Imperial College London

A role for BiogasDoneRight in achieving Global 'Net Zero' Ambitions?

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World Biogas Summit

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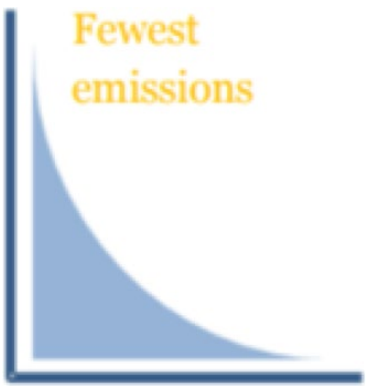
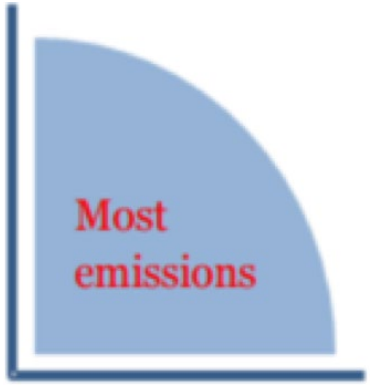
Net-zero framing

Different decarbonisation speeds would lead to different cumulative emissions and, hence, to different amounts of warming, even if net-zero is reached at the same time.





Note the difference between 'Net-zero' and 'neutrality':

'*Net-zero*' requires both emissions reduction + enhanced sinks

'*Neutrality*' only requires that emissions are balanced by enhanced sinks. Is not a viable approach when applied at a global level

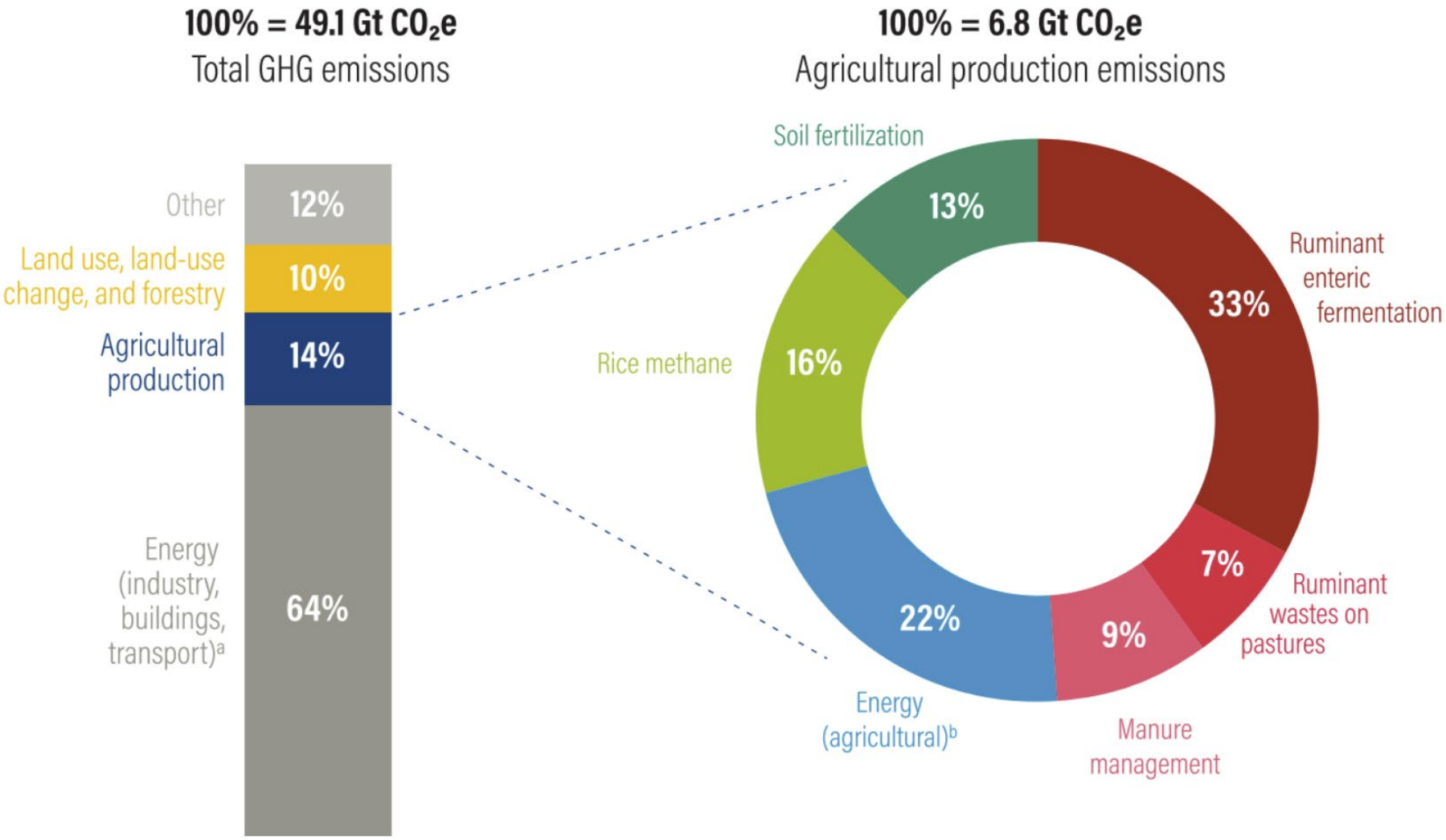
Using the Global Carbon Budget – does not mean methane can be ignored!

