

Decarbonising the Irish Energy System: Cards on the Table?

Barry McMullin
barry.mcmullin@dcu.ie

Dublin City University

(...but all remarks in a personal capacity ☺)

Feasta Retreat
Rossbeigh, 6th September 2018

(Beamer Presentation)

“Never let the future disturb you. You will meet it, if you have to, with the same weapons of reason which today arm you against the present.”

— *Marcus Aurelius*, Emperor of Rome, 161-180 AD.
(From the *Meditations*.)

Context: Climate Change is ...



Katharine Hayhoe ✓

@KHayhoe

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Our 600 page climate report in one tweet:
It's real
It's us
It's serious
And the window of time to prevent dangerous
impacts is closing fast

1:36 PM - 11 Aug 2017

13,308 Retweets 23,947 Likes

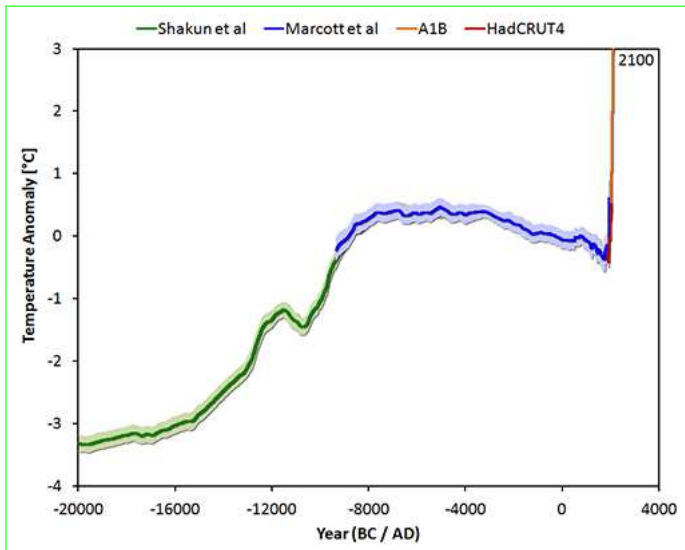


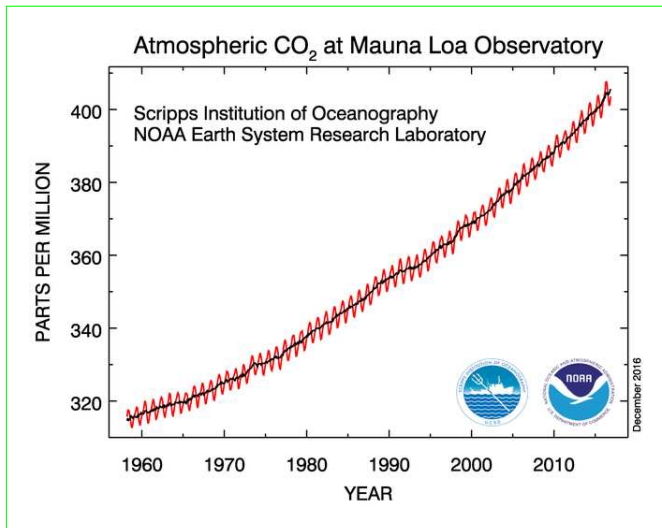
320

13K

24K







Context: ... and yes, it really is *serious*

 **Guardian Environment** ✓
@guardianeco

Following

Climate change will stir 'unimaginable' refugee crisis, says military



theguardian

Climate change will stir 'unimaginable' refugee crisis, says military
Unchecked global warming is greatest threat to 21st-century security where mass migration could be 'new normal', say senior military
theguardian.com

RETWEETS 108 LIKES 47

6:01 AM - 1 Dec 2016

2 108 47 ***

The Paris agreement: “Mischief Managed”?



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COP21: UN chief hails new climate change agreement as ‘monumental triumph’



Secretary-General Ban Ki-moon (second left), UNFCCC's Christiania Figueres (left), French Foreign Minister Laurent Fabius and President of the UN Climate Change Conference in Paris (COP21), and President François Hollande of France (right), celebrate historic adoption of Paris Agreement. UN Photo/Mark Garten



