Germany	Infrastructure Climate Risk Assessment: Principles and Applications
	June 2011	Bonn, Germany	Infrastructure Climate Risk Assessment in Costa Rica: Knowledge Development and Capacity Building Experience
UNFCCC COP-15	June 2009	Copenhagen, Denmark	Danish Society of Engineers KlimateForum - 2009 Adaptation of Infrastructure Best Practices
UNFCCC COP-16	June 2010	Cancun, Mexico	No side event
UN CSD-16	May 2008	UN HQ New York	No side event
UN CSD-17	May 2009	UN HQ New York	Capacity Building – Words Into Action: Physical, Social & Economic Infrastructure
UN CSD-18	May 2010	UN HQ New York	Capacity Building – Words Into Action 2010 "Transport Efficiency and Waste Avoidance – Input for Policy-Makers"
UN CSD-19	May 2011	UN HQ New York	Capacity Building – Words Into Action 2011 "State-of-the-Art Innovative and Sustainable Technologies in Waste Management, Mining, Transport and Chemicals"

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WFEO-CEE 2007-11 Summary Report - Continued from page 6

WFEO-CEE contributed to meetings of the UN Nairobi Work Program within UNFCCC. In 2009 WFEO-CEE submitted an action pledge to the NWP and now provides yearly progress reports.

UN Commission on Sustainable Development (UN-CSD)

For the past four years, the Chair participated in a WFEO Task Force consisting of the Chairs of Energy, Capacity-Building and Engineering and the Environment that participated in 2008-2011 preparatory and full meetings of the Commission by submitting interventions providing the engineering perspective on policy positions and recommendations.

UN Millennium Development Goals

The Strategic Plan directly supported WFEO's mission for engineering to contribute meaningful and recognized support towards addressing the achievement of the UN-MDGs.

Newsletter

Between April 2009 and Sept. 2011, the committee published six newsletters, each focusing on one of the Strategic Plan themes.

2011-15 Strategic Plan

Engineers Canada has confirmed its willingness to host and chair the Committee for a second term. The Chair and Secretary are working with Committee members to confirm themes for the 2011-15 plan to be tabled for approval at the Committee's Sept. 2011 meeting.

Be a Part of *Words Into Action*

On September 6, 2011 at the World Engineers Convention in Geneva, Switzerland, attend a half-day session focusing on: "How will preparing for climate change impact the future of engineering?"

You are invited to join the World Federation of Engineering Organizations Committee on Engineering and the Environment, and Session Chair Paul Fesko of Engineers Canada for a half-day session for engineers on adaptation and mitigation. Find out first hand from engineers who are reducing greenhouse gas emissions and preparing to adapt to the impacts of climate change in their day-to-day work.

When: Tuesday, September 6, 2011 – 14:00 - 18:00

Where: Centre International de Conférences Genève, Room 5-6, Geneva, Switzerland.

When	Topics	Presenters
14:00 - 14:30	Climate Proofing the World's Infrastructure: The Role of Engineering	David Nickols Chair, Expert Panel for Water at the Institute of Civil Engineers, U.K.
14:30 - 15:45	Panel 1: Assessing the Risks of Public Infrastructure	
	Assessing Public Infrastructure Vulnerability to Climate Change: A Central American Perspective	Freddy Bolaños Céspedes Colegio Federado de Ingenieros y Arquitectos de Costa Rica
	Bridging the Gap Between Climate Change Data and Infrastructure Risk Assessment	Heather Auld Environment Canada
15:45 - 16:15	Official Convention Break	
	Coffee available outside room and session speakers available for discussion	
16:15 - 17:30	Panel 2: Engineering Solutions for GHG Reduction	Frida Frost Danish Society of Engineers
	5 ways to Reduce Greenhouse Gas Emissions	Alison Cook Cambridge University
	Get Started on a Country Report: Process and Funding Advice	
17:30 - 18:00	Nature as Infrastructure	Mark Smith International Union for the Conservation of Nature (IUCN)

Learn more about the Agenda and Speakers on line at:
www.wfeo.net and **www.wec2011.ch**; and follow us on Twitter **#ccaction2011**
Please share with your networks!

Danyluk Column - Continued from page 1

Protocol, to proactively address identified vulnerabilities.

The "No-Regrets" approach of embedding climate change assessments into all new capital works and infrastructure rehabilitation and upgrades will, over time, reduce vulnerabilities and climate-proof these systems.

Existing operating and capital budgets can fund this work, and international funding is available for adaptation work in developing countries.

Climate-Related Impacts

Climate-related disasters involving infrastructure may be mitigated only if policy-makers and citizens, administration and other entities appropriately fulfil their roles, and emphasize the importance of awareness-raising and disaster-prevention education.

For example, it is important for water-related parties in each river basin to cooperatively coordinate management of all natural and physical water and inter-related infrastructures.

A national report on adaptation for the United Kingdom has been published by The Royal Academy of Engineering on behalf of Engineering the Future. Titled *Infrastructure, Engineering and Climate Change Adaptation – ensuring services in an uncertain future,* the report clearly states how our critical infrastructures are dependent upon each other.

Using water as an example, the report shows water's dependence on all aspects of infrastructure by noting:

- Energy: water infrastructure is dependent on electricity to power its facilities, particularly pumping and water treatment, and IT systems;
- ICT: it is dependent on ICT to run its centralised IT systems and for communication;
- Transport: there is a dependency on road and rail transport for personnel and supplies to run its facilities, and for transport of waste;
- Water: has an internal dependency on the water infrastructure, in that much of the infrastructure is susceptible to flooding, particularly for treatment works and wastewater removal.

And conversely, the report notes, water has significant impacts on other infrastructures:

- energy is dependent on water for cooling power-generating and oil and gas-processing plants; energy-transmission infrastructure and plants are highly susceptible to flood damage;
- ICT cables are susceptible to flood damage;
- transport systems are also susceptible to flood damage.

Road and rail provide routes to deliver personnel and services to other infrastructure but transportation infrastructures are susceptible to flooding.

And it is noted:

"In addition, any system or process dependent on human intervention is reliant on water for hygiene and drinking: without accessible water workers cannot remain on a site. Similarly, food production and processing is highly dependent on water. The examples are many, and understanding these interrelationships is vital in adapting existing infrastructures to the impacts on the changing climate."

Existing Teams Can Play Key Role

Teams that already design, manage and run the infrastructures provide the essential human resources that will prove useful in identifying climate-related challenges and in recommending adaptive or remedial actions.

So, countries can identify, understand and manage climate-change risks by:

- Increasing awareness and understanding of the impacts of climate-induced risk at all levels within organizations and the society;
- Determining their risk-tolerance level in terms of economic, social, environmental and human criteria;
- Conducting initial risk assessments to identify and prioritize critical areas of land and critical infrastructures vulnerable to a changing climate;
- Conducting engineering vulnerability assessments for priority infrastructures (using engineering assessment tools, such as the PIEVC Engineering Protocol) to identify the vulnerable elements that need adaptive measures;
- Initiating adaptive measures – including changing policies, regulations, operational, and maintenance procedures – and physical interventions to mitigate vulnerabilities;
- Prioritizing adaptation planning and actions – including implementing operational and maintenance procedures that extend the life of infrastructures that are at critical risk of failure, are at high-service demands, are reaching the end of their life cycle, or exceed the risk tolerance level and require significant investment to refurbish or replace;
- Strengthening all decision-making processes by requiring that specific programs and projects include plans and actions to manage risks associated with future, as well as present climate variability and extreme weather events. Such actions will result in the climate-proofing of infrastructure projects (new and refurbished). This is a risk-based "no-regrets" approach.

Impacts of Changing Climate Real

The world is facing a challenging future; the impacts of the changing climate are real and their seriousness cannot and should not be underestimated, and they must be addressed. National plans to assess and prioritize the likely impacts, and systematically implement adaptive actions are required.

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Sustainability and Industry With a Special Focus on Mining

Newsletter #7
April 2012

Mining offers an interesting model in terms of sustainability

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Expect the newly formed WFEO-CEE Task Group on Sustainability and Mining to offer significant input as the mining industry continues to work toward greater sustainability.

The year 2011 marked the beginning of a new era for the WFEO Standing Technical Committee on Engineering and the Environment (CEE) and the opportunity for Engineers Canada to host this committee for a second and final term, and for me personally to have the pleasure of again serving as CEE Chair. As always, we welcome your views, input, comments and participation relative to topics raised in the newsletter.

Term two spans 2011–2015 and the Strategic Plan, which outlines our objectives, goals and deliverables for each of our six focus areas, is in place. This plan is available on the CEE portion of the WFEO website (www.wfeo.net/environment). Our focus areas cover: Adaptation to Climate Change, Mitigation to Climate Change, Sustainability in Industry with a Mining Focus, Engineering and Agriculture, Infrastructure in Developing Countries, and the completion of the Sustainability Guidelines for Engineers.

This newsletter focuses on the upcoming work of the Task Group on Sustainability and Mining. This Task Group is led by the United States, which, through its WFEO member, the American Association of Engineering Societies (AAES), has confirmed Dr. Nikhil Trivedi as Task Group Chair and leader of the initiative.

Sustainability in Mining

This topic was the focus of discussions at the UN Commission and Sustainable Development (CSD) meetings in March of 2011. CEE intervened at the CSD meetings on this topic. Excerpts of this intervention follow:

"The Scientific and Technological Community (WFEO is a co-leader of this major group with ICSU) includes the world's innovators who are the key to the technological solutions needed to address the real and current threats to sustainability.

"Chair, mining offers an interesting model in terms of sustainability. It is a wealth-generator, an employer, a supplier of basic and fundamental infrastructures that provide opportunity for economic and social growth. Its impact on the environment throughout its life-cycle can be long-lasting and its legacy can cause serious concern.

"We believe that sustainable mining includes:

- environmental and social impact assessments, undertaken in consultation with local communities as part of the planning process, and incorporated into the mine development plan that includes rehabilitation of impacted areas;
- adequate environmental monitoring systems and regular socio-economic studies over the life-cycle of the mining operation;
- respective regulatory frameworks at national and international levels to address corporate social and environmental responsibility and complete accountability;
- more investment in targeted scientific and engineering research and in upgrading education and training;
- the development, transfer and application of environmentally friendly technologies, including those technologies that reduce water and energy consumption and impact;

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Mining, Engineering and Sustainability

By Deborah J. Shields, PhD

Dr. Deborah J. Shields is an Affiliated Faculty Member at Colorado State University, a Visiting Professor at Politecnico di Torino, and is a principal with Shields Consulting llc. The author can be contacted at dshields@colostate.edu and Deborah.Shields@polito.it

"Reducing the water footprints of mining and minerals processing is a high mine-management priority."

Minerals, metals and materials are essential to every sector of every nation's economy and will play a determining role in the feasibility of the emerging technologies that sustainability will require. Nonetheless, initial discussions about the role of natural resources in sustainability tended to focus on the need to sustain ecosystems and maintain biodiversity. Clearly, mineral resources are not sustainable in the same way as these resources because they are non-renewable, and as a result, many people view mining as either inconsistent with sustainability (once extracted, the resource is "gone"), an anathema (primarily a source of pollutants and environmental degradation) or of secondary importance (merely a source of virgin materials for which recycled materials or renewable resources can be substituted).

Mineral Resources Are Important for Wealth Creation

In reality, sustainable development involves managing resources in a way that is conducive to long-term wealth creation and the maintenance of capital (natural, social, human, economic and physical). This perspective extends naturally to mineral resources, which are themselves a form of endowed, natural capital and are an important source of wealth creation. As a result, the discussion about minerals in sustainability now focuses on replacing depleted mineral capital with other forms of capital, environmental protection, fair and just distribution of risks and benefits, and ensuring that the contribution of a mine is net positive over the life of the project, from exploration through post-closure. While no single ore deposit or mine is sustainable, mining (primary production) has an important role to play in sustainable development, as a source of essential raw materials, and as an engine of economic development. However, the ability of the minerals and metals industry to make positive contributions to society, and to set the stage that will empower sustainable communities, increasingly depends on its willingness to more universally adopt sustainable mining practices and the capacity of governments to ensure that local, regional and national benefits of responsible resource development are fully realized.

Searching for Sustainable Mining Practices

Over the past decade, as a result of numerous transparent multi-stakeholder dialogues, and through international and collaborative interdisciplinary research projects, the industry has generated a considerable amount of guidance on how mining practices must evolve for the sector to responsibly fulfill its role in society's transition to sustainability. However, these practices, collectively referred to by the industry as sustainable mining practices, are not yet widely embraced, and the degree to which they are implemented varies across political jurisdictions, sub-sectors of the industry, and even within enterprises (private, public and state-owned). During 2010 and 2011, the United Nations Commission on Sustainable Development (CSD 18 & 19) examined the progress the minerals industry has made in implementing sustainable development principles and sustainable mining practices, and negotiated a statement on mining, which included recommendations for increased capacity building within the minerals sector, technology transfer, sharing best practices, and risk management, as well as social and governance issues.

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Task Group on Sustainability and Mining Will Work Under WFEO-CEE Umbrella

By Nikhil Trivedi, PhD

Dr. Nikhil Trivedi is Senior Partner with IDEKIN International and resides in Easton, Pennsylvania, U.S.A. He chairs the WFEO-CEE Task Group on Sustainability and Mining.

The Society for Mining, Metallurgy and Exploration (SME) is an international professional society of mining engineers, metallurgists, underground construction professionals, undersea mining professionals, exploration geologists, educators, students and researchers. SME advances the worldwide minerals community through information exchange and professional development. With its main office in Englewood, Colorado, U.S.A., SME has over 14,000 members located in 85 countries, including 51 local sections and 24 student chapters. Of those, 2,750 members, four sections and six student chapters are located outside the U.S. Over the past several years, SME members have been actively engaged in discussions on sustainability and mining at the United Nations Commission on Sustainable Development (UNCSD) and the WFEO level. As a result, SME was recently invited to organize a task group on sustainability and mining under the broad umbrella of WFEO's Committee on Engineering and Environment (CEE). The organization of this task group is still in its infancy, but we are determined to accelerate our activities soon.

Capacity Building

Our overarching goal is capacity building for mineral producers, and stakeholders, including governmental authorities, non-governmental organizations and the general public.

SME
Society for Mining, Metallurgy & Exploration

We visualize achieving that goal through the promotion and dissemination of information on the application of:

- Environmentally sound engineering practices and technologies in the minerals sector;
- Best practices in social sustainability and the minerals sector – including worker health, safety, reliability and training;
- Best practices in eco-efficient usage of land, water, energy, and mineral resources:
- Engineering solutions to re-using, re-purposing and recycling of minerals; and
- Innovative practices and techniques on risk management in the minerals sector.

Professional Growth and Interaction

We will support professional growth and interaction within the engineering profession through books, articles, symposia, short courses, and/or conferences on minerals and mining in sustainable development, consistent with WFEO principles. Naturally consistent with our theme are the following two initiatives:

- Dissemination of information on the role of minerals and metals in sustainable development, including the role of minerals in improving the quality of life; and
- Promotion of the achievements and capabilities of the mineral community to the general public and specifically to the communities in which minerals companies operate.

Opportunities for Collaboration

We expect to work collaboratively among ourselves and with other task groups within CEE in supporting achievement of the UN Millennium

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A Roadmap for Implementing Sustainability in Mining Enterprises

By Andrea Ramage

Andrea Ramage is responsible for Sustainability Strategy and Planning with CH2M HILL, Inc and is based in Seattle, Washington, U.S.A.

The mining industry recognizes that sustainability issues comprise part of a new business reality, in which traditional business responses no longer fully satisfy the expectations of investors, communities, employees and other stakeholders. Now, companies must develop sustainability programs, at minimum to appease stakeholders and keep pace with peers in the industry; they also have the opportunity to leverage sustainability concepts to drive innovation, establish leadership, and compete more effectively. To help mining companies transition to sustainable business, mining industry organizations can establish basic policy, guidance, best practices, standards, and technical assistance that will help reduce the costs and increase the benefits of sustainability implementation. Good models for such industry level support exist in the building industry, civil engineering and the water/wastewater industries.

However, while the new business reality is clear to most, the appropriate business response can be elusive and sustainability implementation can be challenging. A basic roadmap to implementation, described in this article, helps companies avoid common pitfalls while getting a smart start on their journey toward sustainability.

Part I: Three Implementation Arenas

The first part of the roadmap organizes the bewildering array of sustainability subtopics into three implementation arenas. **Organizational sustainability** consists of policy frameworks, governance, management, culture, leadership, strategy, corporate communications, and various systems to support endorsement and integration of sustainability into the organization. **Operational sustainability** consists of the daily to annual processes and systems that consume natural resources (water, energy, materials), apply human resources, and produce products and wastes. **Project sustainability** consists of planning, design, engineering, and construction activities needed to realize all types of projects, such as mine development, facility expansions, road and bridge improvements, and construction of water and energy infrastructure. Sustainability implementation can begin in any of these arenas, but successful implementation requires action in all three.

Part II: Sustainability at the Mining Enterprise Level

The second part of the roadmap identifies typical implementation challenges and a proven implementation approach.

Implementation Challenges

As for any organizational change effort, typical challenges in implementing sustainability include:

- Overcoming resistance to change, when people are asked to accept and endorse new sustainability goals and programs;
- Effectively linking sustainability goals to strategic goals, while placing them on par with other company goals;
- Integrating sustainability considerations with decision-making processes, including the complex trade-offs amongst sustainability indicators and conventional business indicators; and
- Allowing experimentation to occur, to spur innovation and encourage learning.

Mining must light the way toward sustainable approaches for doing business.

Proven Approach to Implementing Sustainability

In order to address the challenges above, implementing sustainability requires meeting three critical success factors: (1) the benefits must be worth the costs and ultimately support the business, (2) full integration of sustainability into company culture and business processes, and (3) long-term commitment to continuous improvement.

The process for implementing sustainability includes a few basic steps. For each of the three sustainability arenas described in Part I, the steps include:

1. **Vision**: Establish a vision and leadership support. Describe how sustainability is meaningful and relevant to the company to ensure that sustainability efforts will be aligned with business strategy and operating realities.

2. **Strategy and Actions**: Establish a high-level strategy, including goals, objectives and actions to achieve goals.

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A Roadmap for Implementing Sustainability

(continued from page 4)

Prioritization is essential for achieving results within time and budget constraints.

3. **Indicators and Targets**: Establish performance indicators to evaluate progress, including targets. Identify data sources and business processes for collecting data.

4. **Performance Report and Decision-Making**: Choose the methods, frequency and format for reporting indicators and progress toward targets. Address results in decision-making, and develop tools to support these processes. Appropriately engage stakeholders in decision-making.

5. **Educate and Communicate**: Educate leaders, managers, staff and stakeholders. Communicate goals and perfomance results.

6. **Evaluate and Course-Correct**: Regularly evaluate the sustainability approach and supporting processes. Modify vision, goals, objectives, initiatives and actions as needed, as well as indicators and targets and business processes.

Part III: Role of Industry Organizations and Engineering Societies

The third part of the roadmap, involving industry organizations, such as the International Council on Mining and Metals (ICMM) and engineering societies, is to facilitate sustainability implementation, thereby reducing the cost of implementation for mining companies. Their role is to compile information, conduct research, provide learning forums, develop standards for sustainability performance indicators and best practices, and provide technical assistance. Another potential role, borrowed from green building and civil engineering industries[1], is to provide sustainability rating systems (for self-assessment or third-party certification) that establish general standards of best practice and allow comparisons to be made between companies (or projects).

Sustainability requires a commitment to move mining enterprises in new directions.

Conclusion

The road map for sustainability implementation has been proven through multiple case studies in manufacturing, municipal utilities, oil and gas, consumer products, and many other industries operating around the world. Among other factors, successful sustainability implementation at the company level requires a long-term commitment by leadership, embedment into the culture of the organization, and deep integration with existing business processes. At the industry level, industry organizations and engineering societies should provide a strong and consistent platform of policy, guidance, best practices, standards and technical assistance in order to facilitate sustainability implementation.

1.The U.S. Green Building Council offers the LEED™ green building rating system. The Institute for Sustainable Infrastructure offers the Envision® rating system for all types of infrastructure projects.

Online Information Sources of Potential Interest to WFEO-CEE Members

Attention is drawn to the following online information sources.

1) Integrated Research of Disaster Risk (IRDR), a program co-sponsored by the International Council for Science, the International Social Science Council, and the United Nations International Strategy for Disaster Reduction, recently posted a report by IRDR's Forensic Investigation of Disasters (FORIN) Working Group. It is available on the IRDR website at http://www.irdrinternational.org/wp-content/uploads/2012/03/FORIN-report.pdf

2) The UNFCCC Secretariat notes that the latest newsletter of the Nairobi Work Programme on impacts, vulnerability and adaptation (NWP), is available at http://unfccc.int/files/adaptation/application/pdf/nwp_eupdate_march_2012.pdf

Mining, Engineering and Sustainability

(continued from page 2)

Considering the Entire Mine Life-Cycle

Corporate social responsibility and sound governance are essential aspects of sustainable development, whether mineral related or not. However, the correct application of existing and newly developed technologies by skilled and knowledgeable engineers is equally important. For example, the frame of reference for sustainable mining practice has expanded to cover the entire life-cycle of a mine, from exploration to project development, operations, closure and post-closure, but this perspective is not yet widely adopted. In addition, there have been technical improvements over the past decade of which wider implementation is required if societies are to meet their sustainability goals. For example, reducing the water footprints of mining and minerals processing is a high mine-management priority. Wider adoption of sound water-management practices (e.g., increased water treatment and recycling, the use of environmentally benign dust-suppression chemicals to reduce road-watering intensity and frequency, etc.) is needed. Similarly, implementation of measures that result in significant efficiencies and reduction in energy use and carbon emissions need broader adoption. Currently the transport and storage of processing waste products (tailings)

utilize large quantities of water. Technologies are now in practice, but can be improved, which provide for "dry-stacking" of these products. Numerous other examples exist. Another article in this newsletter (page 3) describes a new Task Group within WFEO-CEE on Mining and Sustainable Development that will focus on capacity building, and transfer of technologies and best practices.

Task Group on Sustainability

(continued from page 3)

Development Goals. Moreover, we can think of many opportunities for our task group to cooperate with other standing committees within WFEO, such as Capacity Building, Disaster Risk Management, Education, Innovative Technologies, Energy, Anti-Corruption and Future Leaders.

Our operating principles are simple. We will operate under strict professional and ethical engineering principles. We will honor the unique cultural and social values of the countries of the world where mining and mineral processing occurs. We will endeavor to encourage adoption of engineering guidelines for responsible mining to ensure that the essential flow of minerals continues to keep pace with ever-increasing global demand.

International Participation

We have embarked on an ambitious effort to secure participation from those countries of the world where mining and/or mineral processing are major activities. We have tried to bring balance to our team by specifically seeking skilled engineers from the developing world and the developed world. We have secured participation on our task group from Australia, Brazil, Canada, Chile, China, Finland, Ghana, Greece, India, South Africa, Spain, Turkey, U.S.A. and Zambia.

Our effort to recruit new contributors to the task group will continue as we further refine near-term objectives and goals to support our mission.

Liaisons to the task group are Mr. John Hayden, Ms. Carol Russell, and Dr. Deborah Shields. Dr. Nikhil Trivedi chairs the task group. All are members of SME. We welcome comments, ideas and suggestions from our engineering colleagues.

Please contact John Hayden at hayden@smenet.org or Nikhil Trivedi at nikhiltrivedi@idekin.com. For more information about SME, please visit www.smenet.org.

CEE 2011-2015 Strategic Plan Includes New Themes

By David Lapp, FEC, P.Eng.

David Lapp, is Manager, Professional Practice, with Engineers Canada and Secretary of WFEO-CEE.

During Engineers Canada's first term hosting and chairing the CEE, a four-year Strategic Plan (2008-2011) was implemented, and concluded in September 2011. For the second term, a new plan continues work on three themes from the first plan and embarks on three new ones. All six themes will contribute knowledge and outcomes in support of WFEO's input to the UN Millennium Development Goals (MDGs). The second strategic plan will conclude its work by the time of WFEO's General Assembly in December 2015.

