

# Technologists' Role in Addressing Climate Sustainability

Climate  
Change

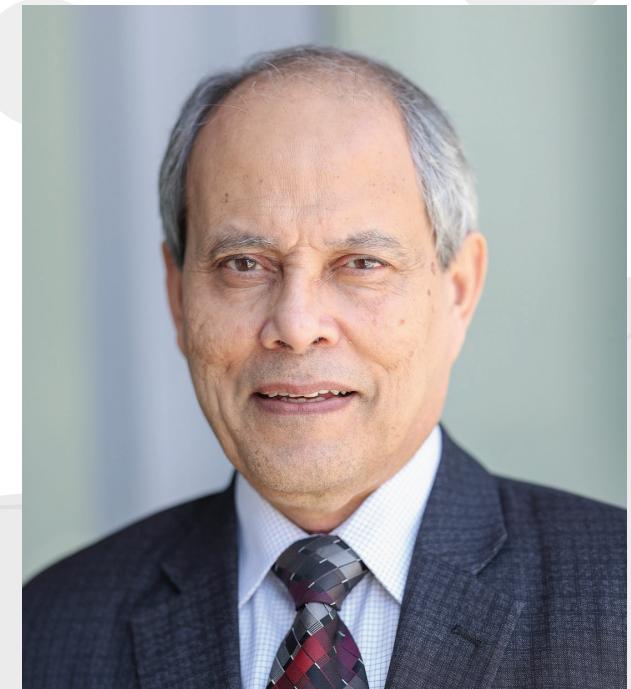
IEEE: Enabling Innovation and Technology Solutions



Prof. Saifur Rahman

2023 IEEE President & CEO

[www.srahman.org](http://www.srahman.org)



Invited Talk  
IEEE Region 10 Webinar, 10 June 2023

# Why is Climate Sustainability a Challenge?

Unprecedented Natural Disasters



Source: Craig Dearden-Phillips: Don't be a polar bear  
<https://www.thirdsector.co.uk/craig-dearden-phillips-dont-polar-bear/management/article/1488091>

# Africa, China and Florida, USA





Source: Stringer/Reuters



Source: AP

# Flooding in Pakistan 2022



Source: Bloomberg

Hurricane Isabel struck the Mid-Atlantic region of the USA between 18-19 September 2003



## 2023 January Flooding in New Zealand



Aljazeera News, The Waiohiki Bridge is washed away in Napier. [Kerry Marshall/Getty Images]



Flash flood caused by torrential rains in Auckland area in late January 2023

<https://youtu.be/5r2AzhxEvxM>

# Hurricane Sandy

## New York, New Jersey 2012



# Droughts in 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 18 August 2022, in Chongqing, **China**

9

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



<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  
13 June 2022, in Flagstaff, **Arizona**.

