

IEEE TEMS Egypt Chapter
13 February 2023

Invited Talk

Clean Tech Solutions for Climate Change

Prof. Saifur Rahman

2023 IEEE President

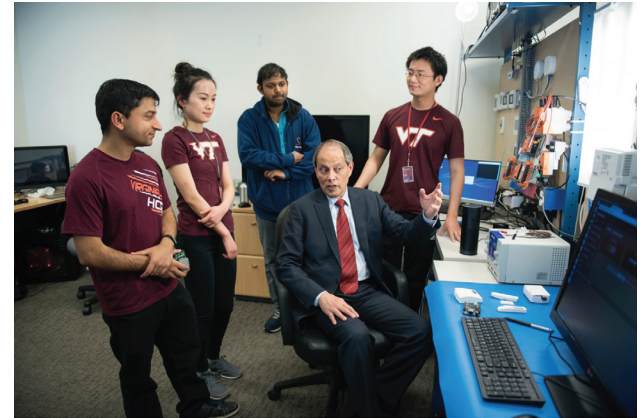


Director, Virginia
Tech Advanced
Research Inst., USA

www.srahman.org

My Professional Background

- Joseph Loring Professor & Founding Director of the Advanced Research Institute at Virginia Tech
 - Trained 80+ MS/PhD students & postdocs
- Served as a Research Engineer at the Tokyo Electric Power Company in 1992-1993
- Chair of the U.S. National Science Foundation Advisory Committee for International Science and Engineering from 2010 to 2013
- Served on the Virginia Governor's Executive Committee on Reduction of Energy Consumption in the Private Sector from 2015 to 2017



My Education



Dr. Saifur Rahman (BSc EE 1972)

My Alma Mater

Bangladesh University
of Engineering & Technology



BUET



Dr. Saifur Rahman (MS EE 1975)

Exciting careers await those who have technical acumen, drive and communication skills. An excellent example is Dr. Saifur Rahman, the Joseph R. Loring Professor of Electrical and Computer Engineering at Virginia Tech. Prof. Rahman earned his Master's degree in electrical engineering from Stony Brook University in 1975.

Professor Rahman came to Stony Brook from Bangladesh University of Engineering and Technology, where he received a bachelor's degree in electrical engineering. At Stony Brook he developed a passion for teaching by being a teaching assistant for Prof. Ken Short and Prof. C.T. Chen. He also

developed a passion for research by interacting and doing joint work with an adjunct professor from nearby Brookhaven National Laboratory (BNL) and did a summer internship with that professor's group there in 1975. The internship gave him the self-confidence to do bigger things in his academic and professional career as he worked alongside other well-known professors from prestigious research universities such as Carnegie Mellon and Cornell.





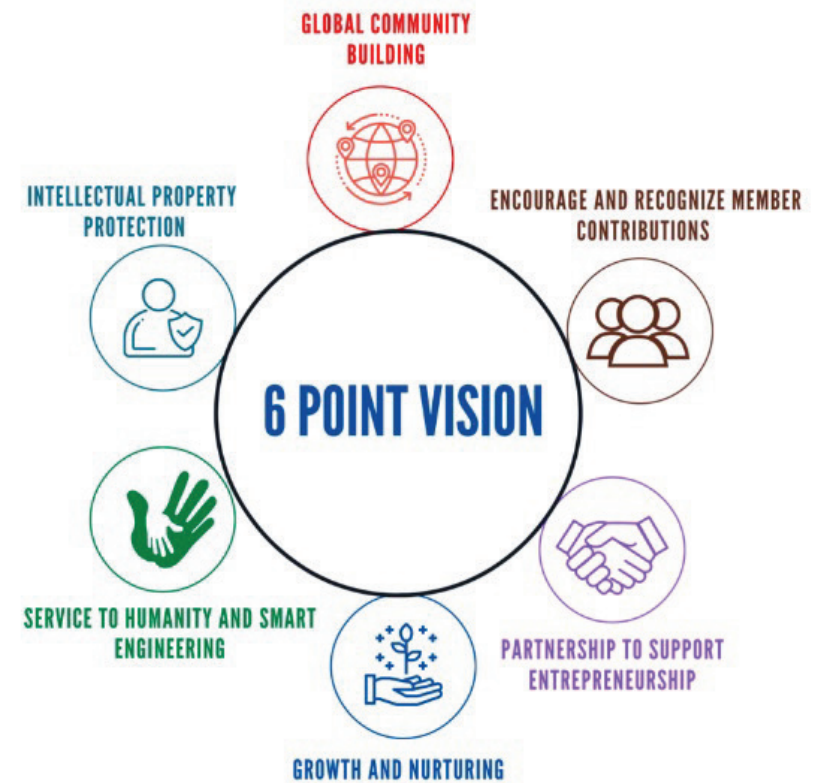
Dr. Saifur Rahman (PhD EE 1978)

