World Federation of Engineering Organisations

The Committee on Engineering and the Environment

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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

UN Photo /Albert González Ferran

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

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

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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
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(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.

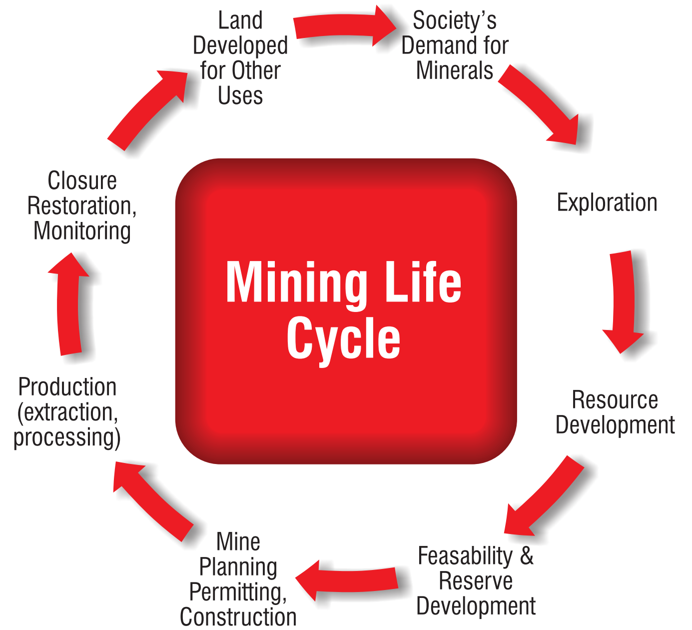
Exploration

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