

"Carbon Budgets" and effective climate action governance

A brief HOWTO guide?

Barry McMullin, Dublin City University
Engineers Ireland, 2nd December 2020 (open webinar)



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Press release

Government publishes new climate law which commits Ireland to net-zero carbon emissions by 2050

From [Department of the Taoiseach](#)

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The Government has today published the draft text of the [Climate Action and Low Carbon Development \(Amendment\) Bill 2020](#). The Bill will set the country on course to become climate neutral by 2050. The key features of the Bill are:

- putting our 2050 climate target in law
- carbon budgets including a provision for setting sectoral targets
- annually-revised Climate Action Plan
- strengthened role for Climate Change Advisory Council
- new oversight and accountability by Oireachtas



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THE IRISH TIMES



“The scale of effort required to bring in Ireland’s first climate budget should not be underestimated if it is to be fit for purpose and begin a process of decarbonising Ireland, according to Prof John FitzGerald...”

Why cumulative “Carbon Budgets”?

nature
geoscience

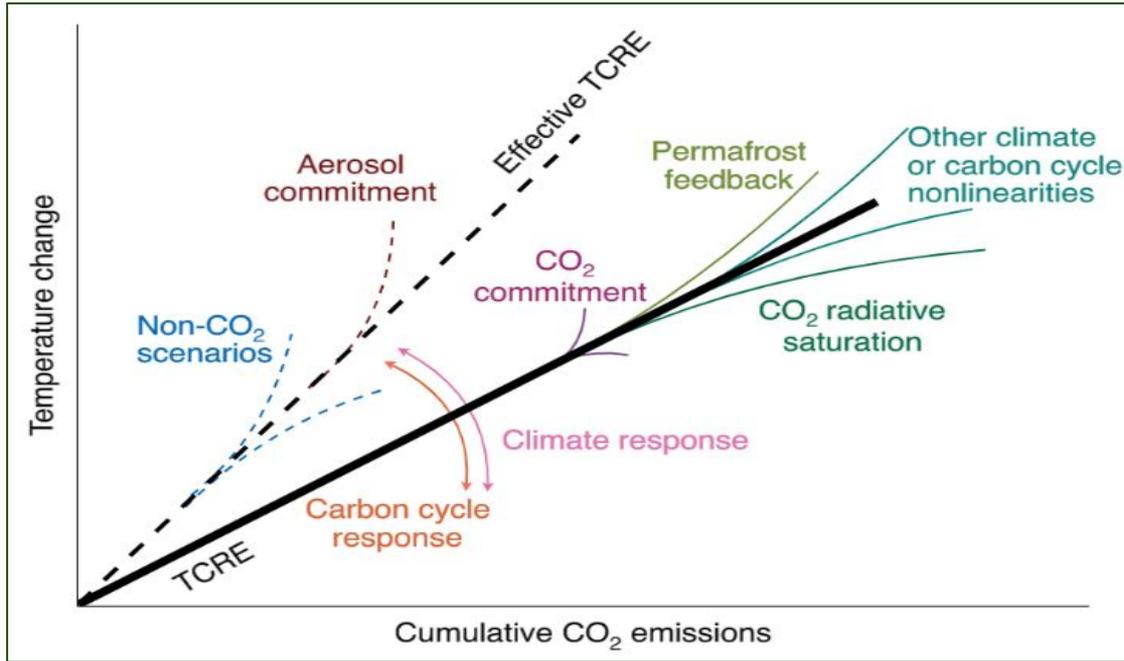
PERSPECTIVE

<https://doi.org/10.1038/s41561-020-00663-3>

Opportunities and challenges in using remaining carbon budgets to guide climate policy

H. Damon Matthews¹ , Katarzyna B. Tokarska ², Zebedee R. J. Nicholls ^{3,4}, Joeri Rogelj^{5,6},
Josep G. Canadell ⁷, Pierre Friedlingstein ^{8,9}, Thomas L. Frölicher ^{10,11}, Piers M. Forster¹²,
Nathan P. Gillett ¹³, Tatiana Ilyina ¹⁴, Robert B. Jackson ^{15,16}, Chris D. Jones ¹⁷, Charles Koven ¹⁸,
Reto Knutti ², Andrew H. MacDougall¹⁹, Malte Meinshausen ³, Nadine Mengis ^{20,21},
Roland Séférian ²² and Kirsten Zickfeld²¹

Long-term global temperature is driven by total *cumulative* CO₂ (the *forever* global carbon budget!)