The themes and the leading countries are:

Theme 1 – Adaptation of Infrastructure to Climate Change – Canada;

Theme 2 – Climate Change Mitigation – United Kingdom;

Theme 3 – Engineering and Agriculture – Tunisia;

Theme 4 – Engineering and Mining – United States;

Theme 5 – Sustainable Infrastructure in Developing Countries – TBC; and

Theme 6 – International Guideline on Sustainable Development and Environmental Stewardship for Engineers – Canada.

Each theme prepares a general workplan, which includes activities and deliverables such as organizing workshops, webinars, preparation of papers and presentations, reviews of documents, attending meetings on behalf of WFEO and the CEE. Each theme working group relies on available resources and volunteers, and is chaired by a Theme Leader from the leading country.

For a copy of the new plan, please contact the WFEO-CEE Secretariat (david.lapp@engineerscanada.ca). WFEO member countries and international organizations are encouraged to nominate individuals to participate and contribute to each of the six themes. To do so, contact the Secretariat at the address noted above.

WFEO-CEE Closely Involved With UN Rio +20

Between June 20 and 22, 2012, the United Nations Commission on Sustainable Development will hold the Rio +20 Summit in Rio de Janeiro, Brazil. Over the past several months, the UN has been working on a Zero Draft Declaration that will communicate outcomes and future actions needed to address sustainable development, alleviate poverty, tackle food security and promote the principles of environmental stewardship in all regions of the world. The WFEO has been working with the International Council for Science (ICSU) as the leading members of the Major Group on Science and Technology to provide mutually agreed input to the Zero Draft to ensure the voice of engineering and science is heard.

This message will be further elevated through events to be held prior to the Summit itself. A five-day Forum on Science Technology and Innovation, the organization of which was led by ICSU with input from WFEO and others, will be held the week prior to the Summit (11–15 June). The Forum will provide a space for interdisciplinary scientific discussions, and dialogue between scientists, engineers, policy-makers and other stakeholders. Key messages and conclusions from the Forum will be reported to the Rio+20 conference to highlight the urgent need for concerted action on sustainable development, and the role that science and engineering should play in this endeavour.

The WFEO-CEE Chair and Secretary, along with several representatives from WFEO-CEE and other WFEO groups will be attending these events and will be preparing reports that will be communicated to the WFEO-CEE and the WFEO community. Further information on Rio + 20 can be accessed through the links provided in the calendar of events or by contacting the WFEO-CEE Secretariat (david.lapp@engineerscanada.ca).

Sustainability and Industry (continued from page 1)

- technical and financial support to developing countries that will strengthen the technical capacities of national institutions regarding the opportunities and challenges of mining, including establishing and managing contracts with international mining companies and organizing participatory processes that includes the local community.

"Chair, the legacies and residual impacts of mining, such as the large physical footprint of a surface mine, should be carefully planned, implemented and monitored to minimize the environmental impacts during mining and to facilitate the return of the land to a sustainable post-mining use."

The CEE Task Group will continue to input the engineering view on mining into the UN process.

UNFCCC Meeting in Bonn

In May of 2012, the United Nations Framework Convention on Climate Change (UNFCCC) meetings will continue in Bonn. The WFEO-CEE delegation has proposed a side event titled: "Climate Vulnerability Assessment: Key Strategies, Lessons Learned, and the Social, Economic, Environmental Costing Component. The Triple Bottom Line!" Meetings are scheduled with national delegations to further the awareness of the engineer's role in adaptation.

WFEO at Rio +20 in June

In June of 2012, the world will come together in Rio de Janeiro, Brazil. Known as Rio +20, the conference references a timeline since changing climate and sustainability were recognized by the UN membership as important areas for policy discussions. WFEO is a co-leader of the "Scientific and Technological Major Group" and in this capacity has the ability to input into the UN deliberations. Our focus has been on raising the profile of engineers and engineering solutions through our input on action initiatives. Through focused seminars and side events, negotiating session interventions and written input into the Conference Chair's "Zero Draft", WFEO maintains the engineering profile on the global stage. Opportunities are available for WFEO national members, and through them, interested individuals. Our experience to date shows that the relationship between active national members and their respective governments are strengthened by becoming involved. We welcome your interest in these opportunities.

Looking Towards CEE's Future

Lastly, I provide some comments and a perspective on the future of the CEE. The WFEO bylaws limit the term (maximum two, four-year terms) that a member country can host a technical standing committee. We have entered our second term and an inherent requirement will be to identify, engage and transition the CEE to a new host country at the General Assembly scheduled for 2015 in Japan. I invite national members to attend and participate in our face-to-face meeting in Ljubljana, Slovenia, in September, and to consider the hosting of this committee beyond 2015.

WFEO-CEE and Related Upcoming Events

- June 27, 2012 (TBC) WFEO-CEE Teleconference Meeting #5
- Sept. 16, 2012 Ljubljana, Slovenia – WFEO-CEE 2012-2017 Face-to-Face Meeting Meeting #5
- Sept. 17–21, 2012 Ljubljana, Slovenia – WFEO-CEE Session on Green Buildings World Engineering Forum, Sustainable Construction for People

United Nations Framework Convention on Climate Change

- May 14–25, 2012 Bonn, Germany – Bonn Climate Change Conference www.unfccc.org
- Nov. 26–Dec. 7, 2012 Doha, Qatar – Conference of the Parties Meeting No. 18 www.unfccc.org

United Nations Commission on Sustainable Development

- June 11–15, 2012 Rio de Janeiro, Brazil – ICSU-UNESCO-WFEO-ISSC-Brazilian Ministry of Science, Technology and Innovation and Brazilian Academy of Sciences Forum on Science, Technology and Innovation for Sustainable Development www.icsu.org/rio+20/science-and-technology-forum
- June 16, 2012 Rio de Janeiro, Brazil – WFEO Seminar on Sustainable Communities www.wfeo.net
- June 20–22, 2012 Rio de Janeiro, Brazil – Rio +20 – United Nations Conference on Sustainable Development www.uncsd2012.org

Meetings Relating to WFEO-CEE Themes

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- May 27–29, 2013 Montreal, Canada – Engineering Institute of Canada – 3rd Climate Change Technology Conference 2013 www.cctc2013.ca

Theme 3 – Engineering and Agriculture

- July 8–12, 2012 Valencia, Spain – International Commission of Agricultural and Biosystems Engineers – 3rd CIGR International Conference of Agricultural Engineers www.cigr.ageng2012.org

Theme 4 – Sustainability and Mining

- Oct 15–20, 2012 Tongji University, Shanghai, China – Underwater Mining Institute: Marine Minerals: Finding the Right Balance of Sustainable Development and Environmental Protection http://www.smenet.org/page/index.cfm?title=2012_UMI_Attendee_Information
- June 30 – July 3, 2013, Milos, Greece – SDIMI 2013 Sustainable Development in the Minerals Industry http://www.sdimi.org

Theme 6 – Infrastructure in Developing Countries

- May 24–26, 2012 New Delhi, India – American Institute of Engineering and Sustainable Development, International Civil Engineering and Sustainable Infrastructure Conference www.aiesd.org

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #8 September 2012

Engineers are broadening their reach and influence, and contributing by increasing the efficiencies within the agricultural sector.

Engineering and Agriculture – Finding a Balance With the Environment

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

The WFEO Standing Committee on Engineering and the Environment (CEE) Strategic Plan for the 2011–2015 term has selected key industrial sectors where the environment and engineering ingenuity are vital to providing, protecting and enhancing societies' quality of life.

This newsletter focuses on the agricultural sector and elements where engineering plays a role in finding a balance between the environment and the delivery of sustainable food. Fertilizer, irrigation, transport, storage, waste management and telecommunications are examples where engineers' ability to innovate is needed. This innovation goes beyond the traditional view of engineering, where built infrastructures are provided. By recognizing the necessity for interrelationships with the actors in the sector and for building technical capacity at local levels, engineers are broadening their reach and influence, and contributing by increasing the efficiencies within the agricultural sector. From improving transport

facilities, to irrigation technologies; and from enabling market-access through wireless-communication to protecting surface water through adequate waste and fertilizer systems, engineers are important contributors of the food supply chain that society depends upon.

The CEE Agricultural Task Group is led by Tunisia and is tasked with the following objectives:

- To develop an understanding, knowledge and capacity to address selected key problems within the agricultural supply chain at a regional or country level that would benefit from engineering;
- To foster co-operation between the engineering and agricultural communities;
- To provide on-going engineering advice to the Farming First organization; and
- To provide the engineering perspective on agricultural supply issues internationally at the United Nations Framework Convention on Climate Change (UNFCCC) and the UN Conference on Sustainable Development (UN-CSD).

The Task Group's term extends four years and members with relevant experience are being sought to broaden the skill base of the task group. If you are interested, please contact the CEE secretariat at: david.lapp@engineerscanada.ca

Of particular importance is the WFEO contribution to the establishment of Farming First. Through WFEO involvement at the United Nations Commission on Sustainable Development as co-chair of the Scientific and Technological Community, WFEO and our co-chair, the International Science Council, joined two other major groups to create Farming First. The Farming First coalition exists to articulate, endorse and promote practical, actionable programs and activities to further sustainable agricultural development worldwide. Farming First has no secretariat and it is not intended that one will be created. The WFEO-CEE contribution is to provide engineering and technical input into documentation produced by Farming First. This newsletter offers further insight on these initiatives.

Farming amounts to a most fundamental and essential of human activities. Even in highly urbanized and industrialized countries, sizable sectors of the population are only a generation of two ”off the land.”

Continued page 8 (Finding a Balance)

Farming and Engineering Walk Hand-in-Hand

Farming First promotes practical, actionable programmes and activities to further sustainable agricultural development worldwide.

By Robynne Anderson

Robynne Anderson is XXXXXXXXXXXXXXXXXXXXX

Food prices are rising and demand for cereals has outstripped production seven of the past ten years. Just watching the news each night, the need to link engineering, technologies, and capacity building to agriculture is clearer now than it has been in the last half century.

That is why World Federation of Engineering Organisations (WFEO) was a founding member of the Farming First coalition. Farming First promotes practical, actionable programmes and activities to further sustainable agricultural development worldwide. With this in mind, its web site is a bountiful resource of information on farming and sustainable development (www.farmingfirst.org). Over 131 organisations representing the world's farmers, scientists, engineers and industry as well as agricultural development organisations, are supporters.

Improving Farmers' Livelihoods

With one shared voice, Farming First highlights the importance of improving farmers' livelihoods and agriculture's potential contribution to global issues such as food security, climate change, and biodiversity. It also aims to build synergies amongst its supporters in promoting Farming First's mission.

"We have a strong communications team that has won awards for our efforts to highlight sustainable agricultural development," explains Farming First CONFIRM Co-chair Morgane Danielou. "WFEO has brought a focus on capacity-building and interdependency to the coalition. Working together with a group like WFEO has helped us expand our expertise and get meaningful policy outcomes focused on what farmers and all agricultural actors will need to grow."

Agriculture Top Rio+20 Priority

From the perspective of WFEO, engagement has encouraged a focus on capacity building in the context of these challenges. An example is the recent engagement at Rio+20, which saw agriculture become a top priority issue in the final outcome.

Where engineers can help includes:

- Focusing investment on sustainable agriculture practices, rural infrastructure, storage capacities and related technologies, co-operatives and value chains;
- Enhancing agricultural research extension services and training to improving agricultural productivity and sustainability;
- Empowering farmers, fishers and foresters to choose among diverse methods of achieving sustainable agricultural production;

Significantly reducing post-harvest and other food losses and waste throughout the food supply chain;

Enhancing resilience to climate change and natural disasters.

A few examples of relevant language directly from the Rio+20 text include:

109. *We recognize that a significant portion of the world's poor live in rural areas, and that rural communities play an important role in the economic development of many countries. We emphasize the need to revitalize the agricultural and rural development sectors, notably in developing countries, in an economically, socially and environmentally sustainable manner. We recognize the importance to take the necessary actions to better address the needs of rural communities through, inter alia, enhancing access by agricultural producers, in particular small producers, women, indigenous peoples and people living in vulnerable situations, to credit and other financial services, markets, secure land tenure, health care and social services, education and training, knowledge, and appropriate and affordable technologies, including for efficient*

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irrigation, reuse of treated waste water, water harvesting and storage….

207. ….We note the importance of mitigating the effects of desertification, land degradation and drought, including by preserving and developing oases, restoring degraded lands, improving soil quality and improving water management, in order to contribute to sustainable development and poverty eradication… *We also encourage capacity building, extension training programmes, and scientific studies and initiatives aimed at deepening understanding and raising awareness of the economic, social and environmental benefits of sustainable land management policies and practices.*

Zero Hunger Challenge

Rio+20 culminated in the launch of the UN Secretary General's new Zero Hunger Challenge, which caps a long effort to get a focus on food and nutritional security. Ban Ki-moon said: "Zero hunger would boost economic growth, reduce poverty and safeguard the environment. It would foster peace and stability."

The Zero Hunger Challenge has five main objectives: to achieve 100 per cent access to adequate food all year round; to end malnutrition in pregnancy and early childhood; to make all food systems sustainable; to increase growth in the productivity and income of smallholders, particularly women; and to achieve a zero rate of food waste.

Sustainable Development Goals

Following Rio+20, the UN is embarking on a process to establish Sustainable Development Goals (SDG). There is already a process underway to establish the post-2015 development framework to replace the Millennium Development Goals (MDG). Certainly hunger and food are high on both the MDG and SDG agendas. For WFEO and our Farming First partners, it is a chance to highlight the impact of good engineering as a solution to improve food production.

Graphic show poster created in connection with three side-events Farming First hosted during the recent Rio+20 gathering in Rio de Janeiro.

"Farming First has been a dynamic partner coalition for WFEO," says Darrel Danyluk, P. Eng., a member of the WFEO Rio+20 coalition. "It has been a symbiotic relationship that has provided another forum to talk about science and engineering while intersecting with the most pressing issues facing the world today."

Engineering and Agriculture – A Growing Relationship

By Fethi Thabet

Fethi Thabet, a Tunisian citizen, chairs the WFEO–CEE Agricultural Task Group and is a founding member of the Tunisian Order of Engineers. He is a long-serving (20 years) CEE member and for four years served on WFEO's Executive Committee. He is a graduate of the Ecole nationale superieure des télécommunications de Paris and holds a master's degree in transportation planning and management from the Central London Polytechnic. Mr. Thabet has spent much of his career in transportation policy development and currently is an Advisor to the Chief Executive Officer ofTunisair, Tunisia's flag carrier.

"There is still enough water for all of us. But only as long as we keep it clean, use it more wisely and share it fairly" UN Secretary General Ban Ki-moon

Overview

The world community of engineers is engaged more than ever in backing the United Nations in its effort to put the planet on the path of inclusive and environmentally sustainable growth. Engineers are committed to identifying, developing and implementing innovative and sustainable solutions that allow for an efficient use of world resources. The profession is ready to provide thought, leadership and appropriate technology-led solutions in all sectors of the economy and particularly in agriculture.

The main reason is that there is a widespread recognition of the growing role of agriculture in building a global green economy. This sector is regarded as an engine suited to eradicate poverty, to reduce inequality, to ensure food and nutrition security worldwide, and to improve the standard of living of those living in rural areas (millions of small farmers representing 50% of the poorest population).

Engineers play an increasingly important role in the agricultural field.

The world population will increase from seven billion today to more than nine billion by the year 2050; of those, more than 70% will live in urban areas. Despite the effort undertaken over the last 20 years, more than one billion are hungry.

For many countries, agriculture's share of the GDP exceeds 50%. Most of these countries are in Africa and Asia (Chad, Comoros, Guinea-Bissau, Liberia, Sierra Leone etc.). So, any growth in agriculture has direct impact on poverty reduction.

Why Agriculture Matters to a Green Economy

The drive toward a green economy goes through agriculture, which worldwide accounts for:

- 70% of water consumption;
- 34.3% of land area;
- 30% of greenhouse gas emissions (deforestation 13%); and
- 37.3% of total labour forces.

In contrast to sectors like industry or transport, agriculture has a huge potential to reduce carbon emissions (since 1960, and because of improvement in crop yield, a saving of more than 34% of total carbon emission has been achieved).

Climate Change

Climate change is among the factors causing serious problems.

The warming of the climate will affect many African countries as yields from rain-dependent agriculture (important to the poorest farmers) could be reduced by up to 50 per cent by the year 2020. Furthermore, any warming above three degrees Celsius will have negative impact on productivity and this will increase food prices, which already are high in many low and middle-income countries. This, in turn, will increase the risk of hunger.

At the same time, agriculture is still an important contributor to the climate problem as the industrial agriculture system depends on synthetic fertilizers and intensive use of inputs like fossil fuel and water.

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Focus Areas for Future Actions

Facing Land Degradations

It is estimated that every year 80,000km^2 are degraded (more than 24% of the soil used by agriculture). The most vulnerable areas are Sub-Saharan Africa, where recent figures show 65% of the land is degraded. As a result, land restoration and regeneration are urgently needed to reduce the scope of migration.

In addition, Africa is suffering from severe climate conditions, civil conflicts, low productivity and insufficient use of technological innovation. Many farmers told us during the June Rio+20 convention that they need knowledge and not money. So engineers are in the front line to review the management of land and regenerate soils and improve rural infrastructure.

Deforestation

Every year, thousands of square kilometres catch fire (this summer, for example, in Algeria 21,000km^2). If we lose the forests, we lose the fight against climate change. In Kuwait, 75% of the land is prone to overgrazing and this causes degradation of vegetation cover and loss of biodiversity.

- the forests, we lose the fight against climate change. In Kuwait, 75% of the land is prone to overgrazing and this causes degradation of vegetation cover and loss of biodiversity.

The contribution of engineers can be in drafting guidelines and disseminate successful examples of reforestation in different physical areas, as well as summarizing methods used to reduce the pollution resulting from the processing of forest production.

Desertification

Desertification affects more than one third of the world landmass, resulting in more than 1.5 billion persons facing the threat of hunger and migration (70 million persons leave rural areas every year) especially in Africa, Asia and Middle East.

Facing Hunger and Food Insecurity

The big challenges for engineers now are:

- To build a sustainable world supply chain and reduce food losses and waste during harvest, storage, distribution, transportation or during processing or packaging as many countries set up quantitative objectives for loss and waste reduction.
- To increase agricultural yields: engineers can foster applied research and share and disseminate knowledge to identify adequate solutions as the demand for food will double by 2050. In many areas, like Middle East and North Africa, more than 40% of crop productions are at risk by 2025 because of water availability and yields may decrease by 20% because of climate change.

Water, whether too much or too little, is vital to the success of agriculture and the well-being of this African farmer and millions of others.

Water Security

The global water system is changing without adequate knowledge of those changes. How is this evolving and how can we respond?

During the past century, population has tripled and the use of water increased six times. Nowadays, more than 2.7 billion people face water shortage and the situation is likely to worsen.

The quality of water has been degraded because of climate change; the precipitation patterns increase the risk of floods and change the seasonal run-off. Practices like pumping water faster than it is replenished are unsustainable.

Another issue is related to water pollution. Livestock is among the largest sectoral sources of water pollution and is responsible for 64% of ammonia emissions, which contribute to acid rain.

The WFEO Draft Strategic Plan (2012–2015), in the field of sustainable agriculture, emphasized the urgent need for new innovative solutions for better use and management of the water resource system to adapt to climate change. (Control of water pollution is also needed.) This is especially the case in Africa where precipitation is expected to decrease by 33% in some regions and increase by 22% in others.

Role of the Agriculture Engineer in Achieving Food Security

By Boubaker Thabet

The author is Professor of Agricultural Economics at the National Institute of Agriculture in Tunisia.

"Providing assistance to building capacities of agriculture engineers would be a top priority."

The engineer is viewed as a skilled, generally educated person capable of calling on science and technology to find operational solutions for real world problems by taking into consideration effective constraints limiting decision-making and progress. The agriculture engineer does this in domains related to agriculture and food.

Food security is taken to mean a situation in which a person, a region or a country is confronted with as little uncertainty as possible in finding and accessing to food.

From this point of view, requirements for successful agricultural engineering in augmenting food security, which is equivalent to reducing food insecurity, are:

(I) skills to adequately address and identify food security or insecurity problems (This depends upon the nature and quality of the engineer's training.);

(ii) knowledge about the food insecurity particularly in terms of causality;

(iii) neutrality in addressing food security complexities so as not to bias the analysis and treatment of food insecurity issues and problems.

In this context, food security treatment and analysis are viewed as the end objective and the engineer's know-how is one of the possible tools that could contribute to achieving such an objective.

In this context, food security treatment and analysis are viewed as the end objective and the engineer's know-how is one of the possible tools that can contribute to achieving such an objective.

Food security involves two aspects: the demand side of the seeker of food and the supply side that provides the food.

Supply and Demand Variables

Elementary economics tells us that the demand side is heavily determined by the consumer's absolute income; among other things, the cost of food items; its fluctuation through time and space; and the socioeconomic characteristics of the consumer etc. The more these variables favor the consumer, the more secure he would be.

The supply of food items also plays a very important role in providing security to the consumer. Typically, food supply has two origins – national and international. The national component is a function of the internal resource potential, plus the technical know-how provided to farmers by research and extension facilities. It is also affected by climatic and natural resource variability and the quality of the national and international market function and performance.

Food security is also quite relative depending on the commodities, consumers, regions and countries. Food security or insecurity are dynamic and evolving in that food demand and, particularly, supply are never stable.

Perceptions of Food Security Sometimes Are Misleading

The public perception of food security as one-view-of-the-consumer-fits-all can be quite misleading. One important segment of the population can face severe food insecurity while most of the population is quite secure. The accounting macroeconomic view of food security, measured in terms of how close or how far from a balanced food trade situation a given country is, while apparently reassuring when it is favorable, can hide very destabilizing factors, which can become very socially explosive.

Ultimately, food security or insecurity is a household concern. It can be a public concern in view of the diverse and sporadic use and misuse of public policy instruments, which no doubt distort an otherwise spontaneous economic and social behavior. Distortions obviously have advantages to those who benefit and disadvantages to those who are penalized.

Policies May Overshadow Debate

To cover up and justify public-policy errors, officials often use the concept of staple, strategic, basic, sensitive and/or sovereign commodities to argue for what could otherwise be ill-advised food policies. While important considerations to study in depth and with skills, these commodity qualifiers have publicly been used in many counties to overshadow adequate public debates about food policies issues.

Importantly, while it can be a cause for social and economic stability or instability, food policy security or insecurity are in themselves endogenous (i.e., result from the interaction of many determining variables). One can notice that in a number of countries significant food deficits have emerged as a result

Continued next page (Food Security)

Food Security (continued from page 6)

of public policies promoting inexpensive basic food items. This has resulted in large imports from world markets where prices have recently been quite volatile, thus making domestic economies increasingly and heavily dependent on international supply, and thereby necessitating public budget outlays that these countries cannot afford.

"Strategic" Commodities Prompt Interventions

Food insecurity questions correspond nowadays to the so-called strategic commodities, which almost everywhere are the subject of policy interventions. It is argued that they are commodities that are heavily consumed by all population segments. Rarely considered, however, is what the level of consumption of those commodities would have been with no or less policy encouragements.

It is believed that new and alternative ways of looking at a number of not only food- security but also more generally true and lasting development issues are needed. It is also hypothesized that agriculture engineers with adequate and comprehensive training programs could contribute to better formulating development questions and issues. In our view, the role of the operational engineer is first in helping diagnose situations and problems; it is not in inculcating learned recipes in classrooms.

Hence providing assistance to building capacities of agriculture engineers would be a top priority. This could involve primarily long-term, but also on-the-job training at relevant scientific and research centers.

Quality applied research dealing with resource limitations to promote food security on the supply side is also of utmost importance. Adequate resource utilization and preservation are also of great need to many countries with limited natural resources.