Rob 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. -

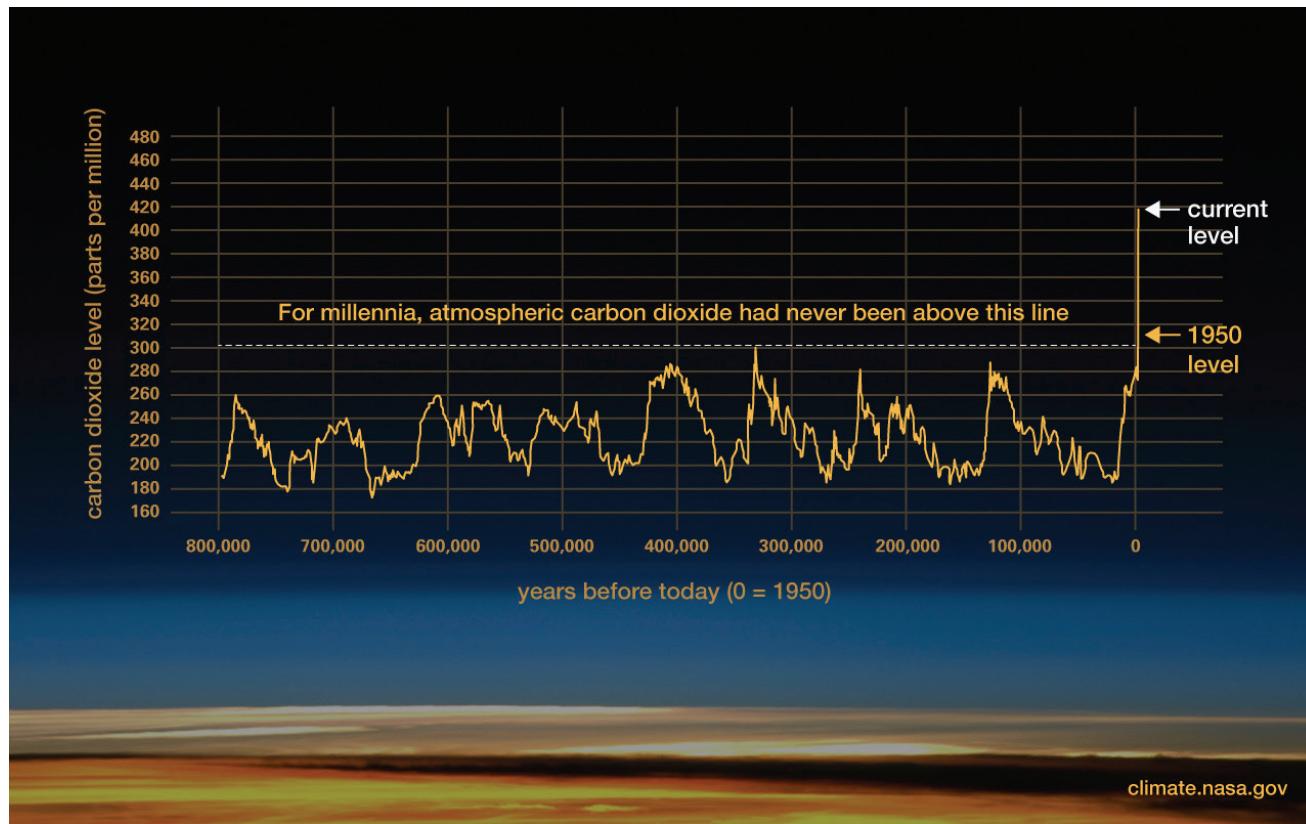
Copyright AP Photo/Maksim Slutsky, File

## 2008 China Snowstorm



# What is Causing This?

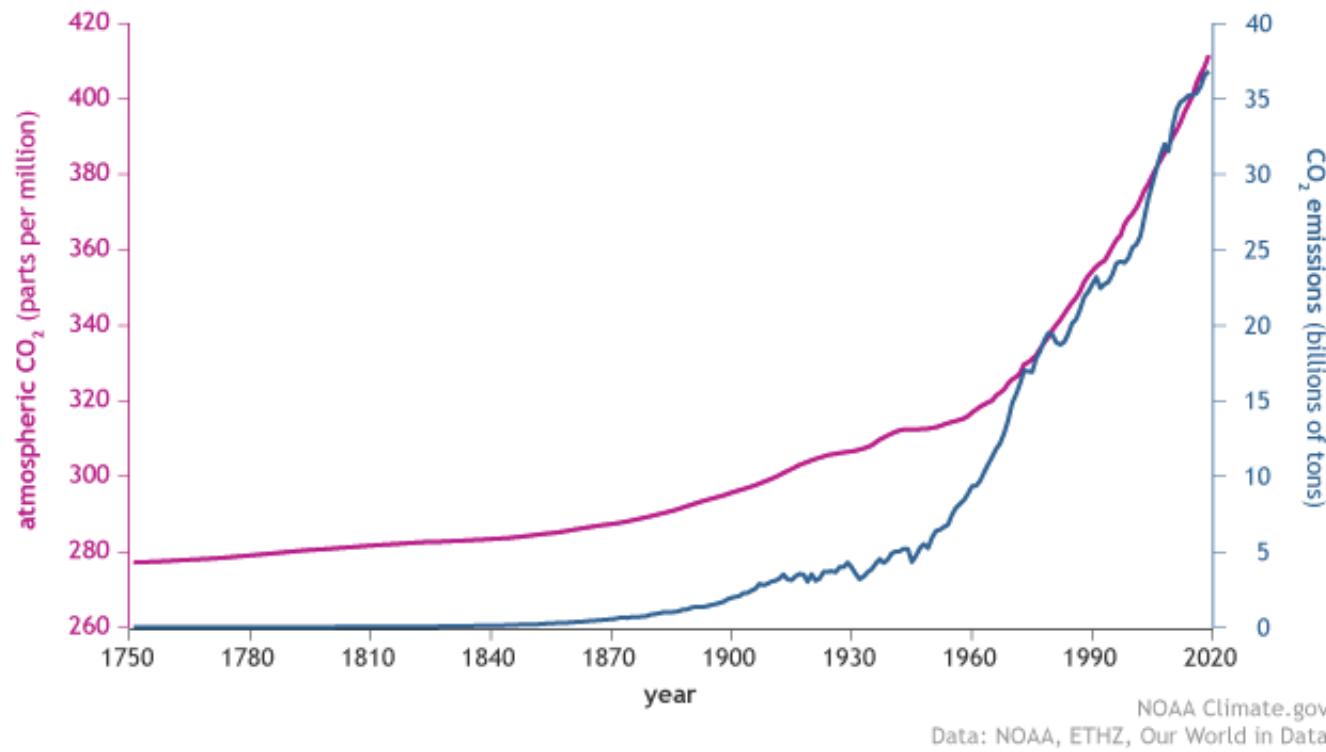
High Anthropogenic CO<sub>2</sub> Emissions



Source: NASA

[https://climate.nasa.gov/climate\\_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/](https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/)

