

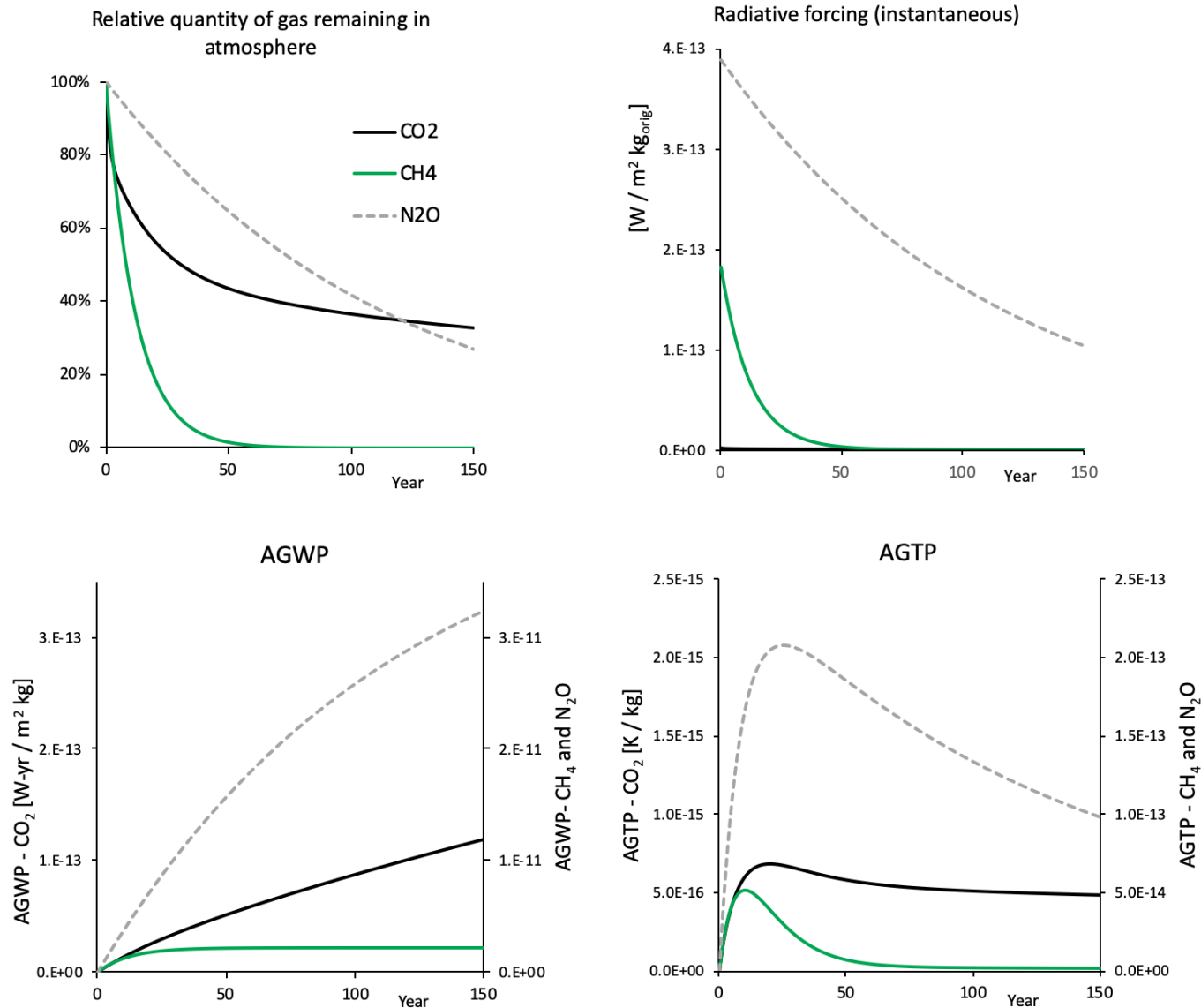
Forecasting impacts – a case study of bioenergy

