

Where is the low carbon energy vision Ireland needs to mitigate climate change? And how can it be delivered?

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

NFLA All Ireland Forum
Spring Energy Policy Seminar
Omagh, 9th March 2018

(Beamer Presentation)

Context: Climate Change is ...

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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

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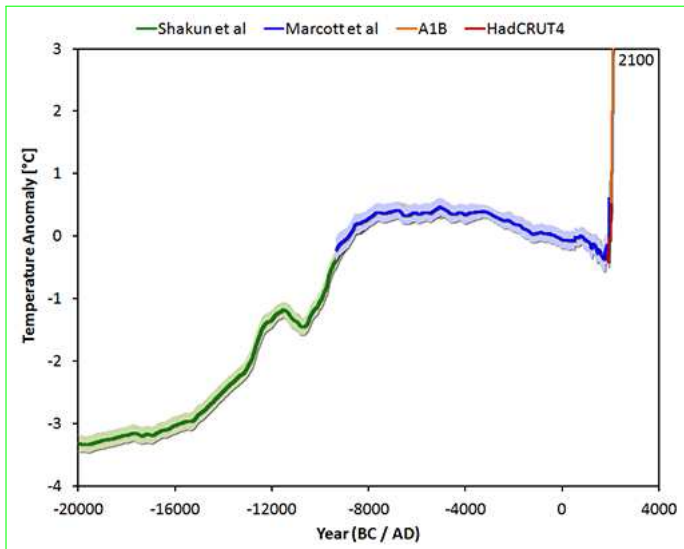


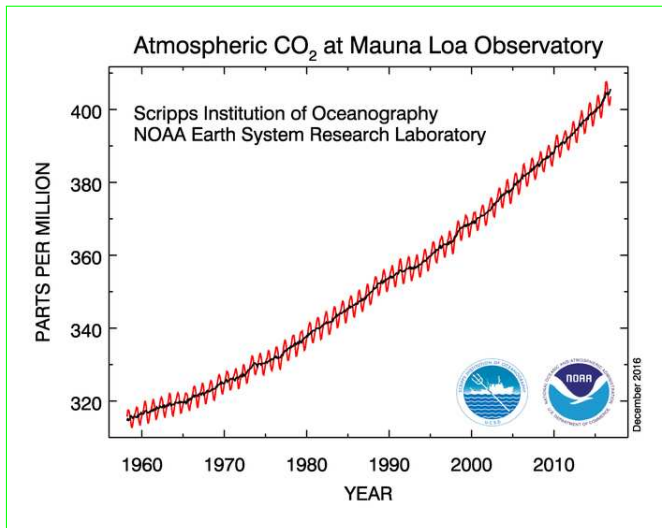
320

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



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)



Source: Nasa

FT

RETWEETS

23

LIKES

13



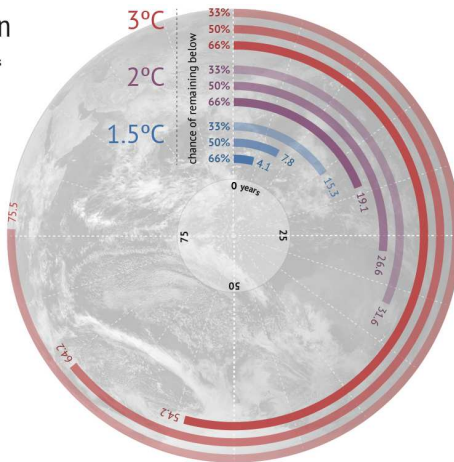
8:19 AM - 3 Nov 2016

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?



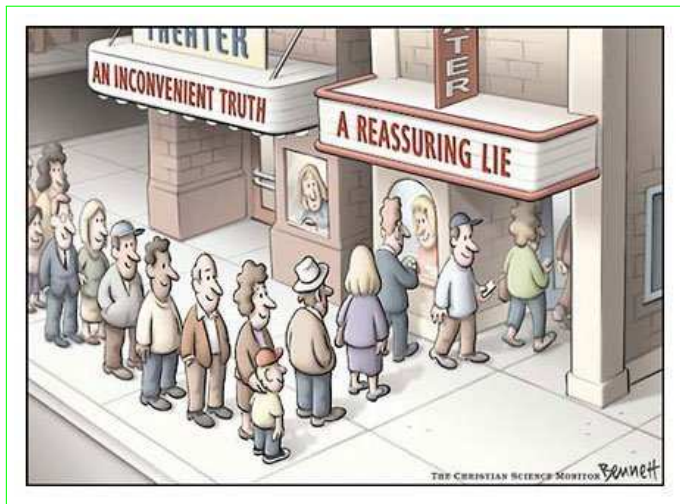
CarbonBrief
CLEAR ON CLIMATE

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!**

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)**

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?

BioEnergy (BE, unabated)

- Carbon-neutral/zero-carbon?
 - Fertilizer (energy, N_2O)
 - 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?

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?

*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!?

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 (in both NI and IE)

Reduce consumption (radically)

- Tradeable Energy Quotas (TEQs) [declining annual cap, with “fair shares”: i.e., *rationing*]
- afreeride.org: Campaign for a fairer, greener tax on air travel
- Efficiency (Passive House, Co-generation)
 - (But beware of rebound/Jevon's Paradox!)

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

- Reduce absolute energy consumption (fairly!). **Repeat.**
 - (For LA's especially: smart, shared mobility, cycling, spatial planning, built environment; AFLA?)
- *Aggressively* electrify heating, transport
- *Aggressively* retrofit CCS where feasible (existing FF electricity generation, large industrial CO₂ sources)
- *Aggressively* build out most favourable indigenous VRE
 - **IE/UK: primarily wind (onshore and offshore)!**
 - Target at least 60% “direct” annual VRE consumption
- 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?~~)

And BRexit?

- Please don't?
- (Seriously...)

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

Note for readers: if reviewing these slides after the NFLA forum in Omagh, 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.