### CO<sub>2</sub> 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/>

# Global CO<sub>2</sub> Emissions Due to Fossil Fuel Use in 2021

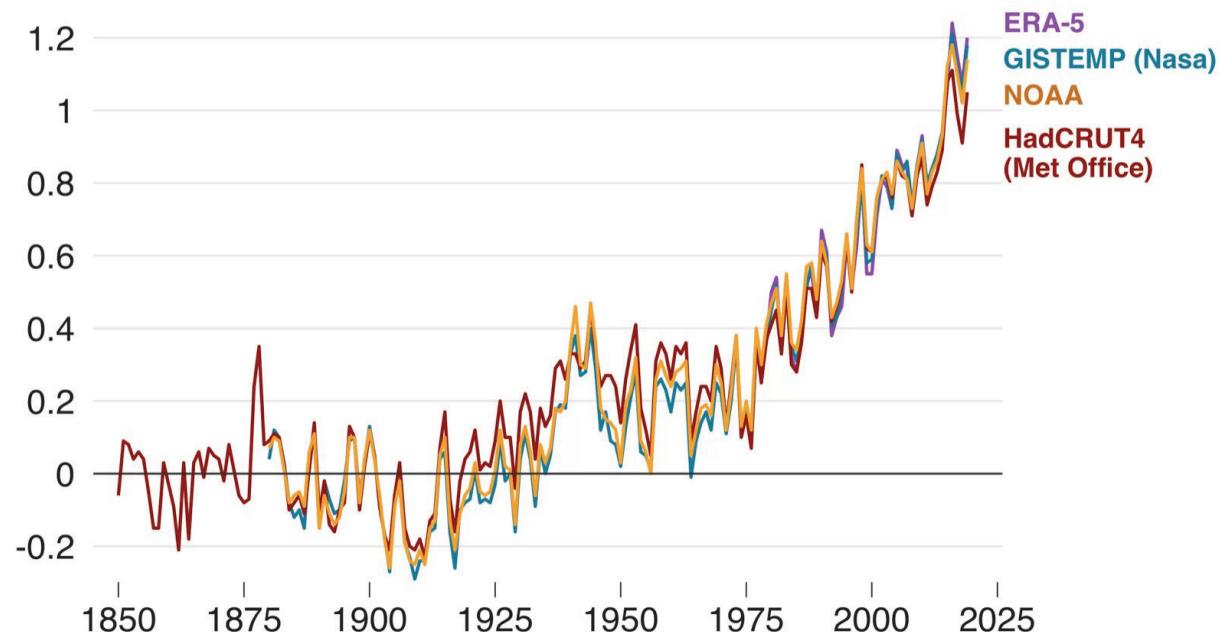
Coal	15.3 billion tons
Natural Gas	7.5 billion tons
Oil	10.7 billion tons

