

Technologists' Role in Addressing Climate Sustainability

Climate
Change

IEEE: Enabling Innovation and Technology Solutions

Prof. Saifur Rahman

2023 IEEE President & CEO

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



Flooding in Pakistan 2022



Source: Stringer/Reuters



Source: AP



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/5r2AzhxEvM>

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**

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



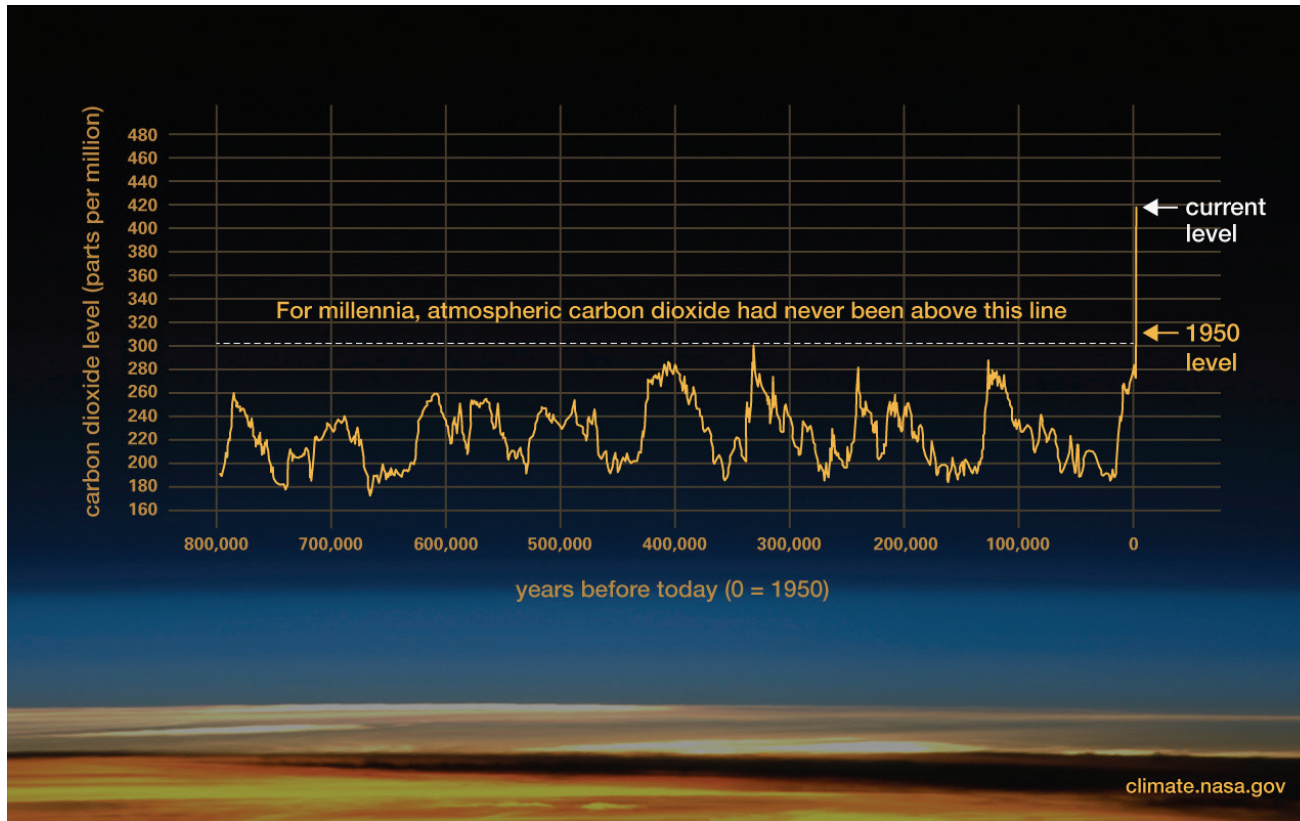
In this June 16, 2021 photo, firefighters work at the scene of forest fire near Andreyevsky village outside Tyumen, western Siberia, Russia. -
Copyright AP Photo/Maksim Slutsky, File

2008 China Snowstorm



What is Causing This?

