Net-zero Transition to Address Climate Change

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2023 IEEE President & CEO
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Invited Talk
Narsee Monjee Institute of Management Studies, Mumbai, 12 July 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
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
Hurricane Sandy
New York, New Jersey 2012
Droughts in 2022

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

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

Climate Change

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India: Enabling Innovation and Technology Solutions
2008 China Snowstorm
What is Causing This?

High Anthropogenic CO$_2$ Emissions
For millennia, atmospheric carbon dioxide had never been above this line.
$\text{CO}_2$ 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$_2$ Emissions Due to Fossil Fuel Use in 2021

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Emissions (billion tons)</th>
</tr>
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<tbody>
<tr>
<td>Coal</td>
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<tr>
<td>Natural Gas</td>
<td>7.5</td>
</tr>
<tr>
<td>Oil</td>
<td>10.7</td>
</tr>
</tbody>
</table>

https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-22
Paris Climate Accord: Limit temperature rise of 1.5 deg C
2.0 deg C rise ⇒ Point of No Return

Global Greenhouse Gas Emissions by Gas

- Carbon Dioxide (fossil fuel and industrial processes) 65%
- Carbon Dioxide (forestry and other land use) 11%
- Methane 16%
- Nitrous Oxide 6%
- F-gases 2%

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

How Do We Address This Problem?
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
Navigating the tension between industrialized nations and emerging economies for global decarbonization efforts requires a diverse portfolio of solutions for low-carbon generation, storage and demand side management with advanced technology focusing on energy efficiency.

To more efficiently facilitate the global shift towards renewable energy adoption, the following six areas should be our priority.
Reduce Carbon Emissions from Electricity Production

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 Climate Change Engagement Opportunities
IEEE MEETINGS, CONFERENCES & EVENTS-DRIVING INNOVATION IN CLIMATE CHANGE

Register for events from IEEE related to climate change and sustainable resources. IEEE sponsors over 2,000 annual conferences and events worldwide, curating cutting-edge content for all of the technical fields of interest within IEEE.

LEARN MORE
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.
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


Climate Change Pavilion at SC2023
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.facebook.com/ieeepresident)
- [https://www.instagram.com/ieeepresident/](https://www.instagram.com/ieeepresident/)
- [https://www.linkedin.com/showcase/ieeepresident](https://www.linkedin.com/showcase/ieeepresident)
- [https://twitter.com/ieeepresident](https://twitter.com/ieeepresident)
Thank You

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