



WFEO / FMOI



The Diversity Imperative for More Women in STEM



***Dr. Marlene Kanga AM
President 2017-2019
World Federation of Engineering Organisations***

20 March 2021

www.wfeo.org

The World Federation of Engineering Organizations



- The peak international body for professional engineering institutions
- Founded in 1968, under the auspices of UNESCO
- 100+ national professional engineering institutions
- 12 international and continental/regional professional engineering institutions
- Representing 30 million engineers
- Co-Chair of Science and Technology Major Group of Stakeholder at the UN
- Represent engineering at other UN organisations
- Associate of UNESCO



TOPICS

1. Engineering challenges for the 21st Century
2. The Diversity imperative for engineering
3. Positive steps for real change

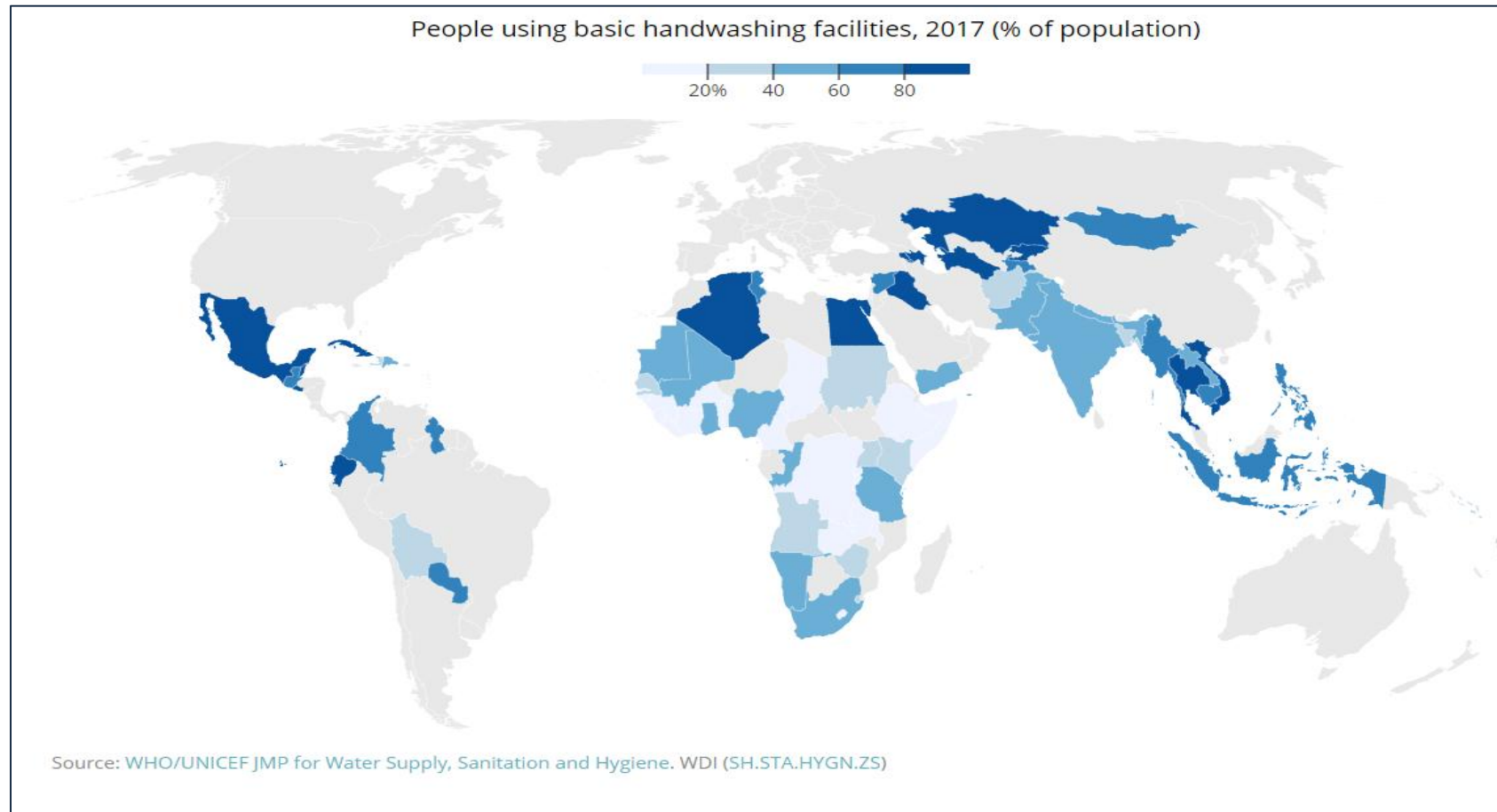


TOPICS

1. Engineering challenges for engineers for sustainable development



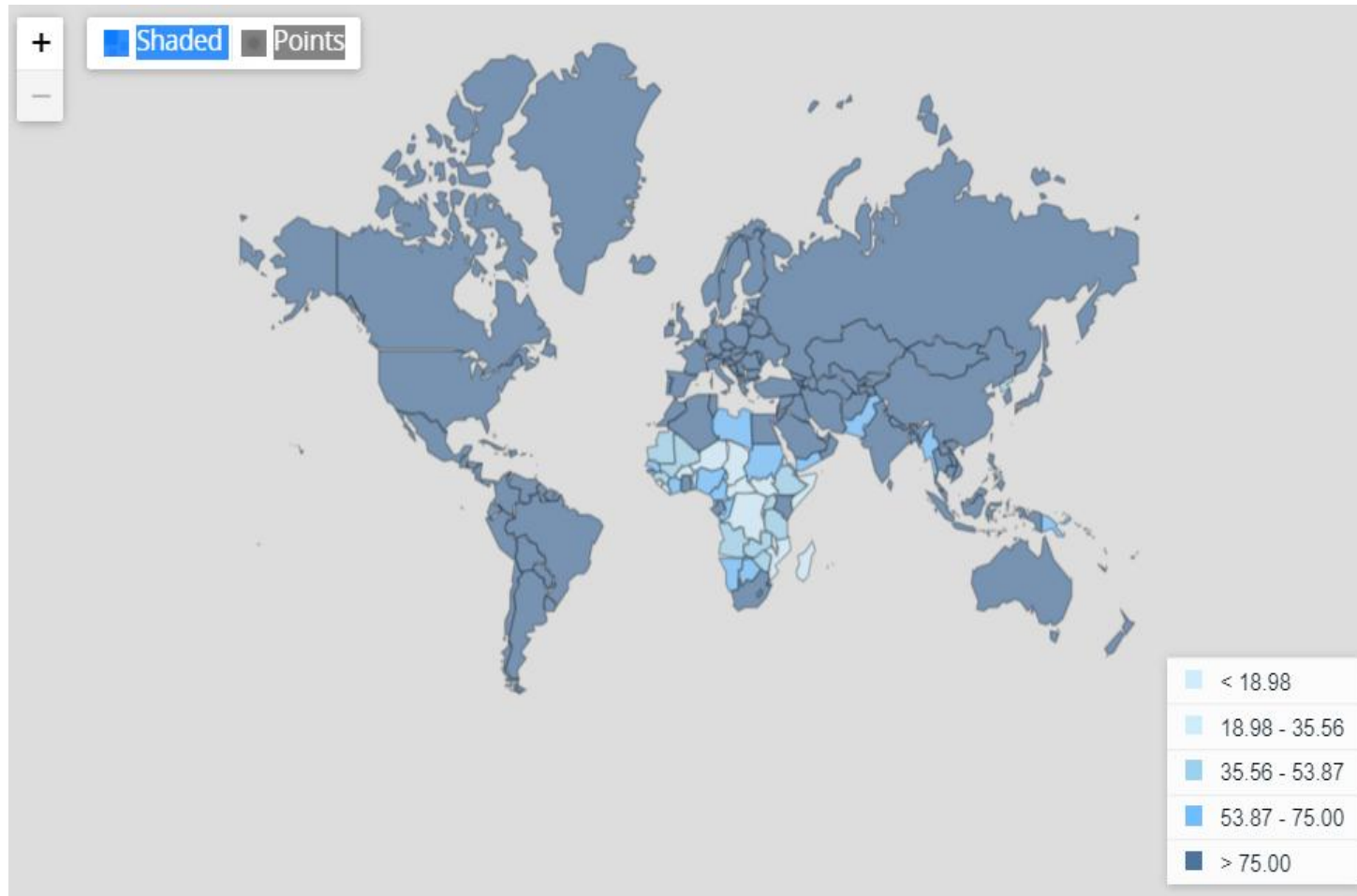
Percent of Population with access to basic handwashing facilities, 2017