In some countries, natural biological diversity has been declining due to intensive use of resources promoted by public policies and subsidies. This has sometimes resulted in excessive use of fertilizers and pest-control chemicals, and contributed to pollution of soils and irrigation waters. Similarly, public subsidies for pasture and grazing have resulted in over-investments in animal stocks.

These are typical areas where well-trained engineers could contribute to minimizing or, at least, reducing the risks of food insecurities.

Call for abstracts due November 15, 2012. See website for details and scope of topics.

WFEO-CEE and Related Upcoming Events

- Sept. 16, 2012 Ljubljana, Slovenia – WFEO-CEE Face-to-Face Meeting #5
- Sept. 20, 2012 Ljubljana, Slovenia – WFEO Executive Council Meeting
- Nov. 26 – Dec. 7, 2012 Doha, Qatar – United Nations Framework Convention on Climate Change – Conference of the Parties - Meeting No 18 www.unfccc.int
- June 3 – 14, 2013 Bonn, Germany – UNFCCC Subsidiary Body Climate Talks www.unfccc.int

Meetings Relating to WFEO-CEE Themes

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- May 27 – 29, 2013 Montréal, Quebec, Canada – 3rd Climate Change Technology Conference 2013 www.cctc2013.ca
- Sept. 11 – 13, 2013 Singapore – World Engineers Summit 2013 – Innovative and Sustainable Solutions to Climate Change www.wes2013.org

Theme 3 – Engineering and Agriculture

- July 6 – 7, 2013 Hong Kong – 2013 3rd International Conference on Environmental and Agriculture Engineering – ICEAE 2013 www.iceae.org

Theme 4 – Engineering and Mining

- Feb. 24 – 27, 2013 Denver, Colorado, USA – 2013 SME Annual Meeting and Exhibit – "Mining - It's About the People" www.smenet.org
- May 22 – 23, 2013 Aachen, Germany – 4th International Symposium on Mineral Resources and Mine Development www.aims.rwth-aachen.de
- June 30 – July 3, 2013 Milos Island, Greece – 6th International Conference – Sustainable Development in the Minerals Industry (SDIMI 2013) www.sdimi2013.conferences.gr

Theme 5 – Sustainable Development and Environmental Stewardship

- Oct. 23 – 25, 2012 Addis-Ababa, Ethiopia – Eight Annual African Development Forum – "Governing and Harnessing Natural Resources for Africa's Development" www.uneca.org
- Nov. 6 – 8, 2012 Manila, Philippines – Third Asian Development Bank Transport Forum – "Inclusive and Sustainable Transport" www.adb.org/transportforum2012

Report on the United Nations Rio+20 Summit

The WFEO, through the UN Relations Committee, chaired by Engineer J. Spitalnik of Brazil, was involved in the organization and execution of two important events prior to the United Nations Rio+20 Summit held in Rio de Janeiro, Brazil, June 20 – 22 (the main Rio +20 website is www.uncsd 2012.org). These events served to increase awareness of the important role of engineering and science in addressing world sustainability issues such as food security, sanitation and potable water supply.

Members of the Organizing Committee of the WFEO Sustainable Communities Day held in conjunction with the United Nations Rio+20 Summit: (left to right) Victoria Rockewell, Dan Hoornweg, Jorge Spitalnik, Darrel Danyluk, Jose Tadeu de Silva, Debra Shields, Michael Michaud, David Lapp and Fethi Thabet.

Rio+20 Science and Technology Forum – June 10–15, 2012

The five-day Forum was held at the Rio Catholic University in Rio de Janeiro and attracted nearly 1,000 participants. WFEO participated throughout the sessions, presented a keynote statement and the CEE Chair and Secretary had many opportunities with delegates to explain an engineering perspective on sustainability issues, as well as the importance of engineering and science working together towards resolving sustainability issues.

The sessions focused on human well -being and population trends, climate and other environmental changes, food security, water security, urban well-being, ecosystem services and biodiversity, indigenous knowledge, disasters, energy, green economy and rethinking social and economic models. Chair summaries of these sessions and further results of the Forum can be found at www.icsu.org.

WFEO Sustainable Communities Day – June 16, 2012

This event consisted of a seminar on sustainable communities with high-quality speakers and excellent presentations. Two sessions covered achieving sustainable communities in large urban settings, as well as small and rural communities. The third session focused on risk assessment and sustainable engineering solutions for communities. This was followed by the adoption of a declaration on sustainable communities that was submitted to the United Nations Secretariat for Rio+20. The Declaration is posted on the World Federation of Engineering Organizations website and was communicated to all national members with an encouragement to use it to engage with their national governments on sustainable development and sustainability issues.

UN Rio+20 Summit Preliminary Meetings and Preparations

The World Federation of Engineering Organizations (WFEO) together with the International Science Council (ICSU) serve as co-chairs of the United Nations Major Group on Science and Technology. The WFEO Co-Chair is Engineer J. Spitalnik and members of the CEE, including Chair D. Danyluk, FEC, P.Eng., are significant contributors.

WFEO and ICSU together participated vigorously in the development of contributing text as stakeholder input to the development of the final declaration of the Summit. Numerous interventions and presentation of views were tabled at the preparatory sessions to explain the engineering perspective and the role of engineering in sustainable development and sustainability. These are available on the WFEO website.

Finding a Balance (continued from page 1)

Whether or not we are farmers, we are close to the land and closely reliant upon it for our very survival. Just because farming has a long tradition, doesn't mean there is no room to improve agricultural techniques and technologies. The UN estimates up to 50% of all food produced is lost to pests, spoilage or waste. In fact, for the very reason that farming's roots run so deep, there is added and continuing need to improve the methods used. Engineers have a vital role in enabling such advances.

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #9 April 2013

Engineers have an inherent obligation to examine the technological options needed to reduce atmospheric GHG emissions.

Climate Change Task Group on Mitigation Forms an Important WFEO-CEE Initiative

By Darrel Danyluk, P.Eng. FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Climate change, greenhouse gas (GHGs) mitigation, sustainable energy, energy efficiently, green energy, and energy innovation are all interrelated and relevant to engineers and engineering worldwide.

The impact of climate change is increasingly observed in developed and developing countries around the world. Whether this is caused by human activity or is part of the earth's natural cycle, this warming has serious implications for the well-being of humanity. Climate science is unequivocally indicating that increasing concentrations of GHGs in the atmosphere are a contributing factor. Anthropogenic contributions of GHGs are of growing concern, and unless mitigated, will likely accelerate and magnify the impacts of the changing climate. Engineers, who design, develop and build the technologies that release GHGs to the atmosphere, have an inherent obligation to examine the technological options needed to reduce atmospheric GHG emissions.

Lost in Political Debate

Expectations were high that the 2009 United Nations Framework Convention on Climate Change (UNFCCC) meetings in Copenhagen would bring the United Nations members to an agreement on addressing GHGs into the future. For these meetings, the Future Climate –- Engineering Solutions (FC-ES) initiative (Phase 1 - led by the Danish Society of Engineers and including 13 participating national engineering associations) had produced compelling information indicating that through planning and the use of existing technologies, significant GHGs reductions were feasible at the national level. This important and relevant information was lost in the “noise” of the political debate.

Given the importance and relevance of these topics to global society as evidenced by the UNFCCC negotiations and the increased attention from international organizations, global conferences and multilateral development actors, the WFEO-CEE has initiated a Task Group on Mitigation. This task group is led by the U.K. and through collaboration with the FC-ES initiative creates a broad international engineering alliance to address mitigation alternatives of GHGs at a national level by carrying on the FC-ES initiative. WFEO has observer status at the UNFCCC meetings and since 2008 has focused upon the adaptation theme as it relates to climate change. Creation of this task group broadens the engineering contribution to the mitigation debate. As such, WFEO and CEE can capitalize on this opportunity to engage with other influential international organizations, and ensure the engineering message is heard in the global climate change debate.

WFEO-CEE encourages national member participation in this task group's activities by carrying out a national assessment on GHG mitigation as part of the FC-ES initiative, and welcomes participation and contribution of interested parties and individuals. This newsletter highlights the new task group, FC-ES and its activities.

Climate Change Mitigation Task Group Update

Future Climate – Engineering Solutions (FC-ES) Project

By Hayley Coleman, Alison Cooke and Daniel Kenning

Hayley Coleman is Area Manager for Europe at the Institution of Civil Engineers and Commonwealth Engineers' Council Secretary, and CEE Climate Change Mitigation Task Group Manager; Alison Cooke is former chair of the FC-ES project; Daniel Kenning is current chair of the sustainability panel at the Institution of Mechanical Engineers (IMechE).

This Yorkshire, England, flood can provide lessons relating to climate change mitigation.

The Climate Change Mitigation Task Group (CCMTG) within the WFEO-CEE aims to promote the key role of civil engineering and clean technologies to mitigate climate change and thus reduce greenhouse gas (GHG) emissions. The group strives to create an international pool of knowledge and collaboration, building upon the extensive network and resources of the Future Climate – Engineering Solutions (FC-ES) Project (http://www.fc-es.net/).

While the CCMTG is confident in its links to the FC-ES project, this element of the task group is in a state of transition. Alison Cooke, who has been chair of the FC-ES project for a number of years and who would have been responsible for the links between FC-ES and WFEO, has resigned from her position as chair of FC-ES. As such, the on-going governance structure for the project is in the process of developing. Daniel Kenning, who has been working on the FC-ES project for a number of years and currently chairs a sustainability panel within the Institution of Mechanical Engineers (IMechE) in the United Kingdom, has agreed to take on the intermediary responsibilities within FC-ES. Professor Paul Jowitt, chair of the WFEO-CEE Climate Change Mitigation Task Group, will look after the linkages to the FC-ES governance structure, and, as such, the connection to WFEO will be maintained.

The FC-ES Project was established in 2008 and is a multi-national, multi-institution global engineering alliance working with national governments to develop and share best practice in the creation and implementation of national energy plans. As such, FC-ES aims to create a global alliance of national engineering organisations which can help each other step forward to help their own respective governments in dealing with the technological challenges of climate change. Countries need to write national energy plans, which, in turn, beget national climate-change plans and engineers can be pivotal in this process.

The FC-ES Project partners represent more than 23 countries – with links to over one million engineers. The partners strive to produce the priority project deliverable: National Climate and Energy Plans, where possible, collaborating with their national governments.

There can be difficulties at the engineering organisation/civil service interface as different bodies learn to trust each other and to overcome the "not invented here" syndrome. One aim of the alliance is to learn from the collective experience, for example: who needs to see the data-based plans? And how can the plans be standardised to enable national arguments to be integrated into the global context?

Another purpose of the FC-ES that is slowly dawning is how useful such an alliance could be when faced with some of the grim scenarios which are becoming increasingly plausible – a sort of triage argument. We will be a network of learned societies in touch with those developing technical solutions; those used to working and collaborating with each other; and also in touch with those that could replicate any good solutions and innovative technologies that are developed.

Countries need to write national energy plans, which, in turn, beget national climate-change plans and engineers can be pivotal in this process.

Continued next page

The project currently comprises engineering associations in the following 23 countries, working to deliver high-quality national energy plans by 2014: Australia, Belgium, Brazil, Canada, China, Croatia, Cyprus, Denmark, Finland, Germany, Honduras, Hong Kong, India, Ireland, Jamaica, Japan, New Zealand, Norway, Russia, South Africa, Sweden, the U.K. and U.S.A.


Daniel Kenning


Paul Jowitt

The project was launched by the Danish Society of Engineers (IDA) in 2008. Phase 1 (2008-09) was led by Denmark, included 13 participating engineering associations and resulted in 10 national energy plans, and the publication of a joint report available online at http://www.fc-es.net.

Phase 2 (2009-11) was led by Denmark in collaboration with IMechE in the U.K., and resulted in 11 national energy plans.

Phase 3 (2011-13) is being led by the U.K. (Daniel Kenning, Fellow of IMechE, and Paul Jowitt, Past-President and Fellow of ICE, supported by the Institution of Civil Engineers) with a global team of 23 national engineering organisations working on new national energy plans.

CEE and FC-ES Collaboration

Currently, the CCMTG is working with the FC-ES project to create a third framework. Norway and Finland have already offered support in drafting this third framework. FC-ES has currently identified the World Engineering Summit (WES) in Singapore as their next major international event. As such, they are hoping to "publish" the Third Framework at WES, and will hopefully be presenting at some point during the conference. The FC-ES and CCMTG joint presence at WES in September will help to gain more international members for both projects, and hopefully produce some national reports and make additional resources available to WFEO members.

The FC-ES and CCMTG joint presence at World Engineering Summit in September will help to gain more international members for both projects.

At present, the task group has the following objectives and goals:

- To produce additional country reports for FC-ES;
- To advocate engineering solutions for climate-change mitigation to the United Nations and WFEO member countries;
- To inform and educate policy- and decision-makers;
- To facilitate the engagement of WFEO member countries to participate in FC-ES;
- To develop presentation and training materials for use and delivery by CEE members and WFEO member countries to inform and educate policy- and decision-makers;
- To collaborate with fellow Professional Engineering Institutions (PEIs) and any other partners to form FC-ES's third framework;
- To successfully host an event or present at WES 2013 in Singapore;
- To send a delegation (or at least some representatives) to COP-19.

Climate Change Mitigation Case Studies and Exemplar Projects

On this and in the following pages, we profile several examples of climate change mitigation in various contexts. We present a case from Doha and two from the United Kingdom, as well as two examples of climate change mitigation in Africa. The case studies and exemplar projects from the developed and developing world illustrate the importance of climate change mitigation across the globe.

Case Study 1 – London 2012 Olympic Park

The Project

While the London 2012 Olympic Park has been designed to meet the requirements of the Olympic and Paralympic Games, the main focus has been on post-2012 use. The aim has been to only build permanent venues where there is a long-term use, not leaving "white elephants", and being creative in the use of temporary venues and seating.

The Olympic Village, the sporting venues, new transport services, supporting facilities and the Park itself have been designed to leave a lasting social, economic and environmental legacy, while minimizing any other adverse impacts during the design and construction.

The challenge of climate change has been addressed through minimising the carbon emissions associated with the development.

The remediation of the site involved bringing existing land back into public use and creating significant improvements in the quantity and quality of green space in east London. One hundred hectares of green spaces have been created which are designed to reduce the risk of flooding in the river valley and enrich the biodiversity of the Lower Lea Valley (45ha of biodiversity-rich parkland). The contribution of having sustainability at the heart of the project brought tremendous benefits, not only in terms of environmental and social benefits, but also in terms of cost savings.

The Benefits

The examples below show how environmental, social and economic benefits have been achieved, and how these are complementary rather than mutually exclusive:

- The decision to remediate heavily contaminated soil on site, rather than send it to landfill saved approximately £68 million;
- In the velodrome, the cable net roof design is lighter weight, uses around a tenth (150 t) of the steel used in more traditional options and is quicker to put up (six weeks vs. several months). It has enabled other parts of the structure to be designed for reduced loads, producing a saving of approximately £1.5 million due to a reduction in the depth of foundations needed;
- Using gas generators, (manufactured and supplied by a Scottish company) instead of traditional diesel generators, reduced CO2 emissions by 10,552 tonnes (22.2%) and provided a cost saving of around £13 million;
- With over 2,800 homes constructed in the Olympic Village, there is an average carbon emissions reduction of around 83% when compared to a typical building-regulations compliant apartment. This equates to an average annual saving per apartment of 1.5 tonnes CO2 or £237 saving at current energy pricing;
- As a part of the Olympic Village concrete procurement strategy, 257,000m^3 in total of concrete was poured, reducing embodied carbon emissions by approximately 50% and avoiding approximately 35,000 lorry (truck) movements from local highways; equating to a 40,000 tonne reduction in vehicle CO2 emissions over two years of operations;

London Olympics point the way.

- People have undertaken bespoke employer-led training linked to jobs on the Athletes Village and BeOnsite has delivered apprentice-ships within these areas and other core trades. The on-site brokerage team also filled 535 jobs for local people.

The Process

The principles that led to the success of the project:

- Buy-in from the top and consistency of leadership – senior management believed in it, owned it, and kept it on the agenda;
- Specific, clear, and challenging sustainability targets were set from the outset in pre-procurement, tender documents and contracts, that allowed for innovation;

Continued next page

London 2012 (continued from page 4)

- Time taken at the start to plan rather than rushing in to the actual build or "doing" phase – including the importance of design and aesthetics as much as thinking about sustainability;
- Defining the scope, budget and funding early and sticking to it, making sustainability a key core driver at the same level as meeting budget and delivery objectives;
- Getting the right people with the right practical skills (delivery capability) on board fast;
- Embedding sustainability values throughout the delivery organization – at all levels;
- Identifying, sourcing and using environmentally and socially responsible materials;
- Creating an environment to challenge the client and contractors while maintaining a collaborative approach which allowed delivery partners to deliver;
- Sharing of resources and knowledge between projects;
- Employing a reliable and independent assurance body – increasing transparency and credibility;
- Maximising opportunities and setting challenging targets for sustainable materials and resource efficiency, including carbon, water and waste.

Key Learning Points

The Olympic Park and its construction has been a huge success. It provides a first-class example of a publicly-funded programme delivered on time and within budget, at the same time as delivering a collection of world-class, highly sustainable, venues.

Drawing on the Olympic Delivery Authority's knowledge and expertise from industry and academia, the lessons on how this was achieved have been distilled into the 12 principles highlighted. The majority of these principles will be readily transferable to most other major infrastructure projects, and the more of them that are applied, the greater the chance that those projects, too, will deliver on time and within budget.

Learn More

http://learninglegacy.london2012.com

This case study has been generously provided by the Green Construction Board. For more about the Board and U.K. efforts to build and construct with low-carbon emissions, visit www.greenconstructionboard.org or email gcb@bis.gsi.gov.uk.

Case Study 2 – Cucumbers in the Desert – The Sahara Forest Project

During the meeting COP-18 last December in Doha, Qatar, the FC-ES team was invited to meet the Sahara Forest Project team, who are building a demonstration "greening the desert" project in Qatar. We were given lovely juicy cucumbers, the first harvest picked that same day from the desert outside Doha! The Sahara Forest Project (http://saharaforestproject.com/) is a system that uses sustainable technologies and systems to bring the desert back into agricultural productivity.

Qatar has in the past taken a high-energy development route, following the Western pattern and using its own extensive oil reserves. This has led to a dependency on water from desalination plants powered by fossil diesel, and thus to the highest per-capita CO2 emissions in the world.

The Sahara Forest Project aims to create new self-sustaining and non-fossil-energy dependent eco-systems, and starts with simple "evaporator hedges" that slow airflow and passively transfer any moisture in the air into the soil, to enable plants to grow. The system relies on two other key technologies: saltwater concentrated solar power (CSP) that generate electricity via steam turbine and saltwater-evaporative-cooling and humidification for greenhouses, driven by this solar electricity.

Sahara Forest Project is greening the Qatar sands.

The idea is that a modular approach comprising 1 km^2 units will enable large areas of the desert on hot sunny countries to be re-vegetated.

The first trial plot was started on site in February 2012, and the first vegetables were harvested in December 2012, grown in the desert, using moisture from the air and salt water that has been desalinated using solar energy.

Case study provided by Daniel Kenning.

Case Study 3 – Carbon Modelling in Sustainable Design

The Project

To mitigate climate change and to provide sustainable water and wastewater services to a growing population, the client Anglian Water – a major English water and wastewater services provider – set some challenging goals to reduce both embodied and operational carbon.

With @one Alliance providing principal design, engineering and contracting services, a clear strategy of measuring, managing and reducing emissions required a range of carbon models to be developed and a tool for design engineers to identify and optioneer between low carbon solutions.

Through 2007-08, around a thousand carbon models were developed ranging from complex treatment processes, reinforced concrete tanks, HPPE mains, pumps, valves, etc. The models were created taking into account the carbon/energy required to extract and fabricate raw materials into products together with transport and installation on site.

As part of business planning and capital investment of more than £2 billion in Anglian Water's infrastructure between 2010 and 2015, the models were used to create an embodied carbon baseline for each individual scheme.

In 2008, a proactive in-house carbon modelling tool was developed and introduced to allow Anglian Water and its delivery-partner framework engineers to calculate embodied and operational carbon impacts of designs. The tool can be accessed via the Internet and requires design engineers to select different items of equipment and process assets, building up the carbon impacts of proposed solutions.

The Benefits

With measurement and management of carbon now fully integrated into the delivery of all capital schemes, we have strong evidence of the correlation between embodied carbon and capital expenditure and operational carbon and operational expenditure.

The reductions in embodied carbon through design not only save costs but also reduce the use of irreplaceable finite materials and help with the provision of more sustainable assets for the future.

Design engineers have risen to the challenge of reducing carbon in their designs, moving forward from the singular focus on cost and released from following standard designs. Key framework partners and suppliers have also been energised to deliver low-

Continued next page

Example 1: Great Rift Valley in East Africa

Energy experts, organisations involved in sustainable development and various news sources have been watching as the Great Rift Valley provides an opportunity to revolutionise the production and quality of energy in East Africa. The large amount of geothermal energy resources beneath the Great Rift Valley has come to fruition, and local populations have begun to switch to geothermal energy sources. This simultaneously provides energy and electricity for a population that has lived without basic energy infrastructure for years, and aids in efforts to reduce the amount of greenhouse gases produced in the region.

In addition, the price of solar energy has begun to drop. As such, African villages can begin to use their climate as an advantage, as solar lights have become a main source of light for approximately seven million Africans*. With the decreasing price, those living at low-income levels will be able to afford a sustainable energy source, shying away from polluting greenhouse gases and using natural sources of energy to mitigate climate change.

*Heap, Eric (2013). Energy revolution promises to transform East Africa. BBC Radio 4's Costing the Earth and Newsnight, 25 February (available at http://www.bbc.co.uk/news/world-africa-21549380

Example 2: Gabal el Asfar Wastewater Treatment Plant in Egypt*

The African Development Bank and the Egyptian government are currently working to increase the capacity of the Gabal el Asfar wastewater treatment plant. Serving as the wastewater treatment plant for around eight million people in the greater Cairo area, the Gabal el Asfar plant must increase its capacity at a pace that equals the growing population in the Egyptian metropolis. According to the African Development Bank, Phase II of this project will be constructing the plant's capacity extension, thus providing an additional wastewater treatment capacity of 500,000 m^3/d.

Greenhouse gas emissions are typically high at wastewater treatment plants, and thus an increased capacity of the Gabal el Asfar would, in theory, mean an increase in the amount of GHG produced. However, actors on this project are aiming to exploit one of the plant's main and most polluting by-products: methane. If methane were to be released into the air as normal – and as is done at wastewater plants – GHG emissions would increase. But, the phase of the project will capture the methane gas, thus supplying a large portion of the plant's energy.

* Information from: African Development Bank, Water and Sanitation Department (document available at http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Climate%20Change_OWAS_2011.pdf).

Carbon Modelling (continued from page 6)

Anglian Water is reducing its CO2 footprint using carbon modelling in sustainable design.

carbon solutions. A number of sectors, including the concrete industry, have worked hard to improve the measurement of carbon impacts of their products.

By April 2012, Anglian Water had achieved a remarkable 32% reduction in embodied carbon, delivered through intelligent design against the 2010 baseline.

The Process

Predicted changes in weather patterns, rising sea levels and meeting the needs of a growing population has meant that Anglian Water is one of the most vulnerable U.K. water companies to be affected by climate change.

In responding to this challenge the company set two clear goals, firstly to halve the embodied carbon impact of assets built in 2015 from a 2010 baseline and secondly to reduce operational carbon by 10% in real terms by 2015 from a 2010 baseline.

Internal conferences on climate change and a number of awareness and training sessions were held between 2008 and 2010 to highlight why managing and reducing carbon is important to Anglian Water and how emissions could be reduced. Design engineers were encouraged to follow a hierarchical approach to emissions reduction through avoiding building assets, re-using existing assets, using alternative low-carbon materials and building more efficiently.

