

Climate Change Advisory Council
Carbon Budgets Modelling Workshop

18 October 2022

Refining the “Paris Test” for Ireland's second Carbon Budgeting programme

Paul R Price *DCU & CCAC Carbon Budgeting Fellow*

DCU Supervisors: Prof. Barry McMullin and Dr. Aideen O’Dochartaigh



Funded by:
Rialtas na hÉireann
Government of Ireland



Why a **Paris Test** for climate action?

- **Climate Act 2021** requires action ‘*consistent with*’ **Paris Articles 2 & 4(1)**
- **Without a Paris Test** there is no reasoned basis for claiming that our carbon budgeting is equitably aligned with achieving the Paris Agreement goal.
- **But note: for any Paris Test, value judgements are unavoidable.**
 - [Dooley et al. 2021](#): *Ethical choices behind quantifications of fair contributions under the Paris Agreement* ⇒
 - ‘Analysis may be rigorous, replicable and systematic, but it should also explicitly outline normative assumptions and values’

The Council’s **2021 Carbon Budget Technical Report** includes a “**Paris Test**”
⇒ Ahead of other nations & expert climate advisory groups.

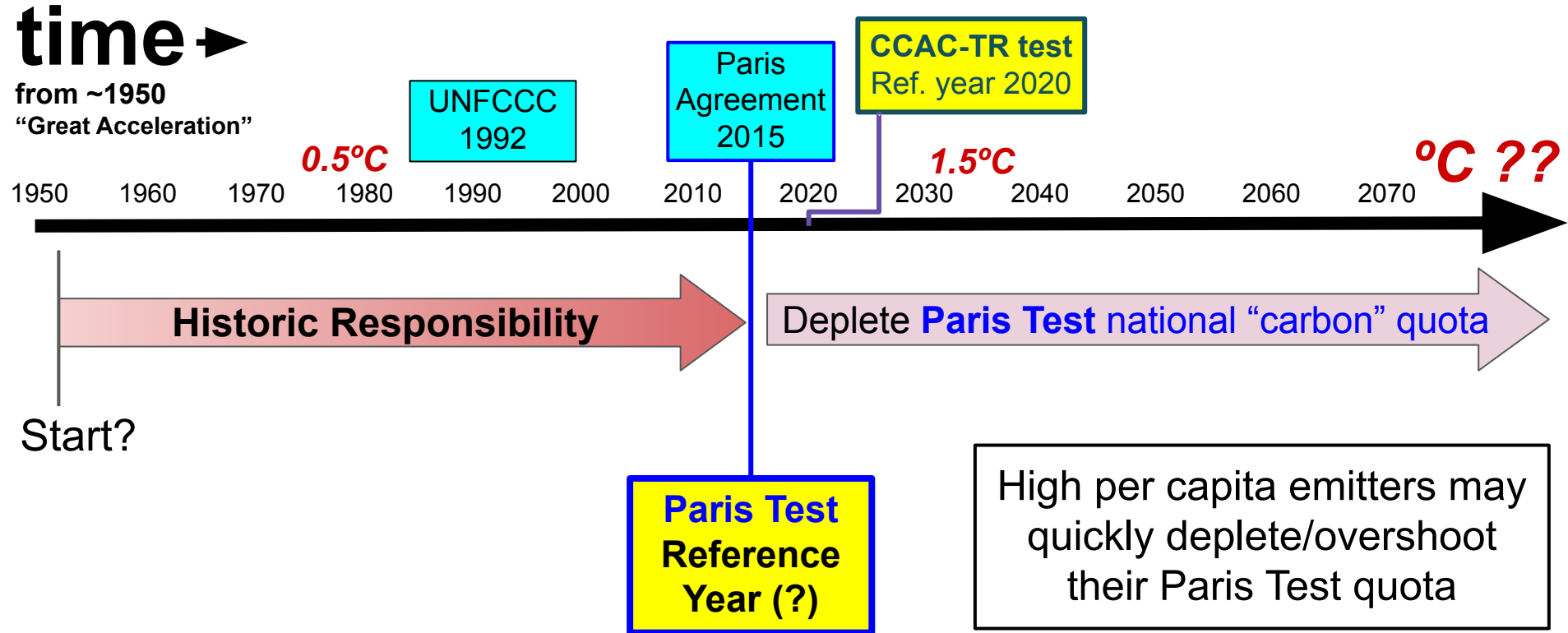
This research:

Clarify and refine the Council's 2021 **Paris Test**,
to support future advisory analysis,
political debate, & public accountability:

- 1. Clarify CCAC 2021 Paris Test choices**
- 2. Refine CCAC Paris Test quantification.**

Choices: Setting a Reference Year:

Separates prior historic responsibility from subsequent mitigation responsibility



1. Clarifying Paris Test choices: Summary

Findings

- A test definition **framework** enables value judgement & quantification issues to be clearly understood for discussion and improvement.
- **2021 Technical Report**: some **PT** choices are implicit or unclear.
- **Reference Year choice** affects equity so justify definition & note effect.

Recommendations

- Stating **Paris Test** choices more explicitly in future strengthens the reasoned basis to say Ireland's carbon budgets meet Paris commitments.
 - **Increasing PT clarity enables analysis, debate, and accountability, and challenges others to show *their own* reasoned basis for a test.**
- **Reference Year**: Do not allow any drift *forward* in time. + Compare to 2015.

Paris Test CCAC October 2021

Carbon Budget Technical Report

Five “core scenarios”



Table 4-4 Summary: Additional Impact of Ireland’s emissions from 2020 on Global temperature in 2050

Summary Table: Additional Impact of Ireland’s emissions from 2020 on Global Temperature in 2050						
	Unit	E51%-A51%	E57%-A40%	E61%-A33%	E65%-A25%	E69%-A19%
Net Change in Global Temperature in 2050 relative to 2020	x10 ⁻³ °C	-0.04	0.03	0.07	0.11	0.15
Upscaled to Global level Temperature change to 2050	°C	-0.05	0.04	0.11	0.16	0.24
Remaining gap to global 1.5 degree goal (with confidence range)	°C	0.23 (0.14- 0.32)	0.23 (0.14- 0.32)	0.23 (0.14- 0.32)	0.23 (0.14- 0.32)	0.23 (0.14- 0.32)

Upscaled 2050 Scenario °C

Paris Test global: 0.23°C

Pass Pass Pass Pass Fail

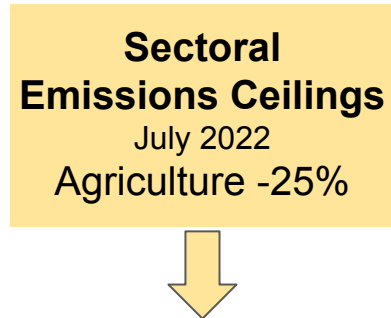
CCAC finding: All scenarios pass the test comfortably, except E69-A19

2. Refining the Council's 2021 Paris Test quantification

Four changes to the CCAC 2021 Technical Report quantification:

- A. Adjust GHG metric \Rightarrow more scenario warming + shows PT overshoot**
 - Use published GWP* \Rightarrow revised g-value + 20-year CH₄ forcing time-lag.
- B. Align global PT to national GHG basis \Rightarrow N₂O+CH₄ warming is negative.**
 - National scenarios use CO₂+N₂O+CH₄, so use same for global Paris Test.
- C. International Aviation & Shipping (IAS). Account: globally or nationally?**
 - IE has high IAS usage: so offer a scenario based on WAM+NetZero 2050.
- D. Reference year: Compare to 2015 (Paris Agreement). +Match global & national.**
 - Benchmark 2015 “latest defensible year” for CBDR-RC \Rightarrow [McMullin et al. 2019](#).
 - + Minor adjustment of global basis to 2021, reduce quota by 2020 GHGs.

Refining the Paris Test: CCAC 2021-TR and **Four adjustments**



CCAC 2021 Technical Report		E51- A51	E57- A40	E61- A33	E65- A25	E69- A19
Upscaled 2050 Scenario °C	Scenario warming °C =	-0.05	0.05	0.11	0.17	0.25
<i>Paris Test threshold basis</i>	<i>PT °C</i>	Scenario °C – PT °C (negative = passes PT)				
2021 PT A. CO ₂ -only (CCAC-TR PT)	0.23	-0.29	-0.19	-0.12	-0.06	0.02

Four adjustments added one-by-one:

A. GWP* change CO ₂ -only (CCAC-TR PT)	0.23	-0.22	-0.12	-0.06	0.00	0.08
B. 2021: CO₂+N₂O+CH₄ rGCB* ₂₀₂₁	0.15	-0.14	-0.04	0.03	0.09	0.16
C. 2021 minus IAS rGCB* _{2021 minus IAS}	0.07	-0.06	0.04	0.11	0.17	0.24
D. 2015 minus IAS rGCB* _{2015 minus [IAS & 2015–2020]}	-0.04	0.05	0.15	0.21	0.27	0.35

2. Refining Paris Test quantification: Summary

Findings

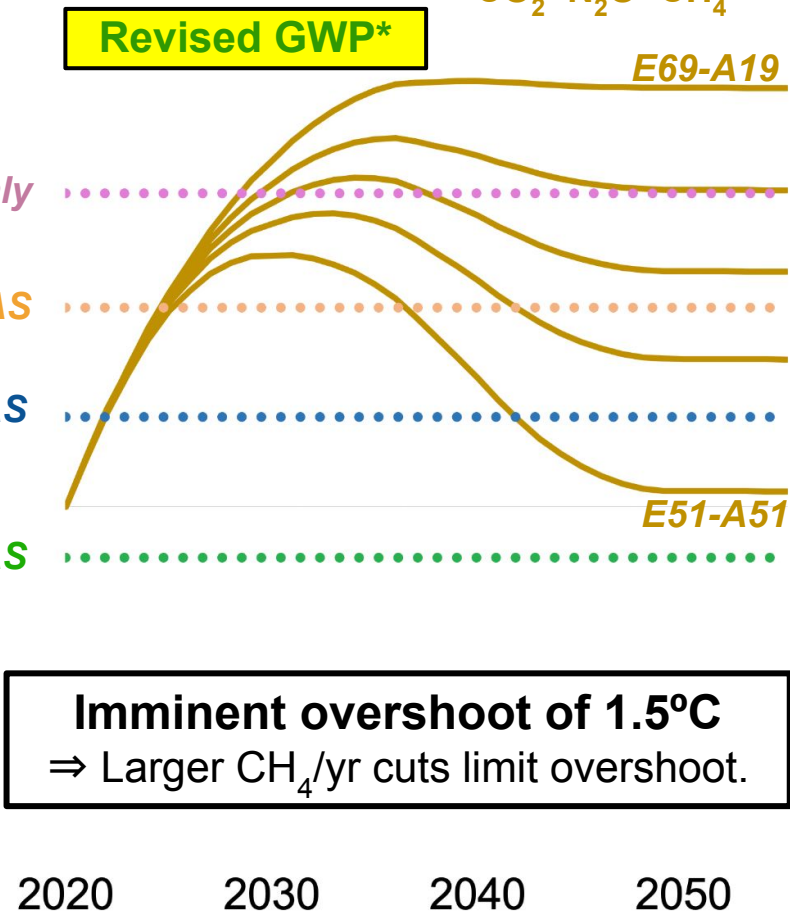
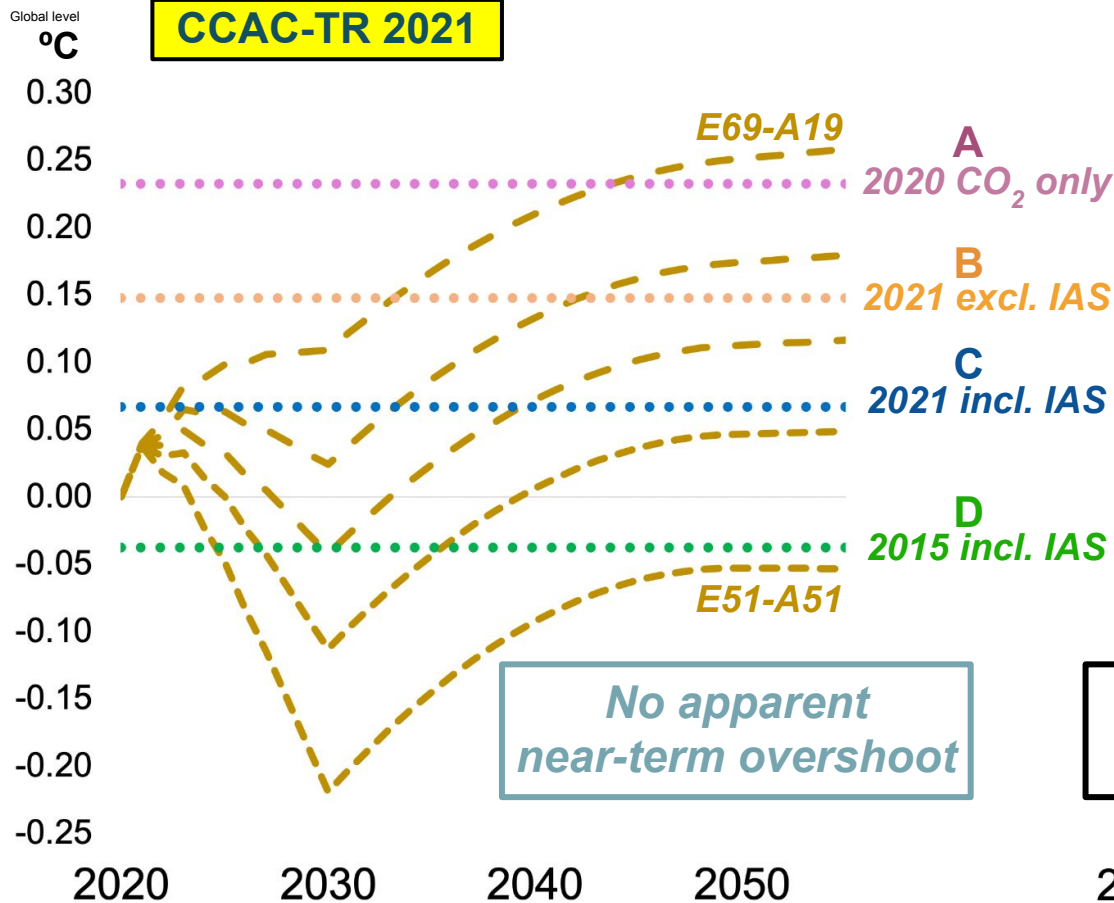
- Only one, or none, of 2021 scenarios pass revised CCAC **Paris Test**
Passing **Paris Test** is more difficult \Rightarrow smaller carbon budgets to 2050.
- **Methane mitigation is crucial** to limit overshoot & reduce reliance on carbon dioxide removal. (All assuming radical reduction in fossil fuel use.)

