



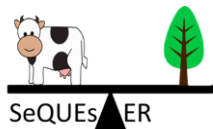
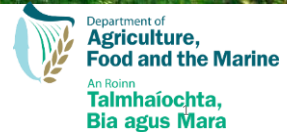
SeQUEsTER: Pathways to carbon neutrality post 2030



Colm Duffy, Remi Prudhomme, Mary Ryan, Cathal O'Donoghue, David Styles

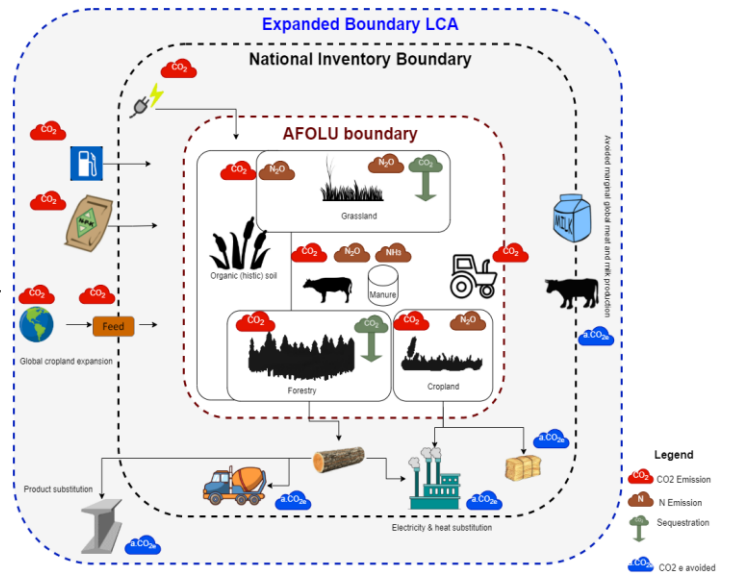


CCAC April 2020



OBJECTIVE

- Identify pathways to a climate neutral AFOLU sector by 2050
- Initial boundary: AFOLU
- Subsequent work: Upstream & downstream consequences