In 2010 a robust governance process was put into place requiring all schemes to report embodied and operational carbon against the baseline on three separate occasions prior to work commencing on site.

The benefits of carbon reduction are being delivered through an understanding of the impacts of climate change and population growth, clear organisational goals, a carbon modelling tool to measure and manage emissions, and a team of design engineers focused and enabled to deliver reductions.

End-User Feedback

Design engineers using the modeller have not simply accepted the outputs of the carbon models. As awareness of embodied carbon has evolved through the organisation, a greater degree of challenge has been demonstrated from both engineers and suppliers. This has resulted in models becoming more accurate over time.

Key Learning Points/Best Practice

To effectively measure, manage and reduce carbon emissions:

1. Clear business drivers and goals are needed as to why reducing emissions is important;
2. Tools and a process are required to enable engineers to design out carbon;
3. Robust governance is required to reinforce the process and to measure and challenge carbon reductions.

This case study has been generously provided by Anglian Water.

WFEO-CEE and Related Upcoming Events

- Sept. 9, 2013, Singapore City, Singapore – WFEO-CEE Face-to-Face Meeting #6
- Sept. 13-15, 2013, Singapore City, Singapore – WFEO Executive Council Meeting and General Assembly 2013

Meetings Relating to WFEO-CEE Themes

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- May 27-29, 2013, Montreal, Quebec, Canada – 3rd Climate Change Technology Conference 2013 www.cctc2013.ca
- June 3-14, 2013, Bonn, Germany – UNFCCC Subsidiary Body Climate Talks www.unfccc.int
- Sept. 11-13, 2013, Singapore City, Singapore – World Engineers Summit 2013 – Innovative and Sustainable Solutions to Climate Change www.wes2013.org

Theme 3 – Engineering and Sustainable Agriculture

- July 6-7, 2013, Hong Kong – 3rd International Conference on Environmental and Agriculture Engineering – ICEAE 2013 www.iceae.org
- Sept. 3-6, 2013, Prague, Czech Republic – 5th International Conference "Trends in Agricultural Engineering 2013" www.conference.cz/tae2013

Theme 4 – Engineering and Sustainable Mining

- May 22-23, 2013, Aachen, Germany – 4th International Symposium on Mineral Resources and Mine Development www.aims.rwth-aachen.de
- June 30-July 3, 2013, Milos Island, Greece – 6th International Conference – Sustainable Development in the Minerals Industry (SDIMI 2013) www.sdimi2013.conferences.gr

FC-ES and Climate Change Mitigation at COP-18

By Daniel Kenning

Daniel Kenning is a Fellow of the Institution of Mechanical Engineers and founder of Splendid Engineering.

(Left to right) Rob Cooke (Buro Happold), Saurev Dhakel (British Council Climate Ambassadors), Andrew Picken (British Council) , Fethi Thabet (WFEO), Adam Poole (FC-ES & Buro Happold), Daniel Kenning (FC-ES & IMechE), Alex May (Mayden Foundation), Chris May (Mayden Foundation), Shalini Sharma (The Institution of Engineers, India).

At COP-16 (the Conference of the Parties 16 to the United Nations Framework Conference on Climate Change) in 2010, in Cancun, Mexico, the Future Climate Engineering Solutions (FC-ES) Project hosted an event which aimed to establish new national teams. Also in 2010, the idea of engineers working with governments to deliver solutions was given a fillip – after the Technology Mechanism was established in Cancun, in December 2010, UNFCCC Executive Secretary Christiana Figueres said: "The challenge we face calls for nothing less than a transformation of the world economy onto a green, sustainable pathway. Technology, both for adaptation and for mitigation, cannot but be at the very centre of this transformation."

By 2012, the FC-ES network had grown to include representatives of the national engineering associations of 23 countries, including key nations in the global energy system: India, China, Russia and U.S.A.

A small delegation from the project went to Doha, Qatar, for COP-18 in order, for the first time, to host an event at the conference targeted at government delegations. FC-ES organised a side event, sponsored by Shell U.K., at which we also launched a new website – www.fc-es.net.

Speakers from six countries came together at the event, including representatives from the World Federation of Engineering Organisations (WFEO), the U.K. Department of Energy and Climate Change (DECC) and the British Council. The development of the website was facilitated by the Mayden Foundation.

The main topics discussed were:

- The Indian Energy and Climate Plan – presented by Dr. Shalini Sharma, Chair, Professor, The Institution of Engineers (India) and Head, Centre for Climate Change;
- The UK Energy and Climate Plan – presented by Daniel Kenning, Fellow of the IMechE and founder of Splendid Engineering;
- The DECC Pathways calculator and the global calculator – presented by Jan Kiso, Senior Policy Advisor, U.K. Department of Energy and Climate Change;
- The FC-ES website – Introduced by Chris May, founder and managing director of Mayden and the Mayden Foundation, who are providing web design and hosting services pro bono and presented by Alex May, web developer;
- The role of WFEO and how it links to FC-ES – presented by Fethi Thabet, a theme coordinator within WFEO-CEE;
- The work of the CEE Engineering and Agriculture Task Group.

Since the event, Tunisia has also expressed an interest in participating in the project.

A video interview about FC-ES project with Daniel Kenning is available here: http://climatechange-tv.rtcc.org/cop18-energy-planning-too-complex-for-politicians/

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #10 September 2013

Engineers cannot remain silent or complacent when it comes to environmental sustainability.

Engineers and Engineering Must Remain Active in Drive for a Sustainable World

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Too often, engineers remain content to undertake their duties within the realm of technology, without the need for fanfare and acclaim. As a result, engineering and its contributions to global sustainability are largely ignored by the media and fly below the radar of public awareness.

In this newsletter we provide a glimpse of the role engineering plays in sustainability initiatives. We provide perspectives from various industries and from several countries, and also highlight our federation's leadership role in developing a Model Code of Practice for engineers worldwide and by participating at the United Nations deliberations. These articles provide a snapshot of engineering perspectives and opinions on the commitments required to ensure that sustainability has meaning at local, regional, national and global levels.

In line with the 1987 Bruntland Commission's definition, the proposed **WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship** defines sustainability as..... "Ability to meet the needs of the present without compromising the ability of future generations to meet their own needs, through a balanced application of integrated planning and the contribution of environmental, social and economic decision-making processes."

Meeting the needs of a consumer society requires that engineers conceive, design, construct, operate and maintain the critical and support infrastructures required. But in providing energy, transport, clean water, agricultural and raw materials, and manufactured goods and the built environment for shelter, health and educational facilities amongst others, these actions must be done in a sustainable manner. This requires that each element of an engineer's contribution consider not only the economic expenditures, but the social and environmental costs and impacts as well.

A key element to achieving success is the recognition that a collaborative approach is required as we seek to determine feasible and sustainable engineering options for society's needs – particularly for its consumption patterns and practices. By joining with social and natural scientists, engineers can collectively develop an understanding of the inter-relationships between scientific knowledge, engineering options and the impacts on the society and the environment. Understanding these impacts is important in determining the best feasible and sustainable engineering option to meet the need. Without collaboration, sustainability will be elusive, difficult and challenging. Engineering leadership at the project level can provide answers to the sustainability challenge. By instilling the principles of sustainability within a project's scope, and insisting upon a triple bottom line assessment and decision-making process – where economic, social and environmental outcomes are seriously considered – we will deliver feasible and sustainable results. Applying this approach on the many projects worldwide will allow us to journey toward a sustainable world.

The engineers' role is clear – take leadership.

WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship

By David Lapp, FEC, P.Eng.

David Lapp is Secretary, WFEO Committee on Engineering and the Environment.

Introduction

Engineers are not only concerned with developing projects that are sustainable, but also with a wide variety of environmental management responsibilities impacting society and the environment. The long-term societal and economic health depends on a healthy environment.

The WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship defines and explains ten principles that guide engineering practice in the wider context of sustainable development (SD) and environmental stewardship (ES). It will support engineers in their professional practice, in dealings with other professionals and guide professional engineering organizations.

SD and ES Explained

Many professional groups, including engineering organizations, have developed specific, though often discipline-centred, SD definitions. Often such definitions fail to distinguish between discretionary wants and essential needs.

The 1987 Brundtland Commission provided perhaps the broadest and most widely accepted SD definition in stating: “Sustainable development is development that meets the social, economic, and environmental needs of the present without compromising the ability of future generations to meet their needs.”

The commission focused on the essential needs of the world's poor, which deserve overriding priority. It also considered “limitations” the state of technology and social organization

impose on the environment's ability to meet present and future needs.

Stewardship means taking care of something not belonging to you. Environmental Stewardship is more difficult to define. Often stewardship has been addressed narrowly as protecting an endangered species or preserving a threatened eco-system. The Model Code states:

“Environmental Stewardship is the prudent use of the finite resources in nature to produce the greatest benefit while maintaining a healthy environment for the foreseeable future.”

The engineering profession plays a significant role in economic development and in protecting the environment. It is ideally situated to play a significant role in SD and ES. For engineers to be relevant to current and future generations and provide guidance and leadership to society, a more proactive approach to sustainability, as outlined in the table below, is required.

The Interpretive Guide

The Interpretive Guide serves as an accompanying document to the WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship. It provides further amplification and explanation to engineers and national engineering organizations on interpretation and implementation of the ten principles.

Next Steps

The Model Code and Interpretive Guide will be published in the autumn of 2013 and posted on the WFEO website (www.wfeo.net). In 2014 and 2015, in partnership with other standing committees, and national and international members, WFEO-CEE will undertake efforts to increase awareness and facilitate engagement of the principles by engineers.

WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship “Think Global and Act Local”

The Model Code consists of ten principles that speak to individual engineers:

1. Maintain and continuously improve awareness and understanding of environmental stewardship, sustainability principles and issues related to your field of practice.
2. Use expertise of others in the areas where your own knowledge is not adequate to address environmental and sustainability issues.
3. Incorporate global, regional and local societal values applicable to your work, including local and community concerns, quality of life and other social concerns related to environmental impact along with traditional and cultural values.
4. Implement sustainability outcomes at the earliest possible stage employing applicable standards and criteria related to sustainability and the environment.
5. Assess the costs and benefits of environmental protection, eco-system components, and sustainability in evaluating the economic viability of the work, with proper consideration of climate change and extreme events.

Continued next page

The WFEO Model Code of Practice (continued from page 2)

6. Integrate environmental stewardship and sustainability planning into the life-cycle planning and management of activities that impact the environment, and implement efficient, sustainable solutions.

7. Seek innovations that achieve a balance between environmental, social and economic factors while contributing to healthy surroundings in both the built and natural environment.

8. Develop locally appropriate engagement processes for stakeholders, both external and internal, to solicit their input in an open and transparent manner, and respond to all concerns – economic, social and environmental in a timely fashion in ways that are consistent with the scope of your assignment. Disclose information necessary to protect public safety to the appropriate authorities.

9. Ensure that projects comply with regulatory and legal requirements and endeavour to exceed or better them by the application of best available, economically viable technologies and procedures.

10. Where there are threats of serious or irreversible damage but a lack of scientific certainty, implement risk mitigation measures in time to minimize environmental degradation.

International Conference on Sustainable Development in the Mining Industry

By John Hayden

John Hayden is Deputy Executive Director Public Affairs & Government Relations with the Society for Mining, Metallurgy and Exploration Inc.

The Task Group on Sustainability and Mining attained a major milestone by holding a panel discussion and a technical session at the International Conference on Sustainable Development in the Mining Industry (SDIMI 2013), meeting (June 30-July 3, 2013) on Milos, Greece.

More than 180 attendees from 30 countries heard over 100 professional papers on topics covering various areas of mining and sustainable development. The SDIMI conference was held under the auspices of the Society for Mining, Metallurgy and Exploration Inc., the Society for Mining Professors and the Greek Mining Association.

CEE's Sustainability and Mining Task Group Chair, Dr. Nikhil Trivedi, moderated a session that covered the activities of the mining and sustainability task group. The session included presentations by four task group members, from Canada, China, Finland and the U.S.A. Topics included methodology to integrate SD performance in the mine design and planning process; examples of reuse, re-purposing and the recycling of minerals to improve resource efficiency in mining; environmentally sound engineering technologies and practices in mining; and a framework of a toolbox for risk management in the minerals sector.

WFEO and CEE were represented by Darrel Danyluk, Vice President of WFEO and Chair of the Standing Committee on Engineering and the Environment (CEE). He participated in a panel discussion on Alternative Perspectives in Mining and Sustainability, which included presentations on mining industry initiatives in SD, capacity building and sustainability in the engineering disciplines and engineering education and sustainability in curricula.

The theme of the SDIMI conference was the development, monitoring and assessment of SD criteria for mineral operations. Major conference take-away points were:

1. At present, the focus of public perception is placed on the environmental and social consequences of mining. Growing environmental and social concerns, supply-chain procurement standards, as well as public pressure and regulatory measures will profoundly shape the global mineral business. To cope with these challenges, the minerals community must integrate SD practices and stakeholder participation into engineering design, technical considerations, business strategies, public education, academic curriculum and business performance goals.

2. There is a pressing need to better manage the mining resource, to increase the transfer of knowledge, and to support capacity building in private firms, government and civil society. This will require a harmonization of engineering policies, government legislation and regulation, academic education and industry best practices within the realm of SD.

Sustainable Development Goals After Rio+20

By Jorge Spitalnik

Jorge Spitalnik is Chair of the WFEO-UN Relations Committee.

One of the main outcomes of the Rio+20 Conference (held in Rio de Janeiro, Brazil, June 20-22, 2012) was the agreement by member states to launch a process to develop a set of Sustainable Development Goals (SDGs) built upon the Millennium Development Goals (MDGs) and converging with a post-2015 development agenda.

RIO+20
United Nations Conference on Sustainable Development

Open Working Group

An inter-governmental Open Working Group (OWG) was created with the assignment to submit a report to the 68th session of the UN General Assembly containing a proposal for sustainable development goals for appropriate action.

Aiming at the preparation of its report, OWG has scheduled to discuss, from March 2013 to February 2014, the following matters: *Poverty eradication; Food security and nutrition, sustainable agriculture, desertification, land degradation and drought; Water and sanitation; Employment and decent work for all, social protection, youth, education and culture; Health, population dynamics; Sustained and inclusive economic growth, macroeconomic policy questions (including international trade, international financial system and external debt sustainability), infrastructure development and industrialization; Energy; Means of implementation (science and technology, knowledge-sharing and capacity building); Global partnership for achieving sustainable development; Needs of countries in special situations, African countries, Least Developed Countries, Landlocked Developing Countries, Small Island Developing States as well as specific challenges facing the middle-income countries; Human rights, the right to development, global governance; Sustainable cities and human settlements, sustainable transport; Sustainable consumption and production (including chemicals and waste); Climate change and disaster risk reduction; Oceans and seas, forests, biodiversity; Promoting equality, including social equity, gender equality and women's empowerment; Conflict prevention, post-conflict peace-building and the promotion of durable peace, rule of law and governance.*

SDGs Need Universal Character

OWG has already recognized that SDGs must have a universal character in order to speak not only to developing countries but also to developed countries, and that there is a need for all to achieve sustainable patterns of consumption and production with developed countries taking a leading role. As for the scope of the SDGs, OWG recently stated that the MDGs did not recognize the many dimensions of poverty, which go beyond monetary income, and that the gap the SDGs are meant to address is the integration of the three dimensions of sustainable development, and implementation of integrated solutions. Initially, OWG characterized three possible types of goals to be dealt with: human development related goals with little environmental impact associated with their attainment (e.g., education); human development related goals with important environmental dimensions (e.g., water, food, energy), and goals related to common management of global resources.

Unprecedented Opportunity For Engineers

Civil society is taking part in the OWG discussions through its major groups and other relevant stakeholders. The Major Group of Scientific and Technological Communities (STC), where WFEO is representing engineering viewpoints and positions, is one of the actors in this process. The WFEO-United Nations Relations Committee (WURC) is the WFEO interface with the UN system and provides engineering advice, review and information that contribute to the definition and achievement of SDGs and other outcomes from Rio+20. The WFEO Standing Committee on Engineering and the Environment Committee is actively involved in WURC undertakings and particularly in this process. Regarding science and engineering, OWG has expressed that it will reach out to the scientific community to provide technical inputs on how to set appropriate goals and especially how to handle targets and indicators.

This SDGs activity poses an unprecedented opportunity for the participation and input of engineers to put the profession at the forefront of the contributing partners for achieving and fulfilling feasible programs and measures on sustainable development and climate change that are being implemented by the UN and its agencies.

Sustainability Key New Zealand Goal

By Carol Boyle, PhD

Carol Boyle is Associate Professor of Civil and Environmental Engineering at the University of Auckland and Chair of The Sustainability Society, a Technical Interest Group of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand National member of WFEO. As a subsidiary body of IPENZ, the Society facilitates learned society activities across the domain of sustainability engineering and science, and is open to non-engineers to participate in its activities. The society is also recognised by New Zealand's lead scientific body, the Royal Society of New Zealand.

The Auckland Plan sets a vision for Auckland (photo above) to be the world's most liveable city by 2040. *Photo by Avi Ceder.*

When it comes to sustainability, New Zealand is blessed. It has abundant sunshine, plenty of rain, good geothermal activity and sits in the “Roaring 40s” – strong westerly winds, blowing between 40 and 50^{0}S latitude.

Electricity production is 75% renewable and the Government has committed to achieving 90% renewable electricity by 2030. With 4.5 million people and a landmass comparable to Japan and the UK, New Zealand is among the few developed countries operating within its ecological footprint. A strong agricultural industry helps feed the global population, while the equally important tourism industry is focused on maintaining important environmental areas.

New Zealand's “100% Pure” slogan is taken seriously and when this is perceived as being at risk, there is public outcry. Consequently, there has been improvement in reducing agricultural discharge to the environment – led by major industries, including Fonterra and supported by municipal councils and consulting engineers. However, concern still exists about poor water quality in many lakes, rivers and streams. New developments, including hydroelectric and irrigation dams, wind power schemes, new mines and transportation projects, are heavily scrutinised by the public, local councils and government. Those not meeting sustainability criteria have been rejected or subjected to considerable public criticism and usually required to meet environmental and social standards. Recent legislative changes reduced the capacity for public input into development proposals and placed a stronger emphasis on economic outcomes. However, strong input from Maori (local indigenous peoples), who are recognised as stewards of the land, has been provided on many projects. This has resulted in innovative engineering approaches, which support the environment, communities and the economy.

Local councils are aware of the needed balance between raising rates and improving existing infrastructure to meet sustainability criteria. The Auckland Plan sets a vision for Auckland to be the world's most liveable city by 2040. Further work on climate change and energy consumption, in collaboration with industry, consulting and local council planners, engineers and Maori, has set significant goals for Auckland, including reducing GHG emissions to 40% of 2000 levels.

Three recent New Zealand disasters refocused engineering effort and activity. Major 2011 and 2012 earthquakes in Christchurch, plus aftershocks, proved the resilience of well-built, modern buildings. It also identified problems with centralised energy and water infrastructure, and liquefaction risks, informing new policies and planning, and new considerations in decentralised infrastructure and greater restrictions on high liquefaction-risk areas. Engineers came under scrutiny for the collapse of one building and this likely will result in strengthened registration requirements for engineers. Earthquake strengthening is being undertaken across New Zealand. Smaller, more recent earthquakes in Wellington also confirmed the value of good building design and construction.

The Pike River mining disaster, in which 29 miners died, led to review of how companies manage risk, health and safety. Good management and good engineering have been identified as priorities as have requirement to assess, mitigate or manage potential risks. The recent international incident with contaminated milk powder produced by Fonterra NZ will further push to position corporate responsibility atop companies' agendas.

It can be argued that some reactions to such disasters simply require improving engineering practice. However, global, future-thinking companies recognise that shifting towards sustainability will assist them in recognising, managing and mitigating future risk, identifying opportunities to develop resilient solutions, and developing innovative and sustainable solutions to engineering issues. Many New Zealand engineers are strongly committed to sustainability and want to understand the issues and risks they will face and how to incorporate sustainable solutions. While it does not face the population pressures of other countries, which force them into sustainability, there is a commitment to sustainability, which will constantly be a driving force in setting pathways for New Zealand's future.

A Dynamic and Strategic Perspective on Corporate Social Responsibility in China

By Zhongxue Li, BS, MS, PhD

Zhongxue Li is Professor at the Department of Mineral Resources Engineering, University of Science and Technology Beijing (USTB), zxli@ustb.edu.cn

Just like sustainability, corporate social responsibility (CSR) has been one of the long-range focuses of global concerns. CSR as a path to sustainable development (SD) has been well recognized all over the world.

CSR Movement

Publicly, the significance of CSR has been highlighted by *The Future We Want*, the outcome document adopted at the United Nations Conference on Sustainable Development (UNCSD or Rio+20) in June, 2012 to support national regulatory and policy frameworks that enable business and industry to advance SD initiatives, taking into account the importance of CSR and to call on the private sector to engage in responsible business practices, such as those promoted by the UN Global Compact.

Privately, the International Council on Mining and Metals (ICMM), among others, has catalyzed environmental and social performance improvement in the mining and metals industry. It brings together 22 giant mining and metals companies and 35 associations to address the core SD and CSR challenges, such as accountability, transparency, effects of carbon-pricing schemes on competitiveness of the industry, climate change revenue recycling schemes, and climate change-related adaptation strategies for the industry.

Civically, a key milestone has been laid by the International Organization for Standardization (ISO) standard of Social Responsibility Guidance (ISO 26000). It indicates a world-wide consensus on CSR issues and its solution among stakeholders, by focusing on the seven principles of accountability, transparency, ethical behavior, respect for stakeholder interests, human rights, rule of law, and international norms of behavior; the seven core subjects of organizational governance, human rights, labour practices, environment, fair operating practices, consumer issues, and community involvement and development; and seven aspects of CSR guidance.

Academically, the International CSR Conference at Humboldt-Universitat zu Berlin series, as a platform for multi-stakeholder dialogues, since 2004, has been exploring the themes of CSR and sustainability in all their various dimensions, such as new forms of stakeholder governance and legitimacy and effectiveness of global CSR standards; CSR networks and co-operations; responsible supply-chain management; sustainable energies, climate change, and carbon-footprint strategies; and CSR measurement and management models.

CSR Conception

What is CSR all about then? Adam Smith during the 1750s said the unfettered free market does not always perform perfectly and participants must act honestly and justly if the ideals of free market are to be achieved.

A. B. Carroll in the 1990s presented a four-layered CSR pyramid model with economic and legal responsibilities as the base levels and ethical and philanthropic responsibilities as the top levels.

ISO in 2010 defined the social responsibility of an organization in general as its responsibility for impacts of its decisions and activities on society and the environment through transparent and ethical behavior that contributes to SD, takes into account stakeholders expectations, complies with applicable law and is consistent with international norms of behavior, and is integrated into the organization and practiced in its activities within its sphere of influence.

CSR Dynamics With Multi-Dimensions

CSR is universal. It is of dual existence having objectivity as a corporate capability and requiring subjectivity regarding corporate decisions and activities. It can apply to all types of corporations in the public and non-profit sectors as well as in the private sector, whether large or small, and whether operating in developed or developing countries.

CSR is multi-dimensional. CSR issues and extent are dependent upon corporate attributes such as ownership

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A Dynamic and Strategic Perspective (continued from page 6)

and governance, types and sizes, competency and market shares, industrial sectors, and geopolitical and cultural contexts in which corporations operate.

CSR is time dependent. Stakeholder expectations and CSR scope, extent and capacity evolve over time. Corporate behavior with CSR issues changes with the life cycle of corporations and the level of economic and social development.

CSR State-of-the-Art in China

In view of the CSR development in the United States and Europe and combined with Simon Zadek's organizational learning models, a framework for characterizing the dynamics of CSR with economic and social development in China has been built. It includes patterns of CSR issues at the latent, emerging, consolidating, and institutionalized stages, and modes of CSR responses at the defensive, compliance, managerial, strategic, and civil stages with corporate CSR behaviors and motives as shown in **Figure 1**.

