



International Commission of Agricultural and Biosystems Engineering

Newsletter 120

March 2020

"...to serve - on a world-wide basis and through its members - the needs of humanity by fostering mutual understanding, improvement and rationalisation of sustainable biological production systems while protecting nature and environment and managing landscape through the advancement of engineering and allied sciences..."

**5TH CIGR International Conference in Quebec, Canada
Postponed to May 2021 due to Government Imposed Restrictions**

Please visit conference web page for latest news

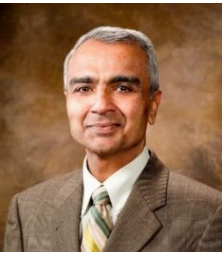
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ASABE and A Pathway Towards Circular Food & Agricultural Systems



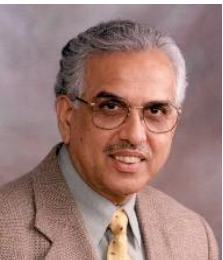
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Circular Economies

The concept of circular economies has entered the main-stream media. The March 2020 issue of National Geographic is focused on “the end of trash” and the Promise of a Circular Economy. The simple definition of a circular economy is an

economy that uses resources sparingly and recycles materials endlessly so that resources are not being trapped in landfills and other waste reserves. Three principles for circular economies were proposed by the Ellen MacArthur Foundation ([2019](#)): design out waste and pollution; keep products and materials in use; and regenerate natural systems. Although implied, it is useful to add a fourth principle – provide economic benefits to society and businesses that design and manage these circular systems.

What would a circular economy look like for the food production system? This is a critical question because the [United Nations \(2019\)](#) projects that the world population in 2050 will be between 9.4 and 10.1 billion people, increasing from the 7.7 billion in 2019. The USA National Academies of Science, Engineering, and Medicine ([2012](#)) issued a report pointing out that by 2050, 70% more food would be required, and it is not obvious how this production increase will be achieved given earth’s finite resources.

Our current food systems are predominantly linear ([Ellen MacArthur Foundation, 2019](#)); they use and leak resources, and over one-third of produced food is discarded as waste ([FAO, 2019](#)). These losses and wastes not only trap valuable resources, but they also create environmental problems which are costly to society. Environmental degradation due to agricultural nutrients flowing into water bodies is problematic. Nutrient runoff from agricultural areas in the USA is thought to be responsible for the large “dead zone” in the Gulf of Mexico, which was over 18,000 square kilometers in 2019 ([EPA, 2019](#)). Also, [CCAFS \(2019\)](#) estimates that agricultural and food systems account for between 19 and 29% of total greenhouse gas emissions to the atmosphere and are responsible for about 75% of global deforestation.

These multiple and interacting challenges have enormous implications on our ability to sustainably meet the demand for food. Planet earth has limited land, water, atmosphere, nutrients, and other natural resources. Sustainably increasing food supply will require transformations enabled by new science and technological innovations, new business models, increased resource use efficiencies, reductions in demand for raw natural resources, decreased environmental degradation, new policies, and added support.

Transforming Food and Agricultural Systems

Recently, a National Academies study identified five promising scientific breakthroughs needed by 2030 to increase the U.S. food and agriculture system's sustainability, competitiveness, and resilience ([NRC, 2019](#)). This report recommended, among other things, a *convergent research approach that harnesses advances in data science, materials science, biological sciences, behavioral sciences, economics, and other fields*.

In the business world, there is growing interest in adoption of circular economies with an aim to transform businesses so that they use and reuse resources, eliminate waste, and stop or capture nutrient losses that contaminate the environment. This concept is getting considerable attention in some regions, particularly in Europe. For example, the Dutch Minister of Agriculture, Nature, and Food Quality ([2018](#)) has adopted the goal of transforming from the existing linear food production systems to circular agricultural systems.

In the USA, there are a number of efforts being studied or proposed in both the public and private sectors. For example, the business community, through coordination with GreenBiz, has created a new Verge-Food (2020) initiative ([2020](#)) specifically for food-related businesses to cooperatively share ideas on sustainable food production practices, and the American Society of Agricultural and Biological Engineering (ASABE) is contributing to this initiative. Another corporate effort was created to provide advanced data

analytics and AI tools for use in digital agriculture to reduce inputs and costs ([Microsoft – FarmBeats](#)). Several universities (e.g., [Cornell](#), [Michigan State](#), and others) have active research programs in digital agriculture. Progress has been made by some food production sectors on reducing the use and subsequent losses of nutrients and water resources by re-using these resources in their production systems (e.g., [dairy](#) and [crop](#) production subsystems).