Sam Cooper, Rowan Green,
Laura Hattam, Marcelle McManus

sjgcooper@bath.edu

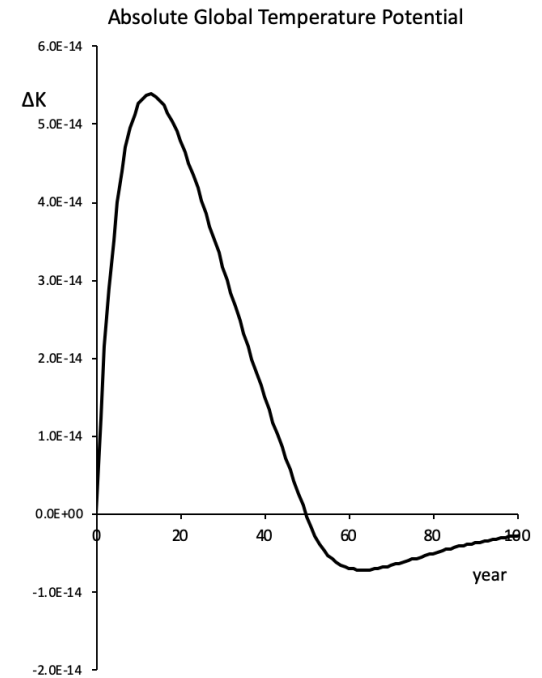
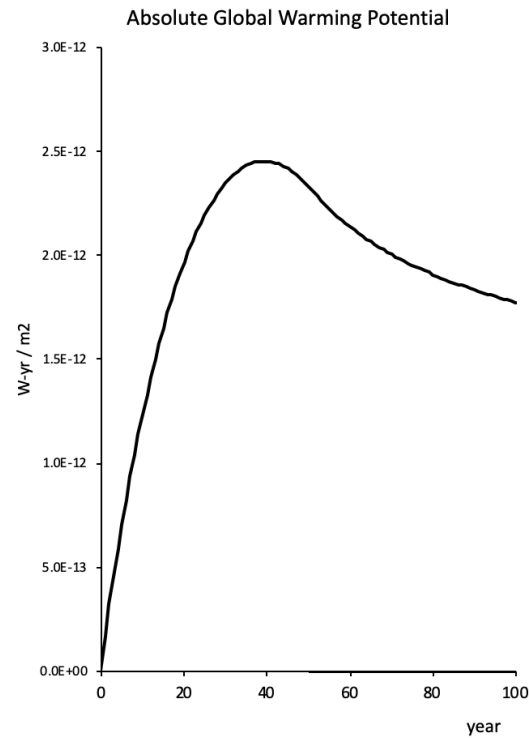
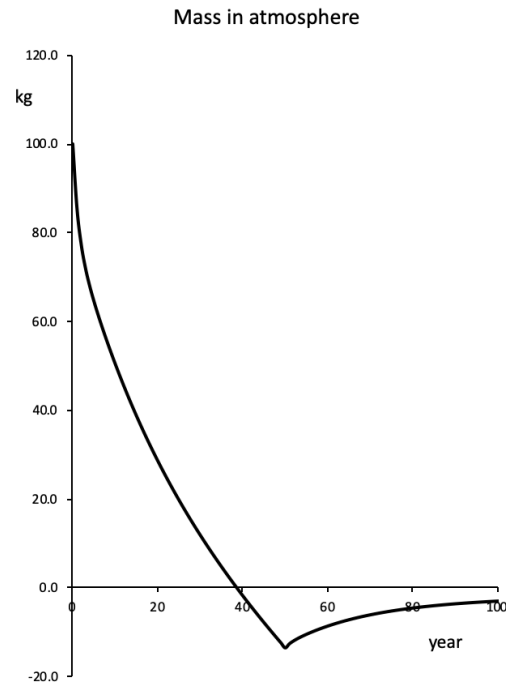
[https://researchportal.bath.ac.uk
/en/persons/marcelle-mcmanus](https://researchportal.bath.ac.uk/en/persons/marcelle-mcmanus)