CLIMATE ACTION

European
Commission

Latest news

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Latest events

Public consultations

Feedback mechanism

RSS

EU leaders commit to swiftly and fully implement Paris climate deal

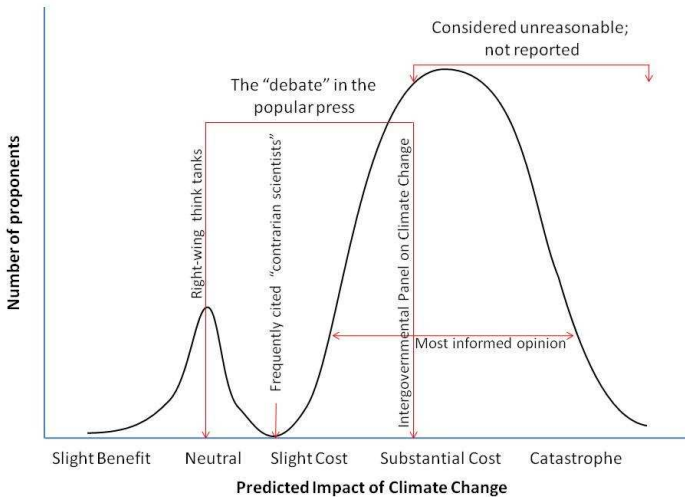


23/06/2017

Heads of the EU Member States, the President of the European Council and the President of the European Commission have strongly reaffirmed the EU's commitment to swiftly and fully implement the Paris Agreement on climate change.

Who will “speak truth to the people”?

Distribution of professional opinion on anthropogenic climate change





Glen Peters

@Peters_Glen



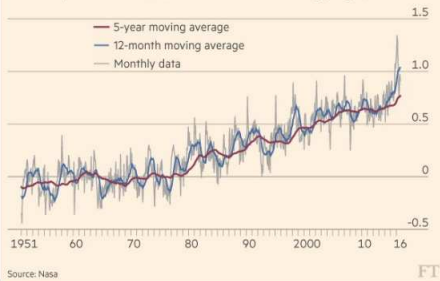
Follow

It is too easy to applaud what are little more than gestures in tackling climate risks as if they are the real thing

buff.ly/2eezePG

Heating up

Global temperature anomalies (difference from 1951-80 average, deg C)



RETWEETS

23

LIKES

13

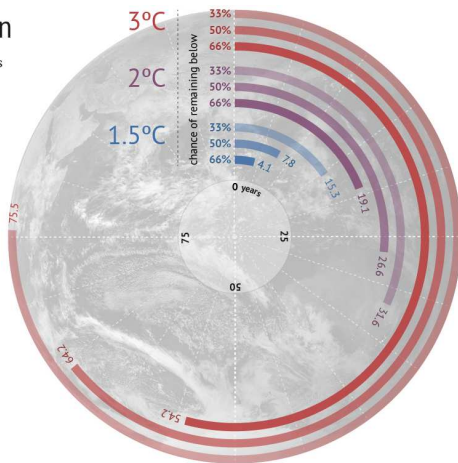


8:19 AM - 3 Nov 2016

The CO₂ problem: the atmosphere is (very nearly) “full”

Carbon Countdown

As of the start of 2017, how many years of current emissions would use up the IPCC's carbon budgets for different levels of warming?