Our highly diverse food and agricultural systems have similar components and multiple subsystems. Figure 1 is a schematic of circular food systems showing seven important subsystems through which food, C, N, and P circulate throughout the system. Transforming current systems into profitable circular systems that design out waste and pollution, keep products and materials in use, and regenerate natural systems presents a significant opportunity. This diagram also shows how food and agricultural systems are embedded within broader systems involving natural resources, ecosystems, environments, policies, and economics, and these broader systems are also affected by climate change and other external drivers. Thus, design of circular economies for food and agricultural systems must 1) consider these other aspects of societies and 2) the wide array of disciplines and businesses involved.

How should the Agricultural and Biological Engineering Profession Respond?

Transformative changes in the food and agricultural systems will not be achieved by disjointed, piecemeal approaches focused on components of food and agricultural systems. Currently missing are integrated systems approaches that provide frameworks and pathways for transforming food systems. Also lacking is a vision that guides convergence of research, business, policy, and technology among many different disciplines to achieve these goals from local to global scales.

Our profession provides strong technical support for 5 of the 7 components shown in Figure 1, in a variety of areas (e.g., machinery design, automation, facility design, sensors, instrumentation, environmental control, packaging, resource/waste recovery and reuse, management, modeling, systems analysis, and data analytics).

ASABE is somewhat uniquely positioned to liaison between the stakeholders because our discipline works across many of the systems involved in this complex problem. In our day to day work we often collaborate with many different agricultural science disciplines, and many different engineering disciplines. We also have experience working from systems of systems perspectives and in a convergent manner which are also essential.

Involvement of the American Society of Agricultural and Biological Engineering

ASABE, under leadership of its current President Sue Nokes, has recognized the importance of transforming the food and agricultural systems

into circular economies in order to address the complex goals described. In November 2019, the ASABE Board of Trustees approved a new priority for the society to develop its own programs, engage other disciplines, and contribute to national and international efforts that are pursuing circular economies for food and agricultural systems. An initial Roundtable meeting will be held at the next Annual International Meeting in Omaha, Nebraska in the USA on July 15, 2020 from 2:30-5 pm to plan additional thrusts, and map out how ASABE will engage with other professional societies and the National Academies of Science, Engineering, and Medicine. Already ASABE has committed to participate in the newly formed VERGE-Food initiative (October 2020) and potentially a new comprehensive National Academy study, currently being considered by the National Academy Board on Agriculture and Natural Resources (BANR). ASABE is working hard to ensure that our society is part of this new, very challenging, and comprehensive initiative.

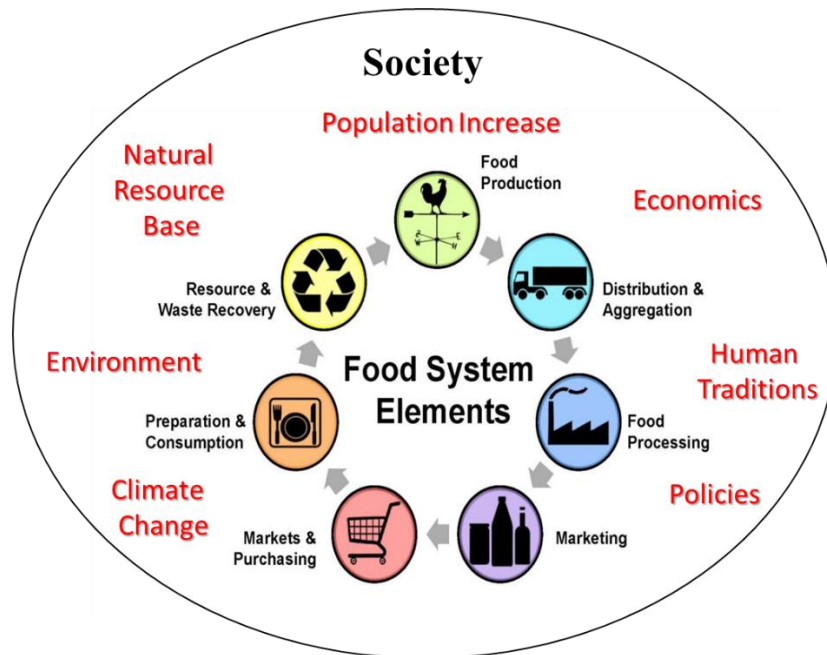


Figure 1. Schematic of Circular Food Systems, showing external systems that affect and are affected by food systems.