Best estimates of the Transient Climate Response to cumulative CO_2 Emissions (TCRE) from climate models and observational data, with corresponding estimates of the CO_2-only carbon budgets associated with a given amount of CO2-induced global temperature increase. (Matthews et al, 2019)

		CO_2-only Carbon budgets		
	TCRE	per °C	1.5 °C	2 °C
CMIP5 models	1.6 °C/1000 GtC (0.44 °C/1000 GtCO2)	625 GtC (2290 GtCO2)	940 GtC (3445 GtCO2)	1250 GtC (4585 GtCO2)
Observations	1.35 °C/1000 GtC (0.37 °C/1000 $GtCO_2$)	740 GtC (2715 $GtCO_2$)	1110 GtC (4070 $GtCO_2$)	1480 GtC (5425 $GtCO_2$)

Italicized values in parentheses are in units of CO2 rather than C, where 1 tonne of C = 3.67 tonnes of CO2, and all carbon budget values are rounded to the nearest 5 Gt.
Matthews et al. 2017. Estimating Carbon Budgets for Ambitious Climate Targets (Carbon Cycle and Climate. Curr Clim Change Rep (2017) 3:69-77

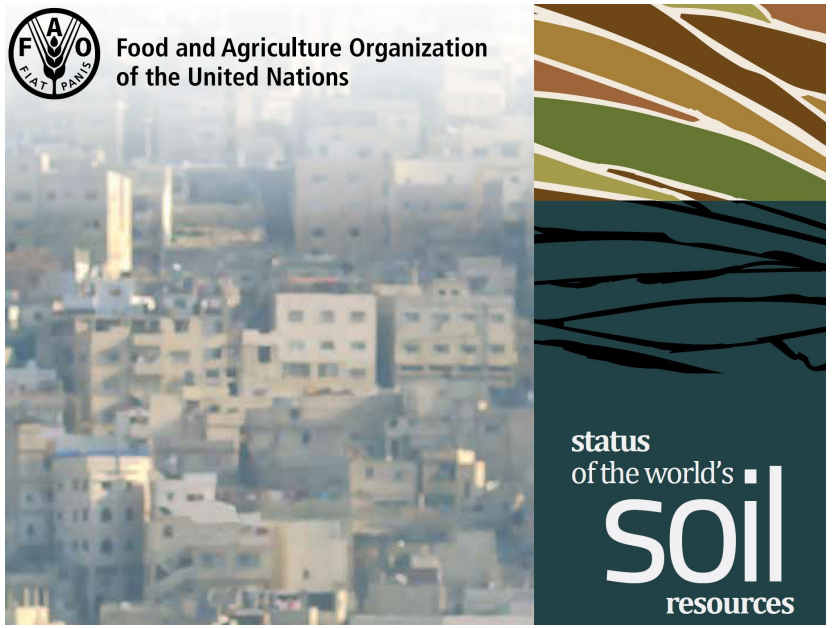
- Climate effective transition pathways will combine emissions reduction & enhance carbon sinks –
- Bioenergy deployment needs to demonstrate both interventions together
- Bioenergy with carbon capture and storage (BECCS) deploys the capture of CO2 and its storage in geological reservoirs
- BiogasDoneRight needs to enhance soil carbon stocks but can also be deployed with CCS



- If not reduced, agricultural emissions alone would use about 15% of the remaining carbon budget.
- Agriculture + land use (AFOLU) would use about 25% of the carbon budget
- BDR offers an option for reducing emissions associated with the food and energy systems, simultaneously enhancing resilience to climate change

Need to enhance carbon in soils and vegetation

- The world's soils may only have 60 (ish) harvests left in them according to the FAO.
- Key issues are:
  - Soil degradation
  - Water availability
  - Soil organic matter = soil carbon
  - Above ground vegetation carbon stocks and fluxes = yields



Whilst controversial and contested, there is a growing recognition of the importance of soil organic matter (soil carbon) in the management of agricultural soils for resilience and enhanced / sustained productivities.

