

IEEE's role in Climate Change Mitigation & Resilience



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2023 IEEE President & CEO

www.srahman.org



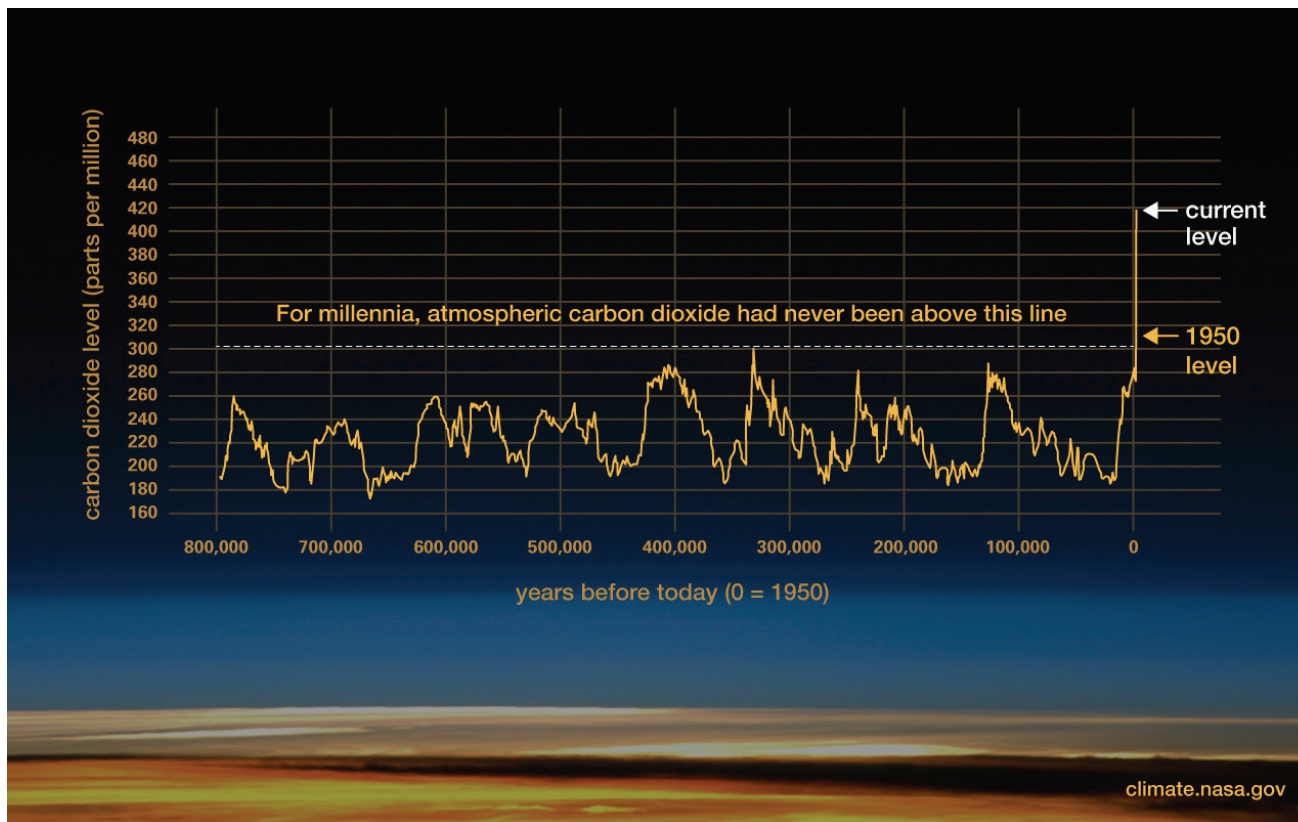
Keynote Speech

IEEE Green-Tech, Sustainability & Net Zero Policies & Practices Symposium