Source, World Bank SDG Atlas 2020, <https://datatopics.worldbank.org/sdгатlas/goal-6-clean-water-and-sanitation/>



Percent of Population with access to electricity, 2018



Source: World Bank Data, 2018, <https://data.worldbank.org/indicator/SH.STA.ACSN?view=map>



Addressing inequality – use of lights in Africa and Europe



Source: World Bank Data, 2018, <https://data.worldbank.org/indicator/SH.STA.ACSN?view=map>, NASA satellite imagery

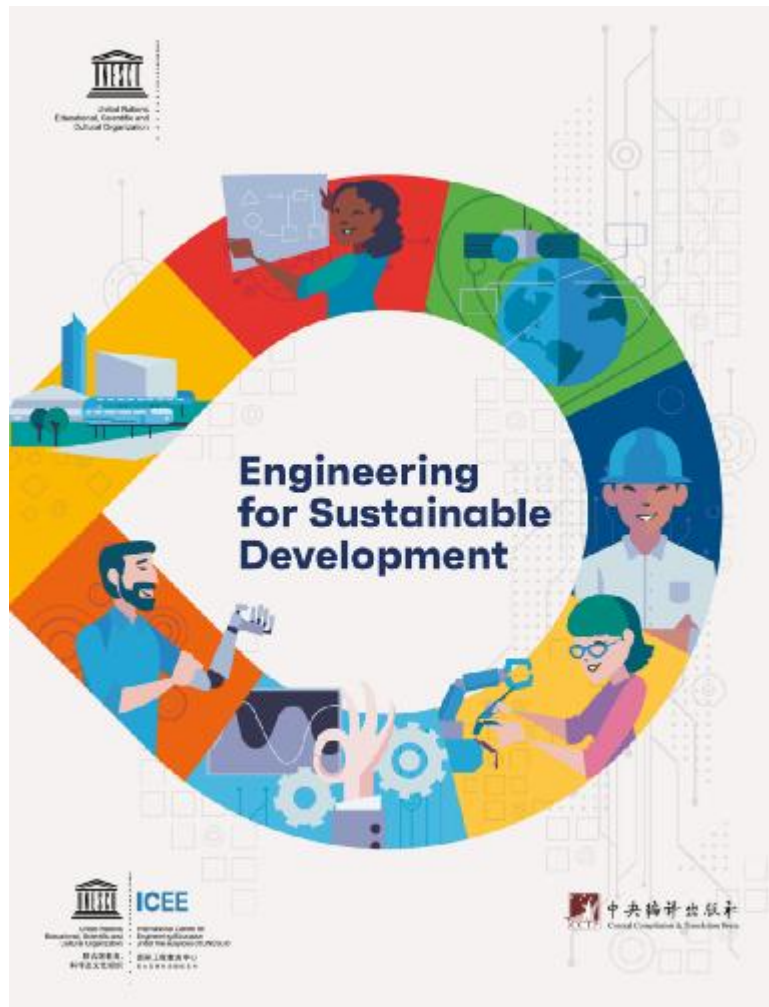




- A key objective of the World Federation of Engineering Organizations (WFEO), since 2018, is to **advance the UN SDGs through engineering**.
- The **WFEO Engineering 2030 Plan** has a number of projects to advance the UN Sustainable Development Goals through engineering
- The **UNESCO Engineering Report – Engineering for the Sustainable Development Goals**, aligns with this vision and shows the important work that needs to be done by engineers and **“how engineering can make it happen”**.
- In addition the report shows that we need **to build capacity for more engineers, especially women**, with the right skills to advance sustainable development.