Should bioenergy play a role in enhancing soil carbon stocks for intensive agriculture for food production? Is this possible / probable?

Global Emissions Trajectory (RCP 2.6)

Source: tool.globalcalculator.org, 2015 also tool.european-calculator.eu

Exploring global potentials – a first guesstimate

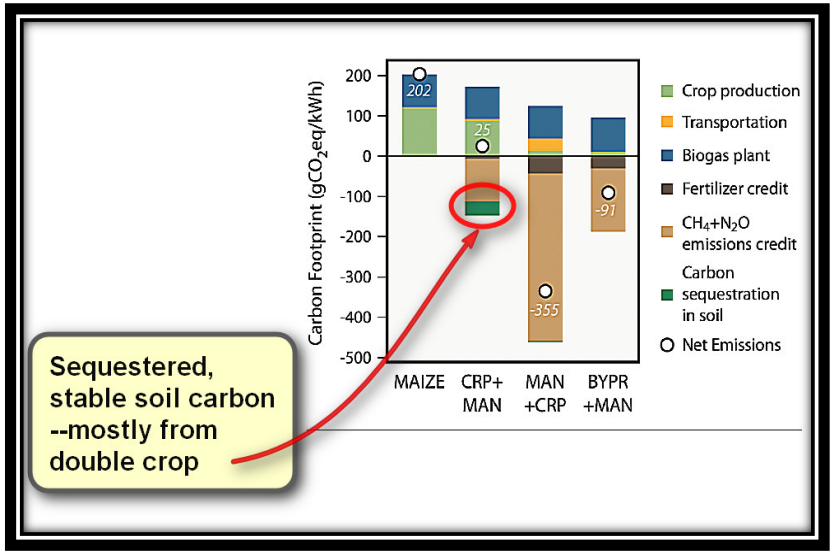
Biogas	$kgCO_2e/GJ$	tCO_2e avoided	Emissions
Conventional	27	-4.1E+08	3.8E+08
CRP+Man	8	-6.8E+08	1.1E+08
BYPR+Man	-11	-9.5E+08	-1.6E+08
Man+CRP	-42	-1.4E+09	-5.9E+08

Calculations assume 10% substitution of 2019 global natural gas consumption (BP, Annual Review, 2020)

Dale et al. 2020. 'The biomethane potential in these countries, estimated conservatively, varies from about **10–30% of their current annual natural gas consumption**.' Biofpr. DOI: 10.1002/bbb.2134

Globally significant levels of Emissions reductions (**between 1% to 3%**) + some Negative Emissions (sequestration) are possible with an extensive and well implemented BDR.
Between 10% and 20% of global Ag emissions

Question: what are the implications for biodiversity and ecosystem restoration?



Valli et al. 2017. Greenhouse gas emissions of electricity and biomethane produced using the Biogasdoneright™ system: four case studies from Italy. Biofpr