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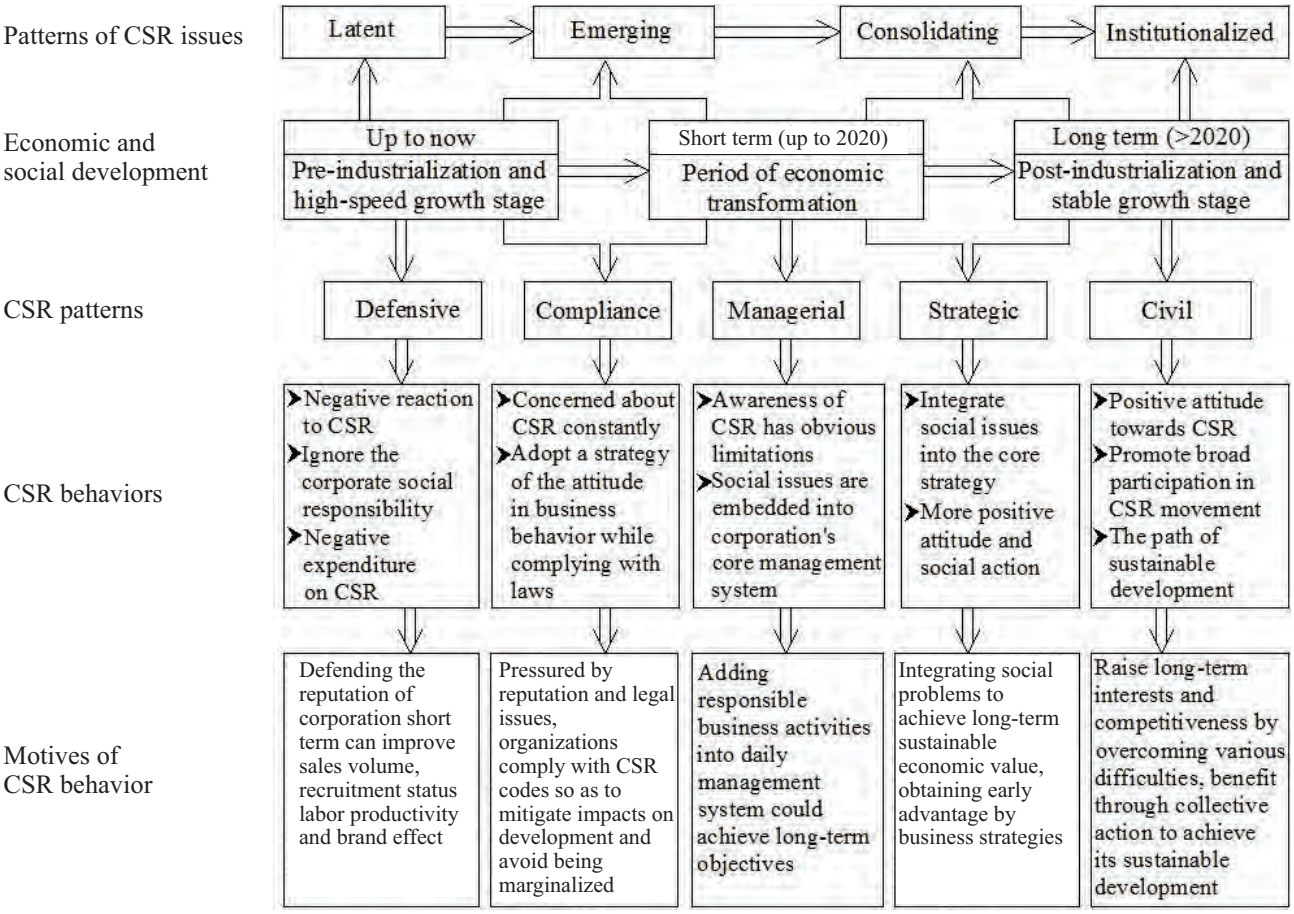
Figure 1 CSR dynamics as economy and society evolves in China



WFEO-CEE and Related Upcoming Events

- Sept. 9, 2013, Singapore City, Singapore – WFEO-CEE Face-to-Face Meeting #6
- Sept. 13-15, 2013, Singapore City, Singapore – WFEO Executive Council Meeting and General Assembly

United Nations Framework Convention on Climate Change

- Nov. 11-22, 2013, Warsaw, Poland – UNFCCC Conference of the Parties – Meeting #19 (COP-19) www.unfccc.int

Meetings Relating to WFEO-CEE Themes

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- Sept. 11-13, 2013, Singapore City, Singapore – World Engineers Summit 2013 – Innovative and Sustainable Solutions to Climate Change www.wes2013.org

Theme 3 – Engineering and Agriculture

- Nov. 17-18, 2013, Abu Dhabi, United Arab Emirates (UAE) – 2013 International Conference on Sustainable Environment and Agriculture www.icsea.org
- Sept. 16-19, 2014, Beijing, China – 18th World Congress of CIGR – International Commission of Agricultural and Biosystems Engineering www.cigr2014.org

Theme 4 – Engineering and Mining

- Nov 5-8, 2013, Santiago, Chile – 2nd International Conference on Social Responsibility in Mining www.srmining.com
- Feb. 23-26, 2014, Salt Lake City, UT, USA – Society of Mining Engineers (SME) Annual Meeting – "Leadership in Uncertain Times" www.smenet.org
- June 12-13, 2014, Falmouth, United Kingdom – SRCR'14 – Sustainability through Resource Conservation and Recycling '14 www.min-eng.com/srcr14

A Dynamic and Strategic Perspective (continued from page 7)

CSR Strategies in China

As a developing economy in transition, China is developing national regulatory and policy frameworks to support business and industry for advancing SD initiatives and engaging in responsible business practices for CSR-related risks to be mitigated. **Table 1** shows some strategies that may be adopted by either the public sector for society risk mitigation or the private sector for corporate risk mitigation.

Table 1 CSR Risk Mitigation Strategies in China

Public strategies for society risk mitigation	Political	• Reform institutional mechanisms and follow the leads of best CSR practices • Promote transparency, communication and CSR awareness • Respect for stakeholder interests, rule of law, international norms of behavior and human rights
	Social	• Develop multi-stakeholder, multi-level strategies and initiatives • Enhance partnerships and stakeholder engagement among the public, private and civic sectors • Encourage CSR reporting for transparency and visibility • Disseminate best CSR practices
	Economic	• Promote international exchanges and cooperation • Adopt green supply chain and procurement • Develop CSR initiatives at various levels • Continually improve CSR performance in view of CSR diversity and dynamics
	Technical	• Establish effective R&D systems to advance scientific and intellectual capabilities • Adopt emerging norms, standards and guidelines • Promote risk-related management systems such as ISO 26000, ISO 14000, OHSAS 18000 and SA8000
Capacity building strategies for corporate risk mitigation	Corporate governance	• Review global and regulatory CSR drivers • Develop forward-looking strategies and goals • Design a CSR structure and cross-functional system • Establish CSR policies, practices and procedures • Continually adapt to more advanced CSR stages
	Financing	• Match budget to best framework and commit dedicated budget for CSR initiatives • Do cause marketing • Promote community investment, employee volunteerism, sponsorships, product give-aways and philanthropy
	Technology	• Integrate CSR into business & spheres of influence • Adopt cleaner, healthier, safer, ecologically more efficient processes, products and services • Identify key social, environmental and ethical issues and evaluate their impacts
	Human resources	• Develop effective staffing plan • Raise awareness of and reach consensus on CSR through effective learning /training and communication processes • Respect for human rights and treat employees fairly • Build a CSR culture

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #11
April 2014

Engineers can initiate programs to maximize energy efficiency and reduce demand, thereby reducing users' costs for energy and lowering GHG emissions.

Mitigating Greenhouse Gases — Engineers Can Make the Difference!

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

The 2009 UNFCCC meetings in Copenhagen held the promise of political continuation of the Kyoto Protocol and renewed efforts to address the discharge of GHGs. Record numbers of NGOs and registrants attended, each expressing their views through every means of communication available. WFEO-CEE and the Danish Society of Engineers (IDA) put forward the engineering perspective outlined in WFEO's Geneva Declaration on Energy, and in the Future Climate – Engineering Solutions Report.

These messages state very clearly that, by using current technologies, the amounts of energy societies require now and in the future are available, and that GHG concentrations can be reduced to required levels by improving efficiencies in all consumption sectors and by increasing the contributions of renewable energy.

The Geneva Declaration states:

"We can do it – let's do it!

"To achieve the goals suggested by IPCC, the entire energy cycle (generation, transmission, distribution) has to be considered, as well as primary and renewable energy sources and efficiencies in utilization and transmission, and include assessment of the environmental and economic consequences. The solutions are of necessity customized for each region. Sustainable models for power interconnection of countries in a given region to complement local supply will have to be pursued and implemented."

The Declaration concludes:

1. To guarantee a good quality of life for everyone, all available energy sources must be considered.
2. The use of any technology requires a thorough analysis of the technological, economical and environmental feasibility of implementing scientifically sound, and efficiently engineered solutions.
3. The technologies needed to supply energy to substantially improve quality of life globally are available or at an advanced stage of development.

Furthermore, the Declaration assumes that society will acknowledge that engineers are recognized as legitimate contributors to the debate and that engineers will take action.

Future Climate – Engineering Solutions reported on 11 assessments on the potential to lower national GHG emissions by using existing technologies and improving efficiencies. The report concluded that while results varied by country, major emission reductions were feasible. This was an important and optimistic statement, led by IDA and endorsed by WFEO, related to the Copenhagen agenda and goals.

Continued page 7

Phase 2 and Phase 3

The Future Climate — Engineering Solutions Project

By Daniel Kenning, CEng.

A principal of Splendid Engineering and based in Essex, the United Kingdom, Daniel Kenning is a Fellow of the IMechE and a Chartered Environmentalist.

Phase 2 (2009 – 2011) of the Future Climate – Engineering Solutions Project was characterised by institutional support from the Institution of Mechanical Engineers (IMechE), and yielded an increase in the size of the network and the number of national energy and climate plans published. The project was led during this phase by Dr. Alison Cooke, a Fellow of IMechE, who brought the support and influence of the Cambridge University Engineering Department, and built a very strong Steering Group.

Phase 3 (2011-2014) has been characterised by a lack of institutional support, as both IMechE and Cambridge University were no longer involved, the engagement of the Steering Group diminished, and Dr. Cooke handed over to Daniel Kenning, also a Fellow of IMechE and a Chartered Environmentalist, and Paul Jowitt, Fellow of ICE, supported by the Institution of Civil Engineers. Work therefore focused on maintaining the project and its profile as a stand-alone contributor to the global energy and climate debate, and on preparations for the project's transfer for Phase 4 to a new, properly resourced, institution in the next host country.

Phase 2: 2009 – 2011

The project was developed substantially during Phase 2 in terms of outputs and influence. The Steering Group assembled by Dr. Cooke at Cambridge University included Dr. David Mackay, Chief Scientific Officer to the Department of Energy and Climate Change (DECC), among others. Strong links were developed with DECC, and its innovative and parallel work on the "Pathways to 2050" open source calculator tool for national energy planning. Financial support was also secured from Shell.

During Phase 2 the support of IMechE and Cambridge University enabled these substantive outcomes:

- An updated and enhanced Framework was developed to enable participating national organisations to develop better national energy and climate plans, retaining the overall project objectives to meet the overall target of achieving a <2C rise in average global temperatures, and the achievement of an energy system that is resilient to peak oil.
- A better website was developed in collaboration with the Mayden Foundation (www.fc-es.net)
- A new plan was published in July 2011 for the UK, *UK 2050 Energy Plan - The challenge continues*, which also delivered the UK government commitment to reduce GHG emissions by 80% by 2050 compared to 1990 levels. (http://www.fc-es.net/wp-content/themes/fces/uploads/2012/08/UK+2050+Energy+Plan+2011.pdf)
- Altogether, 11 national plans were published on the website
- The network of national organisations was expanded to include the following 23 countries; Australia, Belgium, Brazil, Canada, China, Croatia, Cyprus, Denmark, Finland, Germany, Honduras, Hong Kong, India, Ireland, Jamaica, Japan, New Zealand, Norway, Russia, South Africa, Sweden, the United Kingdom and U.S.A.
- A conference at IMechE in London in September 2011 to disseminate the results.

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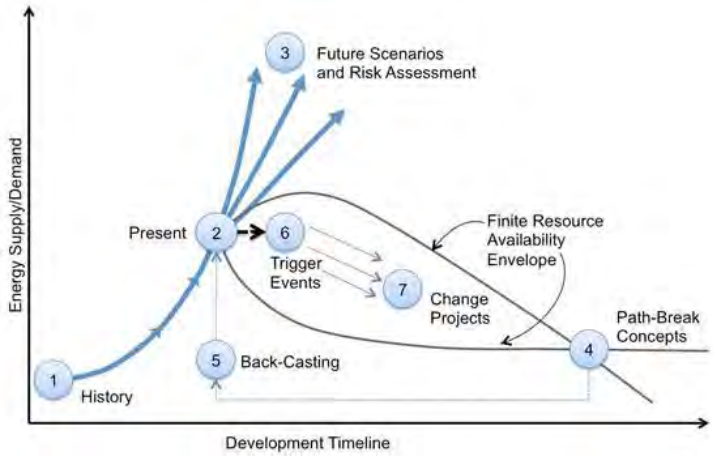
Transition Engineering



Transition Engineering's Seven Steps:

Step 1: History: use of historic data to understand how an energy using system has reached the current status; "how did we get here?"
Step 2: Current Status: use of high-quality data to create a detailed description of the current status in terms of energy use and energy supply,
Step 3: Scenarios: an exploration of future scenarios that are possible based on extrapolation of past trends. This step highlights any false assumptions about whether the current pace of change is likely to lead to a sustainable future.
Step 4: Path-break concepts: this is an envisioning step in which a desirable, sustainable, future scenario is described, separately from past trends. This becomes the objective for future activity instead of the current, possibly inadequate, future scenarios.
Step 5: Back-casting: this is a relatively familiar concept, used to identify a planning pathway that could achieve the desirable future vision.
Step 6: Trigger events: this is a challenging change activity; the engineers must identify means to break the momentum that forces adherence to possibly inadequate and unsustainable trajectories. This requires the identification of specific actions that can serve to get out of a rut; for a national climate and energy plan the act of participating in a global alliance like FC-ES may prove to be the required trigger event. Other trigger events include changes of national government (a new government may be more amenable to sustainable change), a climate change disaster (after which change may be more acceptable), or others that national project teams may identify.
Step 7: Action plans: this is the stage at which engineers establish workable plans to implement the bold visions and courageous change-making activities in the previous steps.

Phase 3: 2011-2014

During Phase 3, the nature and output of the project was much more limited, but included the following key steps designed to ensure that the project can continue, ideally with renewed and increased energy and effectiveness, when a new and well-resourced national host organisation is established for Phase 4.

A new Phase 3 Framework was developed for use by and in consultation with participating national engineering organisations. This built on the Phase 1 & 2 framework documents and incorporated some key enhancements to enable the creation of much higher value national energy and climate plans.

Phase 3 Framework – in consultation with the international network of FC-ES partners, some new elements and principles were introduced. The Framework Document comprises:

Engineering Basis – plans to be based on sound engineering expertise, and not on political whim, short-term expedience or ideology.

Data – plans should be based on high-quality data describing historical demand and supply, as well as trends in supply and demand that inform sensible forecasts.

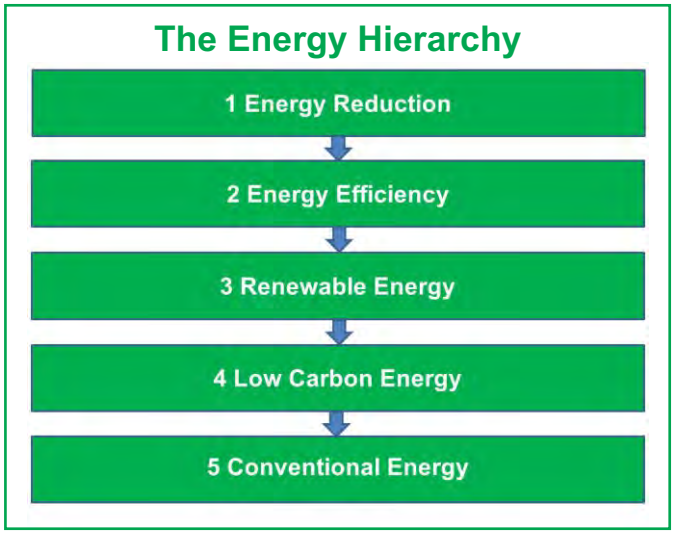
Sustainability – plans should enhance all interdependent aspects of sustainability; the environment upon which society is wholly dependent, society – including employment – and a better, and more stable, economy.

Energy Hierarchy – plans should recognise that the demand side is as important as the supply side, and use the energy hierarchy both as a framework for making decisions about the design of national energy systems, and, just as important, as a testing tool for proving proposals. (The Energy Hierarchy published by IMechE http://www.imeche.org/knowledge/policy/energy/policy/the-energy-hierarchy)

Inclusion of Mitigation of *and* Adaptation to Climate Change – Mitigation of climate change and adaptation to unavoidable climate change are sometimes seen as completely different challenges, but overall there is a need to adapt complex human energy using systems to a changed future, a future which will include both reduced greenhouse gas emissions and changed climate. There is also a need to adapt to a future which will include more constrained energy supply.

Whole-System Climate and Energy Plans – National climate and energy plans should address sectors that are sometimes omitted from purely supply-side energy plans, including: water, food (growing, processing, transporting), transport, waste minimisation and recycling, the built environment, and industry and manufacturing.

Transition Engineering Methodology – the Framework incorporates a new approach to engineering which enables and facilitates change from unsustainable, possibly inherited, orthodoxies, towards a sustainable new development direction. This includes a key seven-step process (Krumdieck, 2009) developed by the Global Association for Transition Engineering. (www.transitionengineering.org) This methodology can enable new ways of thinking to tackle apparently insoluble problems, such as the apparently intractable problems of global or national energy supply and demand post peak oil. See box (page 2) for explanation of the Transition Engineering approach.



Two-Tier Process – simple and advanced, to allow the effective introduction of new participants, and to support the continual learning and improvement process for experienced participants. Each climate and energy plan requires a simple set that a first-time participating organisation should be able to adopt, and some advanced principles for use by experienced participants.

Learning Lessons From Others – because so many others are working on similar endeavours, and because the FC-ES project is as much about "how" a national climate and energy plan is created as it is about "what" goes into that plan, participants are encouraged to collaborate with and learn lessons from other organisations in their home countries.

The project's profile and presence was maintained at key conferences, with the objective of ensuring that the momentum built up so far is maintained for Phase 4.

2012 – COP 18 – Doha

A small project delegation went to Doha for COP-18 to host, for the first time, an event at the conference targeted at government delegations. We organised a side event, sponsored by Shell UK, at which we also launched the new website – www.fc-es.net.

A video interview about the Future Climate – Engineering Solutions (FC-ES) project with Daniel Kenning is available at: http://climatechange-tv.rtcc.org/cop18-energy-planning-too-complex-for-politicians/

2013 – World Engineers Summit

To maintain an FC-ES presence, and to avoid the cost and climate impact of flying, a paper was delivered on behalf of the project by Wilson Ang, President of the Environmental Change Organisation, Singapore, who is a British Council Climate Ambassador and an IMechE member in Singapore.

2013 – COP 19 – Warsaw

The project was represented at COP-19 by Daniel Kenning, as encouraged by Christiana Figueres, Executive Secretary of the UN Framework Convention on Climate Change, who in 2008 put engineering at the centre of her vision: "The challenge we face calls for nothing less than a transformation of the world economy onto a green, sustainable pathway. Technology, both for adaptation and for mitigation, cannot but be at the very centre of this transformation."

Continued next page

Future Climate – Engineering Solutions
The Project – the Story

By Pernille Hagedorn-Rasmussen

Pernille Hagedorn-Rasmussen is a Political Advisor with The Danish Society of Engineers (IDA).

Future Climate - Engineering Solutions is an international project involving engineering associations. Its purpose is to demonstrate sustainable energy technologies and solutions in order to support national and international efforts to reduce emissions of greenhouse gases (GHG).

The core of the project is national climate plans developed by the participating associations.

The project began in 2008 in order to gather engineering associations around the world on the climate change agenda. With the Association of Nordic Engineers serving as the coordinating body, the original partners behind the project were: The Swedish Association of Graduate Engineers, The Norwegian Society of Engineers and Technologists, The Association of German Engineers, and The Danish Society of Engineers.

According to Johan Sittenfeld, of The Swedish Association of Graduate Engineers: "The Swedish Association of Graduate Engineers participated because we think that climate change is one of greatest challenges to society. Different technical solutions are among the most important components in dealing with the problems along with a change in views and attitudes. Therefore, it is important that technical organisations take responsibility through the skills they possess.

"Project Future Climate – Engineering Solutions highlighted the areas in which the countries had substantial knowledge. This helps developing technologies nationally that can have a significant impact globally. We feel that the project has successfully demonstrated that technology in many cases is available or can be accessed only if the political climate and the incentives are favourable."

The participating associations have developed their own national climate action plans. The plans give a technical evaluation of the national possibilities for reducing climate gas emissions to a level matching the best-case scenario of the Intergovernmental Panel on Climate Change (IPCC).

Future Climate - Engineering Solutions,Copenhagen conference.

The national plans have been offering an opportunity for the participating organisations to show the proficiency of their members both with regard to a national and international audience.

The first milestone was the COP 15 meeting in Copenhagen and during the project period several international conferences have been initiated. We have also presented the result of the projects several times at the UN COP meetings, in 2009, 2010, 2012 and 2013. The aim is to show the international community that engineers and their technical knowledge are part of the solution to climate change.

Participating associations are: The Danish Society of Engineers (IDA); The Swedish Association of Graduate Engineers; The Norwegian Society of Engineers (NITO); The Association of German Engineers (VDI); The Institution of Engineers (IEI), India; Institution of Mechanical Engineers, U.K.; The American Society of Mechanical Engineers (ASME), U.S.A, (European operations); The Japan Society of Mechanical Engineers (JSME); APESMA, Australia; The Finnish Association of Graduate Engineers (TEK), Finland: Union of Professional Engineers (UIL), Finland; and Engineers Ireland.

Shalini Sharma, of the Institution of Engineers India, observed: "By participating in the Future Climate Project, we could study the status of carbon emission (from various sectors) in India and its implications and related policies, which was a comparatively new subject in India in year 2008-09. Also we represented India which was the only developing country and fast developing economy in the international group of 11 countries. Further organisations could make this project a base and can expand its research efforts for mitigation/adaptation."

Future Climate – Engineering Solutions Project (continued from page 3)

A short video was recorded - http://climatechange-tv.rtcc.org/2013/11/19/cop19-daniel-kenning-on-transition-engineering/

Preparations were made in collaboration with the network members for the handover from the U.K. to the next national host organisation.

The continuity maintained during Phase 3 will enable a new national host organisation to take on the FC-ES project during 2014-2015. The handover will include workshop activities to introduce the concepts of the project, the Framework Document and its principles, the introduction to the international network, and introduction to lessons learnt about the project. Key stages in the handover include planned activities at the UN Climate Conference in Bonn, June 2014, and at COP-21 in Paris, December 2015.

A Climate Plan for Denmark

By Pernille Hagedorn-Rasmussen

Pernille Hagedorn-Rasmussen is a Political Advisor with The Danish Society of Engineers (IDA).

As part of the Future Climate Project, members of the Danish Society of Engineers (IDA) developed a national climate plan for Denmark, called the IDA Climate Plan 2050. It is a holistic message on the way in which the Danish climate gas emissions can be reduced by 90% by 2050 while also improving Denmark's self-sufficiency, economy, and developing Danish trade and industry.