Dubai, UAE, 08 December 2023

Climate Change and CO₂ Emissions

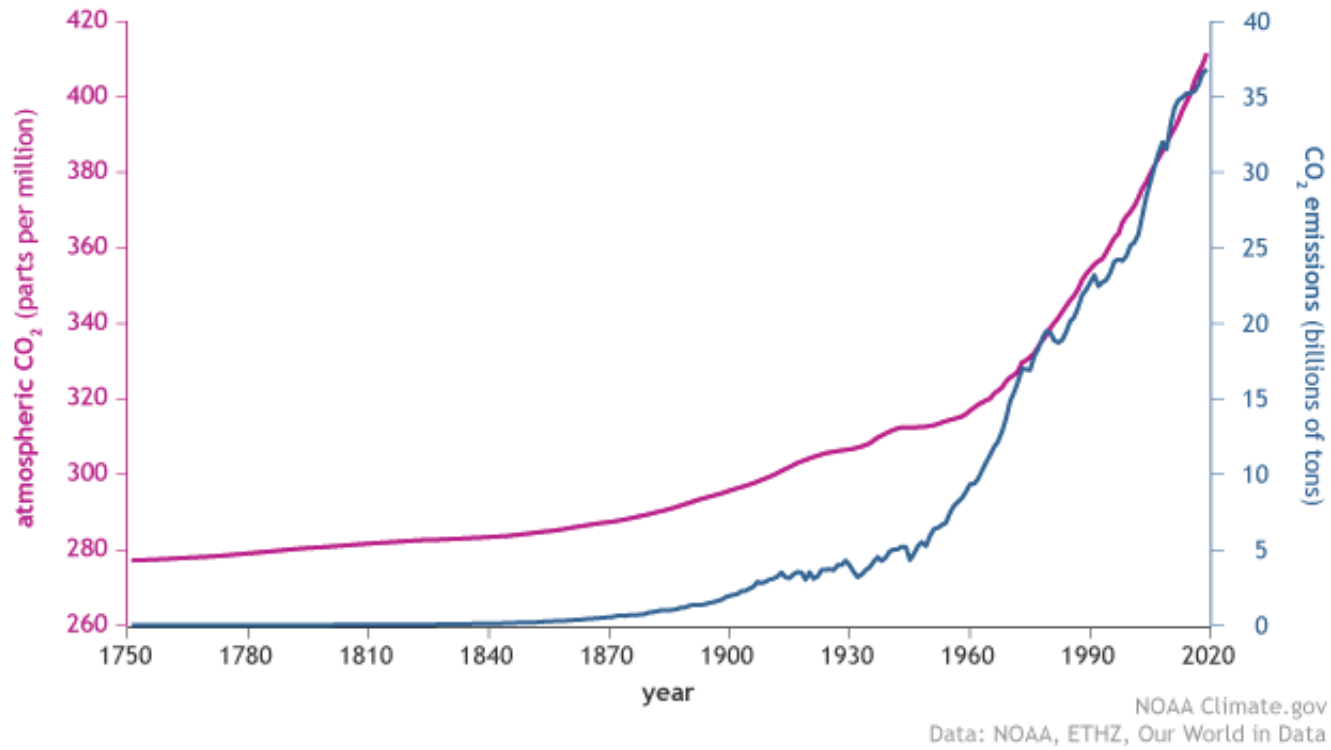
History of CO₂ Emissions



Source: NASA

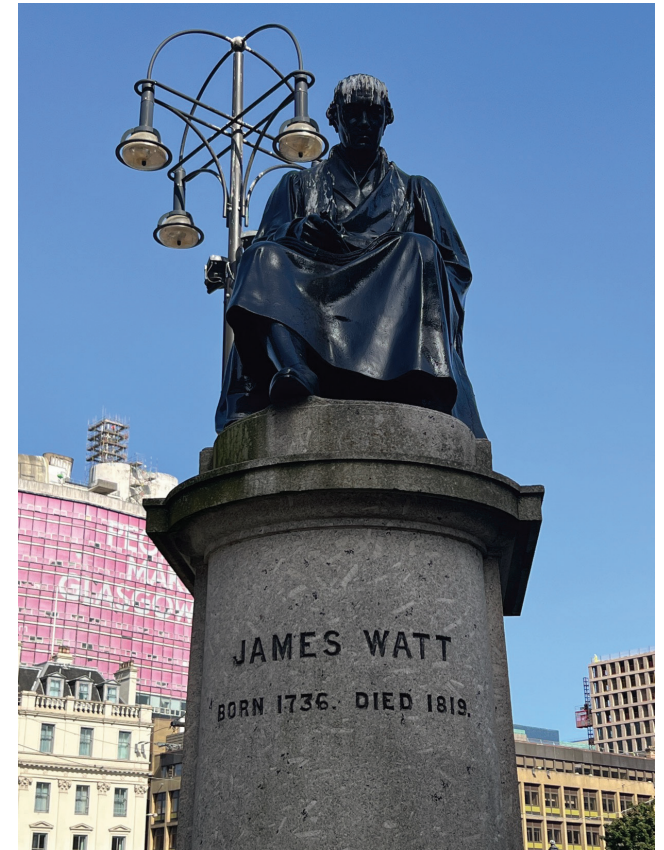
https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/

