



Towards a framework for aligning national mitigation scenarios with 1.5°C in an era of overshoot

Prof. Hannah Daly & Dr. Róisín Moriarty

Theme 1: Highest possible mitigation ambition under overshoot
30th September 2025



How should national models evolve to guide the “highest possible ambition” in an era of 1.5 °C overshoot?

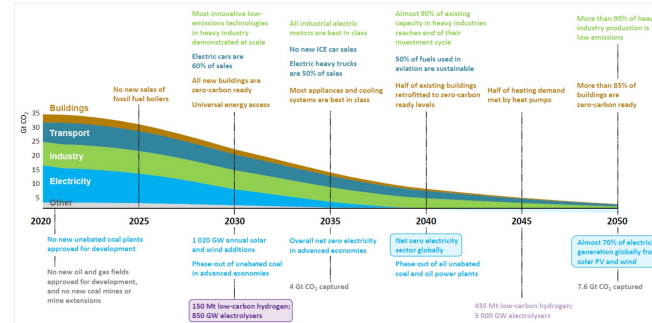
- Returning to 1.5 °C after overshoot requires radical mitigation measures that are mainly implemented **at the national level**
 - **Global IAMs** guide & provide boundary conditions
 - **National scenarios** operationalise & hold to account
 - BUT do national models really depict “**Highest Possible Ambition**”?

**1.5°C
return
scenarios
must be
able to
depict:**

Explicit transition

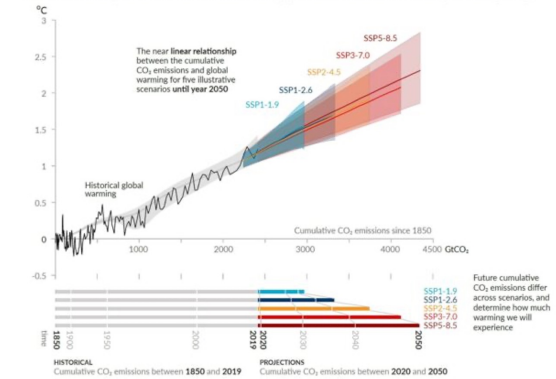
Set near-term milestones to get on track for long-term targets

iea



Adequacy

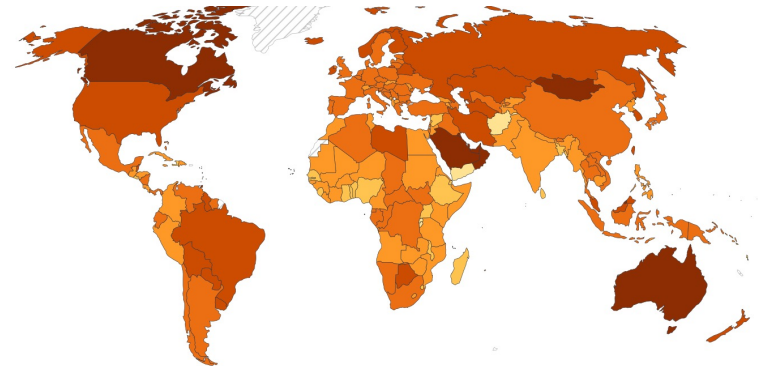
Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)