2023 IEEE Presidency Theme

Focus for IEEE's Volunteer Leadership

Explore the professional needs and interests of working technologists and their interactions with civil society

Build interpersonal relationships, trust, and respect for a productive year working together as a team





*IEEE 2023
Board of Directors
Retreat Focus*



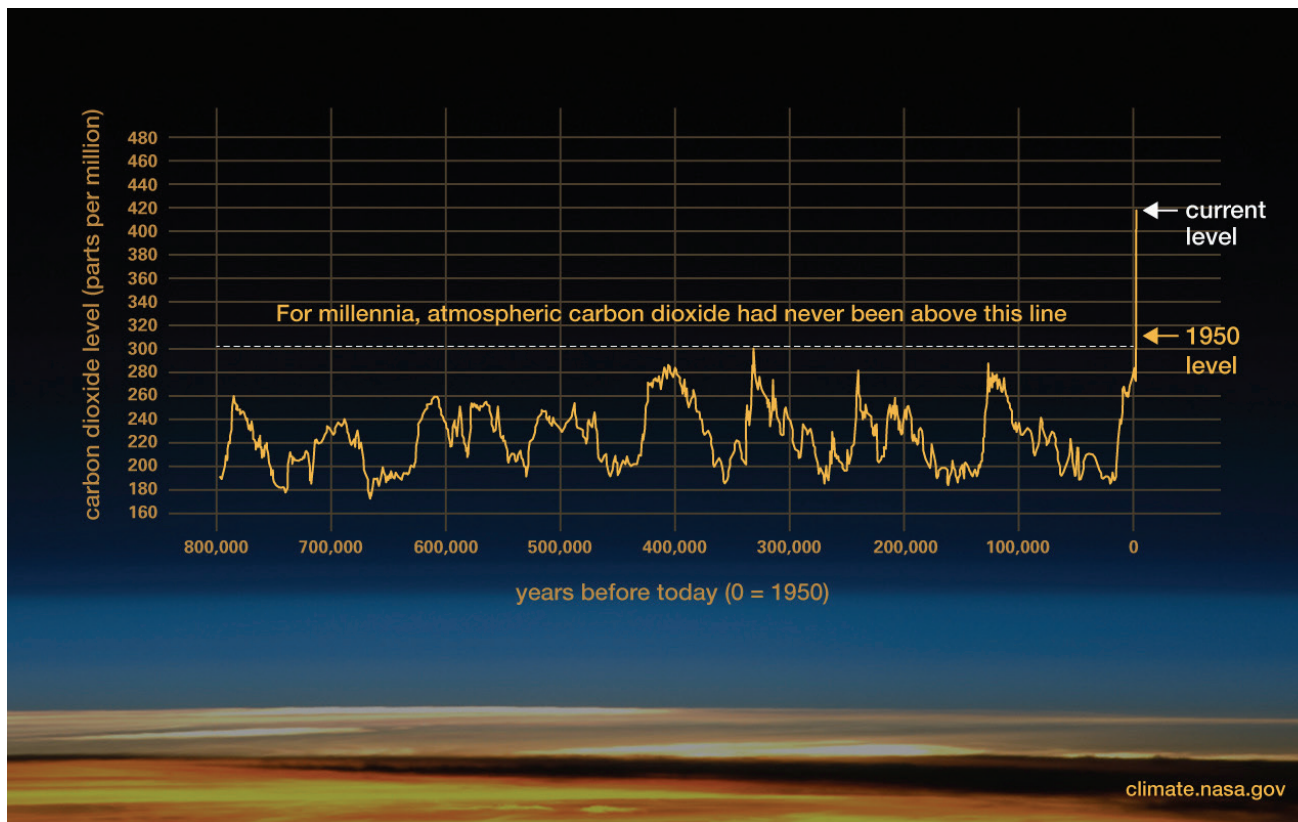


*Advancing Technology
for Humanity*

What Can you Do to Serve Humanity?

Clean Tech Solutions for Climate Change.

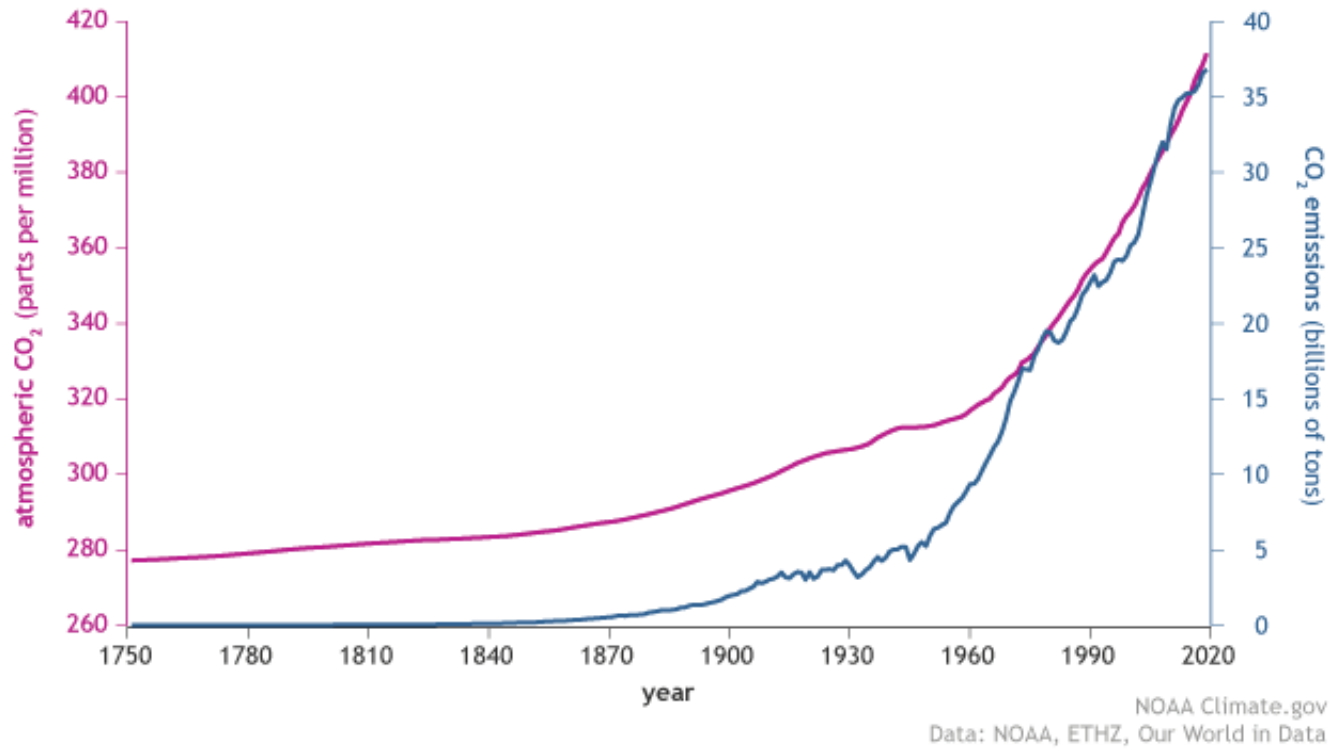
What is Carbonization ?