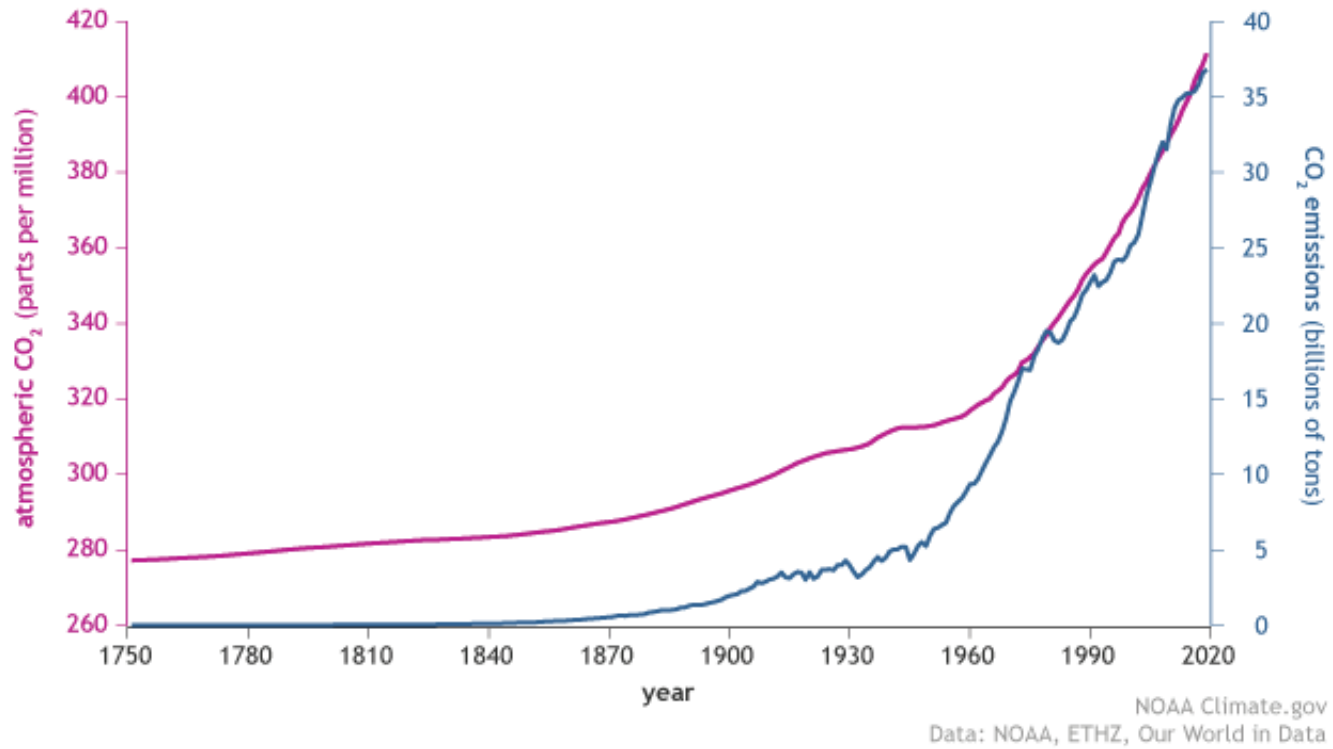
High Anthropogenic CO₂ Emissions



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/>

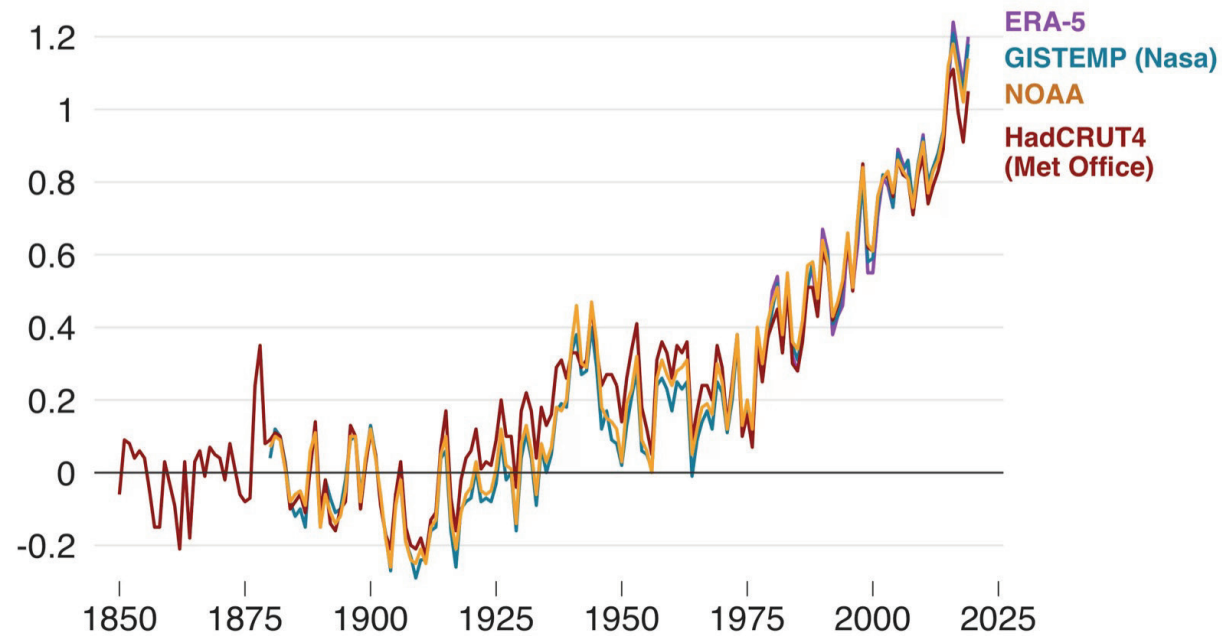
Global CO₂ Emissions Due to Fossil Fuel Use in 2021

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

Source: IEA Global Energy Review: CO₂ 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