Source: IEA Global Energy Review: CO<sub>2</sub> Emissions in 2021

<https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2>

## Temperature rise since 1850

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

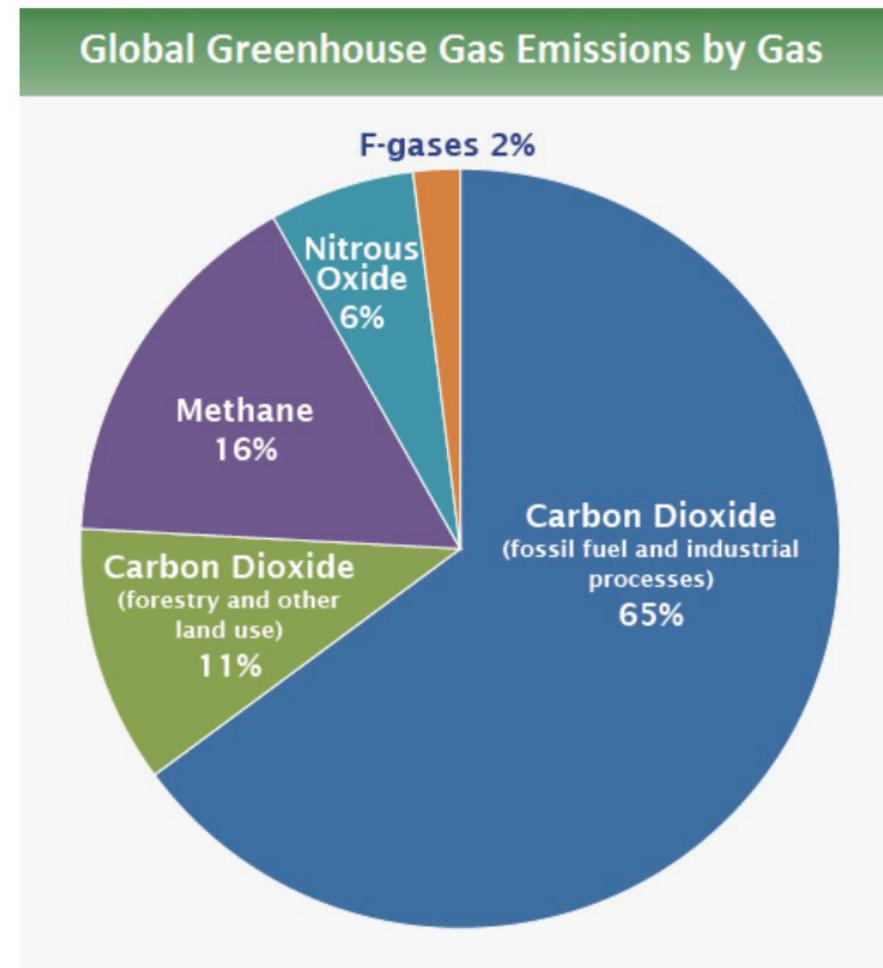


Source: Met Office

BBC

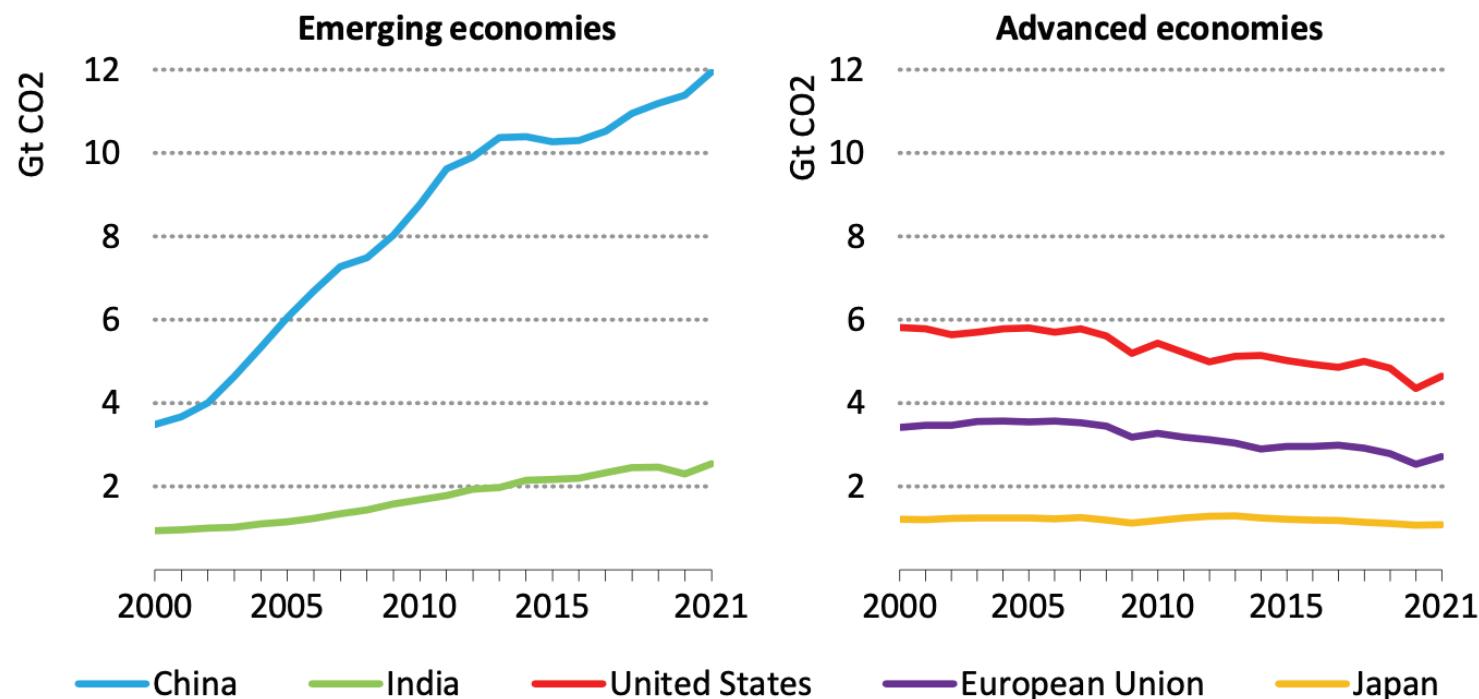
Paris Climate Accord: Limit temperature rise of 1.5 deg C  
2.0 deg C rise → Point of No Return

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



Source: [IPCC \(2014\)](#)  
<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

## CO<sub>2</sub> emissions in selected emerging and advanced economies, 2000-2021

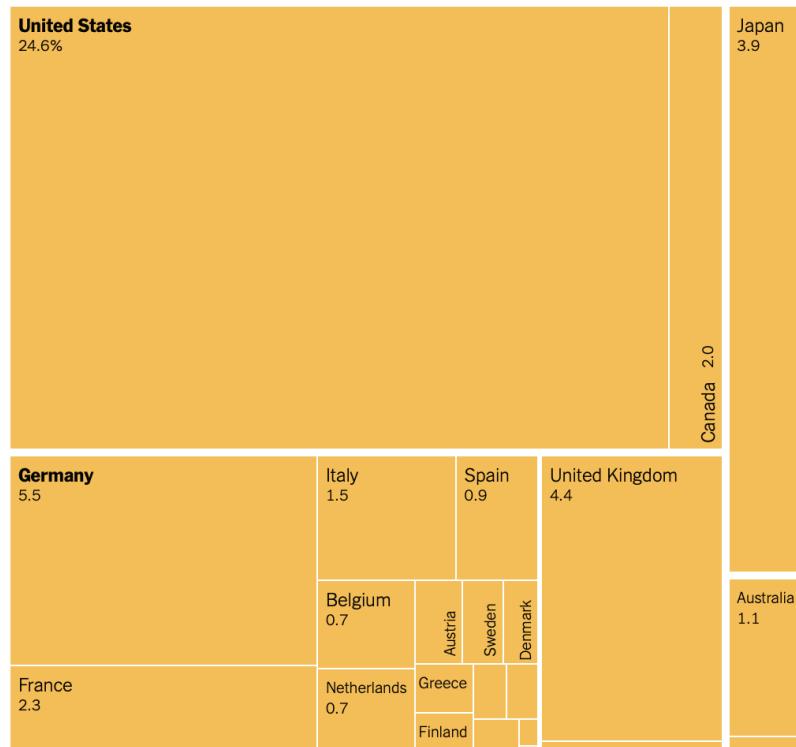


IEA. All rights reserved.