Source: NASA

https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/

CO₂ in the atmosphere and annual emissions (1750-2019)



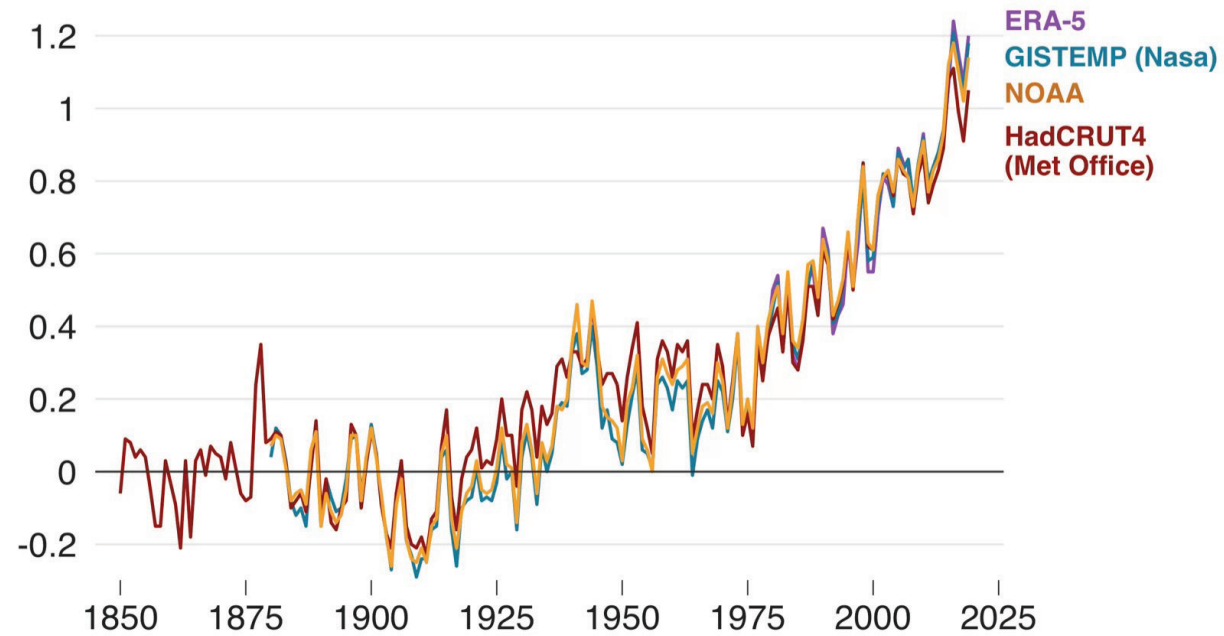
Source: State of the Planet

<https://news.climate.columbia.edu/2021/02/25/carbon-dioxide-cause-global-warming/>

Impacts of Carbonization

Temperature rise since 1850

Global mean temperature change from pre-industrial levels, °C



Source: Met Office

BBC

Source: <https://www.bbc.com/news/science-environment-51111176>

Temperature rise of 1.5 – 2.0 °C = Point of No Return

Visible Impacts of Climate Change

Florida, China and Africa





Hurricane Isabel struck the Mid-Atlantic region of USA between Sept. 18-19, 2003.



Hurricane Sandy

New York, New Jersey 2012



Droughts in 2022



Dry river bed in **Italy** (Po River) due to worst drought in 70 years, June 2022

<https://idsb.tmgrup.com.tr/ly/uploads/images/2022/07/08/217454.jpg>

The Jialing Riverbed at the confluence with the Yangtze River is exposed due to drought on August 18, 2022 in Chongqing, **China**.