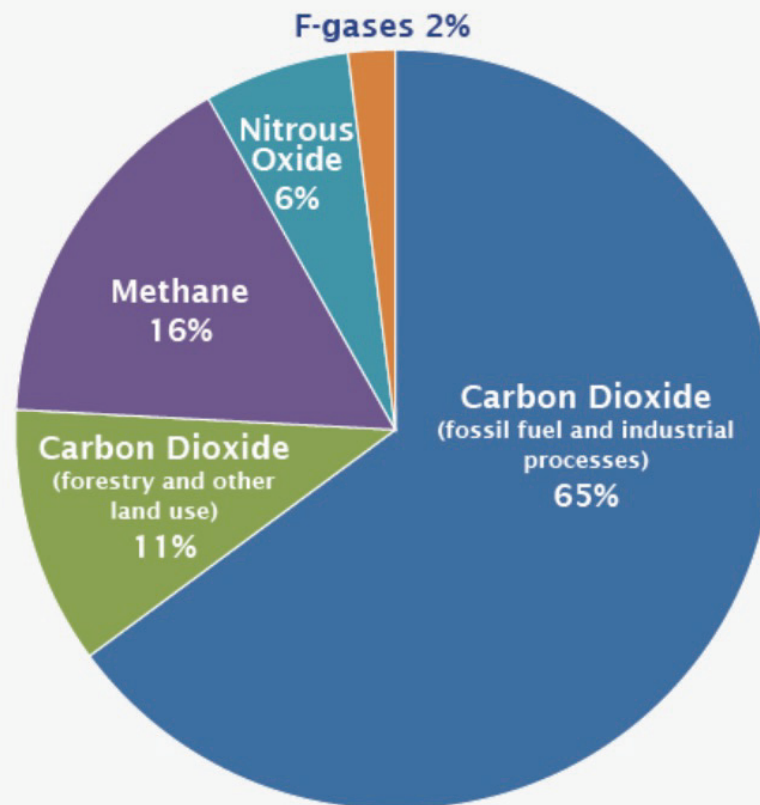
Source: Met Office

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>

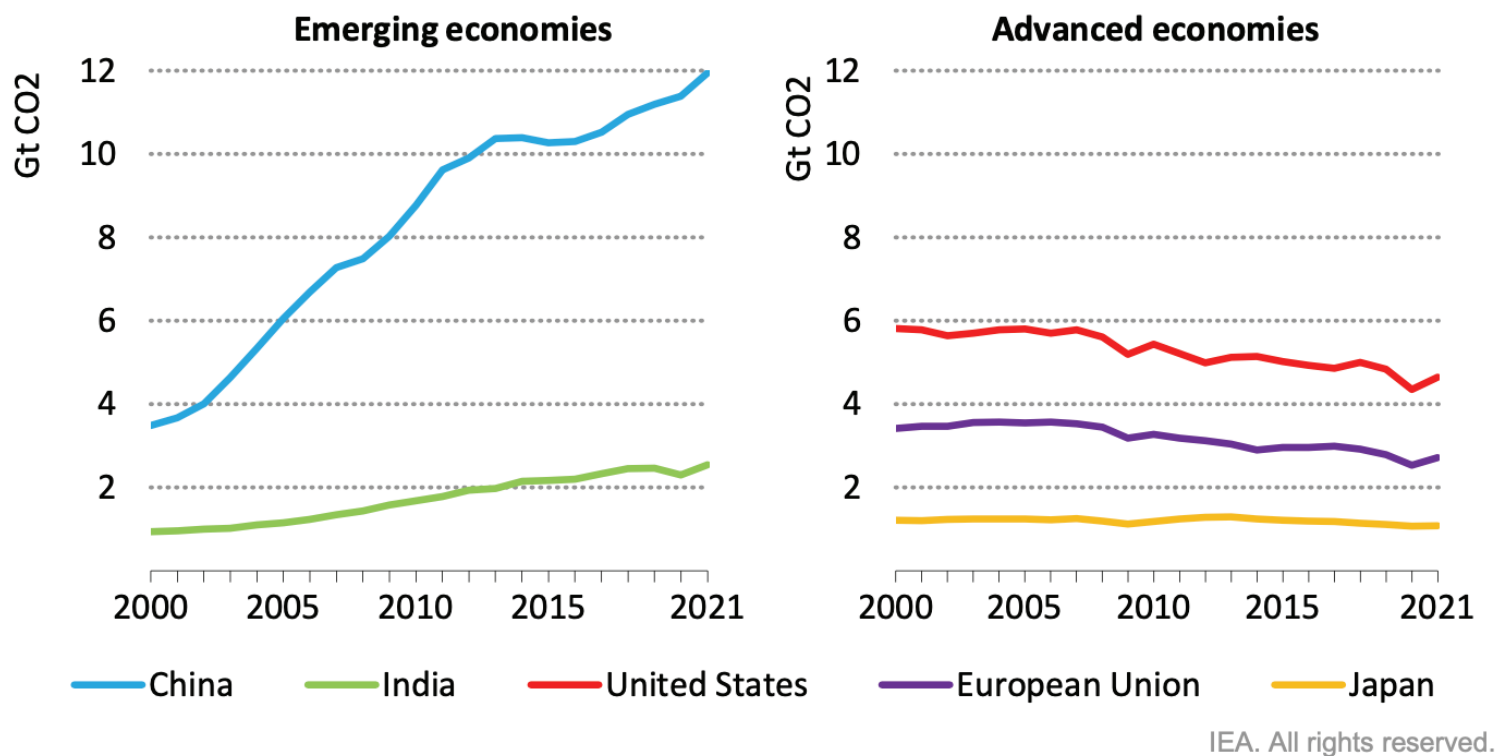
Global Greenhouse Gas Emissions by Gas



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

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

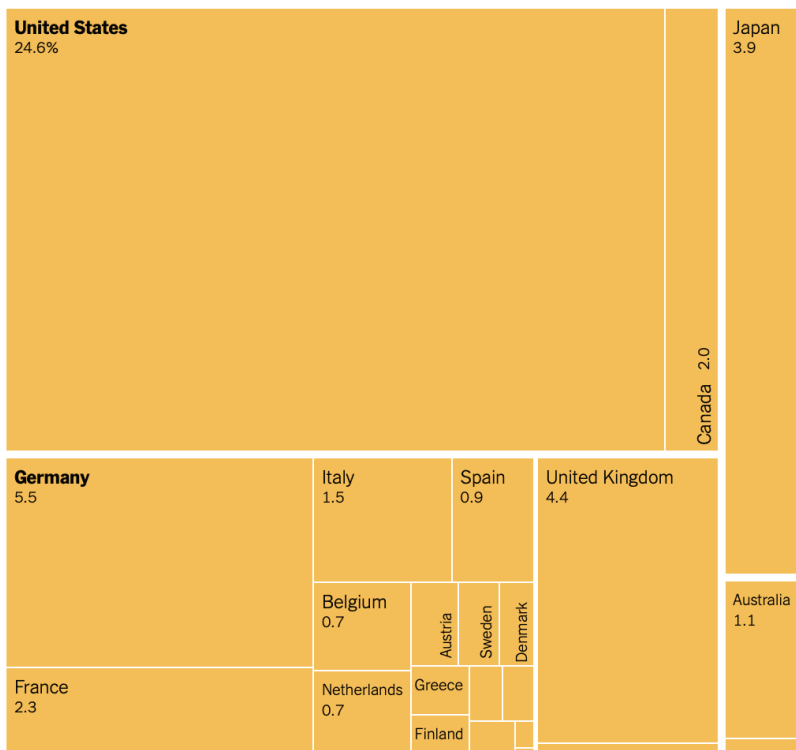