UNESCO Engineering Report – Engineering for Sustainable Development, 4 March 2021

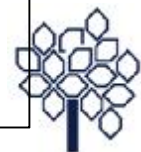


EN <http://on.unesco.org/Eng2021>, FR: <http://on.unesco.org/Ing2021>
ES <http://on.unesco.org/Ingen21>

Engineering for Sustainable Development

Hero message on the need to encourage more women and girls into engineering

© Marlene Kanga 2021





Marlene Kanga

209 Tweets



Marlene Kanga @MarleneKanga · 1m

Agree @antonioguterres as Immediate Past President of @wfeo I proudly led the proposal for #WorldEngineeringDay and delighted to see it celebrated globally as every #Engineer especially #women engineers strive to contribute to advance the #UNSDGs. It's our Day!



António Guterres ✓ @antonioguterres · Mar 5

As a trained engineer, I am passionate about the potential of engineering to help solve the most pressing challenges facing our world.

But to truly maximize that potential, we must ensure women & girls have equal opportunities & representation in this field.
#WorldEngineeringDay



Engineering for Sustainable Development

© Marlene Kanga 2021



The UN Secretary General agrees on the need for more women engineers, Twitter, 5 March 2021, Celebrating World Engineering Day

Engineers need to ensure that women benefit from new technologies and also participate in the technology revolution so no one is left behind



Women engineers working on high voltage electrical systems. © Chinese Society for Electrical Engineering, Chapter 1, UNESCO Engineering Report.

- **We need more engineers especially women engineers!**
- **Engineers** have developed technologies with enormous transformative potential in the digitally connected future workforce - including advanced automation, telecommunications, robotics and artificial intelligence.
- **Women engineers** are needed to contribute as diversity of thought is vital for innovation and the development of solutions that reflect community standards, values and aspirations for sustainable development.
- **New technologies empowering women** - mobile communications and the internet, for access to banking, entrepreneurship and improved outcomes for health, education and childcare.



TOPICS

2. The Diversity Imperative for sustainable development



The Diversity Imperative – an Inclusive Profession is needed now

RELEVANCE & SUSTAINABILITY

- **Relevant team** – Members of the engineering team are similar to the community – in terms of age, ethnicity, gender etc.
- **Sustainable solutions** – diverse teams will understand and reflect community and stakeholder values and expectations and maintain the social license to operate
- **New technologies increasing disruption** – Successful navigation of disruptive technologies needs diverse teams

GOVERNANCE

- **Ethically sound** – promotes good governance
- **Efficient** – We need the world's best intellects for engineering
- **Equal opportunity** for all – a basic human right

PERFORMANCE

- **Encourages innovation** and reduces risk, better decisions, avoids “group think”, ensure a wide range of perspectives are considered
- **Enhances business performance** – financial, customer relationships, safety, sustainability
- **Enhances** reputation