Refresher – GHG characteristics of CO₂, CH₄ & N₂O



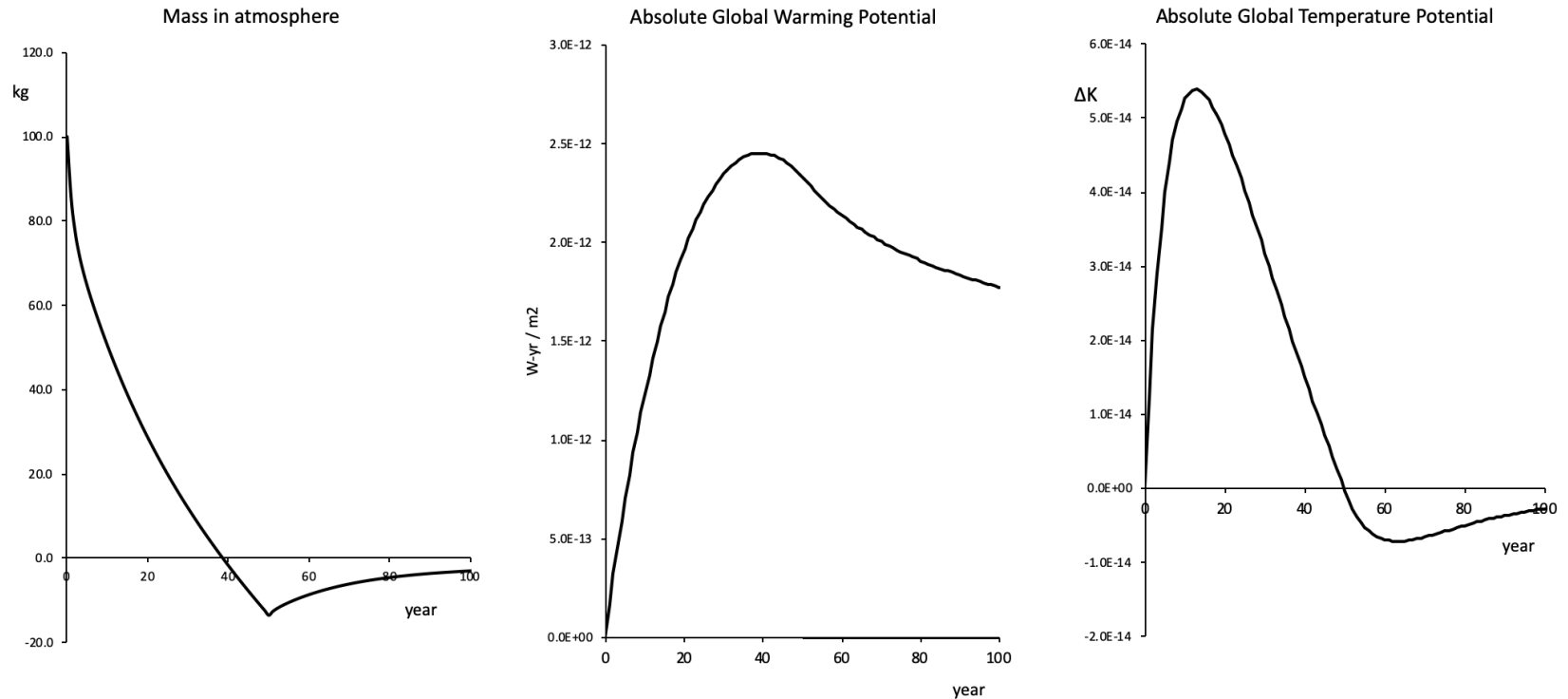
CO₂ flux varying with time

100kg CO₂ emitted in year 0, 