Source: <https://www.canr.msu.edu/news/modeling-an-equitable-michigan-food-system>

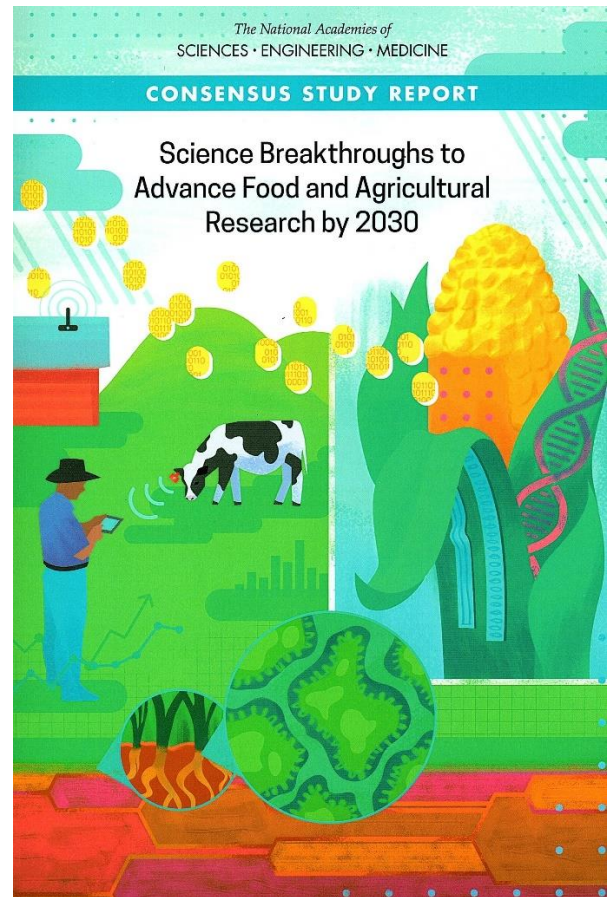
Consensus Study on Science Breakthroughs to Advance Food and Agricultural Research by 2030 (Free Download)

The Consensus Study Report “Science Breakthroughs to Advance Food and Agricultural Research by 2030” was jointly published by the National Academies of Science, Engineering and Medicine of the USA. This report is the result of evidence-based consensus reached on needed research breakthroughs in agriculture by a team of recognized experts. This report is rigorously reviewed by other experts and represents the position of the Academies on the subject.

The report focuses on 6 areas: Crops, animals, food, soil, water and data. It outlines major goals and key challenges and breakthrough opportunities in each of the areas.

The report can be downloaded at no cost in pdf format or purchased in other formats at:

<https://www.nap.edu/catalog/25059/science-breakthroughs-to-advance-food-and-agricultural-research-by-2030>



Call for Interested Societies and Universities to Participate in the International College Students Intelligent Agricultural Equipment Innovation Competition

The National College Students Intelligent Agricultural Equipment Innovation Competition is jointly held by Chinese Society for Agricultural Machinery(CSAM), Chinese Society of Agricultural Engineering(CSAE), and Jiangsu Provincial Synergistic Innovation Center for Jiangsu Modern Agricultural Equipment and Technology(SICMAET). The first competition was initiated in 2015, once a year, and has been successfully held for five times so far. More than 11760 people from 2317 teams of 64 colleges and universities participated in the competition, which

has developed into the most influential competition in the field of Chinese agricultural engineering. The event is divided into three categories: A (free selected topic, scientific and technological invention and fabrication), B (designated topic, intelligent robot) and C (enterprise topic, topics put forward by enterprises). The participants are undergraduates and postgraduates.

Event Organization

On the basis of three existing organizers (CSAM, CSAE, and SICMAET), we will invite

International Commission of Agricultural and Biosystems Engineering (CIGR) and International University Consortium for Agricultural Engineering (IUCAE) as the organizers from the next competition to upgrade the competition to an international level. The competition will be titled “the International College Students Intelligent Agricultural Equipment Innovation Competition”. CIGR and IUCAE will invite students from representative universities in the world, to build an international platform for agricultural engineering students to communicate and cooperate. Every

university may choose one or two teams to participate in the competition.