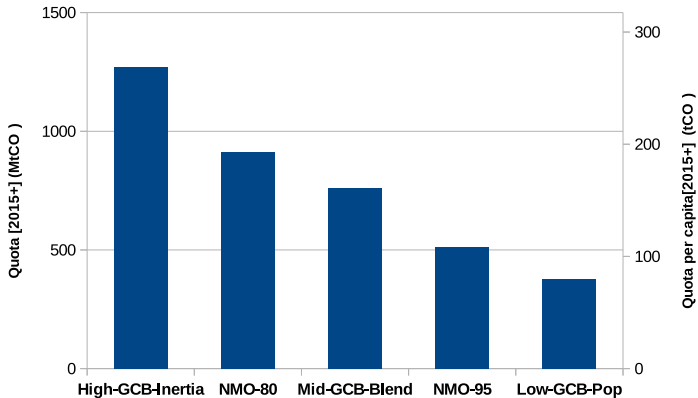
CarbonBrief
CLEAR ON CLIMATE

Photo: NASA Goddard Space Flight Center
Stopwatch icon: T-Rat/Shutterstock.com

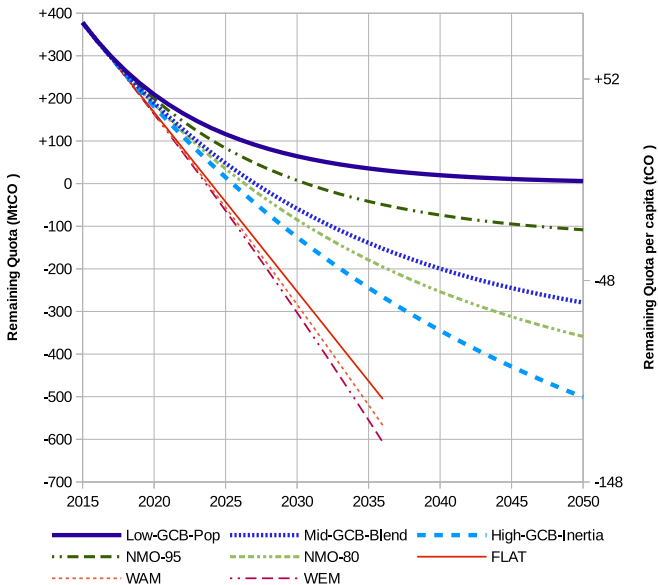
So: this changes everything. . .

- “Low-carbon” (CO₂) is definitely not enough
- “Zero-carbon” is (most likely) not enough
- Need to plan for “*Negative-carbon*” . . .
- **Time is absolutely not on our side!**

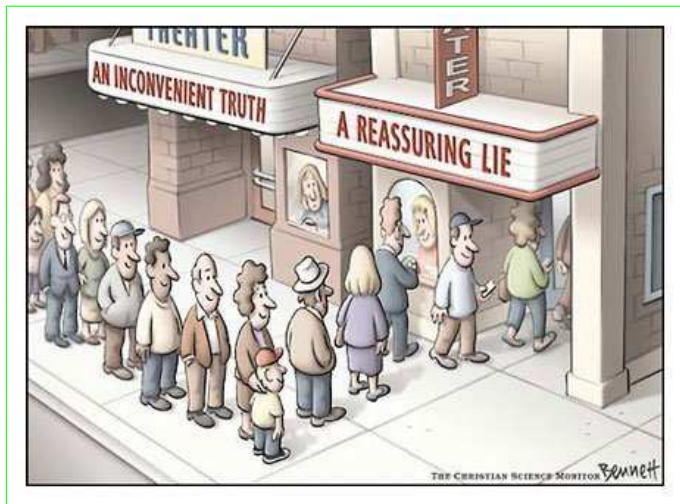
What is Ireland's "fair share"?



How long (before we “commit” to “negative-carbon”?)



But: who will “speak truth to the people”?



Energy system “vision”: cards on the table...

- Nuclear
- Fossil Fuel with Carbon Capture and Storage (FFCCS)
- BioEnergy (BE: unabated)
- Variable/intermittent Renewable Energy (VRE: wind, solar...)
- BioEnergy with Carbon Capture and Storage (BECCS)
- **Reduce consumption (radically)**

Nuclear (fission)

- It works!
- “Low-carbon”! (not zero, not negative)
- Dispatchable 24x7 electricity
- It’s safe (isn’t it?)
 - Or: it’s *safer* than FF alternatives?
- Large fixed electricity plant only: not heat, not transport (?)
- Fuel (uranium) depletion?
- Fuel security?
- Extraction impacts
- Long-lived, dangerous, waste
 - (Or: shorter lived, less dangerous waste than FF alternatives?)
- Scale? (Compatibility with small, isolated, electricity grid?)
- Public acceptability/support?
- **But:** it happens to be illegal...
 - ... *unless* smuggled in by interconnector!
- Cost? Speed of deployment?

Fossil Fuel with Carbon Capture and Storage (FFCCS)

- “Low-carbon” (not zero, not negative)
- Dispatchable 24x7 electricity
- Large fixed plant only: not heat, not transport (?)
- Parasitic load?
- Storage sites? Leakage?
- “Upstream” emissions? (especially CH₄)
- Public acceptability/support?
- Cost? Speed of deployment?

- Carbon-neutral/zero-carbon?
 - Fertilizer (energy, N₂O)
 - Machinery (cultivation, harvest, processing)
 - Transport
 - Land use change? Direct/indirect
 - So: “Low-carbon” *at best* (not zero, not negative)
- All uses (?): electricity, heat, transport
- Dispatchable 24x7 electricity
- Ireland indigenous opportunity?
 - Waste: food, crop residues, sawmills, vegetable oil
 - Forestry?
 - Short rotation crops: Miscanthus, Willow (grass?)
 - Displace ruminants (beef, dairy, sheep. . .)?
 - Processing to biogas/biomethane?
- Very finite potential (land use competition, ecological risks/boundaries): need to *maximise* climate benefit!
- Cost? Speed of deployment?

Variable/intermittent Renewables (wind, solar...)