Recommendations

- **Evenly balanced Energy & Agriculture mitigation best limits warming.**
Cutting CH₄ is far more effective in °C than cutting CO₂ or N₂O by same %.
- **To limit overshoot of Paris Test threshold, need early/deep mitigation.**
- **Next budget cycle:** Refine/state **Paris Test** first, *then* show options meeting it.
- **Evaluate scenario °C warming early:** using GWP* (or climate model) *from* GWP₁₀₀

Revised Temperature Impact Pathways show **PT overshoot**

All pathways include
 $\text{CO}_2 + \text{N}_2\text{O} + \text{CH}_4$



Bonus Slide:

Q: Should a “well below 2°C” **GCB* PT** also be assessed or used instead?

- 1. 50% chance of not exceeding 1.5 °C** was used in the CCAC 2021 **PT**
= 80% chance of not exceeding 1.75 °C = >95% chance of not exceeding 2.0 °C
(as of 2022, see [Matthews & Wynes, 2022](#))
⇒ *This would seem to equate well with the Paris goal*, whereas accepting a higher chance of 2°C warming reduces the chance of “well below 2°C”
- 2. IPCC scenarios for 1.5°C accept limited overshoot, with return by 2100.**
 - Our global CO₂+N₂O+CH₄ CO₂we = peak warming ⇒ so accepts small overshoot.
- 3. Higher estimated TCRE of 0.50°C per 1000 GtCO₂fe** ([Mengis and Matthews 2020](#))
 - 11% more warming for the same CO₂we emissions, therefore higher chance of exceeding temperature values.

A: Given the above, a Paris Test based on above a 50% chance of exceeding 1.5°C, provides a reasoned maximum threshold for “wb2°C”.

Thank-you.

Questions?

Refining the “Paris Test” for Ireland's 2nd Carbon Budgeting programme

Paul R Price *DCU & CCAC Carbon Budgeting Fellow* DCU Supervisors: Prof. Barry McMullin and Dr. Aideen O’Dochartaigh

Video of this presentation: <https://youtu.be/wiQQQprSrCE>
pdf doi: 10.5281/zenodo.7220026



Funded by:
Rialtas na hÉireann
Government of Ireland