Cost for Participation and Other Expenses

There is no charge for the competition, and the international travel expenses shall be borne by the participants. SICMAET will bear the International students’ expenses in China (accommodation, travel, meals) during the competition. African students may apply for certain travel subsidies.

Interested CIGR Members or Universities for more information write to secretarygeneral@cigr.org



Student Designed Robots during the 2019 Competition. Robots were judged in their ability to perform agricultural operations.

CIGR 5th International Conference Postponed to May, 2021



Prof. Stephane Goodbout
Chair, CIGR 5th International Conference
IRDA, Canada

With the COVID-19 virus being declared a pandemic by the World Health Organization, the Canada and Quebec governments put in place several temporary measures to limit the propagation of the virus, including the interdiction to events of more than 250 people, as well as closing Canada's border to most foreign nationals.

As the situation is evolving rapidly and unpredictably, the Local Organizing Committee has decided to postpone the event from June 14 to 18, 2020 to May 10-13, 2021. Until then, we are suspending online registration. Please visit the Conference's website often at www.cigr2020.ca to for the latest updates and news.

5TH CIGR International Conference
Visit Website for Latest News

Agriculture 4.0 Conference Postponed

In light of the current 2019 Novel Coronavirus (2019-nCoV) situation, the Agriculture 4.0 + Industries 4.0 organising committee has decided to defer the Agriculture 4.0 + Industries 4.0 Conference and Exhibition 2020 (Agri4.0), from 10-11 March 2020 to **20 – 21 April 2020**. The host venue will remain unchanged.

We have been monitoring the overall Coronavirus situation over the weeks and feel that given the uncertainty of the outbreak, it is in the best interest of the health of our community, which includes regional delegates, speakers and exhibitors to defer the Event.

The organizing Committee



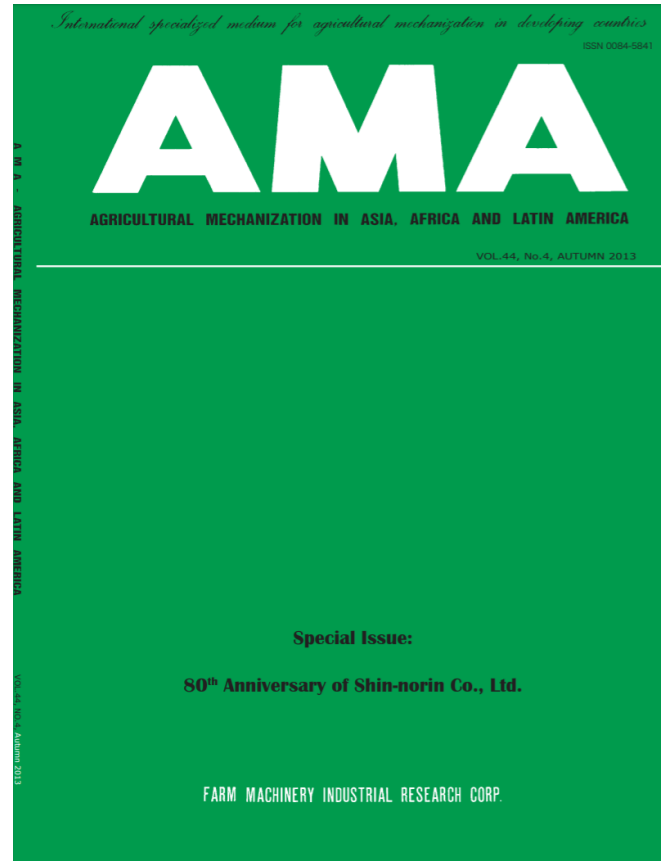
AMA Agricultural Mechanization in Asia, Africa and Latin America Publications Available Online (**Free Downloads**)

The Farm Machinery Industrial Research Corp., a long-time supporter of CIGR and its member societies has created a new web page for publications related to the Journal *AMA Agricultural Mechanization in Asia, Africa and Latin America* and other publications by CIGR members. The AMA Journal is produced in collaboration with the Shin-Norinsha Co. Ltd., and The International Farm Mechanization Research service, Tokyo.

Shin-Norinsha Co., Ltd supports the International Kishida Award that Recognizes outstanding contributions to engineering, mechanization and technology related programs of education, research, development, consultation or technology transfer that have resulted in improved food production, living conditions and/or education for people.