The starting point of the project was the Intergovernmental Panel on Climate Change (IPPC) findings and the United Nations recommendations made in and around the year 2006. It was noted that the inhabitants of the well-to-do OECD countries cannot in the long-run sustain greater greenhouse gas emissions per capita than inhabitants of other parts of the world. Since Denmark's per capita greenhouse gas emissions are approximately double those of the average world citizen, this means that we as a country must undertake and have taken a substantial reduction commitment. The IDA Climate Plan 2050 has therefore aimed to show how it is technologically and economically possible to reduce greenhouse gases emissions in Denmark by 90%. This corresponds to each Dane contributing no more than around 1.3 tonnes CO_2 equivalents by 2050.

A Danish Climate Plan Based Solely Upon Renewable Energy

Wind turbines and biomass constitute the backbone of the IDA Climate Plan 2050, which is based solely upon renewable energy. In 2050, Danish greenhouse gas emissions will originate largely from agricultural production and the emissions that are linked with the Danish people's food consumption. In the IDA Climate Plan 2050, 60-65% of the electricity production will be based on wind power. The majority of the combined heat and power production will be based on biomass and waste and thus constitutes the stabilising element of an otherwise fluctuating energy production.

The remaining electricity and combined heat and power production will be based on solar cells, wave power, geothermal and solar heat. Such a comprehensive development of renewable energy sources requires a number of consecutive initiatives.

It will be necessary to increase research and development within the critical technologies. It is particularly important to also provide necessary opportunities to test and demonstrate the technologies and to establish innovation markets and feed-in tariffs that can support a market characteristic following the new technologies. With windmills, it is also important to draw up as soon as possible a long-term development plan for off-shore and on-shore wind turbines.

Reducing Energy Consumption In Buildings

The IDA Climate Plan 2050 also looks at the energy consumption in buildings and homes being markedly reduced in the forthcoming years, and at making the housing mass CO_2 neutral through a combination of energy savings, the integration of renewable energy and the development of district heating based on renewable energy. The energy consumption in buildings and homes currently constitutes more than 40% of the total Danish energy consumption. Denmark currently has the world's most stringent energy requirements for buildings, but it will still be necessary to enhance those requirements.

The first houses that do not use energy have already been erected, and it is recommended that requirements be introduced at this early stage into the building regulations requiring houses erected after 2020 to be erected in accordance with the Zero Emission Housing standard. However, the greatest savings potential is in the existing housing mass, and even by 2050, the majority of the housing mass will consist of homes erected before 2009.

The Climate Plan looks at a substantial reduction in energy consumption through continuous renovation up to 2020 and at bringing 75% of most poorly insulated structures up to the current building regulation requirements. In 2030, through further reductions, energy consumption in buildings will be halved compared to the present level. Many energy savings are privately financially profitable. In order to support renovation of private buildings, it will be necessary to

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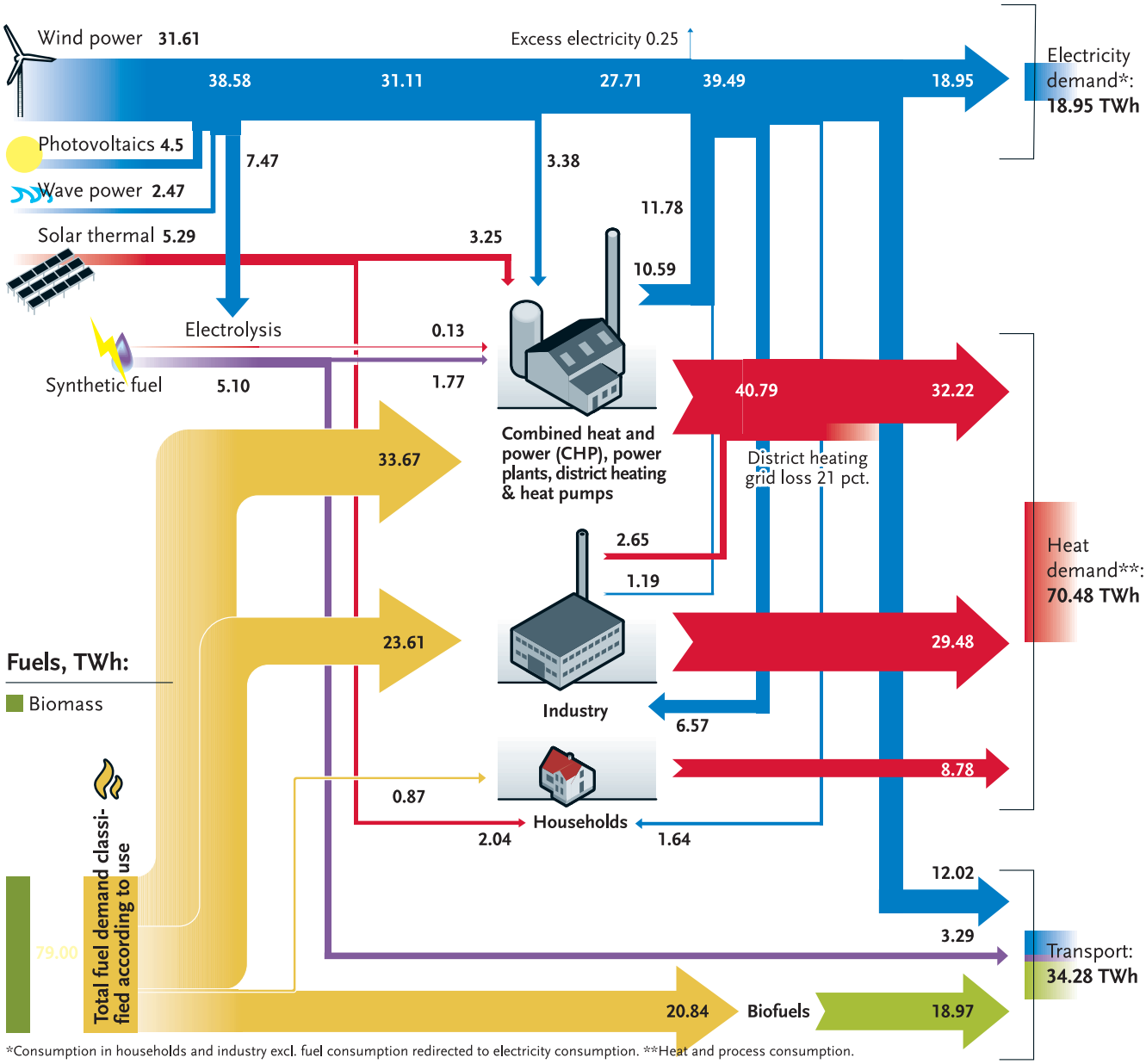
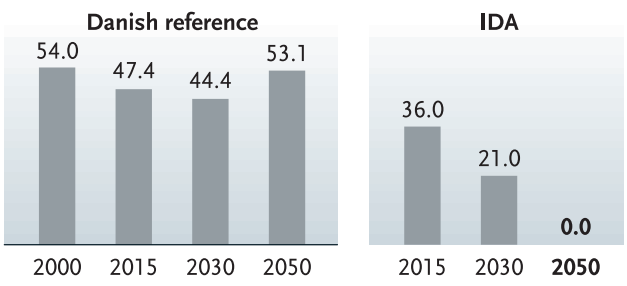
100% renewable energy. Primary energy supply, total: 122.86 terawatt hour (TWh)

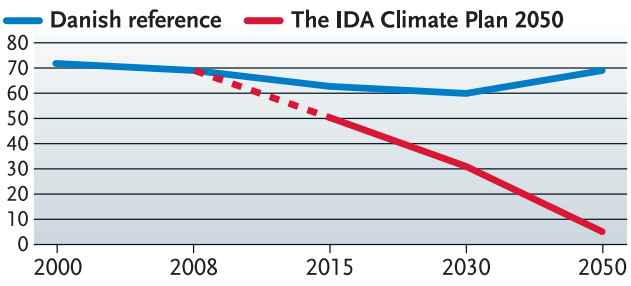


*Consumption in households and industry excl. fuel consumption redirected to electricity consumption. **Heat and process consumption.

CO_2 emissions from the energy system (million ton):



All Danish climate gas emissions in CO_2-eq (million ton):



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A Climate Plan for Denmark (continued from page 6)

prepare a long-term plan for increasing energy efficiency and for state funds to be earmarked to speed up energy savings in private residences and in non-profit residential buildings.

Energy Savings Are a Major Tool

The IDA Climate Plan 2050 for Denmark emphasises cost-effective solutions, which mean that energy streamlining and more efficient utilisation of nature's resources constitute a cornerstone of the plan. The plan looks at the Danish energy consumption being reduced by 50% by 2050.

Danes have this objective in common with the participants in the international project. One of the main points in the report issued by the Future Climate Project is that a large proportion of reductions could be reaped through energy savings. Most organisations, therefore, expect to be able to reduce the emission of greenhouse gases at a national level by up to 50% – solely through energy efficiency improvements within areas such as manufacturing, industry, construction and transportation.

Five Years Work With National Climate Plan

Since the climate plan's publication in 2009, IDA has continually worked to make politicians and the public aware of the possibilities of curbing the CO_2 emissions while at the same time creating jobs.

In 2010, it used the political opposition by the government to the IDA Climate Plan to create a common climate plan. In 2011 there was a change in government in Denmark and the three parties from the opposition took over and brought some of the ideas from their plan into effect.

For the past three years, IDA annually has made a “smiley” report where we match the results of the IDA Climate Plan up against the actually national status in Denmark. We have chosen indicators on the basis of which we evaluate if Denmark is on the right track towards the national goal of CO_2 reductions and share of renewable energy. With this report, we participate in the public debate on climate change and energy planning.

WFEO-CEE and Related Upcoming Events

WFEO Meetings

- Nov. 2, 2014, Abuja, Nigeria – WFEO-CEE Face-to-Face Meeting #7
- Nov. 2–9, 2014, Abuja, Nigeria – WFEO Executive Council Meeting

WFEO Events

- Nov. 2–7 2014, Abuja, Nigeria – WECSI 2014 – World Engineering Conference on Sustainable Infrastructure in Africa www.wecsi2014.org
- Nov. 28–Dec. 4, 2015, Kyoto, Japan – WECC 2015 – World Engineers’ Conference and Convention www.congre.co.jp/wecc2015

United Nations Framework Convention on Climate Change

- June 4–15, 2014, Bonn, Germany – UNFCCC Bonn Climate Change Conference www.unfccc.int
- Dec. 1–12, 2014, Lima, Peru – UNFCCC Conference of the Parties – Meeting #20 (COP-20) www.unfccc.int

Meetings Relating to WFEO-CEE Themes

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- Sept. 23, 2014, United Nations Headquarters, New York, New York, U.S.A. – Climate Summit 2014 - Catalyzing Action www.un.org/climatechange/summit

Theme 3 – Engineering and Agriculture

- Aug. 13–14, 2014, Nairobi. Kenya – The Africa Food Security Conference & Agric Exhibition www.aidembs.com/africafood-security_conference
- Aug. 6–7, 2014, Singapore City, Singapore – 2014 4th International Conference on Environmental and Agriculture Engineering (ICEAE 2014) www.iceae.org
- Sept. 16–19, 2014, Beijing, China – 18th World Congress of CIGR – International Commission of Agricultural and Biosystems Engineering www.cigr2014.org

Theme 4 – Engineering and Sustainable Mining

- June 12–13, 2014, Falmouth, United Kingdom – SRCR'14 – Sustainability through Resource Conservation and Recycling '14 www.min-eng.com/srcr14
- June 25, 2014, Johannesburg, South Africa – Capacity Building Workshop on Mining and Sustainable Development, 25th Anniversary Meeting of Society of Mining Professors www.miningprofs.org
- Feb. 15–18, 2015, Denver, Colorado, U.S.A. – Society of Mining Engineers (SME) 144th Annual Meeting – “Navigating the Global Waters” www.smenet.org

Mitigating Greenhouse Gases (continued from page 1)

Unfortunately this message was lost amid withdrawals from the Kyoto Protocol, amid the political intrigue, environmental activism and the spectacle of failure that followed Copenhagen. The resulting Copenhagen Accord had one new and positive element. It recognized that all GHG emitters must take action and engage in the discussions those major emitters who are not signatories to the Kyoto Protocol. At subsequent UNFCCC meetings, WFEO and the Future Climate team have continuously brought forward our message and updates on progress of our efforts, and have now achieved recognition to the extent that our community is now seen as a contributor.

Engineers Can Initiate Programs

Engineers, in all countries and all sectors, can initiate programs to maximize energy efficiency and hence reduce demand with the dual benefit of reducing the user costs for energy and the reduction of GHG emissions. Secondly, by implementing renewable supply sources and negotiating effective inter-regional sharing in times of peak and growing demand, surplus energy can be sourced and shared. Over time, traditional carbon-based sources can be phased out and replaced with more efficient and less-GHG-intensive infrastructures.

Transitional Plans Required

Significantly, this can and will only happen if transitional plans are formulated and implemented for all GHG-intensive facilities as they reach the end of their useful and economic lives. Engineers worldwide are in positions of influence and decision-making such that these choices can be made without the rigid constraints of local, regional, global corporate politics.

“It can be done - Let's do it”.

Assessments a Success

This newsletter updates on the progress of Future Climate – Engineering Solutions and demonstrates that the format of a national assessment has proven successful. Engineers everywhere need to press for a national assessment, one that outlines the transition plan and subsequently leads to implementation. The template and format are available. Let's take the initiative, and solve the problem – take leadership.

Update on WFEO Model Code of Practice for Sustainable Development And Environmental Stewardship for Engineers

The Model Code was unanimously approved by the World Federation of Engineering Organizations General Assembly in September 2013. It was published and distributed electronically to all national and international members of WFEO in late October. Please see link on the opening page of the WFEO website www.wfeo.net.

The Code has a one-page listing of ten principles, similar in format to the Model Code of Ethics. An Interpretive Guide accompanies the listing and provides additional amplification and guidance on how engineers should interpret and implement the principles. National members may adopt it as their own guide or use it to develop their own.

The Model Code and Interpretive Guide have now been translated into Spanish. Thanks to national member Costa Rica for completing that task. The one-page listing is also available in French. Translation into Arabic by national member Bahrain was completed and posted on the WFEO website. Negotiations to translate into several other languages are in progress.

A PowerPoint presentation on the Model Code was completed in March 2014. It is approximately 30 minutes long, and includes speaking notes so that others may deliver the presentation. The presentation is the first of a series of communication and training products to increase awareness and uptake of the Model Code over the next few months. It may be delivered in person or via webinar.

In April, the presentation will be made widely available after the WFEO Executive Board meeting in Paris. The CEE Secretariat will work with members to facilitate and support speaking opportunities in the coming months. Initial target audiences include national members of WFEO and their engineers as well as United Nations agencies.

World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #12 July 2015

The nearly 20 million engineers within WFEO member nations can contribute significantly toward achieving many of the UN Sustainable Development Goals.

Engineering Helps Achieve UN Sustainable Development Goals

By Darrel Danyluk, P.Eng. FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

In 2012 at the UN Rio+20, the global negotiations on sustainability refocused from bi-annual thematic discussions to the creation and ratification of Sustainable Development Goals. Driven by an underlying and growing concern for the planet's future, the Conference of the Parties (COP) negotiators have received input from civil society, including the World Federation of Engineering Organizations (WFEO) and have developed 17 goals intended to ensure a sustainable future. These goals are subject to final negotiations and approval by the UN General Assembly and are given below, with those where engineering has significant responsibility highlighted in blue.

Goal 1 End poverty in all its forms everywhere

Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3 Ensure healthy lives and promote well-being for all at all ages

Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5 Achieve gender equality and empower all women and girls

Goal 6 Ensure availability and sustainable management of water and sanitation for all

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10 Reduce inequality within and among countries

Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12 Ensure sustainable consumption and production patterns

Goal 13 Take urgent action to combat climate change and its impacts

Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

UN Photo /Albert González Ferran

Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development

Why is it important to establish and achieve these goals?

There are limits to the earth's systems and our growing population is placing additional and growing demands on these systems.

The term earth system refers to the interacting physical, chemical, and biological processes of all regions of the planet. The system includes all the planet's natural cycles, such as the carbon, water, nitrogen, phosphorus, and other influencers, such as life and geologic processes. Life, as it has evolved, has influenced these natural cycles and the underlying concerns of the sustainability negotiations have focused on life's influences amongst others. Of specific concern are the influences of human society and the consumptive nature of our social and economic systems on the planet's

Continued page 3

How the World's Engineers Can Make Hunger History

By Engineer Fethi Thabet

Reprinted with permission, from the website of Farming First (farmingfirst.org) – a global coalition for sustainable agricultural development. As part of Farming First's ongoing series that explores the state of the negotiations on the United Nations Sustainable Development Goals, Fethi Thabet, Theme Leader of Engineering and Agricultural Sustainability at the World Federation of Engineering Organisations, was asked how the engineering community can contribute.

What do the world's engineers have to do with the Sustainable Development Goals? Plenty! If we are to end hunger by 2030 as goal two asks, the engineering profession is going to play a key role.

This is because reducing the vast amount of food that is wasted after it is harvested is going to be vital to meet global demand for food. According to a recent report by the Copenhagen Consensus and statistics from the United Nations, the amount of food wasted is as high as one third of the world's food supply. This number is higher in many developing countries.

The world's engineers can lead the way in improvements in road and railway connections that connect farms to markets, improvements in the storage of grains, fruits, vegetables and meat and improvements in electricity supplies to improve cold storage. This will drastically reduce the percentage of food lost. According to the same report, a total of $239 billion invested over the next 15 years would yield benefits of $3.1 trillion by safeguarding food. This is how it can be done, and where it is already underway.

Improving Transport

If a farmer is helped to improve yield, this investment is wasted if he or she cannot get the crops to market before they spoil. Better roads and railways will ensure this does not happen. For example, intra-Africa trade barely exists currently – the roads on the continent all lead out to the coast instead of connecting the countries within the continent. The African Union has a Programme for Infrastructure Development that will enable a strong regional market to be built. It is estimated that new transcontinental roads in Africa could generate $250 billion in trade over 15 years and greatly reduce the amount of food wasted.

Esther Nduku in Embu, Kenya, stores clean, dry maize in a metal silo. Photo credit: CIMMYt.

Food and Grain Storage

Globally over two billion tonnes of cereals, oilseeds, and pulses (collectively referred to as grains) are produced annually for consumption by people and animals. Grains (as well as fruits and vegetables) need adequate storage for a number of reasons. Sometimes the place of consumption is different than the place of production, in other cases, the time of production is different than the time of consumption.

However, post-harvest losses for grains range from one per cent in some of the developed countries to 50 per cent in some of the less developed countries, due to inadequate storage. By using new technologies, to detect and prevent food waste, it is possible to significantly reduce losses and increase grains available for consumption.

Powering Rural Communities

Rural electrification offers opportunities to mechanize many farming operations as well as prolonging storage to preserve agricultural production until it can be transported or consumed. Another approach to cut post-harvest loss is the implementation of effective storage and refrigeration systems that enable consumers to keep food for longer periods.

Food safety is a big concern, particularly in developing countries where meat and milk can spoil quickly. In India, for example, a new product is being piloted, invented by pioneering engineer Sorin Grama. Called the rapid milk chiller, it is a dome-shaped machine that couples to a thermal energy battery to cool milk from 35°C to 4°C. The rapid milk chiller cools the milk by means of a heat exchange with cold fluid inside the dome. When electrical power is not available, the rapid milk chiller can cool up to 500 litres of milk using only the thermal energy stored in the battery.

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Losses due to inadequate storage of grains range from one per cent in some of the developed countries to 50 per cent in some less-developed countries.

Improving Irrigation

Farmers also have an increasing responsibility to protect the natural resource base that they rely on. In Tunisia, work is underway to install drip irrigations systems that will help farmers apply the optimum amount of water to wheat. Research has shown that over 30 per cent of farmers were applying too much water, and over 50 per cent of farmers were not applying enough. The engineering and installation of efficient drip irrigation systems have shown promise in not only boosting yields, but also in saving water.

Building Local Capacity

The issues that lead farmers and consumers to waste food are different in each local area, and therefore require local solutions. Large-scale infrastructure challenges cannot be met by a private company coming from outside, as this infrastructure needs to be maintained by local people.

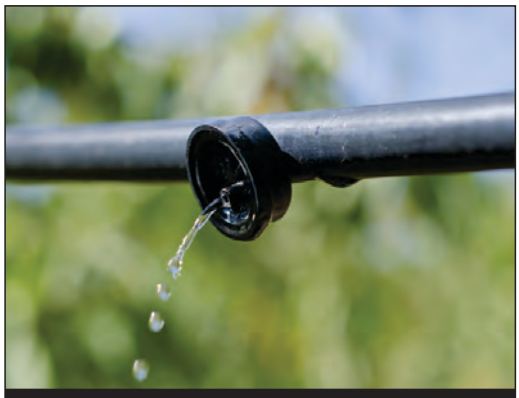
A key step towards realising the engineering solutions that will tackle food waste will be to train local engineers to meet their country's needs. Historically, young African engineers have been sent to Europe to learn a trade, but return to Africa and their knowledge quickly becomes out-dated. Strong institutions, within developing countries, such as the Institut National Agronomique de Tunisie, must be built.

The Way Forward

For many developing countries in Africa and Asia, agriculture's share of the GDP exceeds 50 per cent. Investment in agriculture and the supply chain has direct impact on poverty reduction, another important Sustainable Development Goal.

With the right investments and support, engineers can help improve rural infrastructure, storage capacities and related technologies to significantly reduce post-harvest and other food losses and waste throughout the food supply chain.

The engineering community must step up to take on this surmountable challenge. Our expertise can make the Sustainable Development Goal for ending hunger a reality.



Efficient drip irrigation systems show promise in boosting yields and saving water.

Engineering Helps Achieve UN Sustainable Development Goals (continued from page 1)

sustainability. These human influences are now being considered to be the main drivers of change to the planet's eco-system, an example being the changing climate.

Engineers and engineering have a prominent responsibility to lead society in addressing these concerns by taking a sustainable approach to their practices. The cumulative effect of engineering decisions and actions at the local, regional, and national levels will play the fundamental role in steering society towards a sustainable future. To assist, engineers worldwide have developed the Model Code for Sustainable Development and Environmental Stewardship. (See also page 8.) This pact, by the national members of WFEO, lays out the obligations of engineers worldwide and articulates the meaning of each of the ten principles highlighted in the Code. Application of the Model Code worldwide by the nearly 20 million engineers within the member nations of WFEO is an important component in achieving many of the UN Sustainable Development Goals. This newsletter focuses on ways in which this is happening.

Sustainable Development Practices and the Minerals Industry

By Jessica Elzea Kogel, PhD, CPG

GeoIntellus; 2301 Laurel Lane; Augusta, GA, 30904, U.S.A.

(For more information about the author see page 6.)

For much of history, humans have relied on minerals, which, until the mid-19th century, were mostly extracted by hand from small mines. Large-scale, mechanized mining operations began in Europe during the Industrial Revolution and since 1900 the rate of mineral consumption has grown almost exponentially. Today, minerals provide the basic raw materials for a vast array of manufactured consumer goods and services, including innovative products that directly address some of modern society's most difficult environmental challenges. Some estimates place mining's total direct and indirect contribution to global GDP at more than 45%.

Regions, such as Africa, Afghanistan and parts of SE Asia, where rapid population growth is expected, host the vast majority of earth's remaining untapped mineral resources. In many of these mineral-rich areas, geopolitical risk is high, technology is limited and infrastructure is poor – factors with potential for creating significant and long-lasting negative social and environmental consequences. Steps must be taken to extend the life of earth's remaining mineral reserves. Economic benefits must be maximized and social and environmental impacts minimized. It requires a new business philosophy integrating social, economic and environmental considerations into core business strategies and day-to-day operations. This includes adopting strategies that focus beyond the bottom line and the short-term quarterly or annual business cycle; efficient use of resources; cradle-to-grave material flow analysis to understand the entire manufacturing lifecycle; and designing processes and products to deliver sustainable social, environmental and economic benefits.