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



Source: State of the Planet

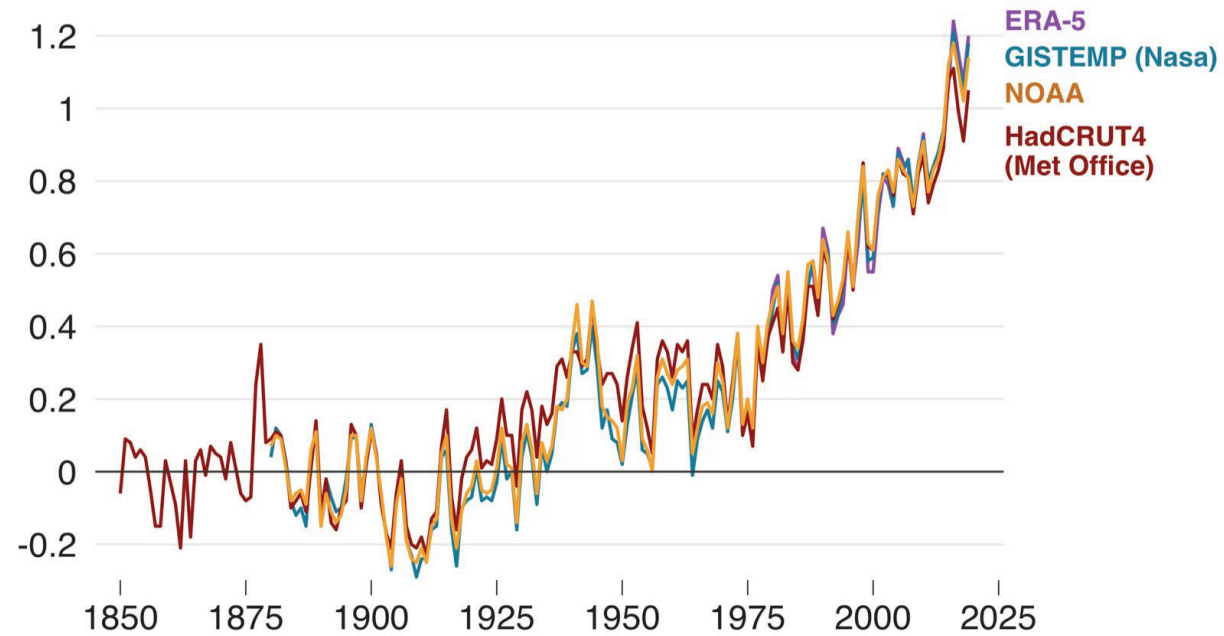
<https://news.climate.columbia.edu/2021/02/25/carbon-dioxide-cause-global-warming/>