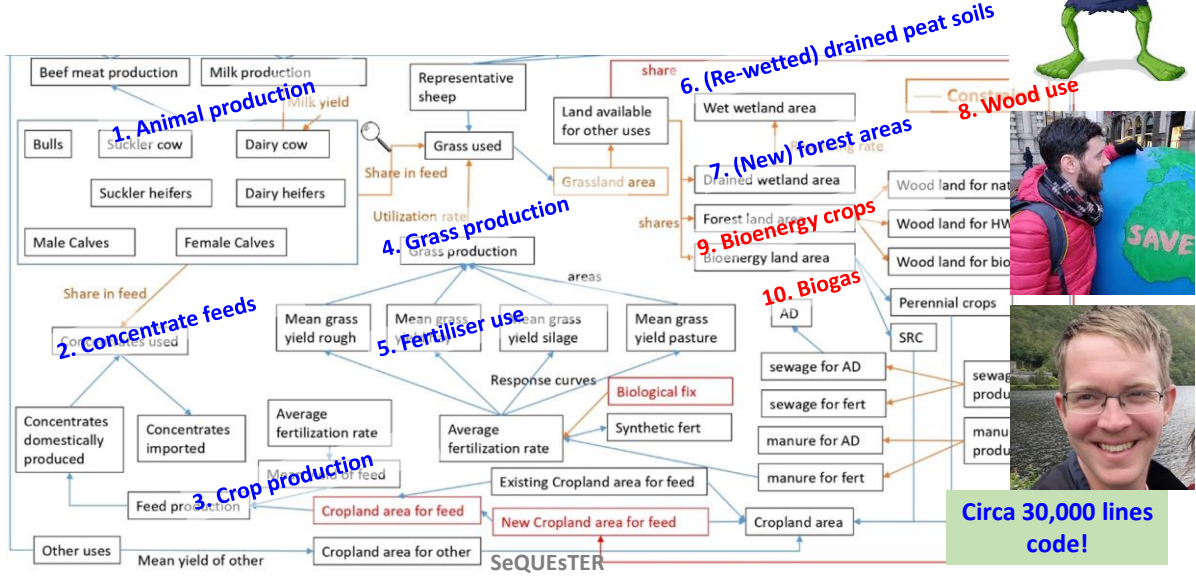


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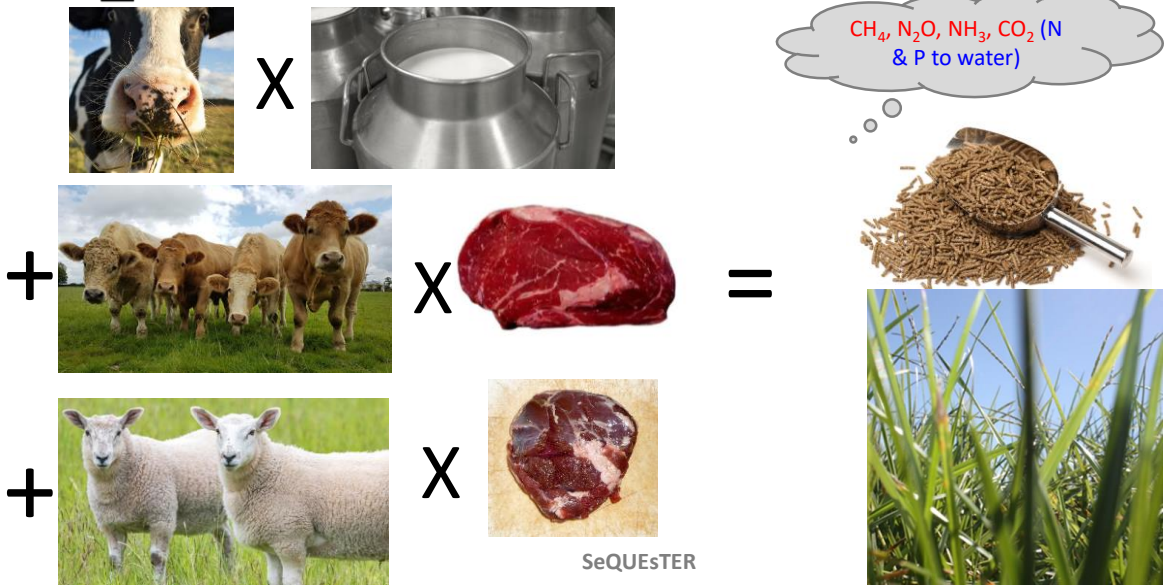


GOBLIN

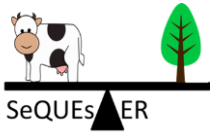
SeQEsTER General Overview for a Back-casting approach of Livestock Intensification (& land use)



DRIVERS: ANIMAL PRODUCTION



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DRIVERS: GRASS PRODUCTION



/

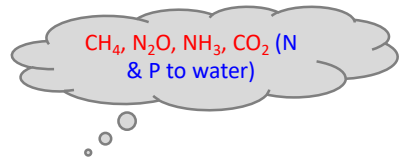


X



use efficiency

= m² (or million ha)! +



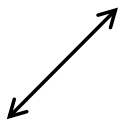
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OFFSET POTENTIAL

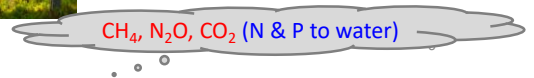
Δm² (million ha) grass

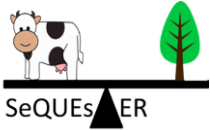


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+





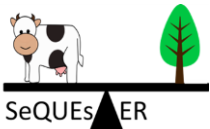
OUTPUTS (2015-2050)

- Agriculture
 - Emissions (CH_4 , N_2O , CO_2 , NH_3 , N & P losses to water)
 - Production
 - Utilised area
- AFOLU
 - Areas & area changes
 - Emissions (organic soils, LUC, biomass removals)
 - Sinks (forestry growth, wetlands, LUC)
- Emissions balance (GWP_{100} , GWP^*)
- Randomised scenarios within biophysical constraints (aligned with NIR accounting)
 - Filter by emissions balance

>What could climate neutrality look like (what's POSSIBLE)?