CO2 emissions in selected emerging and advanced economies, 2000-2021



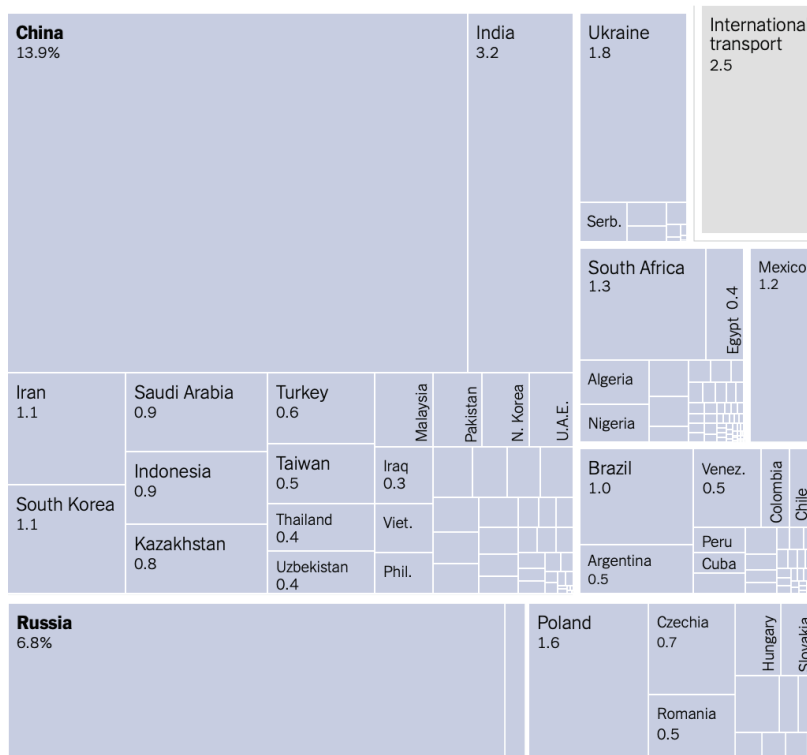
Source: IEA Global Energy Review: CO2 Emissions in 2021
<https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2>

Who Has The Most Historical Responsibility for Climate Change

23 rich, developed countries are responsible for half of all historical CO₂ emissions.