Impacts of Carbonization

Temperature rise since 1850

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



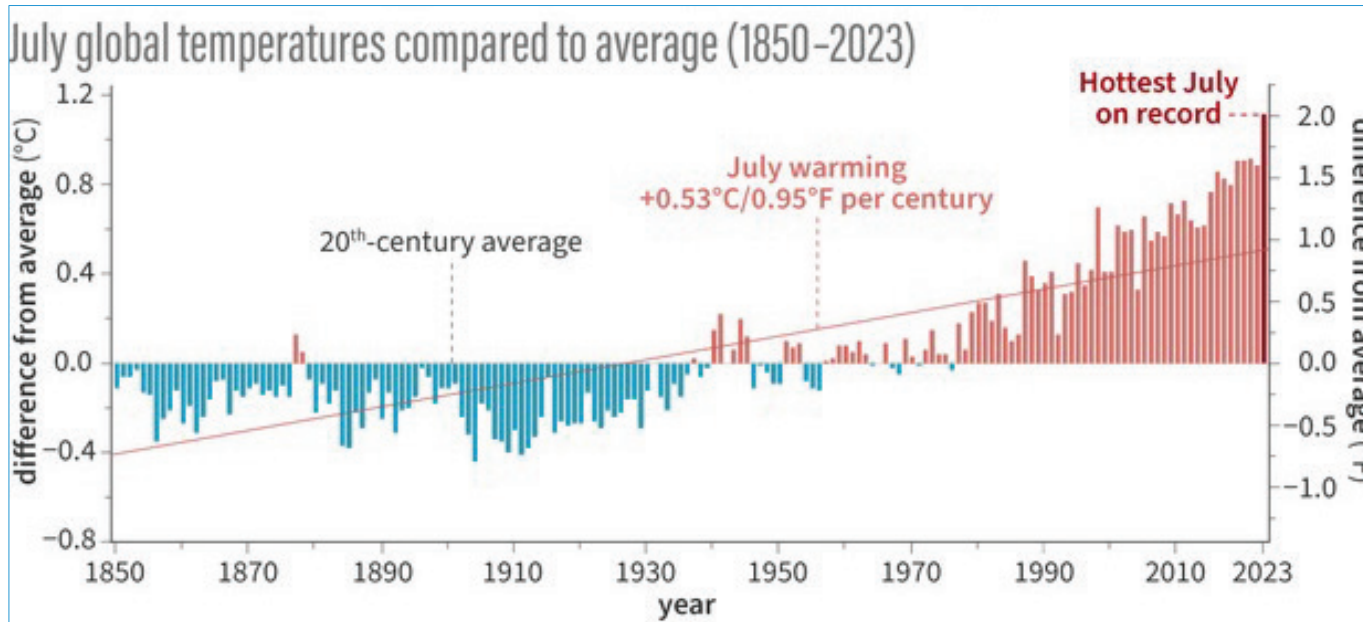
Source: Met Office

BBC

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

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

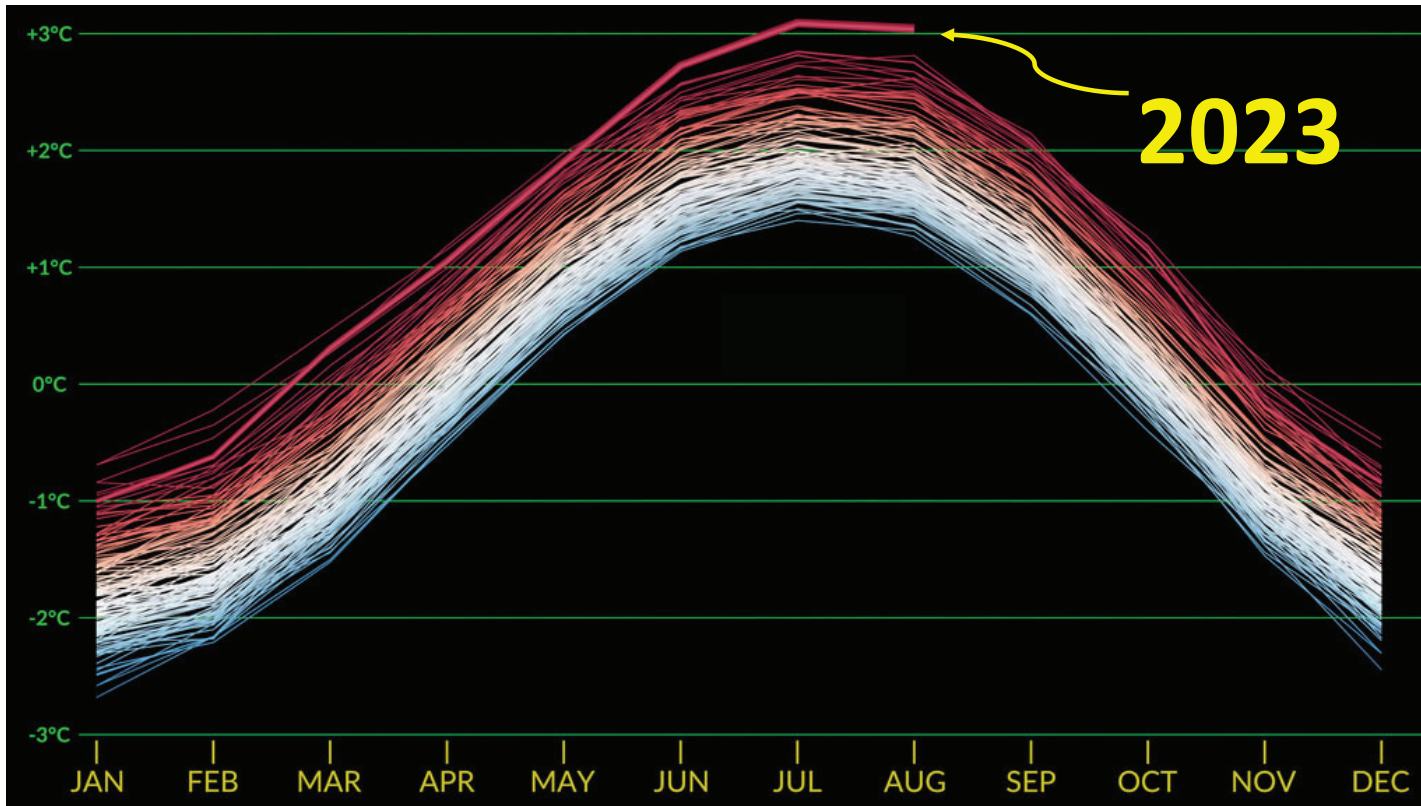
Global Climate Summary for July 2023



July temperatures compared to the 20th-century average for each year from 1850 through 2023, which set a new record for the hottest July. NOAA Climate.gov image, based on data from NOAA National Centers for Environmental Information.