2kg/year CO₂ absorbed in years 1 to 51



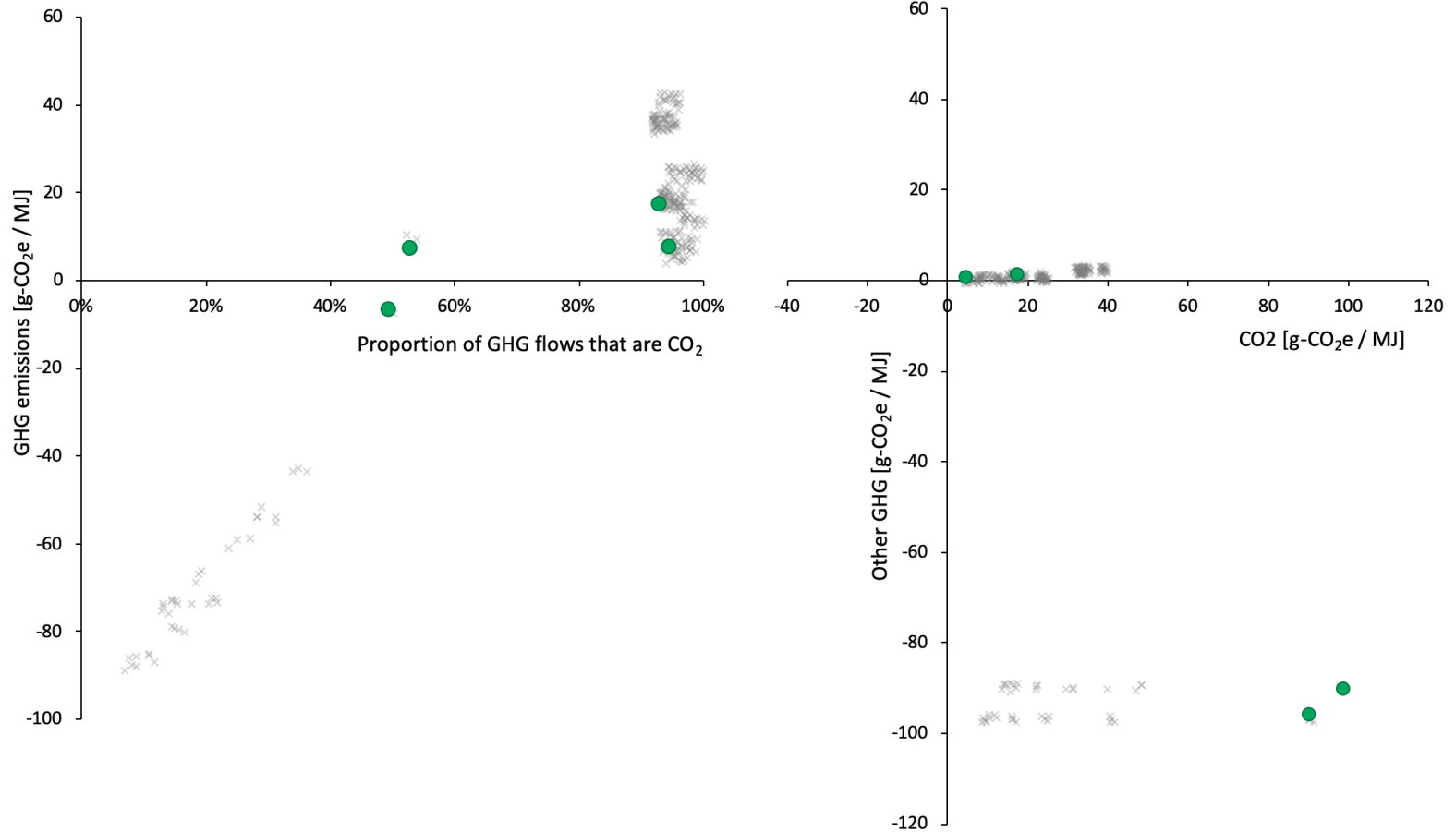
CO₂ flux varying with time

100kg CO₂ emitted in year 0, 2kg/year