Sustainable Development and Mining

One broadly accepted definition describes sustainable development (SD) as meeting "… the social, economic and environmental needs of the present without compromising the ability of future generations to meet their needs." To be sustainable, development must generate wealth, advance social justice, and remain within the limits imposed by the ecosystem and resource availability. Furthermore, development today must not compromise future generations.

Many argue that mining is not sustainable because it extracts non-renewable mineral resources and negatively impacts the environment. This simplified and one-dimensional view is more relevant for renewable than non-renewable resources. Although single mineral deposits are finite, an uninterrupted supply of minerals is required to sustain today's technology-based society and to generate capital that fuels world economic growth. Mining converts non-renewable mineral resources into capital that sustains social, economic and environmental activities that support human development.

Mining, therefore, is unsustainable when it ignores the interaction between mineral resource development and economic growth, social development, and the environment.

While the mining activity or operation itself is not sustainable, mining can be managed so as to contribute to positive environmental, social and economic outcomes. This is often called the Triple Bottom Line, or the three pillars of sustainability. It asks business to look past short-term profitability towards the longer-term objectives of environmental protection and resource conservation locally and globally; social equity and well-being for employees and affected communities; and economic prosperity for business, shareholders and stakeholders.

Two more pillars are unique to mining – namely resource efficiency, and health and safety. Resource efficiency is critically important in mining because minerals have a finite economic and physical life. The goal is to extend the life of these irreplaceable natural assets and to extract their maximum value for human benefit without compromising current and future generations. This requires a sustainable mineral supply through discovery and development of new resources, substitution of functionally equivalent renewable materials (i.e. plastics, composites) for minerals, more efficient resource use through improved mining and processing methods, and recycling. In 2011, recycling supplied about 40% of the U.S. metal. Mining can be a high-risk occupation so worker health and safety is also core to a sustainable industry.

Commitment to SD in Mining Industry

Mining began adopting SD as a paradigm for driving business value and strategy in the late 1990's. Initially, the focus was at the executive level and on crafting an industry-wide commitment to SD. Next, individual companies developed strategies with underlying visions and goals. Finally, and perhaps most challenging, was implementing SD at the operations level.

Not all companies or mining-industry sectors have moved at the same rate. For example, most large, multinational metals mining companies have embraced SD and recognized that SD not only creates shareholder value but preserves the social license to mine. Small-scale and artisanal miners, on the other hand, have not adopted SD to the same extent. They often extract and process minerals using practices that are unsustainable, environmentally harmful and hazardous to human health.

Industry Commitment to SD

About 10 years ago, the International Council on Mining and Metals (ICMM), a consortium of 22 mining and metals companies and 34 global mining associations, began developing an industry-led commitment to SD. ICMM members voluntarily adopted publically stated principles and declarations, transparent reporting following standards set out

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by GRI G4 guidelines, and rigorous third-party certifications such as ISO 14,000. ICMM conducts an annual assessment of the progress each member company is making. While ICMM was developing the 10 principles, minerals professionals representing 12 leading technical professional organizations worldwide wrote and signed onto the Milos Declaration stating how the minerals professional community will contribute to sustainable development.

Individual Professional Practice Guidelines

Sustainability and SD must be integrated into strategic decision-making processes and day-to-day operations. Publically disclosed position statements, codes and principles declaring industry-wide SD commitment are only as credible as the performance of individual operations. It rests with individual mining professionals responsible for day-to-day operations to insure that a plant or mine operates sustainably.

In many companies, daily operations are managed against short-term financial and not longer timeline SD metrics. Often, plant and mine operators have little understanding of how their daily decisions play into these goals. This gap can be bridged through clearly stated and shared operations-specific SD metrics, by including SD related performance measures in individual performance goals, and by giving individuals more accountability and responsibility for SD performance.

Mining Lifecycle Framework for SD

The life of a mine consists of discrete phases or activities that together comprise the mining lifecycle. It provides a framework for both understanding and managing the environmental, social and economic impacts of mining at every stage of the mining project.

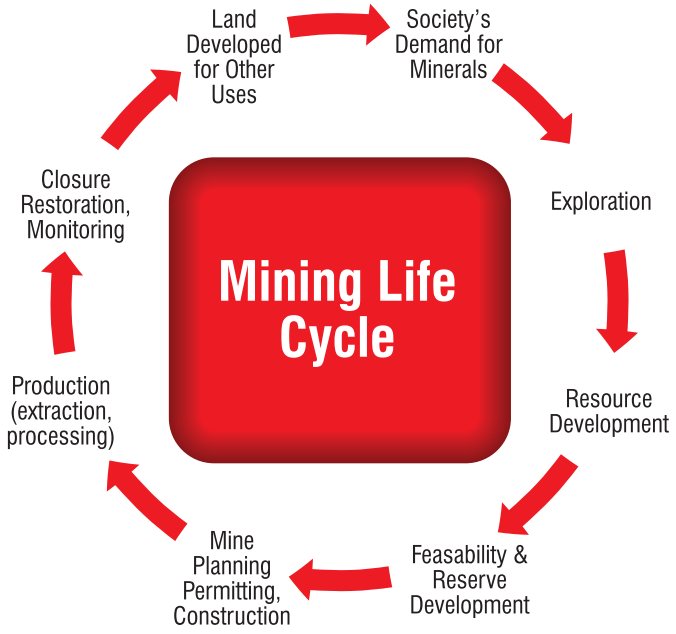
Exploration

Exploration focuses on the discovery of new mineral deposits and typically takes place in two phases. The first involves searching for a deposit on the surface – possibly with a geologist identifying promising areas and seeking signs of mineralization. Prospectors rely on outcrops, streambeds and road cuts for clues to subsurface geology. Stratigraphic position, topographic elevation or geomorphologic features are also common prospecting tools. More sophisticated approaches such as geophysical surveys, remote sensing, and geochemical analysis may be used. The second phase of exploration usually involves drilling a small number of test holes into the subsurface to recover samples.

At this point, the social and environmental impacts of exploration drilling, such as noise, water contamination, soil erosion, disturbance of wildlife habitat, disruption of land use for other activities (i.e. farming, hunting, timber, community recreation) and disturbance of culturally significant sites must be considered. If mismanaged, the company risks losing its reputation and social license to operate. This license is not a physical document but refers to acceptance of the mining company and its projects by the local community.

Resource Development

The next step involves drilling the deposit on an increasingly dense grid pattern to estimate the size of a mineral resource



and to define if a mineral deposit of is sufficient size and quality to have "reasonable prospects for economic extraction." Three pieces of information – tonnage, grade and economic viability – are needed to evaluate a deposit's resource potential.

Economic viability is determined by deposit depth, deposit continuity, distance to the processing plant, distance to market, access to transportation, availability of basic infrastructure (roads, power), and other cost factors. This preliminary economic assessment serves to determine the project's feasibility and associated risk of continued investment. Environmental and social considerations are also examined at this stage – often through the formalized environmental and social impact assessment (EIA and SIA) process.

Feasibility Studies and Reserve Development

Feasibility studies are detailed engineering and economic analyses that include mine design, cash-flow analysis, mineral processing flow-sheets, closure plans, reclamation plans and plant design. This stage may entail additional drilling plus continued environmental work, including wetland delineation, and baseline monitoring.

Mine Design, Construction and Production

Mine design and planning encompasses a broad range of activities mainly concerned with determining the mine size and, layout, mining method, production requirements, and equipment needs. The mining process begins with designing a mine that takes into account the geotechnical aspects of the site. Mine construction begins once all required local, state or federal permits are secured.

Once overburden is removed, ore is extracted using various methods including loaders, dredges, drag lines, blasting or hydraulic mining. For open-pit mines, cut and fill methods are

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A forward-looking approach seeks to harness the value that mining generates and use it to solve real social, environmental and economic problems today and to create a better future for the next generation.

used whereby overburden removed from the first pit is stockpiled and then the overburden from each subsequent pit is placed in the previously mined-out pit. The in-filled area is then sloped and graded in preparation for re-vegetation and final reclamation.

Construction of underground mines involves digging shafts and underground excavations to access the ore. Head frames, hoisting-machine buildings, machine repair shops, and other administration buildings are constructed on the surface.

Closure and Reclamation

After the ore has been removed, the mine is closed and the land is graded, re-vegetated and developed for various post-mining uses that, if managed appropriately, will bring long-term value such as wildlife habitat creation, community recreation areas, timber plantations, farming, hunting, agriculture and fishing. The best outcomes occur when communities have a role in deciding how to repurpose the land.

Companies establish environmental monitoring programs to ensure that there are no long-term environmental issues once mining is finished. Mismanagement at this stage puts a company's reputation at risk.

A Vision for the Future

William McDonough and Michael Braungart in their 2013 book, *The Upcycle: Beyond Sustainability,* introduce the concept of constantly improving and moving from being "less bad" to becoming "more good." They call this the upcycle. Conventional eco-efficient approaches are aimed at reducing or minimizing damage with the goal of shrinking negative footprint. This is where many companies focus efforts today because becoming more efficient generates positive bottom-line results. However, even better results may come by going beyond efficiency and focusing on sustainable value-generation through innovation that creates a "positive footprint,"

So how do we harness the value that mining generates and use it to not only solve real social, environmental and economic problems today but to create a better future for the next generation? The answer is not simple but there are four areas where the industry needs to shift or sharpen focus namely:

- People affected by mining must be treated fairly and with respect.
- Mining companies must create a culture of transparency by being more inclusive in engaging with stakeholders, including NGOs.
- The industry must step up efforts to support social and economic development, especially in underdeveloped countries where wealth tends to be concentrated in natural capital (minerals, oil, gas) while wealth in advanced economies tends to be concentrated in physical and human capital, thus creating disparity between the two.
- As grades decline and demand for minerals grows, the industry must change the way it operates through innovation, new technologies and new processes.

It is not up to industry alone to make changes. Other stakeholders must participate. Local and national government agencies must enact policies that support this commitment; the public must engage with open minds and with a willingness to participate in the process; mining professionals in both the private and public sector, must innovate and seek new solutions to technical problems that are barriers to sustainability; NGOs and the international community must be at the table as well. Through collaborative problem-solving, the mining industry will meet the SD challenge.

About the Author

Jessica Elzea Kogel *is a mining industry leader with more than 25 years of industrial experience encompassing a wide range of business activities including R&D management and mine operations management. Over the past decade, she has become increasingly involved in sustainable development and mining's contribution to sustainability.*

She is actively engaged in capacity building and sustainable development for the global mining industry through the World Federation of Engineering Organiza-tions Task Force on Sustainable Mining. Her work in sustainable development has resulted in peer-reviewed publications, serving as a delegate to the United Nations in 2011, leading workshops on stakeholder engagement and lecturing at national and inter-national events. She has authored more than 30 peer-reviewed papers, book chapters and field guides and holds four US patents.

Kogel is past president of the Clay Minerals Society and served as the 2013 president of the Society for Mining, Metallurgy and Exploration. She earned M.S. and Ph.D. degrees in geology from Indiana University, Bloomington after completing bachelor's degrees in Earth Science and Paleontology at UC Berkeley. She is a certified professional geologist.

Mining Lifecycle Stages and the Impact of Each Stage

	Activities	Environmental Impacts	Social Impacts	Economic Impacts
Mineral Resource Development	Drilling, Feasibility, Mine Planning, Mine Design, Permitting	Land Disturbance, Vegetation Disturbance, Noise, Dust, Water Consumption, Energy Consumption	Worker H&S, Community H&S	Jobs
Mine Development & Operation	Infrastructure Development, Overburden Removal or Underground Mine Construction, Ore Extraction	Land Disturbance, Noise, Dust, Asthetics, Water Consumption, Energy Consumption, Water Discharge, Air Emissions, Biodiveristy Protection, Resource Efficiency	Worker H&S, Community H&S, Capacity Building, Skills Development, Enhanced Community Services	Jobs, Royalties, Taxes, Capital Investment
Ore Handling	Transport ROM to Plant (truck, pipeline, conveyor, other), Storage	Land Disturbance, Vegetation Disturbance, Noise, Dust, Water Consumption, Energy Consumption	Worker H&S, Community H&S	Jobs
Processing	Crushing, Screening, Grinding, Separation, Concentration, Particle Size Fractionation, Physical or Chemical Removal of Contaminants, Drying	Waste Generation, Recovery and Reuse; Water Consumption, Contamination, Discharge and Reuse; Energy Consumption and Recovery; Air Emissions, Resource Efficiency; Noise	Worker H&S, Community H&S, Capacity Building, Skills Development, Enhanced Community Services (water, power, roads, schools, hospitals)	Jobs, Royalties, Taxes, Capital Investment
Transportation	Product to customer by rail, truck, ship.	Air emissions, Noise, Dust	Worker H&S, Community H&S	Jobs
Waste Disposal	Process and mine waste to, impounds, backfill or deep well injection	Land Surface Distrubance Water Contamination, Asthetics	Worker H&S, Community H&S	Jobs
Closure	Backfilling, Removal of Equipment, Removal of Buildings & Pipelines, Monitoring, Revegetation	Waste Disposal, Biodiversity Protection, Water Discharge, Aesthetics	Worker H&S, Community H&S, Future Land Use	Jobs, Revenues from post-mining land use (timber, agriculture etc.)

WFEO Model Code of Practice For Sustainable Development and Environmental Stewardship Update

The Model Code was unanimously approved by the WFEO General Assembly in September 2013. It is published on the WFEO website (www.wfeo.net) and distributed electronically to all national and international members of WFEO. Being a "Model Code", national members may adopt it as their guide or use it to develop their own.

The Model Code is a one-page listing of ten principles, with an Interpretive Guide that provides additional amplification and guidance on how engineers should interpret and implement the principles. A 30-to-45-minute presentation on the Code and the Interpretive Guide is available and includes speaker's notes. It can be delivered at professional development events, e.g. seminars and workshops, speaking engagements and conferences or via webinar.

WFEO and Engineers Canada are hosting webinars on an ongoing basis in 2015 to train engineers to become official presenters of the Model Code. The target audiences are fellow engineers as well as government organizations to increase their awareness and uptake of the principles. Two "train the presenter" webinars were delivered in the first quarter of 2015 – one to Central and South American countries and the second to African countries. Another webinar for Central and South America occurred on July 2 and one for Middle East countries will be delivered at the end of July. Webinars for Europe, Asia and North America are in the planning stages for the third and fourth quarters of 2015.

Any national member may request a webinar for engineers in their country. Contact Engineers Canada (david.lapp@engineerscanada.ca) for further information and registration details.

WFEO-CEE and Related Upcoming Events

WFEO Meetings

- Nov. 28, 2015, Kyoto, Japan – WFEO-CEE Face-to-Face Meeting #8
- Nov. 28 – Dec. 4 – Kyoto, Japan – WFEO General Assembly, Executive Council and Committee Meetings www.wfeo.org

WFEO Events

- Nov. 29 – Dec. 2, 2015, Kyoto, Japan, WECC 2015 – World Engineering Conference and Convention www.wecc2015.info/index.html

Meetings Related to WFEO-CCE

- Nov. 30 – Dec. 11, 2015, Paris, France – United Nations Framework Convention on Climate Change / UNFCCC Conference of the Parties (COP) Meeting No. 21 www.unfccc.int

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- Sept. 28 – Oct. 2, 2015, Location to be announced – Training Workshop for the Africa Region on Vulnerability and Adaptation Assessment www.unfccc.int/bodies/body/6440.php
- May 10 – 13, 2016, Rotterdam, Netherlands – Adaptation Futures 2016: Practices and Solutions www.adaptationfutures2016.org/
- May 16 – 26, 2016, Bonn, Germany – 42nd Sessions of the UNFCCC Subsidiary Bodies www.unfccc.int
- Nov. 7 – 18, 2016, Marrakech, Morocco – UNFCCC Conference of the Parties (COP) Meeting No. 22 www.unfccc.int

Theme 3 – Engineering and Agriculture

- July 30 – 31, 2015, Nairobi, Kenya – 2nd Africa Ecosystem Based Adaptation for Food Security Conference 2015 (EBAFOSC 2) www.afsac2.aaknet.org/
- Nov. 6 – 7, 2015, Hanover, Germany – 73rd conference LAND.TECHNIK – AgEng 2015 – "Innovations in Agricultural Engineering for Efficient Farming" www.vdi.de/landtechnik-ageng/
- June 26 – 29, Aarhus, Denmark – 4th CIGR International -AgEng Conference 2016 - Automation, Environment and Food Safety http://conferences.au.dk/cigr-2016/
- Sept. 15 – 16, 2015, Nairobi, Kenya – The Africa Food Security Conference & Agric Exhibition www.aidembs.com/africafood-security_conference
- Aug. 5 – 6, 2015, Paris, France -- 2015 5th International Conference on Environmental and Agriculture Engineering (ICEAE 2015) www.iceae.org

Theme 4 – Engineering and Sustainable Mining

- Nov. 4 – 6, 2015, Antofagasta, Chile – Third International Conference on Social Responsibility in Mining, Srmining 2015 www.gecamin.com/srmining
- Dec. 2 – 4, 2015, Lima, Peru – 4th International Seminar on Environmental Issues in Mining www.gecamin.com/enviromine
- Feb. 21 – 24, 2016, Phoenix, Arizona, U.S.A. – Society of Mining Engineers (SME) Conference and Expo - "The Future for Mining in a Data-Driven World" www.smeannualconference.com/
- June 23 – 24, 2016, Falmouth, Cornwall, England – 4th International Symposium on Sustainable Minerals '16 www.min-eng.com/sustainableminerals16/
- *Theme 5 - Environmental and Sustainable Engineering Practices for Engineers*
- Oct. 28 – 30, 2015, Tsinghua University - Mianyang, Sichuan Province, China – 10th International Conference on Waste Management and Technology – Towards Environmental Quality Improvement http://2015.icwmt.org/ICWMT2015/listen.asp?nid=869
- Dec. 2 – 4, Cairo, Egypt, 2016 – Improving Sustainability Concept in Developing Countries (ISCDC) www.ierek.com/events/improving-sustainability-concept-developing-countries/

Post 2015 Sustainable Development Goals

- Sept. 25 – 27, 2015 – UN Headquarters, New York City, U.S.A. – UN Summit for the Adoption of the Post-2015 Development Agenda https://sustainabledevelopment.un.org/post2015/summit

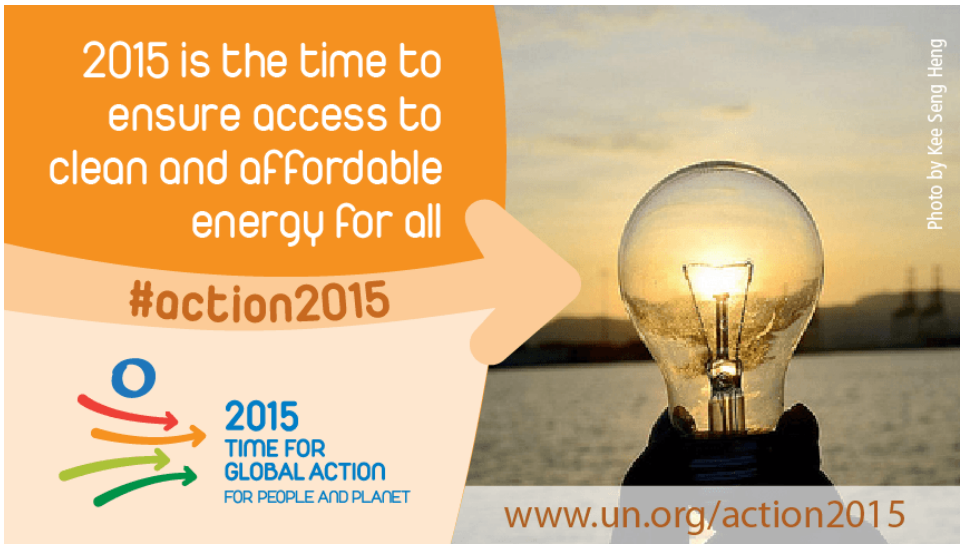
World Federation of Engineering Organisations

The Committee on Engineering and the Environment

Newsletter #13 November 2015

Within the UN Agreements on Sustainability and Climate Change lie words and objectives that clearly require engineering input and action to become a reality.

Turn to World's Engineers to Transform Climate Change Words Into Action



Source UN

By Darrel Danyluk, P.Eng.
FEC, FCAE, FEIC, FCSCE

Darrel Danyluk chairs the WFEO Standing Committee on Engineering and the Environment (CEE).

Even as the United Nations works towards a Climate Change Agreement and during the implementation phase of the UN Sustainable Development Goals* the list of key words and significant challenges grows longer. Climate change – be it mention of adaptation, mitigation, extreme events, or disaster-risk mitigation; Security – of food, water, energy or from conflict; Sustainability – of planetary boundaries, population growth, urbanization, new and aging infrastructures, agriculture, mining, forestry – scroll by us constantly like the electronic tickertape at the bottom of a television newscast.

The terms are repeatedly voiced and discussed by political leaders but the time has come to turn the words into action. The Committee on Engineering and the Environment (CEE) and the other WFEO Standing Technical Committees have set out a solid foundation from which engineers can play a vital role in addressing these challenges in practical and innovative ways. It is intrinsic to professional engineers to wish to turn concepts and designs into reality.

Global Response Required

That, in fact, is what engineers and engineering teams do in addressing the day-to-day needs of society around the world. Nationally, regionally and locally, the critical infrastructures are developed, constructed and maintained. Innovative solutions conceived in the minds of engineers provide reliable services for society. While specific, local and one-off engineering responses are important and do add up, they are not in themselves enough. The challenges are global and feasible solutions can only be effectively achieved if implemented at the global level. A unique opportunity has developed for the engineering community. Within the text of the new UN Agreements on Sustainability and Climate Change lie words and objectives that clearly require engineering input and action to become a reality.

In the text of each of the Sustainable Development Goals, engineering plays a role and the UN states that: “Parties to the Convention must submit national reports on implementation of the Convention to the Conference of the Parties (COP). The required contents of national reports and the timetable for their submission are different for Annex I and non-Annex I Parties”.

Annex 1 of the Climate Change Documents requires: “parties provide information on emissions and removals of greenhouse gases (GHGs); national circumstances; policies and measures; vulnerability assessment; financial resources and transfer of technology; education, training, and public awareness; and any other details of the activities a Party has undertaken to implement the Convention.”

At the 2009 Climate Change Summit, IDA (the Danish Society of Engineers), working with a dozen other countries, led the way in demonstrating that taking a feasible approach with existing and alternative energy sources on a sector-by-sector basis would make significant reductions in GHG emissions. Through demonstrated case

* https://sustainabledevelopment.un.org/?menu=1300

Continued page 10, see - Words Into Action

The Art of Working with Nature for the Benefit of Society

At the WFEO Annual Summit this November, the Institution of Civil Engineers (ICE) hopes to officially take on the responsibility of chairing the Committee for Engineering and the Environment (CEE).

Professor Jean Venables CBE FREng (see also below) has agreed to chair the WFEO-Committee on Engineering and the Environment on behalf of ICE.

ICE is a U.K.-based international organisation with over 85,000 members ranging from professional civil engineers to students. It is an educational and qualifying body and has charitable status under U.K. law. Founded in 1818, ICE has become recognised worldwide for its excellence as a centre of learning, as a qualifying body and as a public voice for the profession.

By Robert Curd

Robert Curd is Innovation Manager, Engineering Policy and Innovation, with the Institution of Civil Engineers, U.K.

Perhaps when you think of civil engineering you see the traditional roles of our Victorian forbearers who described the profession as: "the art of directing the great sources of power in nature for the use and convenience of man." (Thomas Tredgold 1828)

These are the words used in ICE's charter and still very much describe how the public perceive civil engineering today. However, the role of civil engineers and engineers of all types no longer reflects this somewhat "entitled" view of how we interact with the environment. More recently our colleague (and Co-chair of the Climate Change Mitigation Standing Technical Committee), Professor Paul Jowitt has rephrased the above as: "the art of working with the great sources of power in nature for the use and benefit of society."