The July global surface temperature was 1.12°C (2.02°F) above the 20th-century average of 15.8°C (60.4°F), making it the warmest July on record. This marked the first time a July temperature exceeded 1.0°C (1.8°F) above the long-term average.

July 2023 was 0.20°C (0.36°F) warmer than the previous July record from 2021. July 2023 marked the 47th-consecutive July and the 533rd-consecutive month with temperatures at least nominally above the 20th-century average.



Monthly temperature anomalies from 1880 to August 2023 measured with respect to the baseline period 1951-1980.

This graph includes the seasonal cycle showing that June 2023, July 2023, and August 2023 were each consecutively the warmest month on record.

Climate-change Impacts



Pethi Belaid/Agence France-Presse — Getty Images



Opportunities of Decarbonization in the Electric Power Supply Industry

Source: IEEE Spectrum, Jan 2023



Reduce Carbon Emissions

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

CO₂ Emissions for Coal and Combined Cycle Power Plants



Coal power plant emission: 950g of CO₂ per kWh

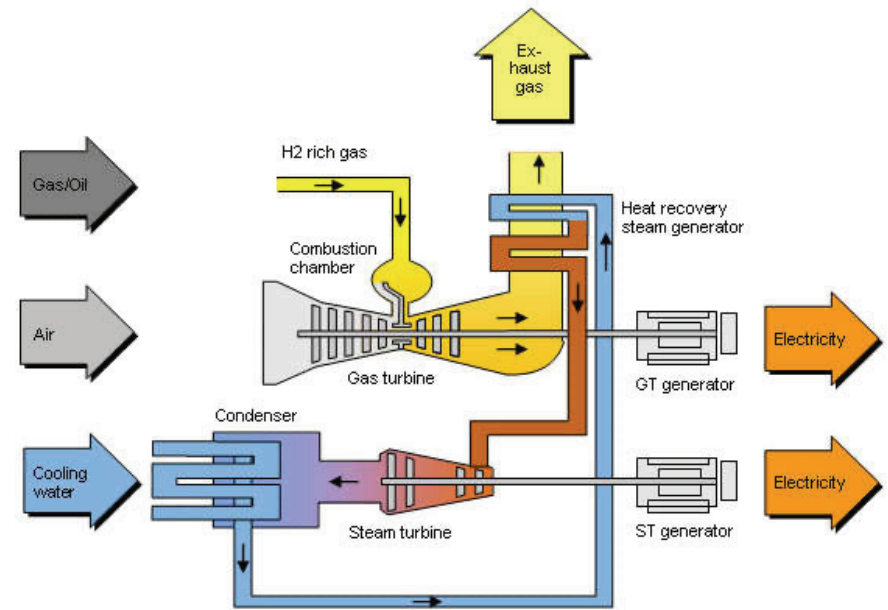


Image courtesy of: <http://www.powersgeneration.siemens.com>

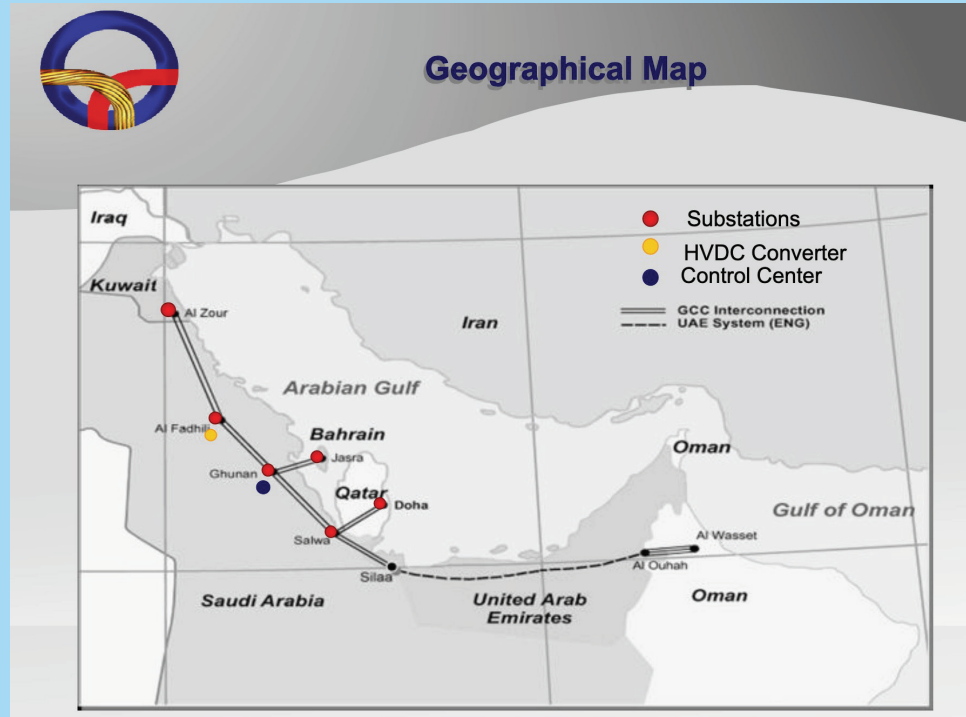
Combined cycle power plant emission: 350g of CO₂ per kWh