TCRE: *transient climate response to cumulative CO₂ emissions*

Paris *Global* Governance Framework

- Global temperature rise limits
 - **Well below +2°C** (vs “pre-industrial”)
 - Efforts (good faith?) toward **limit of +1.5°C** (vs “pre-industrial”)
- Nationally Determined Contributions (NDCs)
- Science and Equity
- Acid Test: Do the NDCs add up **in CO₂ budget terms...**
 - Hence: nationally determined “fair shares” of global forever budget?
 - **NCQ**: declares or implies a *national* CO₂ quota (bottom-up: claimed, annexed...)
 - $\Sigma (\text{NCQ}) < \text{GCB}_{\Delta T}$ (modulo start year: 2015?)
 - And ... overshoot, CO₂ removal, risk, intergenerational justice
 - And ... multiple *other* planetary boundaries!?

Simples ...

- Just agree (at national level):
 - Climate “risk appetite” (dealing with radical uncertainty)
 - Principles of global equity and justice (what is our “fair share”?)
 - Principles of inter-generational justice (how much overshoot/deficit to pass on?)
- Declare a **prudent, equitable National Carbon (forever) Quota (NCQ)**
 - Enshrine the NCQ in legislation (the “National Climate Objective”, say)?
 - Set limits on NCQ overshoot (amount, duration), hence IOU for CDR
- Distribute the NCQ over time and sectors: a **Carbon Budget Programme**
 - Must **add up** to (less than) the NCQ, satisfy overshoot/CDR constraints
 - $\sum_{\text{time}} \sum_{\text{sector}} \text{CB}_{t,s} < \text{NCQ}$
 - Adopt governance rules to *respect* the carbon budget programme

Details, details...

- How to deal with component $CB_{t,s}$ *surpluses*?
- How to deal with component $CB_{t,s}$ *deficits*?
- What GHGs are in scope?
 - Need new tools (GWP*?) to properly integrate Short Lived Climate Pollutants
 - (Yes methane, we are looking at you...)
 - (No, “biogenic” methane is not magically benign...)
- Territorial versus consumption emissions?
- International aviation and shipping?
- Still a global commons problem (articulation with EU, UNFCCC?)
- Government “of the people, for the people, by the people” ...

A carbon budget program in action?

Preliminary advisory note to inform “how five-year carbon budgets will be set” in the forthcoming Irish Climate Action Bill

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Date: 20 July 2020

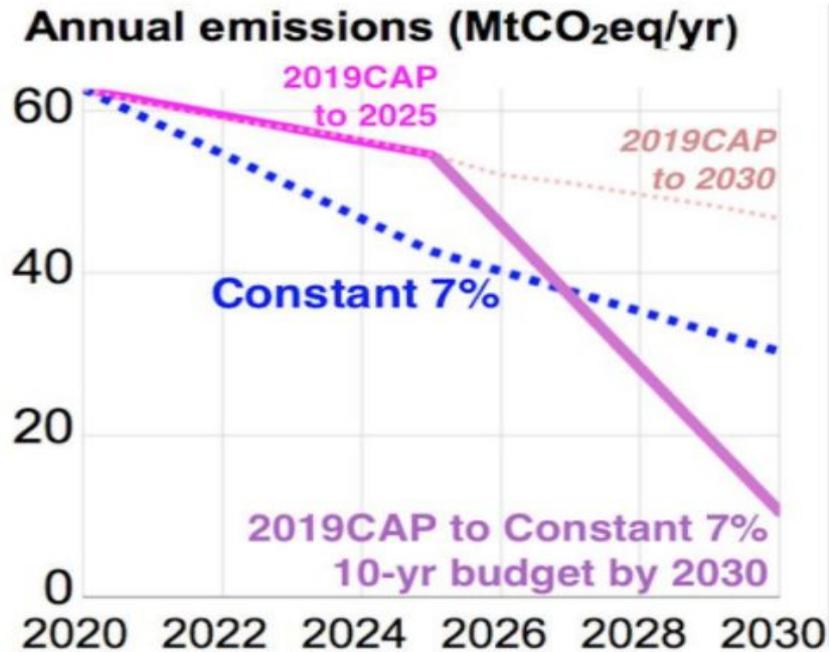
A carbon budget program in action?