<https://image.cnbcfm.com/>

Wildfires in the US



July 2021 - The Dixie fire burned close to a million acres in **California's** Lassen county over three months and became the first fire to cross the Sierra Nevada. Photograph: Noah Berger/AP

Peaks glowing with thousands of spot fires on June 13, 2022 in Flagstaff, **Arizona**.
Schumacher/The Republic



Wildfires in Europe - Summer of 2022



Southwestern France, July 17, 2022



Central Portugal, July 13, 2022



Brandenburg, Germany, August 2022



Greece, July 2022



Northern Spain, June 2022



Central Italy, July 2022

“The number of wildfires in 2022 in the EU have nearly quadrupled the 15-year average”

[Source: CNN according to Copernicus, EU Earth observation program](#)

Siberia: Wildfires in June 2021



The Greenpeace Russia team has documented forest fires in the Krasnoyarsk region.
JULIA PETRENKO / GREENPEACE



In this June 16, 2021 photo, firefighters work at the scene of forest fire near Andreyevsky village outside Tyumen, western Siberia, Russia. -
Copyright AP Photo/Maksim Slutsky, File

2008 China Snowstorm



Electrification to Reduce Fossil Fuel Use



Electric Vehicle



Heat Pump as opposed to
oil/gas furnace

Reduce Carbon Emissions from Electricity Production



Reduce Carbon Emissions

1. Use less electricity, energy efficiency
2. Use low carbon fossil fuel power plants
3. Use H₂ & other storage technologies
4. Promote more renewables
5. Accept some nuclear
6. Promote cross-border power transfer

IEEE Spectrum

ARTICLE THE INSTITUTE

IEEE Discusses 6 Simple Solutions to Climate Change at COP27 > They include switching to LEDs and making coal plants more efficient

BY KATHY PRETZ 26 JAN 2023



<https://spectrum.ieee.org/6-solutions-to-climate-change>

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IEEE at UN Climate Change Conference



Global Alliance of Universities on Climate



Presentation at GAUC



Partnership with International Renewable Energy Agency (IRENA)

Energy Transition Education Network

ETEN Founding Partners

Convened by:  **IRENA**
International Renewable Energy Agency

PERMANENT MISSION OF THE UNITED ARAB EMIRATES INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA)  **البعثة الدائمة الإمارات العربية المتحدة الوكالة الدولية للطاقة المتجددة (إيرينا)**

Partners:  **unesco** **Teach For All**
A Global Network

 **unicef** **for every child**  **Higher Education Sustainability Initiative** **HESI+10**
Celebrating 10 years with Higher Education Sustainability Impact  **IEEE**
Advancing Technology for Humanity

 **ENERGY TRANSITION EDUCATION NETWORK**  **IRENA at COP27**

IEEE's Role in Education/Training/Research

Energy Transition Education Network





United Nations
Framework Convention on
Climate Change

COP27
SHARM EL-SHEIKH
EGYPT 2022

The global engineering view: Delivering an equitable,
sustainable and low carbon resilient world

November 10, 2022 / 11:30 – 13:00 am Egypt time (GMT + 2) / 10:30 – 12:00 CET (GMT + 1)



Davide Stronati
Chair, WFEO
Committee on
Engineering and the
Environment



Jianping Wu
Member, WFEO
Committee on
Engineering and the
Environment



Valentina Putrino
Member, WFEO
Committee on Disaster
Risk Management



Saifur Rahman
Virginia Tech
Advanced Research
Institute, 2022 IEEE
President-Elect



Tariq S Durrani
University of
Strathclyde, Life
Fellow of IEEE



Altazaz Farooque
School of Climate
Change and
Adaptation

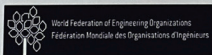
This is a Side Event organized by the World Federation of Engineering Organizations (WFEO) in collaboration with the Engineering Institute of Canada (EIC) and IEEE.

The speakers will cover the following topics:

- Exploring the engineering role in building climate resilience of cities and reducing risk for local communities,
- Understanding decarbonization through the lens of both industrialized and emerging economies, utilizing low carbon energy solutions,
- Showcasing the importance of women and future leaders.

The event will take place in the Akhenaten room.