Cross-border Power Transfer

- As we are in this fight together, our solutions should be collaborative to secure better outcomes for all countries, regardless of location
- The International Energy Agency (IEA) has identified three main modes of cross-border energy integration:
 - Bilateral
 - Multilateral
 - Unified



Gulf Coordination Council Interconnection



Major Benefit: Reduction of Reserve Requirements
Also helpful in dealing with Intermittent sources (PV)

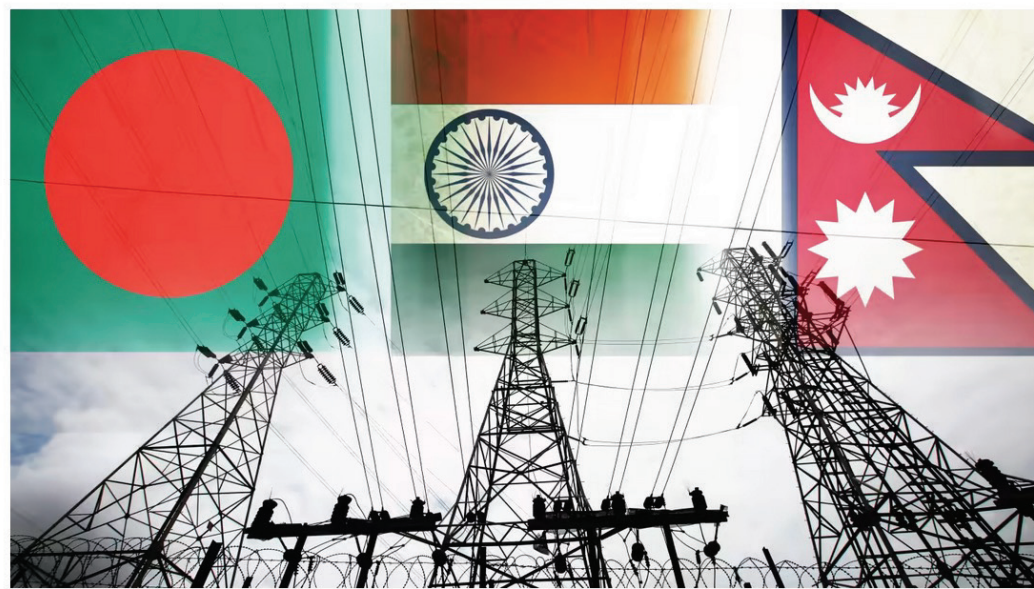
Nepal, India reach 'milestone' deal on trade, transmission of electricity

Nepal to be permitted to participate in real-time trade in the Indian market, an upgrade from existing day-ahead energy trade.



Import of Hydropower will Reduce
India's Dependency on Coal-fired
Power Stations

Source: Kathmandu Post



Bangladesh, India and Nepal are expected to soon finalize an agreement that would allow power sharing across Indian transmission lines. (Source photos by AP and Reuters)