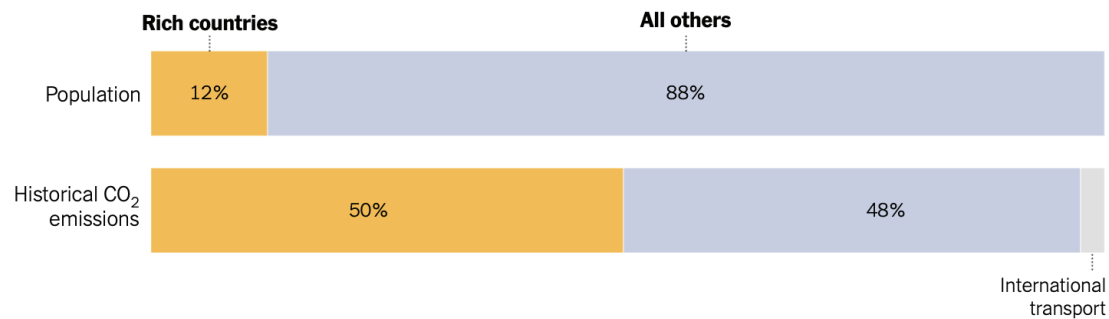
More than 150 countries are responsible for the other half.



Source: The New York Times article "Who Has The Most Historical Responsibility for Climate Change?" by [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 [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?

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climate-change.ieee.org



Mitigation

Slow down the impact

Adaptation

Take action to live with it

Climate Resilience

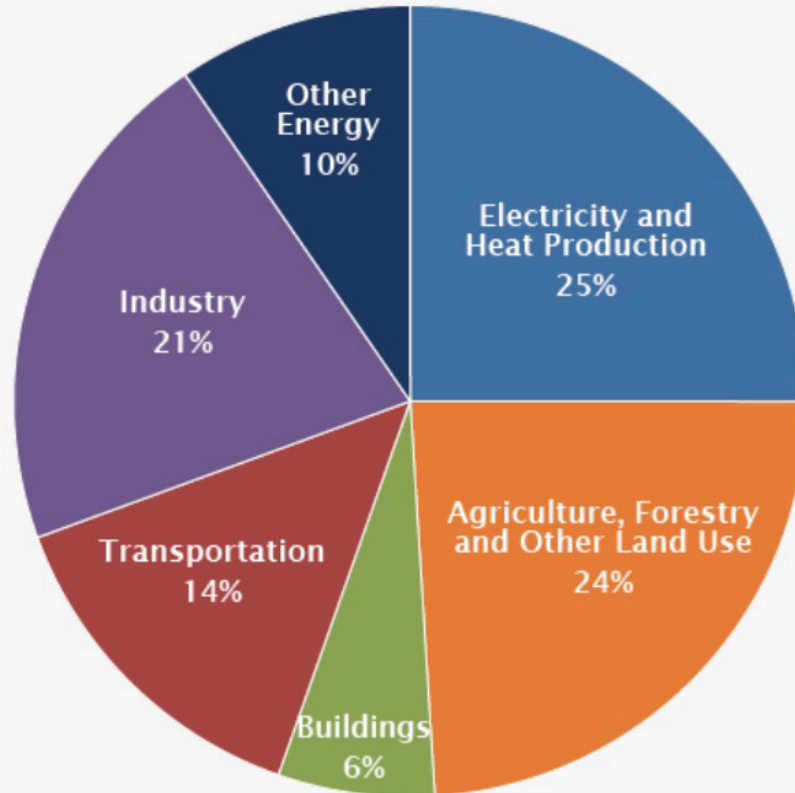
Prepare to recover quickly

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?

Global Greenhouse Gas Emissions by Economic Sector



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 H₂ & other storage technologies
4. Promote more renewables
5. Accept some nuclear
6. Promote cross-border power transfer

Climate Change

IEEE: Enabling Innovation and Technology Solutions

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>



[Resources from IEEE](#)

[Climate Change in the News](#)

[Contact](#)



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



IEEE Climate Change Collection

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

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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.

