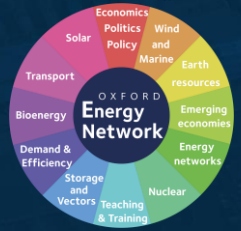


10th Oxford Energy Day
Renewable Generation

Session chair: Andrew Watt

12:10	Integration of renewables	Sarah Darby
12:25	Tidal energy	Tom Adcock
12:40	Panel Q&A	
1:00	**Lunch, posters and networking**	
2:30	Offshore wind	Byron Byrne
2:45	Solar PV	Henry Snaith
3:00	Panel Q&A	
3:20	**Tea, posters and networking**	
3:50	Bioenergy and land use	Alison Smith
4:05	Economics of decarbonisation	Sam Loni
4:20	Panel Q&A	
4:40	**Move back to plenary session**	

Lecture Theatre 2

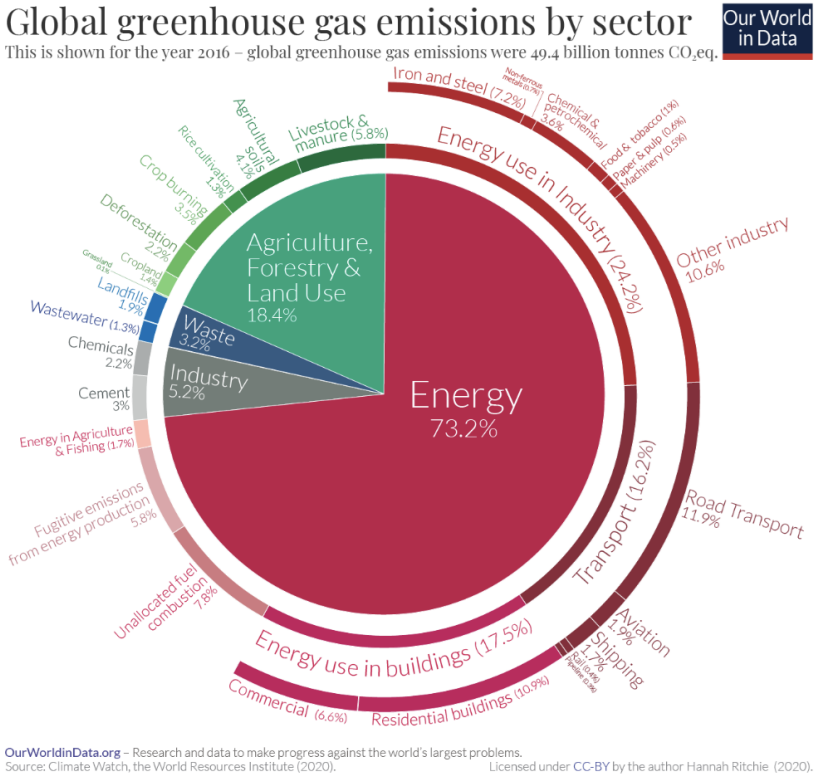
#OxEnergy2022

The new economics of energy system decarbonisation

Sam Loni, Research Assistant
Smith School of Enterprise and the Environment (SSEE)
Institute for New Economic Thinking (INET)
University of Oxford

Introduction

- **The net-zero landscape following Glasgow**
  - *Inadequate commitments adding up to ~2.4C*
  - *Implementation gap and committed emissions*
- **The disruptive transition to a net-zero economy**
  - *Uncertainty, complexity, and non-marginal change*
  - *Shifts in technology, industry, and institutions*
  - *Power dynamics, redistribution, and geopoliti*
- **The narrative of short-term pain v long-term gain**
  - *Limitations of current climate-economy models*
  - *Inadequate framing of the net-zero transiti*



The limitations of CGE and IAMs

"Integrated Assessment Models (IAMs) have flaws that make them close to useless as tools for policy analysis"

Robert Pindyck

"World deserves better and more robust economic models of climate change"

Nicholas Stern

Problematic Models

Inadequate Climate-Economy Models

- **Outdated climate-economy models being used in policy circles**
  - *Computational General Equilibrium (CGE)*
  - *Integrated Assessment Models (IAM)*
  - *Economy wide energy system models*

- **Critique of mainstream climate-economy models in the literature**
  - *E.g. DeCanio 2003, Ackerman et al 2009, Pindyck 2013, Stern 2013, Rosen & Gunther 2015, Cai et al 2016, Farmer et al 2016, Beinhocker et al 2018, Dietz 2021, etc.*

- **A long list of critiques concerning parameters, structure, and function**
  - *E.g. disequilibrium processes, non-marginal change, tipping points, uncertainty, fat tailed possibilities, technological shifts, distributional impacts of policies, etc.*

Damage Functions

Economic Impacts of Climate Change

- **Estimation of the economic impacts of climate change and damage functions**
  - *A key variable in cost-benefit analyses of climate policies*
  - *Mainly based on extrapolations of observed relationships between temperature, productivity, and GDP.*
  - *E.g. current estimation approaches have mainly looked at aggregated temperature-economy damages.*

- **Main issues with current damage functions**
  - *Failure to incorporate the latest physical science (and uncertainties within)*
  - *Failure to capture tipping points and nonlinear dynamics*
  - *Failure to include factors such as health, biodiversity, land-use, etc.*
  - *Failure to account for disasters and extreme weather events*

Decision Making

Model Application and Decision Making

- **Models as important tools of policy design and decision making**
  - *Forecasting vs scenario analysis*
  - *Influence on expectations of actors and self-fulfilling beliefs*
    - *Influence of climate-economy models at the international level; e.g. IPCC scenarios, climate targets, NDCs, corporate net-zero pledges, etc.*
    - *Influence of climate-economy models at the domestic level; e.g. climate laws and legislation, including financial stress tests, disclosures, carbon price, etc.*

- **Challenges with model application and transparency**
  - *E.g.the misuse of climate-economy models by policymakers, including political capture; challenges with transparency, including the lack of disclosure on key assumptions, data sources, and calculations.*

The need to incorporate new economic thinking into policy design

"New analytical frameworks that incorporate methods from dynamical systems, network analysis, and agent-based modelling at a granular level can help to capture essential nonlinear feedback mechanisms. Such models could provide richer and more accurate insights into the costs and benefits of interventions with amplified effects. More realistic models may increase trust and interest in their results, and lead to better-informed policy."

Farmer, Hepburn, et al. 2019

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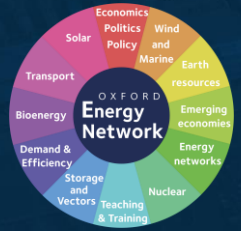

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