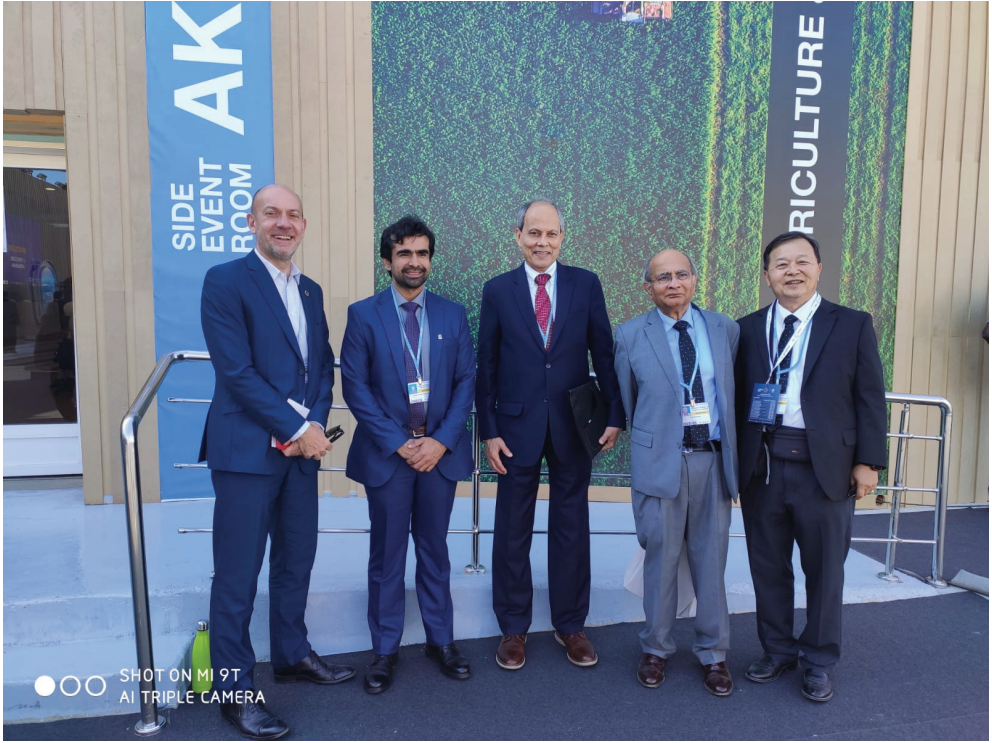
The event is organized by:



Learn more about how IEEE is making a difference at ieeecomclimatechange.org.

In Collaboration with the World Federation of Engineering Organizations and Engineering Institute of Canada

WFEO/EIC/IEEE Participants at COP27



Energy Day (15 Nov 2022) at COP27



Collaboration with Industry



Webinar: Uniting to Tackle Climate Change Through Electrification

Date: Wednesday, October 19th @11:00am EDT



Saifur Rahman
IEEE



Anne White
MIT



Adile Ajaja
EVLO Energy Storage



Gurunath Kedar
Dana



Nick Goberville
Argonne National
Laboratory



Tanya Morton
MathWorks

ieee.org

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So, What is the bottom line?

- Efforts in the electric power sector by replacing fossil fuel with renewables and nuclear will help
- But if emission from the transportation sector continues to rise, the power sector contributions will not be enough
- Large scale Electric Vehicle deployment will help, but question remains – how will the EV be powered



IEEE Climate Change Website

<https://climate-change.ieee.org>



Resources from IEEE Climate Change in the News Contact 



MAKING A
DIFFERENCE

TECHNICAL Solutions	BUILDING Technical Community	CLIMATE CHANGE Mitigation
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Email: ccircc@ieee.org

IEEE Climate Change Collection (ICCC)

[IEEE.org](#) | [IEEE Xplore Digital Library](#) | [IEEE Standards](#) | [IEEE Spectrum](#) | [More Sites](#)

Climate
Change

IEEE: Enabling Innovation and Technology Solutions

[Resources from IEEE](#)

[Climate Change in the News](#)

[Contact](#)



RESOURCES FROM IEEE

As the world's largest organization of technical professionals, IEEE has both the opportunity and the responsibility to assist in organizing the response of engineers, scientists, and technical professionals across the world to address the causes, mitigate the impact, and adapt to climate change.

IEEE's scholarly publications, conference proceedings, technical standards, and other materials help foster the exchange of technical knowledge and information for the critical climate issues that our planet faces today.

[View the IEEE Climate Change Collection in IEEE Xplore®](#)

THANK YOU!

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