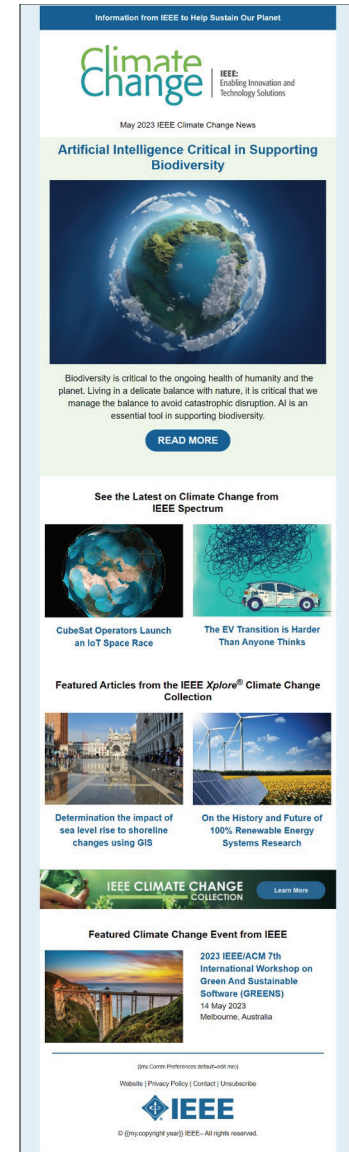
[View the IEEE Climate Change Collection in IEEE Xplore®](#)