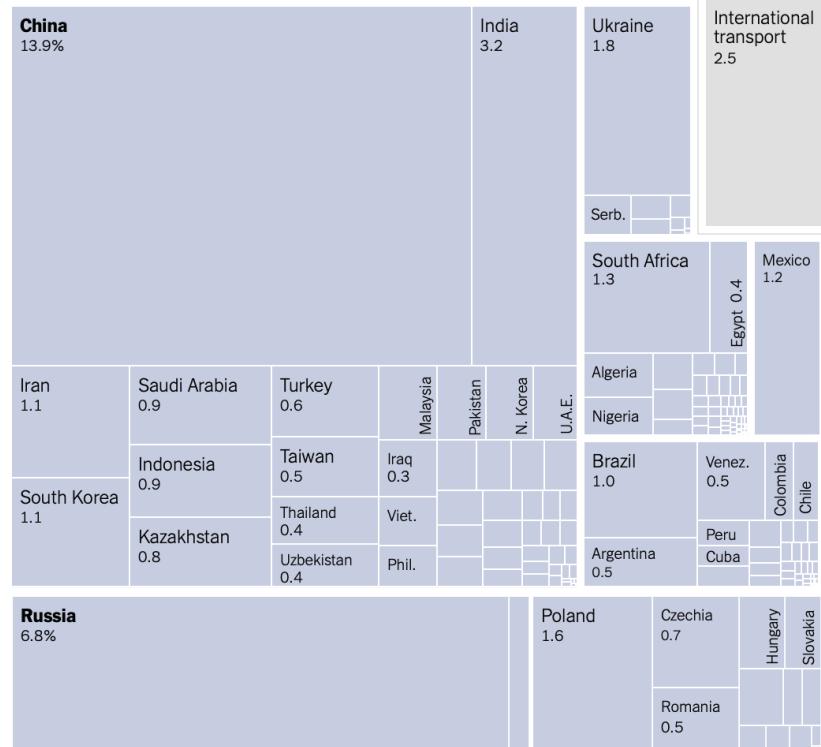
Source: IEA Global Energy Review: CO<sub>2</sub> Emissions in 2021  
<https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2>

# Who Has The Most Historical Responsibility for Climate Change

**23 rich, developed countries** are responsible for half of all historical CO<sub>2</sub> emissions.



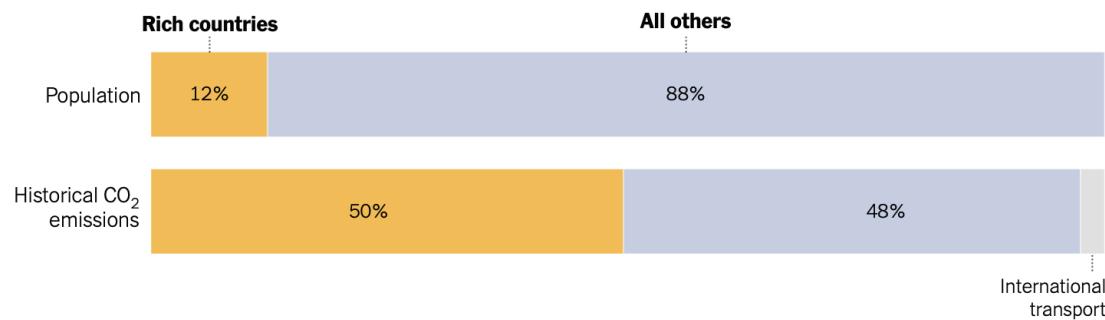
**More than 150 countries** are responsible for the other half.



Source: The New York Times article "Who Has The Most Historical Responsibility for Climate Change?" by By [Nadja Popovich](#) and [Brad Plumer](#), Nov. 12, 2021  
<https://www.nytimes.com/interactive/2021/11/12/climate/cop26-emissions-compensation.html>)

# Who Has The Most Historical Responsibility for Climate Change

Rich countries, including the United States, Canada, Japan and much of western Europe, account for just 12 percent of the global population today but are responsible for 50 percent of all the planet-warming greenhouse gases released from fossil fuels and industry over the past 170 years.



Source: The New York Times article "Who Has The Most Historical Responsibility for Climate Change?" by By [Nadja Popovich](#) and [Brad Plumer](#), Nov. 12, 2021  
(<https://www.nytimes.com/interactive/2021/11/12/climate/cop26-emissions-compensation.html>)

# How Do We Address This Problem?

23

Climate  
Change

[climate-change.ieee.org](http://climate-change.ieee.org)