- The commitment to achieving an “average” 7% per annum emissions reduction over the period 2021-2030 must be interpreted as meaning that, while actual year-on-year reductions may vary up or down from the 7% rate, **the maximum allowed cumulative emissions (“carbon budget”) over the full period must correspond to that of a constant 7% per annum pathway.**
- “We emphasise that this is the *only* interpretation that yields a satisfactorily well-defined scientific bound on Irish contribution to future climate change arising from emissions over this period.”

A carbon budget program in action?

- A constant 7% per annum pathway would result in an aggregate (compounded) reduction of 51% over 10 years, but ...
- ... it does not follow that every pathway meeting the latter end point is equivalent!
- The **cumulative carbon budget interpretation** is essential to place an effective bound on climate change effect.
- Any early shortfall on the 7% annum reduction rate implies that the 2030 target aggregate reduction will have to be significantly greater!

A carbon budget program in action?



“Such [delayed emission reduction] would imply that, by 2030, the annual emissions rate would have to fall by about 83% relative to 2020...”

Legislating for carbon budgets

Carbon Budgets and Climate Action Governance: Assessing the Climate Action and Low Carbon Development (Amendment) Bill 2020

A submission to the Oireachtas Joint Committee on Climate Action

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Dublin City University

30th October 2020



Legislating for carbon budgets

- **Current draft Bill:** *Paris Agreement temperature goals are only **obliquely** recognised, merely as one among many matters to “have regard to”, rather than being the very essence and test of the required national contribution to effective global climate change mitigation.*
- **Recommendation:**
 - Reformulate the **National Climate Objective (NCO)**
 - Remove the flawed concept of national “climate neutrality by 2050”
 - Instead: a simple but explicit commitment that **the State shall act to make a full, equitable and just national contribution to meeting the global temperature goals set out in Article 2.1(a) of the Paris Agreement.**

Legislating for carbon budgets

- **Current draft Bill:**
 - Climate Change Advisory Council (CCAC) to propose rolling 15-year Carbon Budget Programme (3x 5-year)
 - **BUT:** no clear basis or criteria!
 - Advisory task is “... *at best arbitrary, and at worst utterly ineffective.*”
- **Recommendation:**
 - Reformulate the **National Climate Objective** (to incorporate the Paris temperature goals)
 - Specify that alignment and consistency with this reformulated NCO is the ultimate, overriding criterion to be used by the Advisory Council in proposing the carbon budget program

Legislating for carbon budgets

- **Current draft Bill:**
 - Rolling (annual update) 10-year **Climate Action Plan**
 - Sets “sectoral decarbonisation target ranges” ...
 - Conceptually obscure?
 - **Not** explicitly bound to the Carbon Budget Programme (!?)
- **Recommendation:**
 - Abandon ill-defined “decarbonisation target ranges”
 - Replace with: **sectoral allocations of the relevant overall carbon budget**
 - Subject, of course, to the hard arithmetic constraint that **sectoral allocations must sum to no more than the budget!**

$$\sum_{\text{time}} \sum_{\text{sector}} \text{CB}_{t,s} < \text{NCQ}$$

Follow up ...

- Opportunities and challenges in using remaining carbon budgets to guide climate policy (Matthews et al, Nature Geoscience, Nov 2020)
- Preliminary Advisory Note on Setting 5-Year Carbon Budgets (McMullin, Sweeney and Paul Price, July 2020)
- Carbon Budgets and Climate Action Governance: Assessing the Climate Action and Low Carbon Development (Amendment) Bill 2020 (McMullin, Oct 2020)
- Potential for Negative Emissions Technologies in Ireland (McMullin et al, EPA Research Report 354, Nov 2020)
- Society-wide Scenarios for Effective Climate Mitigation (McMullin and Price, EPA Research Report 352, Nov 2020)
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