Back issues of the AMA Journal can be downloaded from;

<https://www.agriculturalmechanization.com/>



Upcoming CIGR Conferences

Agriculture 4.0 Bangkok Thailand



www.agriculture4pointzero.com

Agriculture, Food and Horticulture are key sectors throughout Southeast Asia, accounting for a substantial share of the region's GDP and employing an important part of the workforce. With the increasing populations, climate change, rising level of urbanisation and workforce challenges due to rural depopulation in most of the ASEAN countries, there is an urgent need for innovative solutions for the agriculture sector.

Currently, the agriculture sector is undergoing digital transformation with huge potential to producers and the consumers. Introduction of digital agriculture, industrialisation and mechanisation of production processes, connectivity and data management are now set to unleash the next revolution in the history of agriculture and farming. Utilising smart IT, Drones, Machine Learning and other advanced technologies and crucially networking these assets enables more efficient use of resources, results in higher yield and production, increase efficiency and productivity and answers to the new environment.

The hosting of the inaugural **Agriculture 4.0 Conference and Exhibition 2020 (Agri 4.0)** is set to provide an interactive platform to discuss the opportunities offered by disruptive digital technologies to increase productivity, and access to services and markets in the agricultural sector. This will be an unparalleled meeting place for decision-makers, plantation and farms managers, digital leaders, and other business professionals to share knowledge and experience in optimising the agricultural farming process in the age of technology.

The conference represents a unique opportunity for learning, exchanging opinions, and expanding one's network enabled by live presentations followed by dynamic networking sessions – providing the attendees with valuable insights from specialists in the sphere of agriculture technologies.

KEY THEMES OF AGRICULTURE 4.0

- Available Technologies for Agriculture 4.0
Drones, Sensors, Internet of Things, Robotics, Big Data, AI and more
- Precision Agriculture
- Agricultural Resource Management for Improved Resource-use
- Process Automation and Mechanisation
- Water Management and Irrigation
- Innovative Approach towards Technological Development
- Indoor Farming Technologies
- Agriculture Software Enhancing
- Investment in R&D
- New Business Models
- Cross disciplinary themes

REASONS WHY YOU SHOULD NOT MISS THIS

Understand The Current & Future Trends

Hear from inspiring digital leaders, agriculture economists and business innovators on new technologies & applications for plantations and farms

Comprehensive Content

Updated information reflecting your most concerned issues in developing smart and precision agriculture

Distinguished Presenters

Renowned best practitioners, industry leaders and innovators sharing insights

Extensive Showcase

Discover new and innovative technologies and services for smart and precision farming and agriculture

Premium Networking

Unrivalled networking and exchange of experiences across 20+ countries

Business Opportunity

Explore potential collaborations and with 300+ local and international industry stakeholders

EurAgEng Conference, July, Evora, Portugal



<https://ageng2020.com/>

The **AgEng2020 Conference** will be held in Évora, Portugal, between 5 and 9 of July 2020 with the focus on **New Challenges for Agricultural Engineering towards a Digital World**. It is our pleasure to host this conference and we want to invite all of you to participate.

Authors are invited to submit an extended abstract of maximum 1200 words in English, (excluding references, including figures and tables), as MS Word file. The abstracts and or posters can be submitted electronically by

email: submission.etagro@gmail.com no later than **15th April 2020**. Abstracts will be accepted based on quality, originality and relevance to the conference topics. Authors of accepted abstracts are also invited to submit full research papers of high quality, originality and relevance to the conference topics. We look forward to receiving your paper and we hope to see you actively taking part in the International Section in Agricultural Economics of the **16th Conference** of the Hellenic Association of Agricultural Economists – ETAGRO.



<https://asabe.org/Event-Detail/2020-annual-international-meeting>

ASABE 2020 presents a forum to expand awareness of current industry trends, promote and acknowledge innovations in design and technology, and provide opportunities for professional development – all with a focus on the economic, political and societal impacts facing the industry. Join us for 4 days this summer in Omaha!

Share your expertise, professional insights, and industry best practices by becoming a presenter. Interact with the industry's best and brightest engineers and engineering students while imparting your knowledge. Hot topics are especially encouraged in the areas of: Digital Agriculture, Data Analysis, Artificial Intelligence, Machine Learning, Autonomous Systems and public awareness surrounding issues related to agriculture, food, and natural resources.