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# Mitigation

Slow down the impact

# Adaptation

Take action to live with it

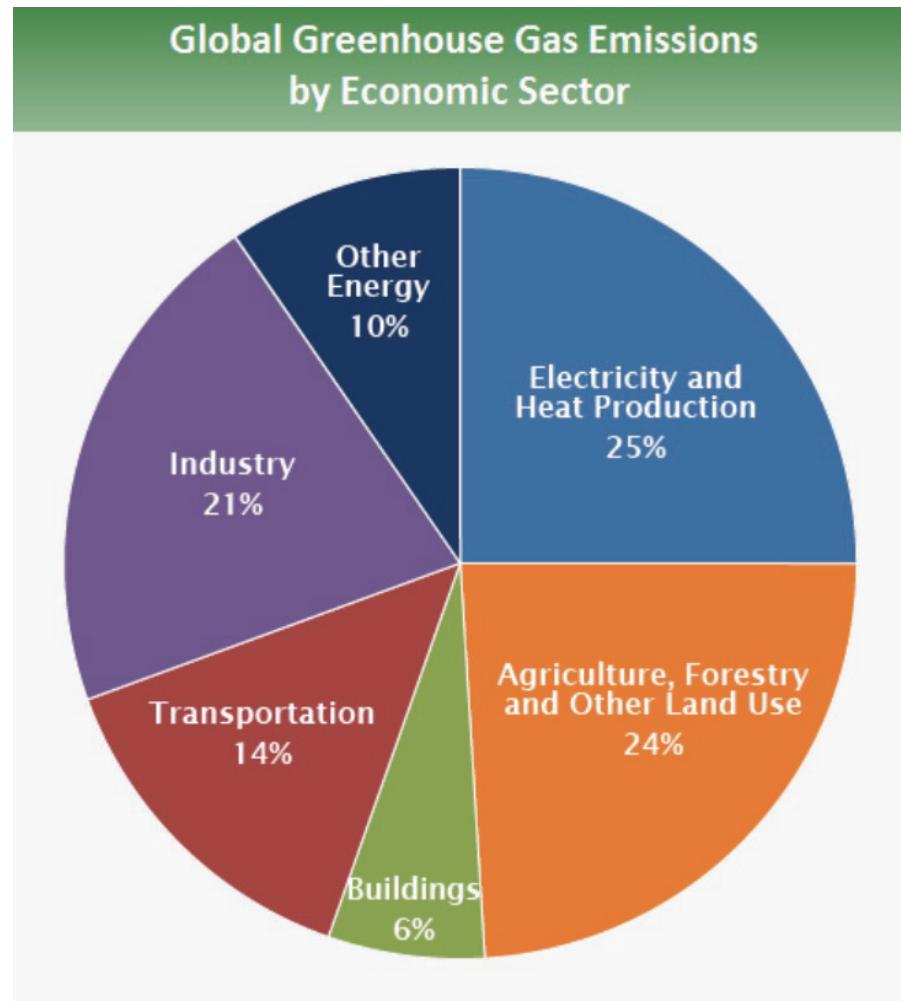
# Climate Resilience

Prepare to recover quickly

Mitigation will allow time to adapt by developing new technologies, best practices and policy formulation

# What is the Role of the Technologist?

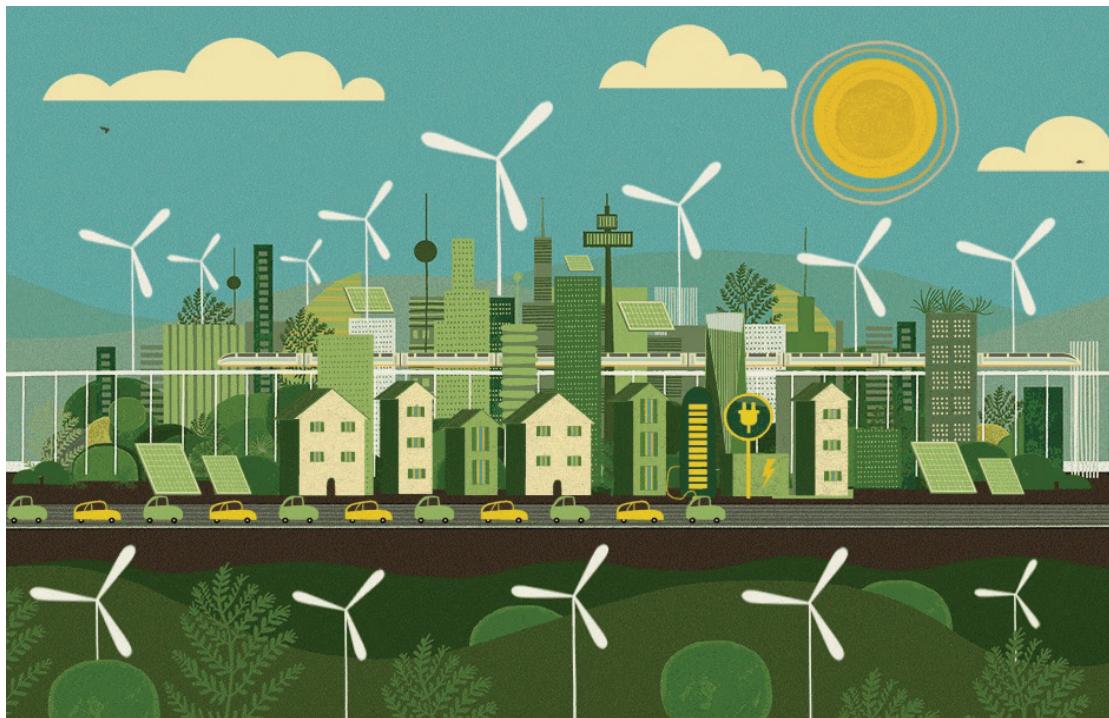
Develop and Promote Universally  
Applicable Cleantech Solutions  
for Climate Sustainability?



Source: [IPCC \(2014\)](#)

<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

# 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 H<sub>2</sub> & other storage technologies
4. Promote more renewables
5. Accept some nuclear
6. Promote cross-border power transfer



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## IEEE Climate Change Engagement Opportunities

# IEEE's Engagement in Addressing Climate Change



Mission-based Challenge

- Pragmatic and accessible technical solutions are urgently needed to address climate change
- We, as engineers and technologists, are well and uniquely placed to provide technical solutions and offer a neutral space for discussion and action



What IEEE Brings to the Challenge

- Commitment to the constant pursuit of innovation and excellence for the benefit of humanity
- The technical expertise of IEEE members and volunteers from across IEEE OUs
- The power of IEEE's collaborative platforms to enable innovation with purpose
- Longer-term IEEE engagement in creating and promoting technical solutions and applications for addressing climate change

# IEEE Climate Change Website

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



# Climate Change Website

Discover global IEEE activities and get involved!