- “Low-carbon” (“very”? but not zero, not negative)
- Electricity only (not heat, not transport?)
- *Not* dispatchable (“feast-or-famine”)
- Public acceptability/support?
 - Onshore/offshore wind?
 - Transmission lines?
- Cost? Speed of deployment?

*Engineers will certainly make every effort to adapt new energy resources to familiar usage patterns. We **can**, to a certain limited extent, press solar and wind into the mold of our current energy system by buffering their variability with energy storage technology and grid enhancements. But the larger the proportion of our total energy we get from these resources, the more our buffering efforts will cost in both money and energy. . . . **Past 60 to 80 percent, the need for storage and redundancy will likely explode.** The goal of a near-100 percent [variable] renewable, grid-based electricity system is a subject of great controversy and research, but it remains theoretical. . .*

— *Heinberg and Fridley, 2016*

- **Might reach “negative-carbon” . . .**
 - But: “it all depends” (devil in the detail. . .)
- Electricity only (not heat, not transport?)
- Dispatchable 24x7 electricity
- Usable bioenergy resource (land, feedstocks) remains highly constrained
- Absolutely relies on proving CCS at scale; which also links directly back to . . .
- . . . Cost? Speed of deployment?

Aside: The deeper “RHI scandal” . . .

- The EU Renewable Energy Directive is *not* currently aligned with strong climate mitigation: not all “renewables” are “low-carbon”; not all “low-carbon” is “renewable”
- Without much stronger bioenergy safeguards/constraints/limits, the supposed climate benefit of higher “Renewable Energy” penetration is speculative (at best)
- Prioritising unabated bioenergy (without CCS) *potentially increases* climate impact by displacing direct fossil demand reduction, existing nuclear, and/or potential FFCCS or BECCS
- Naive promotion of unabated bioenergy, especially with multi-decade lock-in is therefore a highly questionable climate policy . . .
- But that is precisely an *expected* and *intended* effect of RHI/SSRH (in both NI and IE)

Reduce consumption (radically)

- Efficiency (*Passive House*, *Co-generation*)
 - (But beware of *rebound*/*Jevon's Paradox!*)
- *Carbon pricing* (*tax*, *fee* and *dividend* . . .)
- *Carbon capping*
 - *Tradeable Energy/Emission Quotas (TEQs)* [declining annual cap, with (tradeable) “fair shares”: rationing but without the “black” market?]
 - *Cap and Trade* (e.g., *EU-ETS*)
 - *Cap and Share*
- afreeride.org: Campaign for a fairer, greener tax on air travel

And so: *my* “vision” for energy system transformation?

- Reduce absolute energy consumption (fairly!). **Repeat.**
- *Rapidly* electrify heating, transport
- *Rapidly* retrofit CCS where feasible (existing FF electricity generation, large industrial CO₂ sources)
- *Rapidly* build out most favourable indigenous VRE
 - **IE/UK: primarily wind (onshore and offshore)!**
 - Target at least 60% “direct” annual VRE consumption (in *total* energy system!)
- Deploy bioenergy *very cautiously*
 - *Only* with direct, verifiable, climate benefits (indigenous waste feedstocks, short-rotation crops, ruminant displacement)
 - Keep door open to seasonal storage, BECCS (strongly favours CH₄ pathways: “biomethane” via AD, gasification?)
- Close final FF gap with large scale storage (P2G/SNG?)
- Act **now** for beyond-zero/carbon-negative (forestry, DACCS, EW)
- Revisit nuclear?

Parting Thought...



We Need Courage, Not Hope, to Face Climate Change

BY KATE MARVEL (@DRKATEMARVEL), CONTRIBUTING EDITOR

As a climate scientist, I am often asked to talk about hope. Particularly in the current political climate, audiences want to be told that everything will be all right in the end. And, unfortunately, I have a deep-seated need to be liked and a natural tendency to optimism that leads me to accept more speaking invitations than is good for me. Climate change is bleak, the organizers always say. Tell us a happy story. Give us hope. The problem is, I don't have any.

- IE-NETs Project:
The Potential for Negative Emissions Technologies in Ireland
- EPA funded, grant reference 2016-CCRP-MS.36
- Collaboration between DCU and TCD (Prof. Mike Jones)
- More info: ienets.eeng.dcu.ie
- Contact me: barry.mcmullin@dcu.ie

(The “afterword” ...)

Note for readers: if reviewing these slides after the Feasta Retreat in Rossbeigh, note that there are links to further information online interspersed throughout. In particular, many of the images are clickable links to more detailed background.

Enjoy! - Barry.