CO₂ absorbed in years 1 to 51



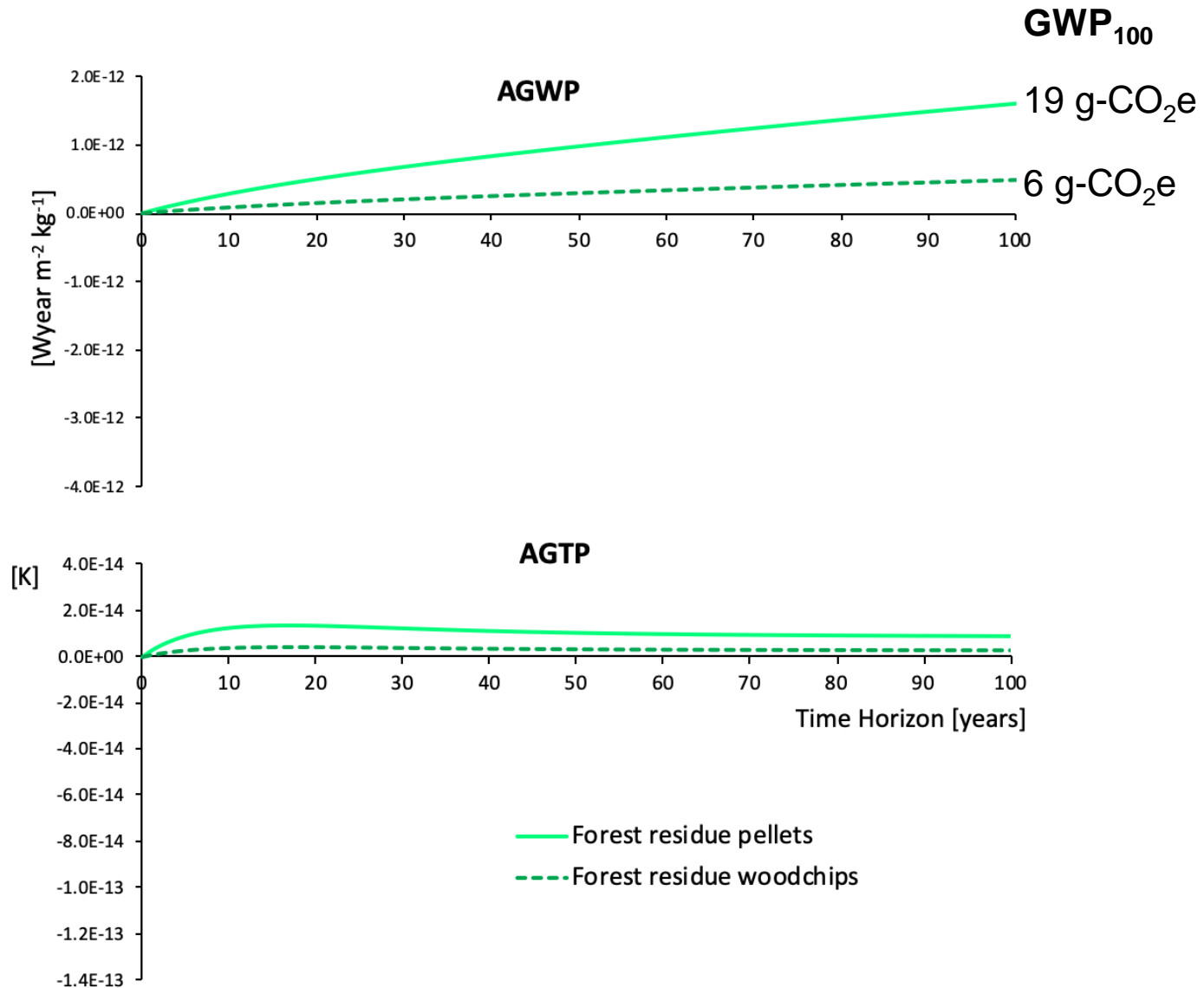
Note that damage mechanisms are more complex and relate to range of effects!