Source UN

We realise we cannot control the environment, we realise that there are limited resources, we realise that if the whole world industrialises itself in the manner that Tredgold and his contemporaries did then we will be locked into a catastrophic high-carbon economy.

Realising these issues are not enough, however. We need to work out how to address them. So how do we work with nature? How do we benefit society?

The vision set out by the CEE is a step in the right direction. Through the following actions:

- Increasing the global understanding of sustainable engineering;
- Providing recommendations on the adaptation of civil infrastructures to the impacts and risks of climate change;

Source UN

- Engaging with the appropriate United Nations agencies to provide engineering advice and strategies related to the international agriculture and food security;
- Achieving recognition of the role and contributions of WFEO and the

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Jean Venables CBE FREng was appointed a Director of the Nuclear Liabilities Fund in July 2014. She is a consultant in flood risk management and water level management; Chairman of Crane Environmental; a Non-Executive Director of HR Wallingford; and Chair of the Customer Scrutiny Panel for Sutton and East Surrey Water Company. Jean was President of the Institution of Civil Engineers in 2008-9. Her volunteer professional activities include being Chairman of the ICE Professional Conduct Panel, a Foundation Governor of Tiffin School, and a member of both the RNLI Council and Technical Committee. She is also a member of university advisory boards.

Source UN

worldwide engineering profession towards the environment and sustainability elements of the UN Sustainable Development Goals;

- Engaging with other international bodies such as the World Meteorological Organisation, FIDIC (the International Federation of Consulting Engineers) and the International Water Association on projects that support the practice of engineering.

We can begin to coordinate a body of knowledge that influences the practice of sustainable engineering on a global scale.

By structuring our programme of activity around the UN's Sustainable Development Goals we can also ensure that we are taking action against the most critical needs. Although all aspects of the goals will interlink with engineering, the engineering community can make a particular impact in the following areas:

Goal 6. Ensure availability and sustainable management of water and sanitation for all;

Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all;

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable;

Goal 13. Take urgent action to combat climate change and its impacts.

Source UN

We will be liaising with the WFEO/UN Relations Committee to ensure that our efforts in this area are coordinated to the best effect.

This is an exciting time to be taking on the committee. With COP21 taking place later this year the world's attention will be focused on the issues of climate change. Engineers across the world will have a crucial role to play in providing solutions that will enable us all to live in a sustainable low-carbon world and WFEO and the CEE will have a crucial role in working with those engineers.

Source UN

Thanks to the great work put in by Engineers Canada, the committee is already in a strong place, what we will achieve is therefore an “evolution” of their plans. We hope to continue the work that they have started, focusing on the key engineering challenges that we face today.

Embracing Sustainable Infrastructure Development And Environmental Stewardship

By David Lapp, FEC, P.Eng.

David Lapp is Secretary of the WFEO Committee on Engineering and the Environment.

The 2013 WFEO General Assembly adopted the WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship.

Science has sounded the alarm that the future wellbeing of humankind is at risk, and that we are facing serious changes in Earth's life-support system, including profound impacts from extreme weather and our changing climate. Our continued existence on Earth depends on natural resources, but science and economic analysis show that these are being depleted at unprecedented rates and that we are degrading vital ecosystems and the services they provide to our environment.

Sustainability and Stewardship

Sustainability and environmental stewardship are two important principles that must be ingrained into engineering practice for our profession to contribute solutions that harmonize projects to reduce consumption and preserve our resources. Our Code of Ethics demands that engineers assume this responsibility in their work for the public good.

The world suffered a very significant financial downturn in 2008 and our slow recovery has threatened the sustainability component of projects in some areas. There is a perception that including sustainability considerations, particularly in infrastructure projects, costs more and increases risk environment, and in the short term this can often be true. More detailed design is required, and the process of carrying out a project in a new way can increase the risk that there will be surprises.

Can Lower Operating Costs

Risks and uncertainties can be assessed initially and managed over the long term where operating expenses are normally lower for sustainable facilities. Incorporating sustainability principles and environmental stewardship improves social acceptance of such projects, and that helps expedite licensing and approvals processes. Improved resilience and environmental stewardship pays off for the owner. Infrastructure facilities have lengthy lifetimes, and engineers have an important role and responsibility to society to encourage thought and action aimed at the longer term.

The concept of sustainable development – the idea that humanity must greatly improve the resource efficiency and environmental protection of its development processes to provide for its growing population – has been around for more than 20 years. For infrastructure, significant improvements have been made in the way projects are executed to improve sustainability and environmental impact. But explicitly embedding these principles and practices in practice guidance is rare among the national and international members of WFEO.

CEE Developed Model Code

This prompted the Committee on Engineering and the Environment to develop the WFEO Model Code of Practice for Sustainable Development and Environmental Stewardship. Led by Engineers Canada, the Model Code was developed over several years and adopted at the 2013 WFEO General Assembly. It is now published on the WFEO website (www.wfeo.net). A presentation on the 10 principles of the Model Code is available on the website and presented several times in 2015 through international webinars. Engineers Canada encourages WFEO and the Institute of Civil Engineers to continue these webinars in 2016 and beyond. National members are also encouraged to raise awareness and uptake of the Model Code so that all engineers embrace and practice these principles in their work.

What is a Model Code of Practice? It is an expression of principles and guidance in their application developed by consensus to support the practice of individual engineers. It is not legally binding unless a jurisdiction elects to do so, and it may modify it to suit local needs. It may also be

Continued next page - Sustainable

Engineering Can Contribute to Solutions That Help Address Global Food Waste

By Fethi Thabet and David Lapp, FEC. P.Eng.

Fethi Thabet is a founding member of the Tunisian Order of Engineers and WFEO Task Group Leader for Engineering and Agriculture. David Lapp is WFEO-CEE Secretary.

In September 2013, the UN Food and Agriculture Organization published the report "Food wastage footprint - Impacts on natural resources."* The waste of a staggering 1.3 billion tonnes of food per year is not only causing major economic losses and decreasing food security, but also wreaking significant harm on the natural resources that humanity relies upon to feed itself. The report provides a global account of the environmental footprint of food wastage (i.e., both food loss and food waste) along the food supply chain, focusing on impacts on climate, water, land and biodiversity. It provided some startling statistics:

- The global volume of food wastage is estimated at 1.6 billion tonnes of "primary product equivalents." Total food wastage for the edible part of this amounts to 1.3 billion tonnes.
- Food wastage's carbon footprint is estimated at 3.3 billion tonnes of CO_2 equivalent of GHG released into the atmosphere per year.
- The total volume of water used each year to produce food that is lost or wasted (250km^3) is equivalent to the annual flow of Russia's Volga River, or three times the volume of Lake Geneva.
- Similarly, 1.4 billion hectares of land – 28 percent of the world's agricultural area – is used annually to produce food that is lost or wasted.
- Agriculture is responsible for a majority of threats to at-risk plant and animal species tracked by the International Union for Conservation of Nature.

Source FAO

- A low percentage of all food wastage is composted: much of it ends up in landfills, and represents a large part of municipal solid waste. Methane emissions from landfills represent one of the largest sources of GHG emissions from the waste sector.
- Home composting can potentially divert up to 150 kg of food waste per household per year from local collection authorities.
- Developing countries suffer more food losses during agricultural production, while in middle- and high-income regions, food waste at the retail and consumer level tends to be higher (In the case of Tunisia, which imports more than half of its cereal, it loses 13 per cent of its own harvest due to out-of-date equipment.)
- The direct economic consequences of food wastage (excluding fish and seafood) run to the tune of $750 billion annually.
- Between 1/3 and 1/2 of the world's annual food production goes to waste or is lost.

Infrastructure Lacking

There are many elements of the agricultural supply chain that impact food wastage, especially in developing countries where the needed infrastructure, particularly storage and transport, is often lacking.

The WFEO Committee on Engineering formed a Task Group on Engineering and Agriculture in 2011 to improve the understanding, knowledge and capacity of engineers and engineering practice to address key issues within the agricultural supply chain at a regional or country level. It undertook to do this in collaboration with other international agricultural NGOs, particularly Farming First (www.farmingfirst.org), that are

* www.fao.org/docrep/018/i3347e/i3347e.pdf

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Sustainable *continued from page 4*

adopted as written/as modified to provide voluntary guidance. Engaging engineers through continuing professional development to adopt the principles and apply them in their practice is a proactive step to increasing awareness and fostering knowledge.

In 2014, Engineers Canada adopted a Canadian version of the Model Code of Practice, publishing it as a National Guideline for the use of its 12 associations and the more than 280,000 professional engineering members. We encourage all WFEO members to do the same.

WFEO should aim to have 75 per cent of members officially adopt the Model Code by 2020. Such a level of uptake sends a powerful message to national governments and the United Nations that engineers take their responsibilities seriously. Adopting these principles will contribute towards the post-2015 Sustainable Development Goals recently adopted by the UN General Assembly. Our world needs this level of engagement from our profession.

actively engaged in supply chain elements and who directly or indirectly interface with the stakeholders that include farmers, industry and government. The Task Group formulated a work program that included the following objectives:

- To evaluate the vulnerability of the agricultural supply chain from an engineering perspective and advise stakeholders on best engineering practices and technologies to address key vulnerabilities.
- To develop the capacity of engineers and other professionals in developing countries to identify vulnerabilities and promote engineering and other related solutions.
- To develop understanding of the issues of concern for engineering. Some elements of the supply chain include food production, transport, storage (where old handling equipment and inadequate technical skills are factors), security and safety.
- To foster cooperation between the engineering and agricultural communities through formal liaison with the Farming First organization.
- To advocate the engineering perspective on agricultural supply issues to the United Nations.

Source UN

The Task Group planned a 2-3 day workshop on “The Role and Contributions of Engineering Towards African Food Security”. Themes included:

1. The role of engineers in identifying and evaluating potentialities and preserving natural resources.
2. Agricultural production systems and natural resource sustainability.
3. Reducing post-harvest losses and pricing systems for agricultural products.
4. Strengthening basic storage and transportation infrastructure.
5. The agri-food sector's role as a driver of agricultural product development.
6. The impact of climate change on food security.
7. Human resource development and international cooperation.

The workshop was to be held in Africa with technical support and potential sponsorship from FAO, the African Development Bank and UNESCO. Unfortunately, it was not realized during the 2011-2015 term because of insufficient sponsorship. However, it remains an important “first” action for the 2016-19 term if the agriculture theme is continued. The workshop would engage local engineers with stakeholders in a region that critically needs engineering to develop a more sustainable agriculture supply chain to improve long-term food security. A major shortcoming exists in transfer to farmers of R&D insight regarding water management and soil degradation.

Further steps should include capacity-building in developing countries where engineers in the Task Group could facilitate training of local engineers to develop human capital, facilitate the implementation of projects to solve local or regional issues around storage and transportation as well as promote the principles and practices for food security and sustainable development.

Post 2015 UN Sustainable Development Goal #2 (SDG #2) states to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture” by 2030. Let's start the engagement of WFEO's national members and their engineers to build local capacity to resolve agricultural supply chain issues in Africa. This can become a significant step towards meeting SDG #2.

Environmental Impacts of Olympic Games: A WFEO/CEE Report

By Eng. Spyros Papagrigoriou

For eight years, our Committee on Engineering and Environment worked under the inspired and productive chairmanship of Darrel Danyluk and his dedicated team from Engineers Canada.

I worked in close cooperation with the team of our Chair as Vice-Chairman of the Committee, as representative of the Technical Chamber of Greece and as Leader of Theme 1: “Environmental Impacts of Major Engineering Projects for Sporting Events (Olympic Games).”

The objective of this CEE initiative through Theme 1 was to document the environmental impacts and sustainability issues around recent large-scale sporting events.

The intent of the resulting Committee report, with the same title, was to develop an engineering strategy in planning and designing infrastructure for the Games to enable the early assessment of the environmental impact. The aim also was to provide the key elements on how the Games can serve as a good opportunity to improve the environment, engineering performance of infrastructure and related matters.

IOC Received Report

The objective of this CEE initiative, through Theme 1, was to document the environmental impacts and sustainability issues around recent large-scale sporting events, such as the Olympic Games, and to communicate these findings to future organizing committees or responsible bodies. The latter included the International Olympic Committee (IOC), the National Olympic Committees (NOCs), world sport federations and organising committees of major sport events.

For the production of the report, a number of CEE members contributed with their views, and comments coming from many countries, such as Greece, Pakistan, Canada, China, U.K., U.S.A. and India.

Public and private investment in infrastructure and sporting facilities projects can influence improvement of social and economic living standards.

The success and failure stories for recent Olympic Games in Barcelona, Sydney, Athens and Beijing have been examined. Basic conclusions of the report state that:

- Engineers, among all professionals involved with Games, should aim at sustainability and environmental protection in urban and natural environments. The significant resources made available for large-scale sporting events should be used for the best interest of local populations and take into account existing infrastructure needs.
- In a global economic environment hit by the recent recession, the role of major public and private investment in infrastructure and sporting facilities projects can influence improvement of social and economic living standards. The principles of sustainable development should be strictly followed and convincingly show the whole world that a major project, rather happening through quick expansion of a human-created system, can and must occur while respecting the environment.
- The organization of the Olympic Games or any other major sport event can function as a role model for a similar effort on a global scale to work hard to achieve growth that can eradicate poverty and make peace prevail. At the same time, through the advance of technology, it can minimize the waste of resources, reduce the effects of pollution and protect the environment.

Photo shows kyak venue at Hellinikon, Greece, used during 2004 Olympics.

It will be an interesting task for the next term of CEE to produce a new report on this subject, including looking at the London 2012 and Rio 2016 Olympic Games, with an emphasis on climatic change.

Report of WFEO-CEE Task Force On Sustainable Development and Mining

By Jessica Elzea Kogel, PhD

The Task Force on Sustainable Development and Mining (TF) was established in 2011 to raise global understanding and application of engineering approaches and technologies to increase the contributions of the mining and minerals industries to economic, social and environmental wellbeing, and sustainable development. Currently the TF is comprised of 32 representatives, who have experience and expertise in mining and sustainability, from 19 developed and developing countries. The group assists the Committee on Engineering and the Environment (CEE) of the WFEO in supporting achievement of the UN Millennium Development Goals through the promotion and dissemination of information on the application of:

1 Environmentally sound engineering practices and technologies in the minerals sector;
2. Best practices in social sustainability and the minerals sector including worker health, safety, reliability and training;
3. Best practices in eco-efficient usage of land, water, energy, and mineral resources;
4. Engineering solutions to reusing, repurposing, and recycling of mineral materials;
5. Information on risk analysis, mitigation, and management techniques in the minerals sector, with the over-arching goal of capacity building for mineral producers, and stakeholders, including authorities, non-governmental organizations, and the general public.

Small-Scale Mining a Focus

The TF engages in a range of activities that generally fall into one of two broad categories: (1) Technology and Best Practices Transfer and (2) Capacity Building. These activities take many forms including articles, symposia, short courses, workshops, expert panels, and/or conferences on minerals and mining in sustainable development. In 2014, TF members began the process of identifying a focus area that fits the overall TF mission and purpose while providing a more targeted goal around which TF work activities and products could be developed. The TF selected Artisanal and Small-Scale Mining (ASM) as their focus area. ASM employs 10 times more people than large-scale mining, provides jobs and income for 20-30 million of the world's poorest people and supports the livelihoods of five times that number (International Institute of Environment and Development, www.iied.org) This sector is associated with severe social, environmental, safety and security risks and lacks access to the technical information, training and best practices needed to address these challenges.

Artisanal and small-scale mining, as pictured in Burkina Faso, Africa, employs ten times more people than large-scale mining, and provides jobs and income for 20-30 million of the world's poorest people.

Supporting Capacity Building

The TF is working to fill this gap through various approaches, including Capacity Building Workshops. The first workshop “Creating Sustainable Partnerships for the Mining Industry: Southeast Asia's Workshop on Practical Technical, Environmental, Economic and Social Solutions” was held October 2014 in Vietnam. Additional workshops are scheduled for 2016. The TF has also started down the path of building alliances with international partners, such as the World Bank, to explore additional opportunities for serving the global ASM community. The World Bank's Sustainable Management of Mineral Resources Project in Tanzania is an example of such as opportunity. Through this project, the TF plans to develop a proposal for an environmental assessment tool targeting the ASM sector in Tanzania. ASM will continue to be a significant global challenge for the foreseeable future, especially in developing economies, and will therefore continue to be a key focus area for the TF.

Jessica Elzea Kogel, PhD, is based in Atlanta, Georgia, U.S.A. She is a mining industry leader with more than 25 years of industrial experience encompassing a wide range of business activities, including R&D management and mine operations management. Over the past decade, she has become increasingly involved in sustainable development and mining's contribution to sustainability.

Dr. Kogel is past president of the Clay Minerals Society and served as the 2013 president of the Society for Mining, Metallurgy and Exploration.

Thanking Our Sponsors!

Engineers Canada wishes to express its gratitude to TD Meloche Monnex for its financial sponsorship of the Committee on Engineering and the Environment over the past eight years. Their generous contribution allowed Engineers Canada and our volunteers to engage in the work of the Committee on Engineering and the Environment as well as the WFEO Executive Council and the United Nations, particularly the UN Framework Convention on Climate Change and the World Meteorological Organization.

TD Insurance Meloche Monnex

APEGA

TD Meloche Monnex also joined APEGA (the Association of Professional Engineers and Geoscientists of Alberta) in lending support to facilitate production of the WFEO-CEE newsletters. Again, a big thank you to both organizations.

WFEO-CEE and Related Upcoming Events

WFEO Meetings

- Nov. 28, 2015, Kyoto, Japan –WFEO-CEE Face-to-Face Meeting #8
- Nov. 28 - Dec. 4, 2015 – WFEO General Assembly, Executive Council and Committee Meetings Kyoto, Japan www.wfeo.org

WFEO Events

- Nov. 29 - Dec. 2, 2015 – WECC 2015 – World Engineering Conference and Convention – Kyoto, Japan www.wecc2015.info/index.html

Meetings Related to WFEO-CEE

- Nov 30 - Dec. 11, 2015 – United Nations Framework Convention on Climate Change/ UNFCCC Conference of the Parties (COP) Meeting No. 21 – Paris, France
- www.unfccc.int

Themes 1 and 2 – Climate Change Adaptation and Mitigation

- May 10-16, 2016 – Adaptation Futures 2016: Practices and Solutions – Rotterdam, Zuid-Holland, Netherlands www.adaptationfutures2016.org/
- May 16-26, 2016 – 42nd Sessions of the UNFCCC Subsidiary Bodies – Bonn, Nordrhein-Westfalen, Germany www.unfccc.int
- Nov. 7-18, 2016 – UNFCCC Conference of the Parties (COP) Meeting No. 22 – Marrakesh, Marrakech, Morocco www.unfccc.int

Theme 3 – Engineering and Agriculture

- June 26-29, 2016 – 4th CIGR International - AgEng Conference 2016 - Automation, Environment and Food Safety – Aarhus, Denmark http://conferences.au.dk/cigr-2016/
- Aug. 23-24, 2016 – 3rd International Conference in Agricultural and Food Engineering – Kuala Lumpur, Malaysia www.cafei.upm.edu.my

Theme 4 – Engineering and Sustainable Mining

- Feb. 24-26, 2016 – Society of Mining Engineers (SME) Conference and Expo - "The Future for Mining in a Data-Driven World" – Phoenix Convention Center, Phoenix, AZ, USA www.smeannualconference.com/
- May 26-28 – Society of Mining Professors' Regional Conference – Medellin, Colombia https://www.facebook.com/events/1597074427231349/
- June 23-24, 2016 – 4th International Symposium on Sustainable Minerals '16 – Falmouth, Cornwall, United Kingdom www.min-eng.com/sustainableminerals16/
- Sept. 21-24, 2016 – Society of Mining Professors' Annual Conference – Washington, D.C., U.S.A. www.miningprofs.org

Theme 5 – Environmental and Sustainable Engineering Practices for Engineers

- Feb. 9-16 – 2016 Sustainable Communities Conference – Federation of Canadian Municipalities – Ottawa, Ontario, Canada http://www.fcm.ca/home/events/sustainable-communities-conference.htm
- Dec. 2-4, 2016 – Improving Sustainability Concept in Developing Countries (ISCDC) – Cairo, Egypt www.ierek.com/events/improving- sustainability-concept-developing-countries/

Post 2015 Sustainable Development Goals

- May 16-20, 2106 – WASH 2016 Conference – Pathways to universal and sustained water, sanitation and hygiene – Brisbane, Australia http://www.watercentre.org/services/events/wash2016
- Oct. 17-21, 2016 – Third UN Conference on Housing and Sustainable Urban Development (Habitat III) – Quito, Pichincha, Ecuador http://unhabitat.org/habitat-iii-conference/

After Eight Years as CEE Chair Darrel Danyluk Delivers Parting Reflections and Thanks

This is my last column as Chair of CEE. Over the last eight years, we have taken a thematic approach to our work and engaged national members to be (Thematic) Task Group Leaders of the various themes.

In our first four-year term, we identified five themes, namely:

- Climate Change – Adaptation
- Legacy Opportunities from Infrastructures at Large Sporting Events
- Model Code of Practice – Sustainability
- Disaster Risk Mitigation
- Infrastructure Needs of Developing Countries

In our second term, we addressed following six themes:

- Climate Change – Adaptation
- Climate Change – Mitigation
- Sustainability in the Mining Sector
- Sustainability in the Agricultural Sector
- Implementation of the Model Codes of Practice – Sustainability
- Development of a Model Code of Practice – Climate Change

Through the efforts of the Task Group Leaders, and many volunteers within the task groups and others on the CEE, we have developed tools, built

Darrel Danyluk, P.Eng., speaks during the 2015 World Engineers Summit. The latter, held in Singapore, was one of numerous international conferences that he attended during the last eight years in his capacity of Chair of the WFEO Standing Committee on Engineering and the Environment.

relationships and formal arrangements within the UN agencies. My special thanks to all whose dedicated efforts have made our term both enjoyable and successful.

In term one, we recommended and were successful in having our Task Group on Disaster Risk Mitigation become an independent Standing Committee. The report on the legacy of major sporting events was published. WFEO became an Official Observer at the United Nations Framework Convention on Climate Change (UNFCCC) with CEE the focal point. We engaged national members to attend and participate at the major Conference of the Parties (COP) meetings, as well as the negotiating meetings in June. Over 60 engineers participated on behalf of WFEO, including five students, in June of 2015. WFEO signed a Memorandum of Agreement (MOU) with the World Meteorological Organization (WMO) to work on areas of mutual interest and jointly held side events at the UNFCCC meetings.

A key responsibility of the CEE is to identify a host country to assume the responsibility of chairing the committee and, in this regard, we are pleased to recommend the United Kingdom and the Institution of Civil Engineers as Engineers Canada's successor to host the CEE.

Finally, but by no means least, a special thank-you goes to David Lapp, P.Eng., who provided the secretariat support to CEE. His dedication and commitment to all the Task Group Leaders and communications with WFEO headquarters provided the foundations for our success.

Words Into Action

Continued from page 1

studies, CEE showed that climate-change adaptation of existing and new infrastructures should begin by defining the climate-specific vulnerabilities of infrastructures. The CEE work proved that vulnerabilities could be prioritized based on the severity of impact, with most adaptive actions planned into future infra-structures annual capital and maintenance budgets.

The Model Code of Practice for Sustainable Development and Environmental Stewardship, and the Model Code of Practice on Climate Change, the draft of which is out for comment, outline to individual engineers the profession's expectations on acceptable practice. Developed by CEE and endorsed by the WFEO general assembly, these tools are fundamental to a unified global response.

The challenge the global engineering community faces lies within the scope of the national members of WFEO. Having a roadmap for implementation at national levels, endorsed by and acted upon by engineers within each national member, demonstrates at the global level the way forward.

We have the tools, the skill sets, the local and national teams, the political will and above all the urgent need to solve and implement solutions. Engineers do possess the knowledge and ability to turn words into action.