- Opt in to the new climate change newsletter to launch in June
- New topical climate change articles each month posted to the website
- IEEE Xplore® Climate Change Collection at your fingertips
- Help promote articles by sharing through social media icons: *share articles or include a link in your communications*
- Learn about IEEE events on climate change

The screenshot shows the IEEE Climate Change website. At the top, there's a navigation bar with links to IEEE.org, IEEE Xplore Digital Library, IEEE Standards, IEEE Spectrum, About IEEE, and a search bar. The main header is 'Climate Change' with the subtitle 'IEEE's Climate Change in the News'. Below the header, there are several sections: 1) 'ELECTRIFIED INFRASTRUCTURE PROVIDES A BRIGHT FUTURE FOR TRANSPORTATION' featuring a blue truck connected to a charging station. 2) A text block about the mission of IEEE to advance technology for the benefit of humanity, combat climate change, and collaborate with external partners. 3) 'COORDINATING IEEE'S RESPONSE TO CLIMATE CHANGE DEDICATED COMMITTEE' showing a hydrogen fuel truck. 4) 'PROVIDING TECHNICAL RESEARCH EXPERTISE' with a callout for a blueprint for action. 5) 'BUILDING TECHNICAL COMMUNITY' with statistics on members, student branches, and sections. At the bottom, there are links to the IEEE newsletter, a 'Sign up' button, and the IEEE logo.

# IEEE Climate Change Collection

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



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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.

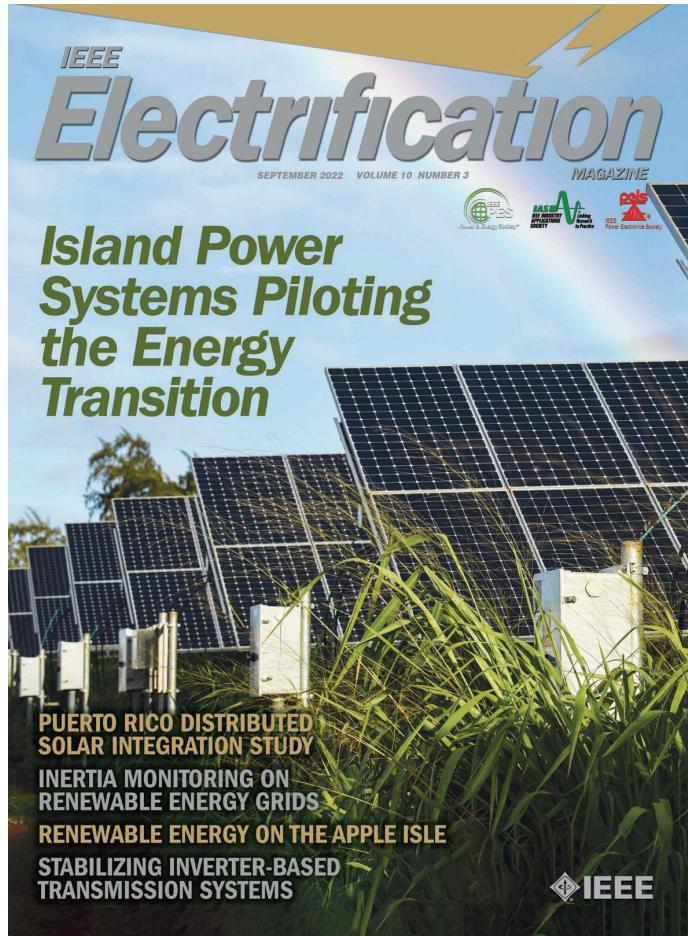
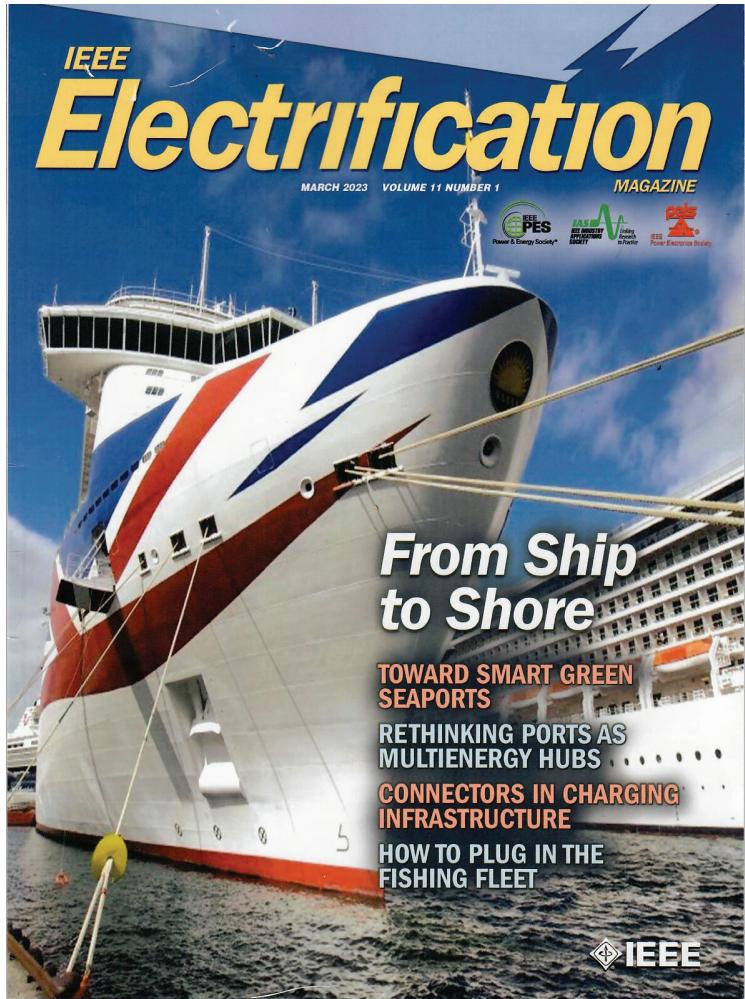
[View the IEEE Climate Change Collection in IEEE Xplore®](#)