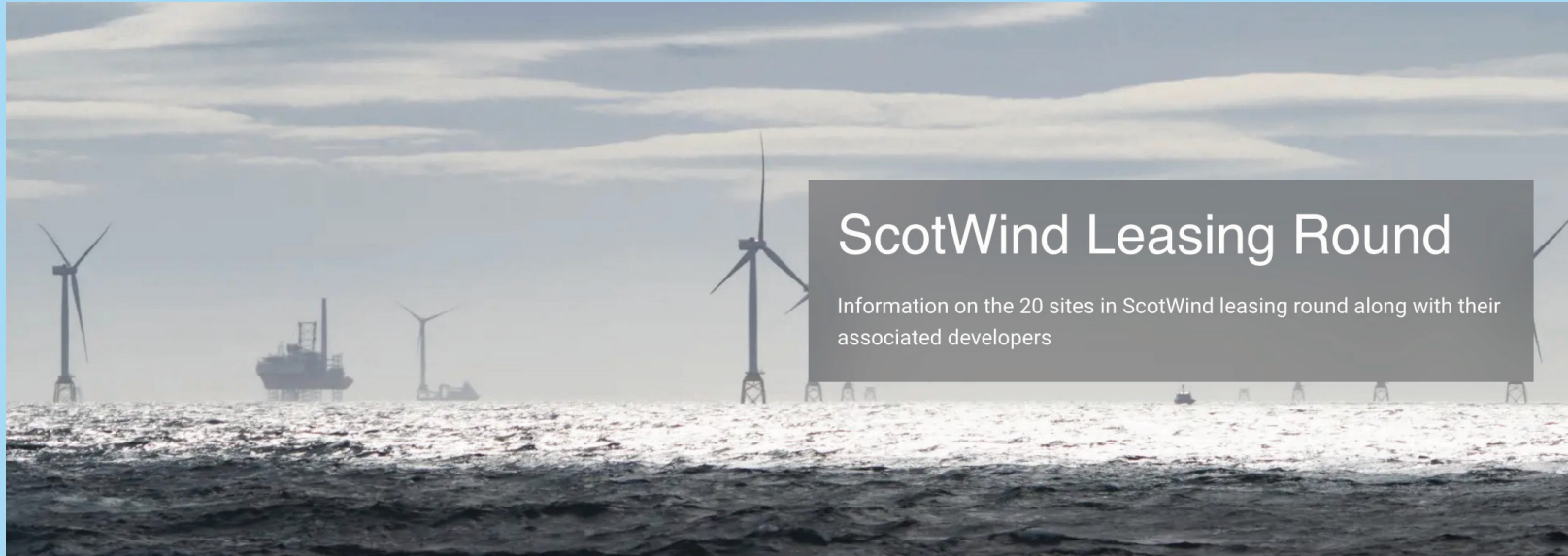
Nepal needs to attract investment by developing a market outside
Nepal needs less electricity in summer than in winter
It is opposite in India and Bangladesh due to high air conditioning load

Low-carbon, cheaper and non-intermittent electricity

Champion Hudson Power Express: 1250 MW
(Quebec to New York City)

545 km of underwater-underground transmission line
from Québec, Canada to New York City, about 500 km in NY State

Industry tends to locate in areas of low-carbon electricity to help
meet their own net-zero targets for scope II and scope III emissions



ScotWind leasing round on the 17th of January 2022: **25 GW**

Demand for Electricity in Scotland in 2030: **6 GW**

IEEE at UN COP28
Dubai, December 2023



Climate Change

IEEE: Enabling Innovation and Technology Solutions

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

IEEE Climate Change Program

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



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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.

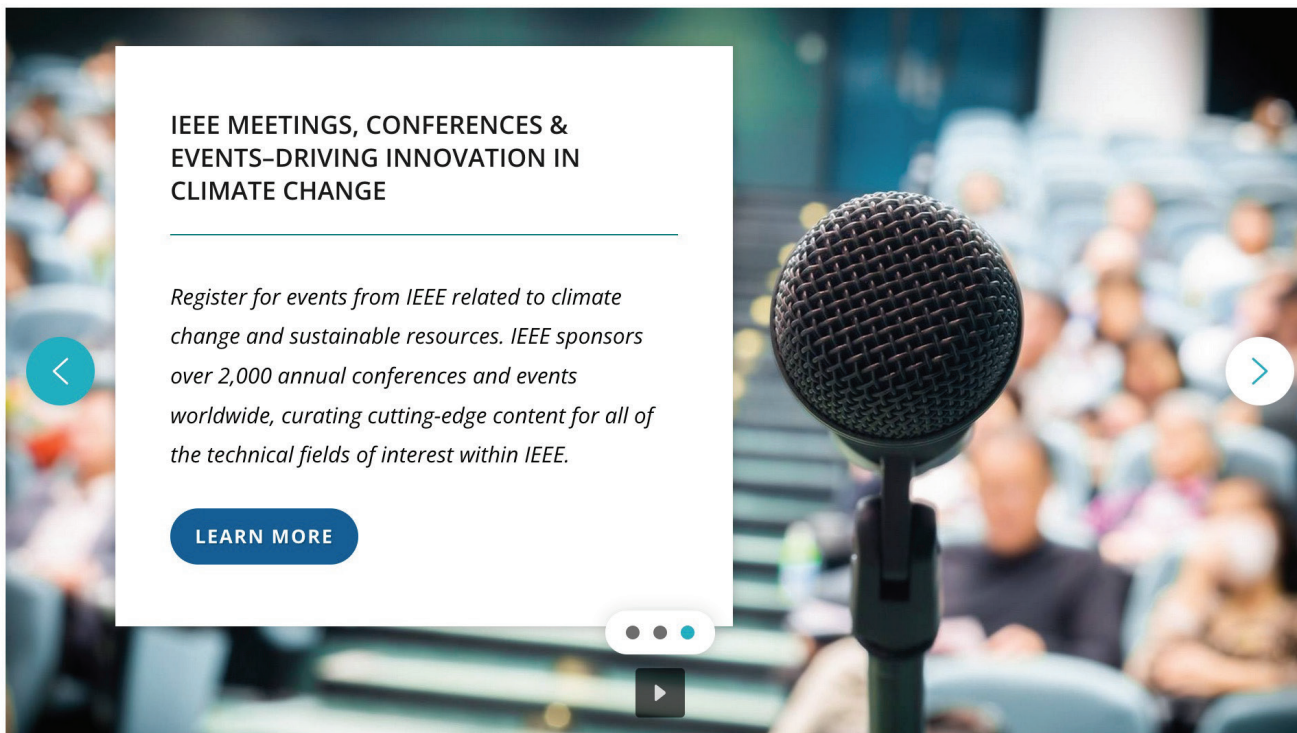
IEEE's scholarly publications, events, conference proceedings, technical standards, and other materials help foster the exchange of technical knowledge and information for the critical climate issues that our planet faces today.