Feasibility



Fairness

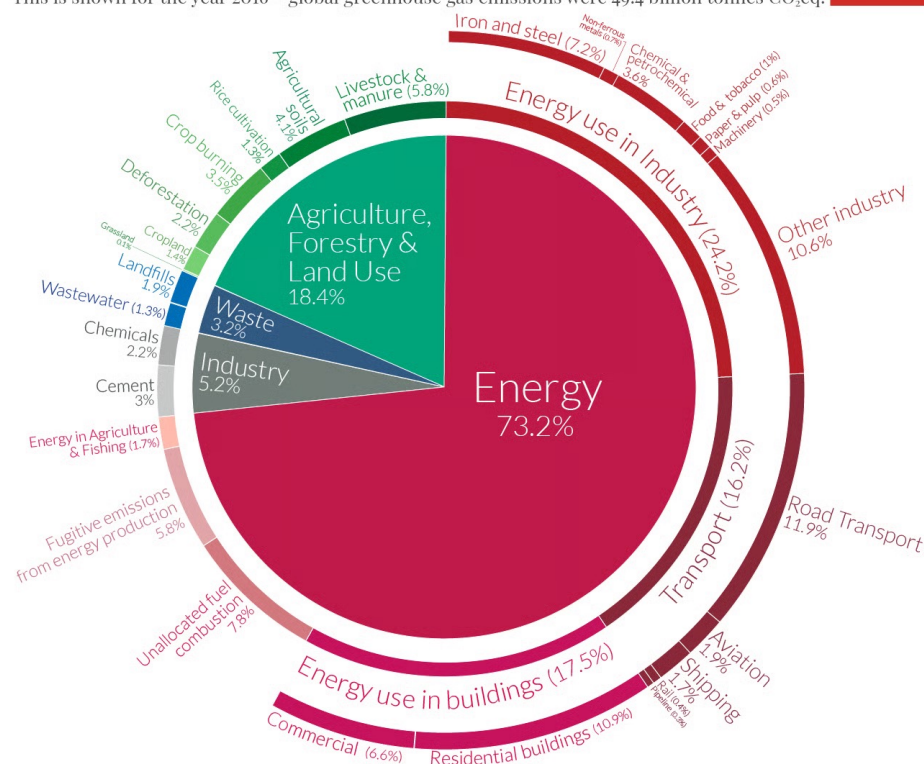


Represent all GHGs, sectors & account for carbon cycle

Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.

Our World
in Data



OurWorldinData.org – Research and data to make progress against the world's largest problems.

Source: Climate Watch, the World Resources Institute (2020).

Licensed under CC-BY by the author Hannah Ritchie (2020).

- National models are typically limited or lacking in:
 - Non-energy GHGs
 - International aviation & shipping
 - Embodied GHGs in international (energy) trade
 - Agriculture, forestry and other land uses (AFOLU)
 - Carbon & land use accounting – for biomass

Returning to 1.5 °C
after overshoot
requires going
beyond the energy
transition to a
**fundamentally
broader
mitigation agenda**

Necessity with 1.5 °C overshoot

Carbon Dioxide
Removal (CDR)

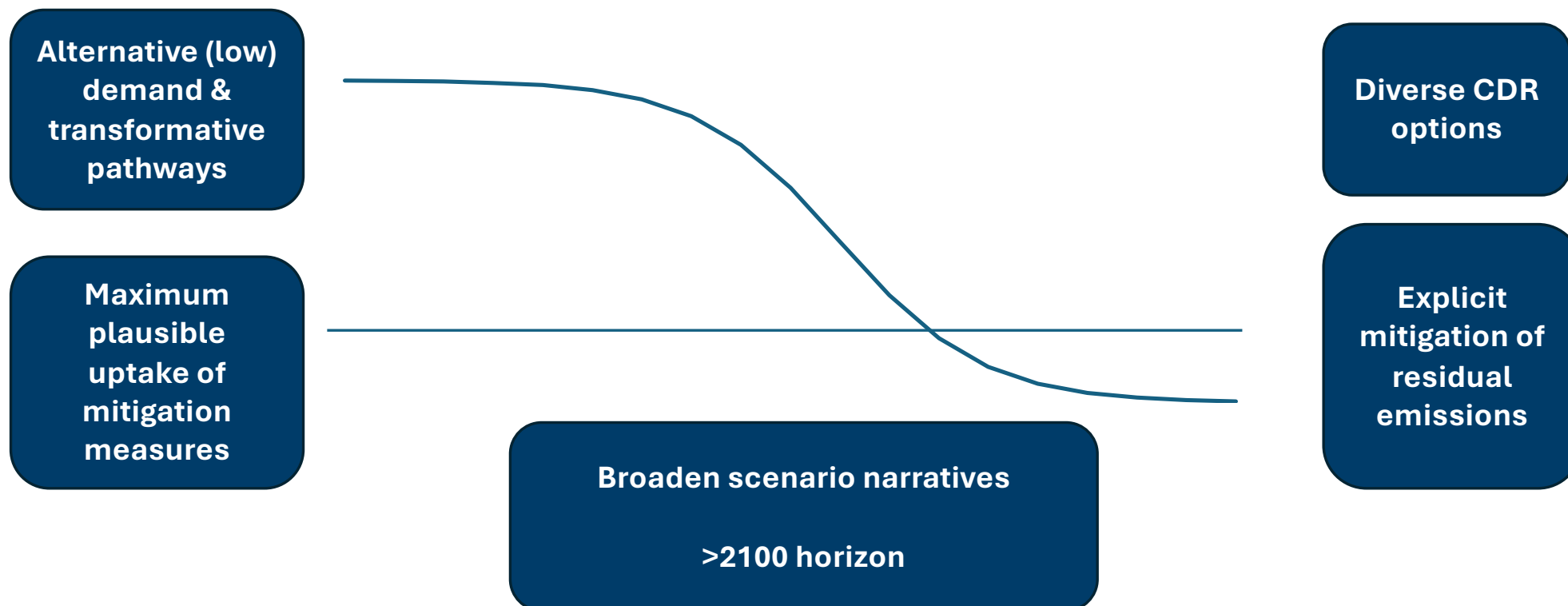
Demand reduction
Societal
transformation