Diversity is an opportunity that cannot be ignored



Engineering needs more brain power not muscle power



Engineering for Sustainable Development

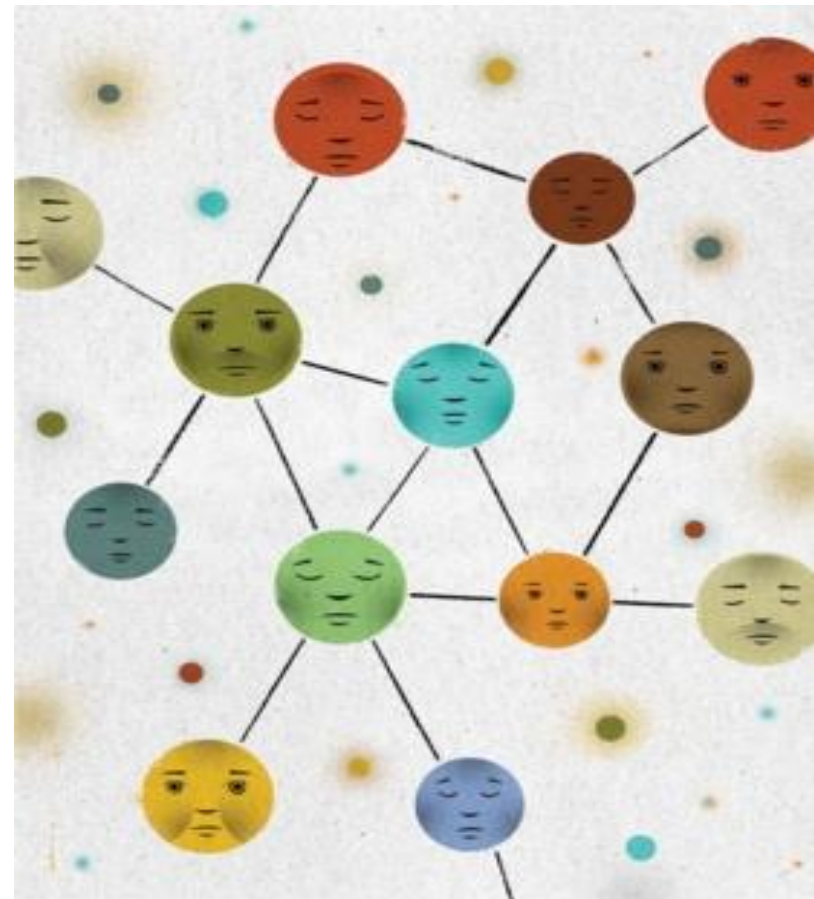
© Marlene Kanga 2019-2021



Diverse teams are smarter

“A diverse group of competent performers almost always outperform a homogenous group of star performers by a substantial margin when it comes to complex problem solving or innovating”

Scott Page, Professor of Complex Systems Theory, University of Michigan



We need to change
the rules to get better
outcomes for
engineering and
technology, to solve
the world's most
pressing problems and
to leave no one behind



TOPICS

3. Working together for real change



STEPS FOR CHANGE

1. Create women in engineering networks for support and awareness
2. Attract more girls to engineering
3. Provide encouragement, mentoring
4. Recognise achievements
5. Empower our leaders to change the system



WFEO Committee – Women in Engineering



Inaugural Meeting Brasilia Oct 2008



Global Engg Congress, London Oct 2018



First Africa Women in Engg. Forum Sept. 2018

Attract more girls to engineering – partner with WomEng - 1 million girls in STEM