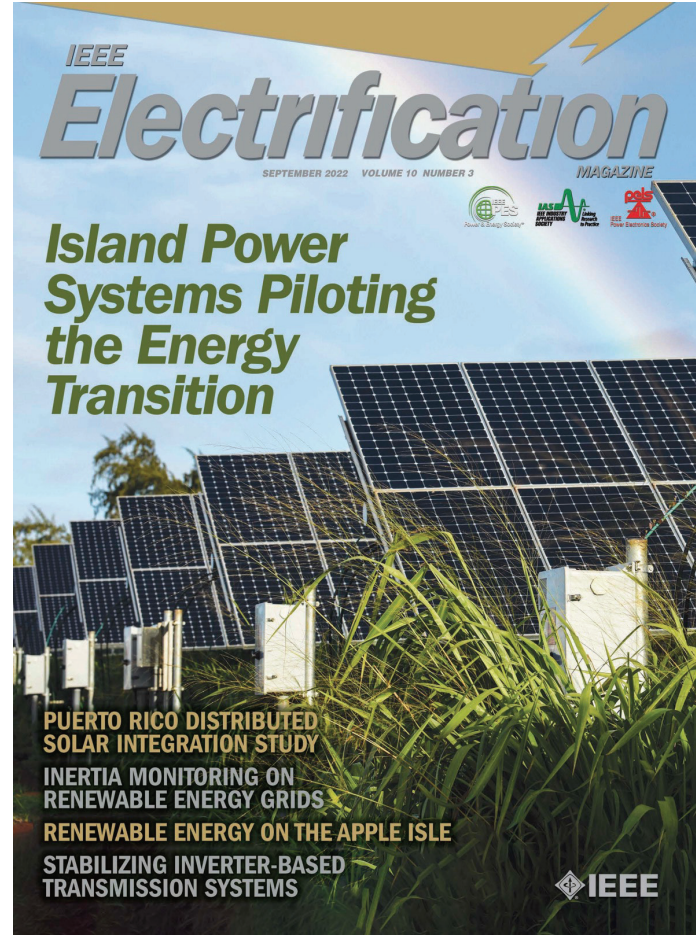
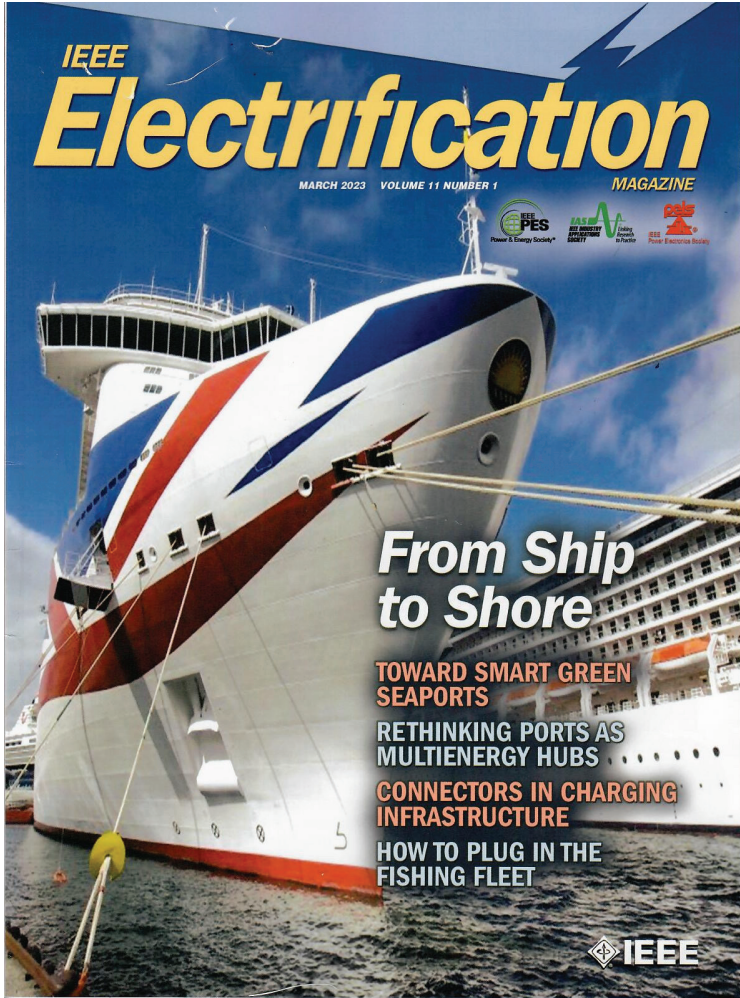
New Climate Change Newsletter coming in June 2023!