GWP₁₀₀ results – bioenergy supplying district heating

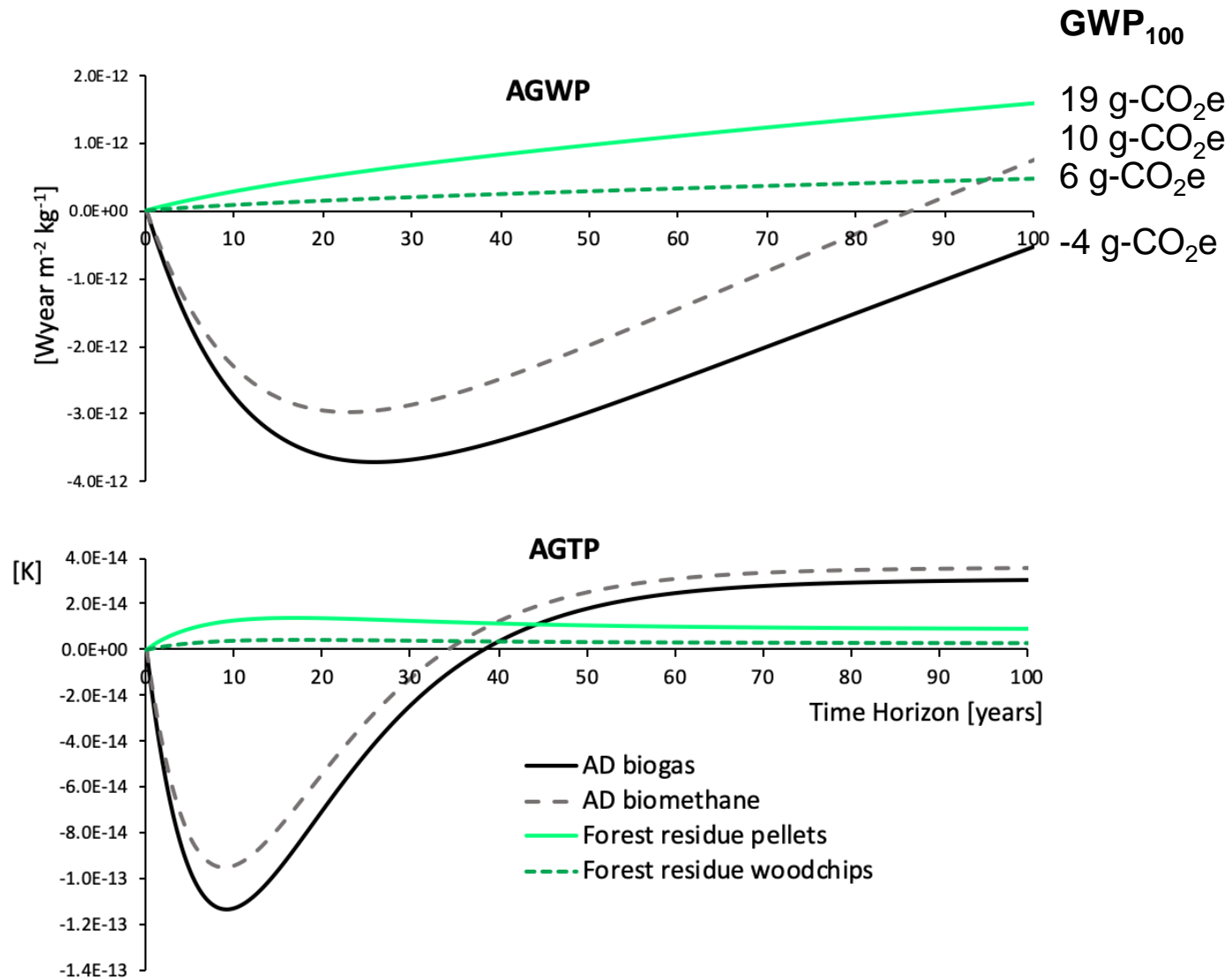


(data from Biograce-II)

AGWP and AGTP variation with time



AGWP and AGTP variation with time



Recommendations

- The GWP100 metric has limitations that are well recognised in climate science but **typically not reflected in LCA work. This can be a problem as LCA results are often used as a decision-making tool.**
- For LCA work in which climate change is a key impact category, we recommend that warming and temperature effects over time are reported.
 - We have produced a simple spreadsheet to facilitate this.
- If this is not possible, it would be good to report GTP as well as GWP at appropriate (and consistent) time horizons.
- Or, otherwise to report gases separately (probably in addition to above) or note any caveats relating to the timing of impacts (e.g. if the GWP is substantially due to anything other than a CO₂ pulse emission).