Launch at UN Commission on Status of Women March 2017



STEM Workshop South Africa 2017



Kuwait Society of Engineers – Women in Engineering



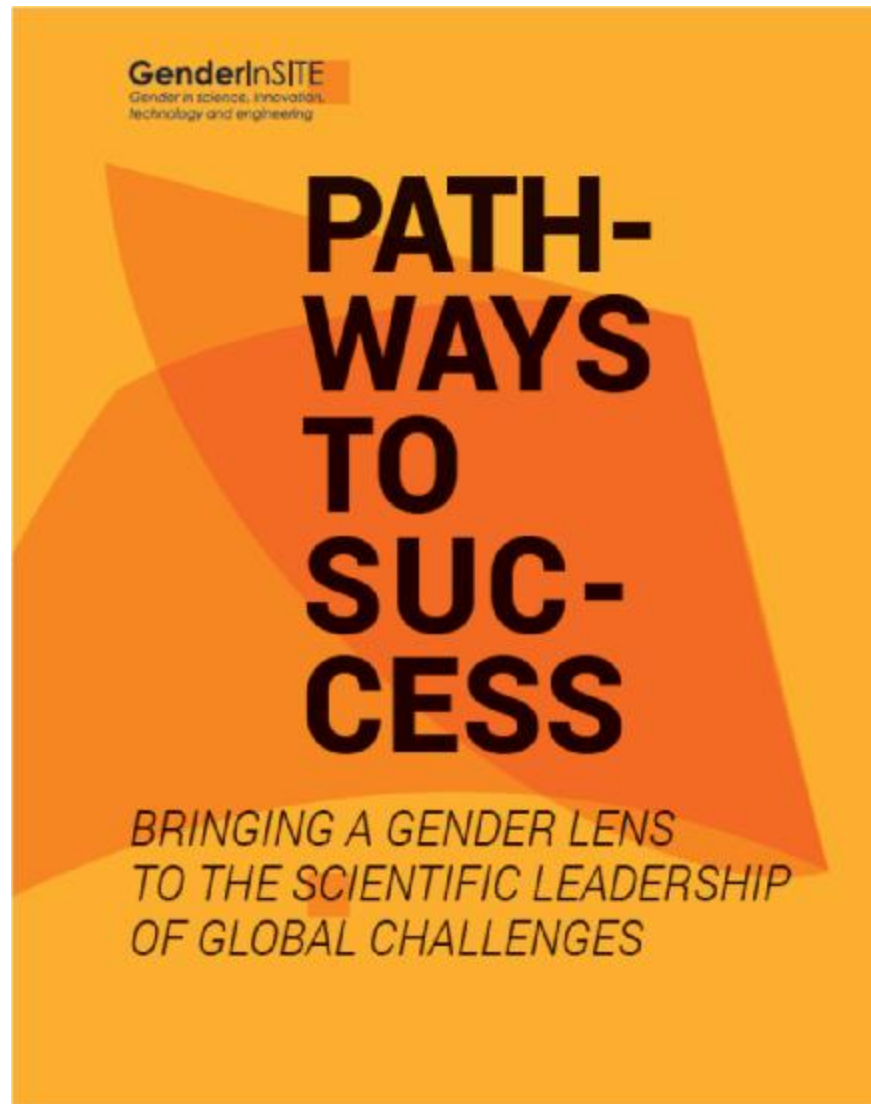
50%+ women in engineering

Engineering for Sustainable Development

© Marlene Kanga 2017-2021



Encouragement, mentoring and support



GenderInSITE

PATHWAYS TO SUCCESS: BRINGING A GENDER LENS TO THE SCIENTIFIC LEADERSHIP OF GLOBAL CHALLENGES

"The academic pipeline from junior to senior faculty leaks female scientists, and the senior ranks of science bear the imprint of previous generations' barriers to the progression of women."
(Sugimoto et al. 2013: 213)

Dr. Marlene Kanga AM was interviewed for the research into women leaders in STEM.

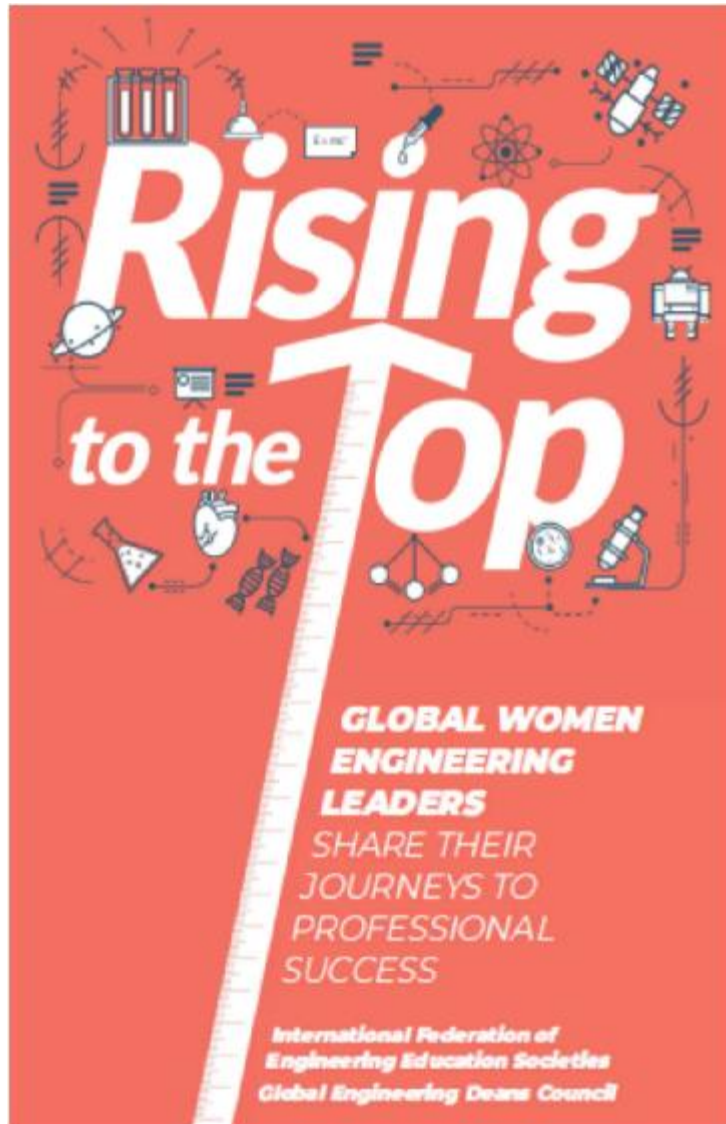
See: <https://genderinsite.net/news/genderinsite-report-completed-pathways-success-bringing-gender-lens-scientific-leadership>

Engineering for Sustainable Development

© Marlene Kanga 2019-2021



Encouragement, mentoring and support



The goal of this book is that a new generation of female engineering leaders will be inspired by their peers. Equally important is that many of our male colleagues are sure to be positively impacted as they reflect on the experiences so honestly shared within these pages. My hope is that this book will trigger men in the profession and in engineering education to seriously reflect on how they can be more effective, engaged, and sensitive in terms of supporting women in their leadership roles—regardless of what culture they are in.