# New Climate Change Newsletter coming in June 2023!

- Starting 15 June, the climate change website will offer a monthly climate change newsletter!
- **Sign up and stay apprised about IEEE's global climate change efforts here: <https://climate-change.ieee.org/signup/>**

*Image shown is a draft mockup only.*

The image is a draft mockup of the IEEE Climate Change Newsletter. It features a header with the IEEE logo and the text "Information from IEEE to Help Sustain Our Planet". Below the header is a large image of Earth from space, with the title "Artificial Intelligence Critical in Supporting Biodiversity" and a "READ MORE" button. The main content area includes sections for "See the Latest on Climate Change from IEEE Spectrum" with images of a globe and a car, and "Featured Articles from the IEEE Xplore® Climate Change Collection" with images of a city square, wind turbines, and solar panels. At the bottom, there is a section for "Featured Climate Change Event from IEEE" with an image of a bridge over water and details about the "2023 IEEE/ACM 7th International Workshop on Green And Sustainable Energy Systems (GREENS)" held on 14 May 2023 in Melbourne, Australia. The newsletter also includes links for "Edit Preferences", "Website", "Privacy Policy", "Contact", and "Unsubscribe".



IEEE Publications Board has  
started work on publishing a  
journal like IEEE Access



Multidisciplinary :: Rapid Review :: Open Access Journal



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# Ecosystem for IEEE's Climate Sustainability Work

37



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**IEEE Spectrum:** Climate Change News Feed; Podcasts; Features; Archives; Journal Watch Posts (Xplore); The Institute (Engineers of Climate Change; Coverage of Conferences and Standards)

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

BY KATHY FETTER | 26 JAN 2023 | 4 MIN READ

Simple, effective solutions that can help lessen the impact of climate change already exist. Some of them still need to be implemented, though, while others need to be improved.

## Social Media



## Sponsored Content From Industry

Rohde & Schwarz webinar

**Evolution of In-Vehicle Networks to Zonal Architecture**

In this webinar, you will learn more about:

- I Evolution of In-Vehicle Network architecture
- I Autonomous Ethernet characteristics
- I Compliance testing of Ethernet
- I Practical demonstration

[Register now](#)

**Xplore:** Engineers to Follow; Journal Watch Articles (free); Climate Change Articles

**Advancing Technology for Humanity**

SEARCH 5,866,681 ITEMS

IEEE CLIMATE CHANGE EXPERTISE

Winnie N. Ye, David Scaramuzza, and Fei (Fred) Wang

**Making a DIFFERENCE**

Resources from IEEE | Climate Change in the News | Contact | IEEE

TECHNICAL Solutions | BUILDING Technical Community | CLIMATE CHANGE Mitigation

IEEE's mission is to advance technology for the benefit of humanity. Today the world faces its largest modern-day threat—climate change. We recognize this global crisis and are committed to helping combat and mitigate the effects of climate change through pragmatic and accessible technical solutions and providing engineers and technologists with a neutral space for discussion and action.

COORDINATING IEEE'S RESPONSE TO CLIMATE CHANGE  
DEDICATED COMMITTEE

In 2022, an Ad Hoc Committee was formed to Coordinate IEEE's Response to Climate Change, identifying ongoing efforts across IEEE and collaborating with key external partners for a comprehensive response to climate change.

## Jobs From IEEE Job Site

**FEATURED JOBS**

- Image Reconstruction Scientist - Varian Medical Systems, Inc., Palo Alto, CA
- Senior Test Systems/Electrical and Instrumentation Engineer - Honeywell Aerospace, Morrisville, NC
- Scalable Project Manager - Senior PM - Asst PM - Varian Medical Systems, Inc., Palo Alto, CA
- Leadstar - Varian Medical Systems, Inc., Palo Alto, CA

[View All Jobs](#)

## Conferences



## Standards



## Newsletters

**Tech Alert** 2 FEBRUARY 2023

Here's How Apptronics Is Making Their Humanoid Robots Smarter

It's the right time for useful, affordable, general-purpose humanoid robots?

All Good To X Street: ChatGPT Turns Lobbyist

> Automated influence campaigns could spell trouble for society.

IEEE Sections can help bridge the gap between technology and it's applications through awareness building



Home

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Venue ▾

Past Events ▾

Register Now



# IEEE Sections Congress 2023

The triennial gathering of Section leadership bringing together hundreds of delegates from all ten Regions to network, learn and collectively shape the future of IEEE.

Registration Open

Early bird registration deadline: **21 July 2023**.  
Registration fee increases by **US\$ 50** after that.



## Climate Change Pavilion at SC2023

## Sections Congress Climate Change Pavilion

***Join us at the Climate Change Pavilion at Sections Congress on 12-13 August in Ottawa!***



**Increase your knowledge of climate change**

**Gain an understanding of what IEEE is doing in response**

**Personally commit by making a pledge**

- See what IEEE units are doing to impact climate change; [Provide your ideas](#) by July 15
- Join the conversation with IEEE volunteers who are leading the charge
- Access interactive touch screens to learn more about your climate locally
- Learn more about the climate change website and how to engage with the new Newsletter!
- Write to us at [ccirccc@ieee.org](mailto:ccirccc@ieee.org)

# 2022 IEEE President and CEO Social Media Channels

Follow the President's channels and stay abreast of climate change information

**There are four social media channels for the IEEE President:**

<https://www.facebook.com/ieeepresident>



<https://www.instagram.com/ieeepresident/>



<https://www.linkedin.com/showcase/ieeepresident>



<https://twitter.com/ieeepresident>



# THANK YOU!

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[www.srahman.org](http://www.srahman.org)