ASABE is seeking abstracts for the following

technical communities:

- Applied Science & Engineering
- Energy Systems
- Ergonomics, Safety & Health
- Education, Outreach & Professional Development
- Information Technology, Sensors & Control Systems
- Machinery Systems
- Natural Resources & Environmental Systems
- Plant, Animal, and Facility Systems
- Processing Systems

A complete list of sessions available to submit to is available here. Answer the Call for Abstracts TODAY and help promote and educate your profession! Submitting an abstract indicates your commitment to present at the annual meeting. Please expect to attend. Three submissions are allowed per author.



**16th Conference
International Section**

9-10 October 2020, Athens, GR

*Sustainable Agriculture, Food Security and Climate Change:
Challenges and Opportunities in Bio-economy*

www.etagro.gr/2020

The Hellenic Association of Agricultural Economics (ETAGRO) is pleased to invite contributors across the globe to attend the International Section in Agricultural Economics which is going to be part of the 16th Conference of the Hellenic Agricultural Economics Association, held in the historic and lively city of Athens during October 2020. The main theme of the International Section of the Conference is Sustainable Agriculture, Food Security, and Climate Change: Challenges and Opportunities in Bio-economy.

Authors are invited to submit an extended abstract of maximum 1200 words in English, (excluding

references, including figures and tables), as MS Word file. The abstracts and or posters can be submitted electronically by email: submission.etagro@gmail.com no later than **15th April 2020**. Abstracts will be accepted based on quality, originality and relevance to the conference topics. Authors of accepted abstracts are also invited to submit full research papers of high quality, originality and relevance to the conference topics. We look forward to receiving your paper and we hope to see you actively taking part in the International Section in Agricultural Economics of the **16th Conference** of the Hellenic Association of Agricultural Economists – ETAGRO.

AfroAgEng
PAN AFRICAN SOCIETY FOR
AGRICULTURAL ENGINEERING

**PAN AFRICAN SOCIETY for Agricultural Engineering
&
The Nigerian Institution of Agricultural Engineers**
(A Division of the Nigerian Society of Engineers)

PASAE-NIAE
2020
**INTERNATIONAL
CONFERENCE**

**"Africa's Agenda 2063:
The Africa We Want"**

Theme:
**Engineering Africa's Agro-Industrial
Transformation for Economic Prosperity
and Sustainable Development**

Date:
21-26 September, 2020

Venue:
NAF Conference Centre and
Guest House, Jaji Abuja, Nigeria.

Conference Theme and Sub-Themes

The Conference aims to harness an emerging global movement for Africa's renaissance through knowledge and practice-driven agriculture and agriculture-led industrialization. Africa's potentials in human, agricultural and natural resources is significant but largely underexploited and underutilized. The aim of the conference is to create a new momentum for concerted action through the following theme and sub-themes.

CONFERENCE WEBSITE:

Further details, including guidelines for technical papers and other contributions, Exhibitions and Registration details, and Full Conference Brochure are available at

<https://pasae-niae2020conference.com/>

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5th CIGR International Conference, May 2021, Quebec, Canada.



5TH CIGR International Conference in Quebec, Canada
Postponed to May 2021 due to Government Imposed Restrictions

Please visit conference web page for latest updates

The CIGR2020 conference will be held at the same venue from May 10-13, 2021. The primary goal of this conference is to bring together the elite scientists from all over the world, and to provide a

unique forum for exchange on agricultural and biosystems challenges and opportunities. For the latest information and news please visit <http://www.cigr2020.ca/en/>

XX CIGR World Congress, December 2022, Kyoto, Japan



The XX CIGR World Congress 2022

[HOME](#) [COMMITTEES](#) [ORGANIZATION](#) [REGISTRATION & ACCOMMODATION](#) [GENERAL INFORMATION](#)

*Sustainable Agricultural Production
– Water, Land, Energy and Food –*

December 5 (Mon)–9 (Fri), 2022

Venue: **Kyoto International Conference Center, Japan**

The theme of this CIGR World Congress "Sustainable Agricultural Production - Water, Land, Energy and Food" will underpin the need for collaboration and cooperation of individuals from a wide range of professional backgrounds. This congress will provide an excellent international

platform for academicians, researchers, engineers, industrial participants, and students from around the world to share their research findings with global experts in all areas related to agricultural engineering. For information please see <http://CIGR2022.org>.