Dr. Hans Jürgen Hoyer is Secretary General of the International Federation of Engineering Education Societies (IFEES) and Executive Secretary of the Global Engineering Deans Council (GEDC).

<http://www.ifees.net/wp->

[content/uploads/2019/10/Rising-to-the-Top.pdf](#)

Webinar: <https://www.wfeo.org/event/rising-to-the-top-webinar-1-global-women-engineering-leaders-share-their-journeys-to-success/>

Dr. Marlene Kanga AM was a contributing author to this book and nominated leading women engineers to contribute to Book 2.



Encouragement, mentoring and support



Ms. Ania Lopez, first female Councilor, Council of Engineering, Italy, National Member Representative at WFEO Executive Council, Chair of WFEO Award Committee

During Marlene Kanga's term as President of WFEO, changes achieved were:

- 25% of speakers at WFEO Conferences were women in engineering
- 25% were keynote speakers, panellist chairs
- All WFEO Board Committees have women as members
- One Board Committee Chair is a woman
- Three women are chairs of standing committees (out of 11)
- 25% National Member representatives are women
- 16% International member representatives are women



Networks for support: INWES Asia Pacific Nation Network (APNN)



Photo: INWES APNN meeting. Seoul 2017.

- International Women Engineers and Scientists (INWES) – Partner of WFEO
- First APNN meeting hosted by Engineers Australia, Chair Dr Marlene Kanga, Adelaide July 2011
- Women in Engineering Groups established after the meeting in: India, Sri Lanka, Mongolia, Nepal, Taiwan, Vietnam, Malaysia, Bangladesh, Myanmar
- Sharing of experience as women engineers and scientists and support network across Asia

See: <https://www.inwes.org/apnn/>



Recognise achievements of women engineers



- Inaugural women in engineering award in 2018
- Sponsor Madame Dong Ming Zhu is one of China's leading women engineers and entrepreneur owns GREE Electrical appliances, largest white goods manufacturer in the world

Inaugural WFEO GREE Women in Engineering Award, London 2018, initiated during the term of Dr Marlene Kanga as President of WFEO
See: <http://www.wfeo.org/awards/>





SAGA

(STEM and Gender Advancement)

Improved Measurement of Gender Equality in
Science and Engineering

A Global UNESCO Project, with the support of Sida



Dr. Marlene Kanga AM was a member of the SAGA International Advisory Council. National Policies in 8 nations for gender as a result of SAGA.

See: <https://en.unesco.org/saga>

Engineering for Sustainable Development

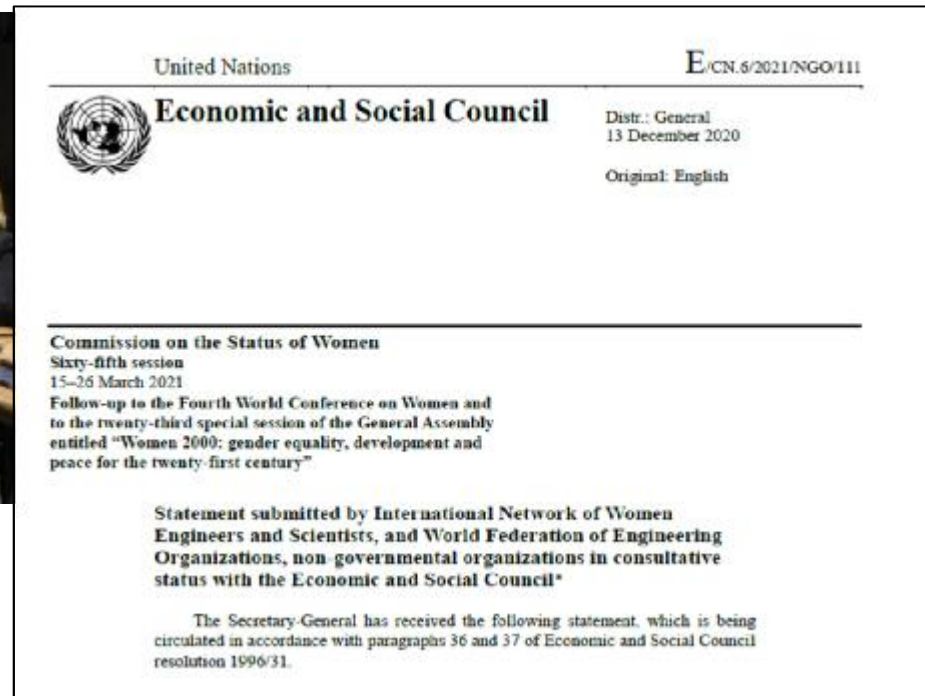
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Advocacy to Address Systemic Issues