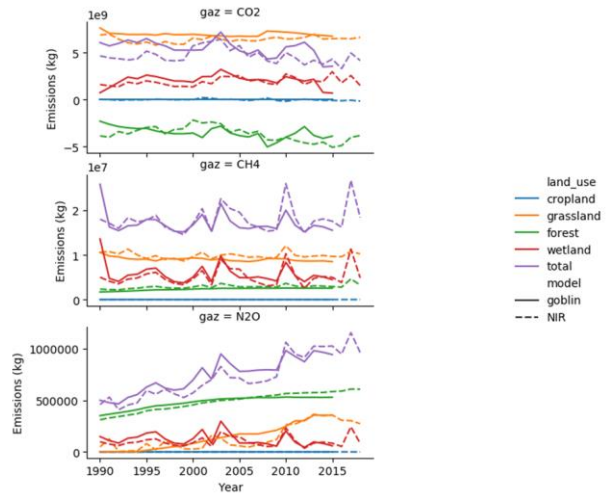
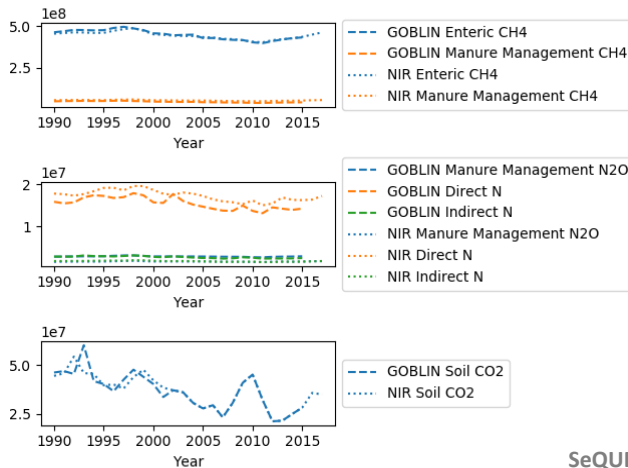
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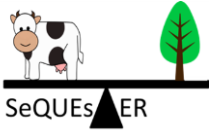
VALIDATION

NIR activity data IN = NIR emissions OUT



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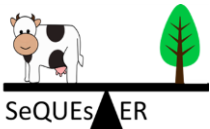


PRELIM SCENARIOS (2015 baseline)

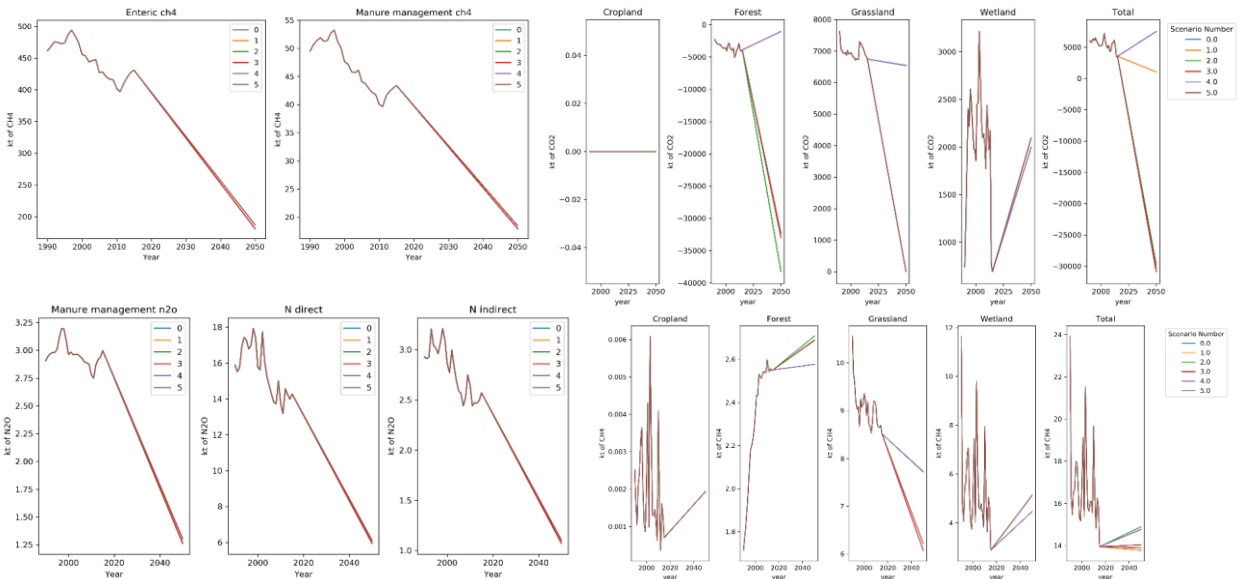
Scenario	Name	Animal numbers	Productivity	Re-wetting	Forest
		Head/yr	kg/head/yr	ha/yr	ha/yr
0	Animal numbers only	-1.66%	Static	0	0
1	+Grassland rewetting	-1.66%	Static	9,698	0
2	+Afforest.	-1.66%	Static	0	68,432
3	+Rewetting +Afforest.	-1.66%	Static	9,698	58,733
4	+Product.	-1.66%	+0.43% (milk)	0	0
5	+Product. +Rewetting +Afforest	-1.66%	+0.43% (milk)	9,698	57,591