- 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/>

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Image shown is a draft mockup only.





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IEEE: Enabling Innovation and Technology Solutions

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

IEEE Access®

Multidisciplinary :: Rapid Review :: Open Access Journal

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Ecosystem for IEEE's Climate Sustainability Work

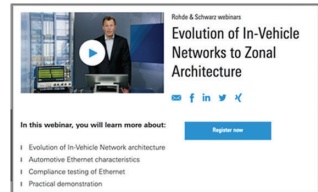
IEEE Spectrum: Climate Change News Feed; Podcasts; Features; Archives; Journal Watch Posts (Xplore); The Institute (Engineers of Climate Change); Coverage of Conferences and Standards)



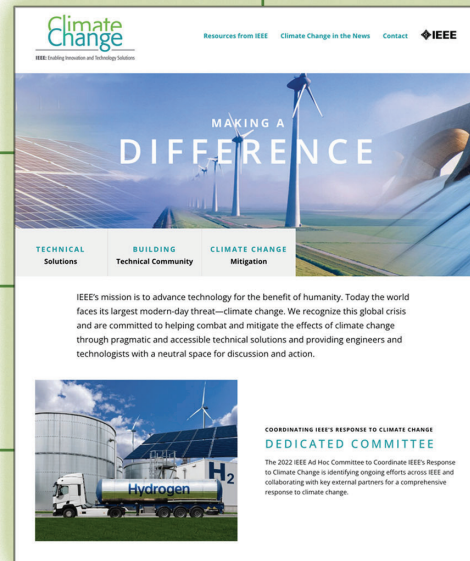
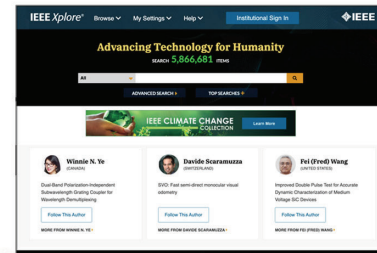
Social Media



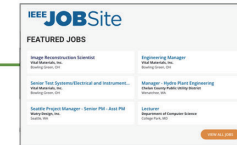
Sponsored Content From Industry



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



Jobs From IEEE Job Site



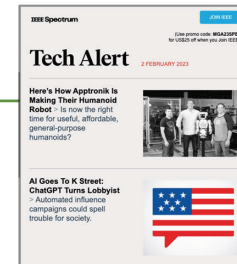
Conferences



Standards



Newsletters



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



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.

Date
11-13 August 2023



Location
Ottawa, Canada

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 ccircc@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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