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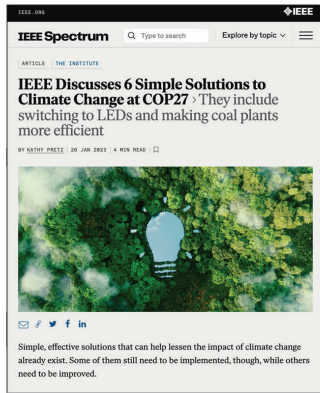


IEEE: Enabling Innovation and Technology Solutions

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

Ecosystem for IEEE's Climate Sustainability Work

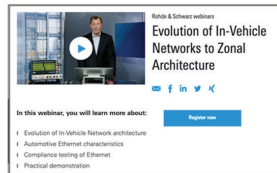
IEEE Spectrum: Climate Change News Feed; Podcasts; Features; Archives; Journal Watch Posts (Xplore); The Institute (Engineers of Climate Change); Coverage of Conferences and Standards



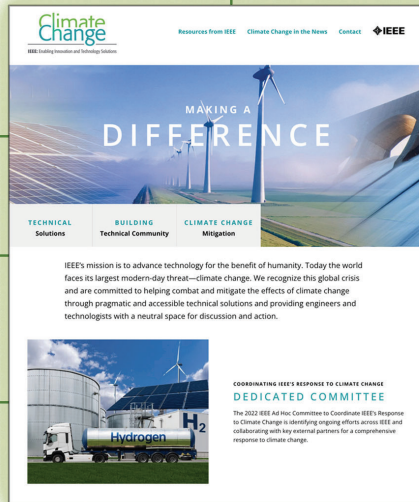
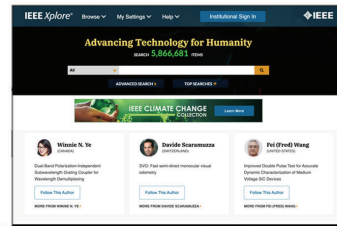
Social Media



Sponsored Content From Industry



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



Jobs From IEEE Job Site



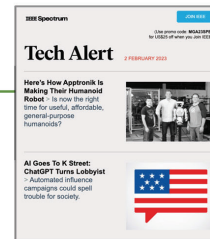
Conferences



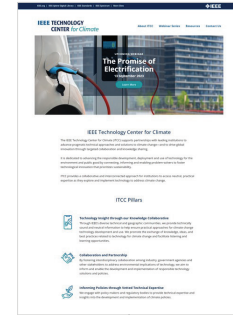
Standards



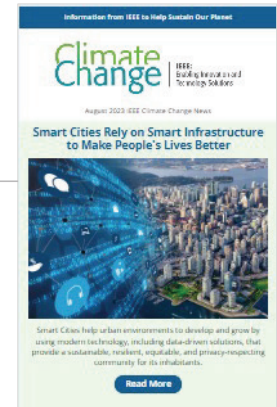
Newsletters



IEEE Technology Center for Climate



IEEE Climate Change newsletter





Thank you

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