
Climate Change Challenge: Role for ECE Departments

Climate Change and ECE
Panel Discussion
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Climate Change Challenge

(One of the) most important challenges for human civilization in the 21st century

Primary cause: fossil-fuel based modern socio-economic-technological global society

Relates to several other UN Sustainable Development Goals (SDGs)

Three Domains

Climate change science and understanding

Climate change mitigation

Climate change impacts and adaptation

ECE community can contribute to all three domains

Climate Change Mitigation

Net-zero pathways

Decarbonize the electric power sector: ECE can play a central role

Energy efficient computing

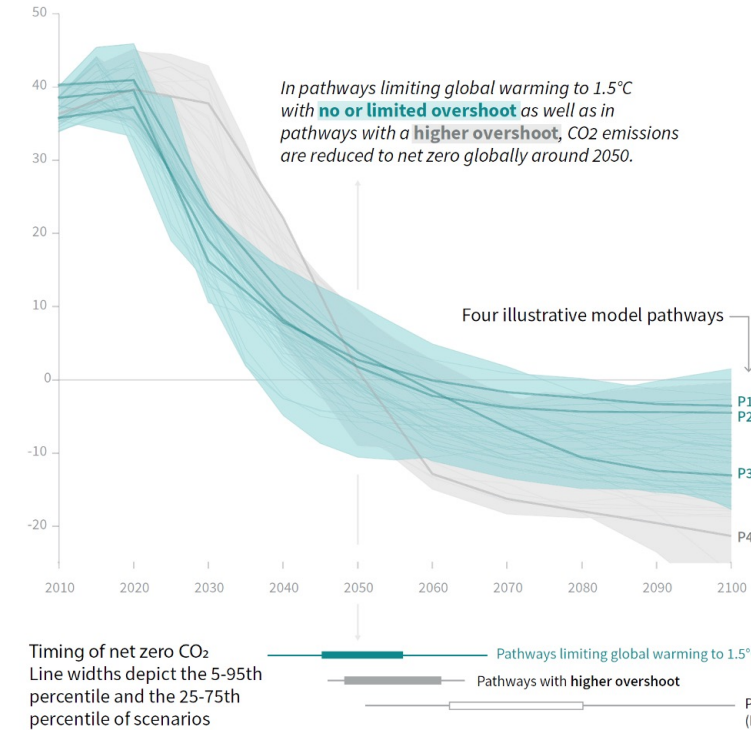
Decarbonization of transportation through electric vehicles and renewable fuels

Decarbonization of buildings - cyber-physical systems for HVAC efficiency

Decarbonization of industry - manufacturing process sensing, control, optimization

Global total net CO₂ emissions

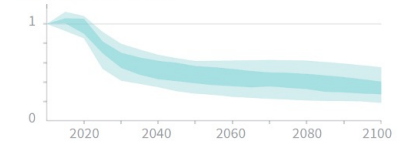
Billion tonnes of CO₂/yr



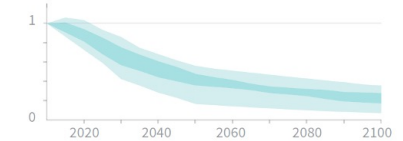
Non-CO₂ emissions relative to 2010

Emissions of non-CO₂ forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

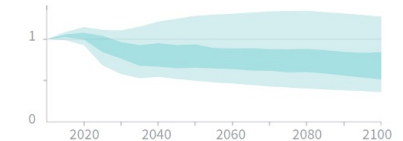
Methane emissions



Black carbon emissions



Nitrous oxide emissions



Climate Change Adaptation: Resilient Infrastructures

More frequent extreme events: storms, flooding, droughts, wildfires, heat

Resilient critical infrastructures

ECE Role central in energy and communications infrastructure resilience

Interdependence among infrastructures



Climate Change Science and Understanding

Mainly physical sciences, computational modeling, ...

Potential role for ECE:

- Sensors

- Sensor networks

- IoT for climate change monitoring

Overarching Comments

Climate change is intrinsically transdisciplinary, and systems problems are ubiquitous

ECE Departments will need to work with other departments, schools, colleges within the university and with industry, non-profits, government

Lead in some areas and participate in many others

Issues of social justice, inter-generational equity, and global nature of the problem are essential

Our students are deeply interested - we need to enable them with education and research