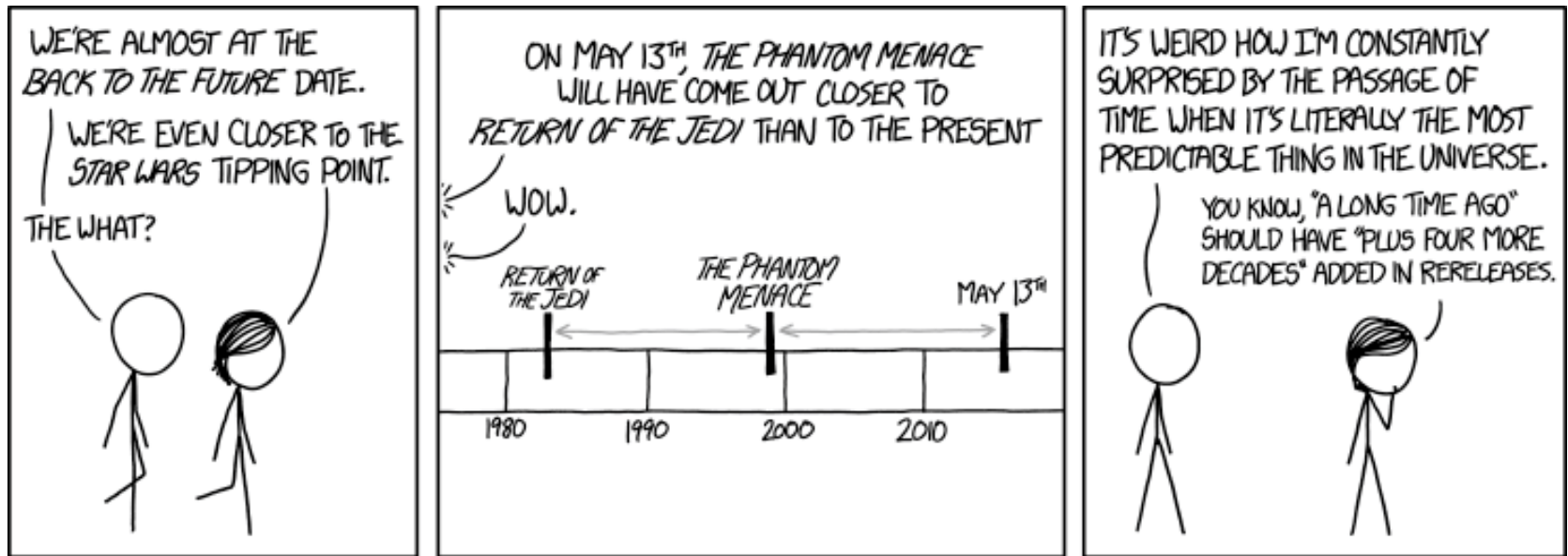
Broader Conclusions

- Other (non-climate change) impacts may exhibit similar properties over different time scales. Future work might include investigating this further.
- More generally, we believe that this rationale supplies additional evidence / support / driver for activities to abate CO₂ emissions now rather than in the future. This effect of timing is potentially underplayed in IAMs that use a fixed time horizon.
- Rapid development of quick options and of long-term abatement (through forestry and bioenergy crops) should begin now even if future uses are less optimised.
- (Speculatively), perhaps policy that incentivises the actual abatement part of bioenergy (that could start to occur now) should be separate and additional to incentives for effectively using it (which might vary more and operate over different time scales).

Thanks!

sjgcooper@bath.edu

temporary folder with spreadsheet: tiny.cc/xicsfz



GWP and GTP variation with time