Thank You

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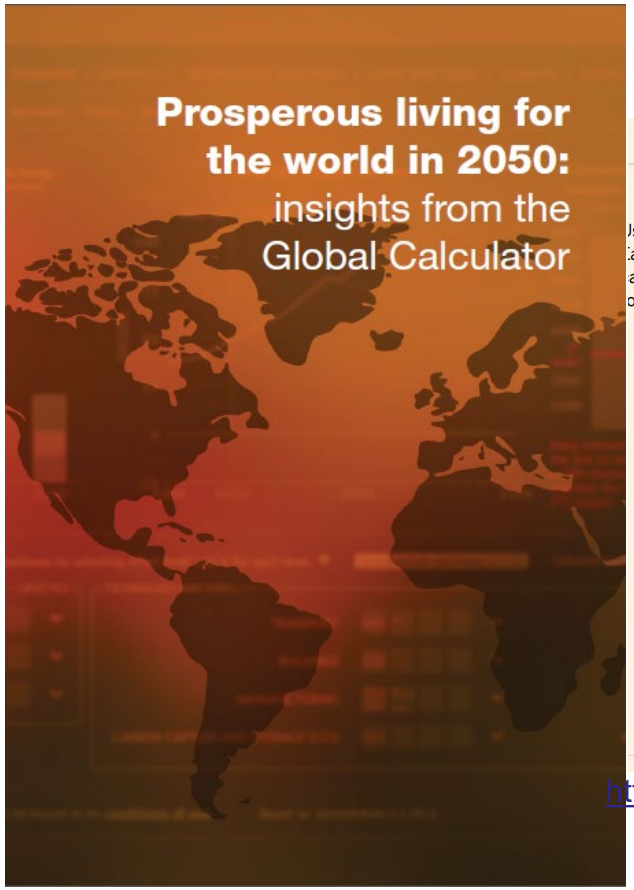
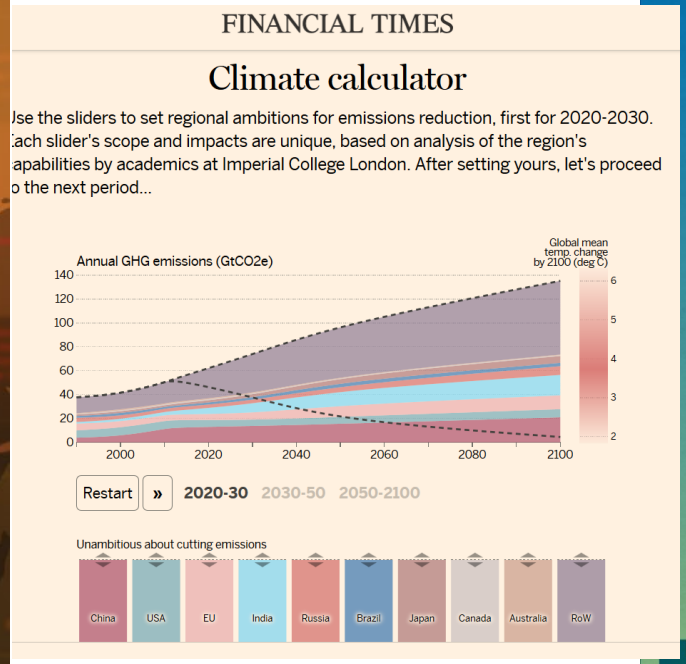
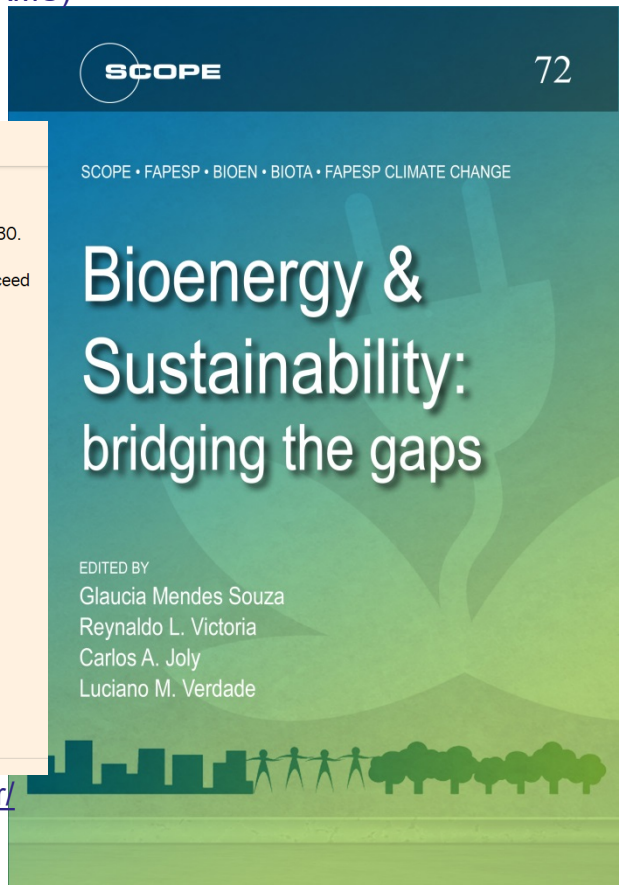


http://www.globalcalculator.org



http://ig.ft.com/sites/climate-change-calculator/



http://bioenfapesp.org/scopebioenergy/index.php