“Hard to abate” sectors
Agriculture, Forestry & Other Land Uses

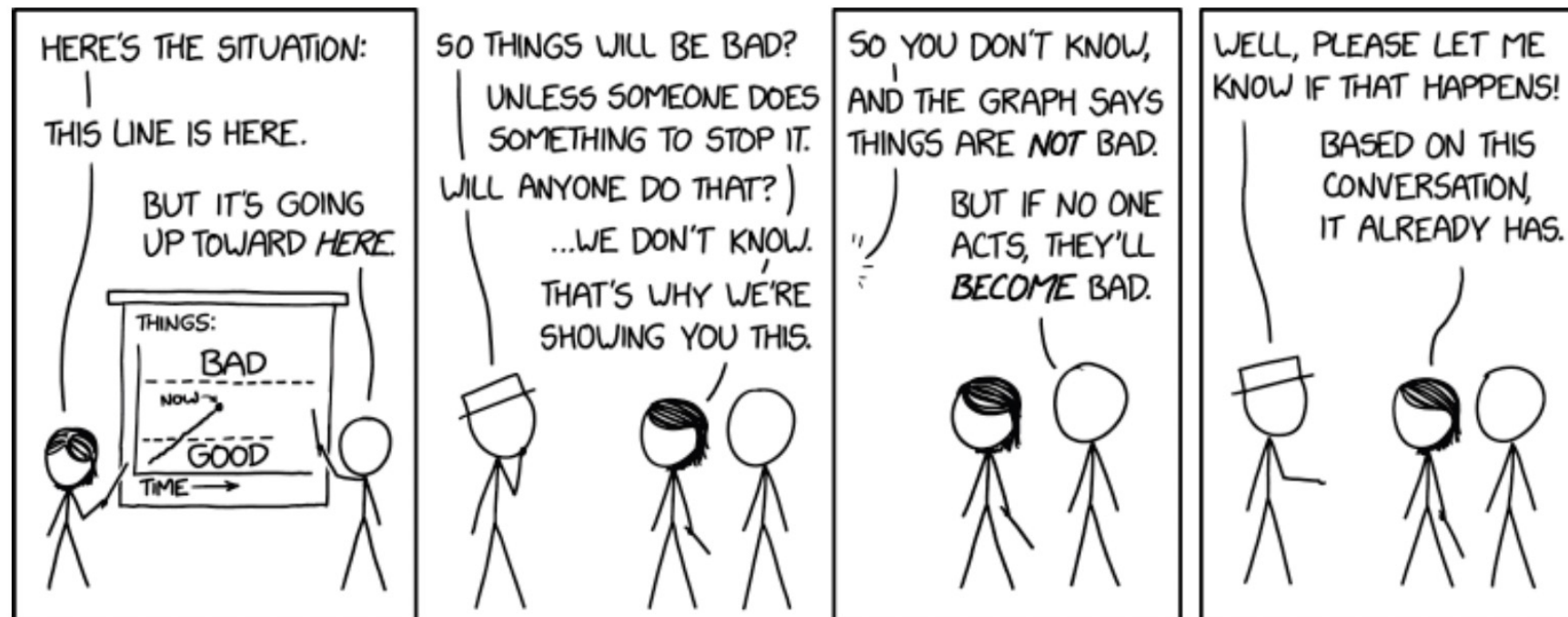
Energy system decarbonisation

Maturity within national models

Broaden the mitigation & scenario space



National scenarios confront decisionmakers with choices & trade-offs



Thank you

Contact: h.daly@ucc.ie

Website: <https://www.ucc.ie/en/epmg/>

This project is funded under the EPA Research Programme 2021-2030. The EPA Research Programme is a Government of Ireland initiative funded by the Department of the Environment, Climate and Communications.

SELS

Sustainable integrated pathways for
carbon-negative energy, land
and food systems

 **epa**Research

 **UCC**
Coláiste na hOllscoile Corcaigh
University College Cork, Ireland