Side Event CSW 61, March 2017



Partnership with International network for Women Engineers and Scientists (INWES), International Science Council (ISC)

Written Statement, UN Women, CSW65, March 2021

See:

<https://undocs.org/E/CN.6/2021/NGO/111>



Changing the Rules – for engineering education and professional competencies

The poster is for a consultation webinar on diversity and inclusion. It features a purple background with white and yellow text. At the top, logos for WFE/IFEA, UNESCO, International Engineering Alliance, and The Committee on Women in Engineering are displayed. The main title 'CONSULTATION WEBINAR ON DIVERSITY AND INCLUSION' is in large white letters. Below it, the date 'FRIDAY 31 July' and time '1:00 PM - 2:30 PM CET' are shown. The topic is 'UNESCO IEA WFE Draft Review of IEA Graduate Attribute and Professional Competency Framework (GAPC)'. A list of speakers and a moderator is provided, each with a circular portrait. At the bottom, four icons represent Sustainable Development Goals 4, 5, 16, and 17. A registration link is at the bottom right.

CONSULTATION WEBINAR ON DIVERSITY AND INCLUSION

FRIDAY 31 July
1:00 PM - 2:30 PM CET

UNESCO IEA WFE Draft Review of IEA Graduate Attribute and Professional Competency Framework (GAPC)

MODERATOR:
Prof. Gong He
President, WFEI

SPEAKERS:
Dr. Peggy Oti Beating
Director, Division of Science Policy and Capacity-Building, UNESCO
Ms. Gail Mattson
President, IEAES
Prof. Bulent Oezguler
Chair, WFE-IEA Working Group
Dr. Marlene Kanga
Past President, WFEI
Prof. Wai Ye Leong
Board Member, IEAES
Prof. Dawn Bonfield
WFEI Committee for Women in Engineering
Ms. Yetunde Holloway
Chair, WFEI Committee for Women in Engineering

Register: <https://bit.ly/2OHX8rx>

Partnership with International Engineering Alliance and other international organisations in engineering – educators, industry and women - to change Engineering Education Benchmarks for Graduate Attributes and Professional Competencies.

See: <http://www.wfeo.org/consultation-with-wfeo-members-and-partners-on-proposed-updated-iea-benchmark-for-graduate-attributes-and-professional-competencies/#Webinar-Diversity&Inclusion>



World Engineering Day for Sustainable Development

Creating Global Awareness of the need for Diversity

- **4th March every year**
- Declared by UNESCO as an international day
- An opportunity to engage with people, government, policy makers, students on the importance of engineering in our societies
- Encourage young people, boys and girls, to consider engineering as a career for positive change for a better sustainable world
- Its our celebration of engineering!!

See: <https://worldengineeringday.net/>



**WORLD
ENGINEERING
DAY** FOR SUSTAINABLE
DEVELOPMENT





**WOMEN
ENGINEERS CAN
CREATE**

**THE
WORLD
WE WANT**





Engineering for Sustainable Development

- Participation
- Influence
- Representation



**The world's engineers
united in rising to
the world's challenges.
For a better,
sustainable world.**



**The World Federation of Engineering
Organizations**

Fédération Mondiale des Organisations d'Ingénieurs

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