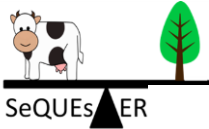
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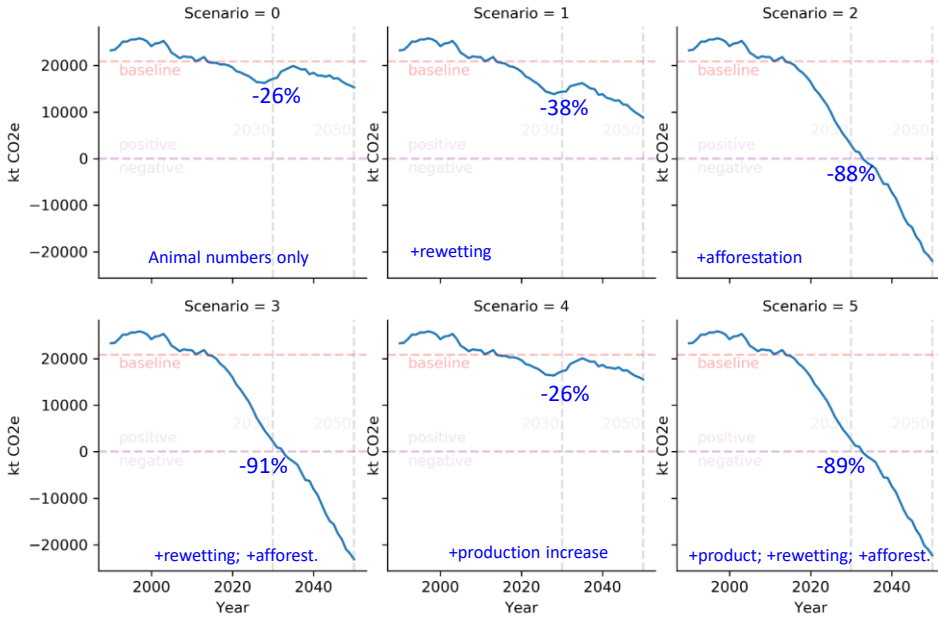


PRELIM RESULTS (SNAP SHOTS)

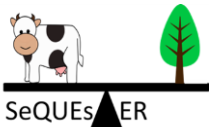




PRELIM RESULTS (SUMMARY)

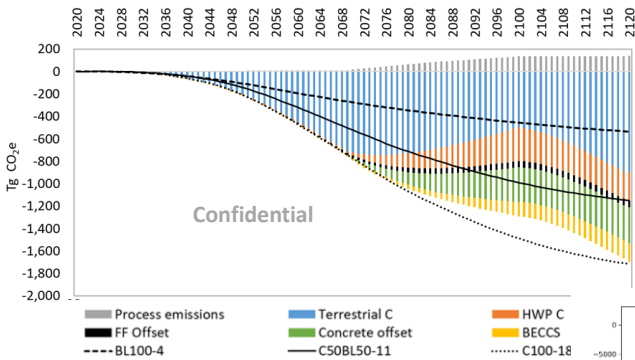


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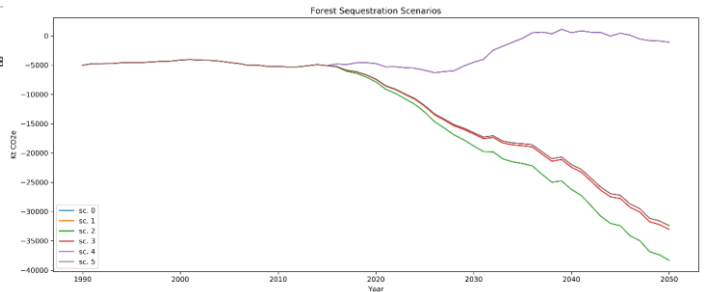


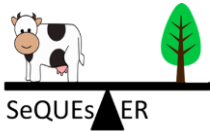
FORESTRY

- Forestry sink is declining in Ireland
- Commercial forest mitigation *faster & longer* than conservation forests (flexible future uses)
- Rolling planting = just 15% of 100-yr mitigation achieved by 2050!
- Long term, more trees in ground = more headroom for animal production
- Planting needed **NOW!**



Forster et al. (accepted). Nature Comm.





CONCLUSIONS

- Climate neutrality = Animal production *interacting* with land use
- GOBLIN identifies *biophysical constraints* to long-term AFOLU climate neutrality
 - **Socio-economic-cultural-policy filters need to be applied**
- Need to integrate with wider climate neutrality plans
 - Bio-energy/product demand
 - Residual offsetting (i.e. AFOLU > climate neutral?)
- Long-term climate neutrality not a technical challenge; direction of travel clear
 - Plant trees & rewet organic soils
 - **How much animal production can these measures support?**

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Questions welcome...

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