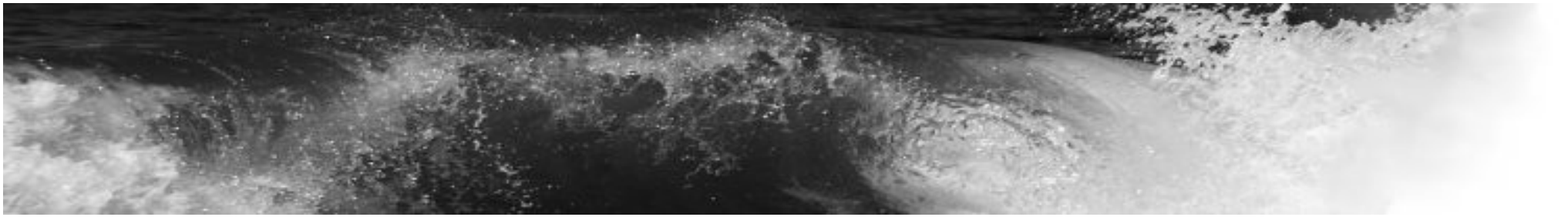
Delayed CH4 emissions



Linear approaches to impact correction
Article submitted to J of Ind Ecology

Maartje Sevenster
July 2013
ALCAS conference Manly

Short-cycle carbon

Delayed emissions in LCA/CFP

Cut-off at time horizon (usually 100 years) or gradual effect?

Recent literature on this topic:

Brandão M., Levasseur A., Kirschbaum M., et al. 2013. Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. Int Journal LCA 18 p.230

Levasseur A., Lesage P., Margni M. and Samson R. 2012. Biogenic Carbon and Temporary Storage Addressed with Dynamic Life Cycle Assessment, Journal of Ind Ecology Vol 17(1) , p.117

CFP standards

Delayed emissions in LCA/CFP

None allow including in main CFP unless specified in PCR; separate reporting optional

PAS2050-2011 Linear approach distinguishing single release < 25 yrs and other cases

ISO 14067 draft Optional reporting for delay > 10 yrs; no preference for calculation method

GHG protocol No preference for calculation method but if applying “weighting” to e.g. combustion emissions then also to recycling benefits

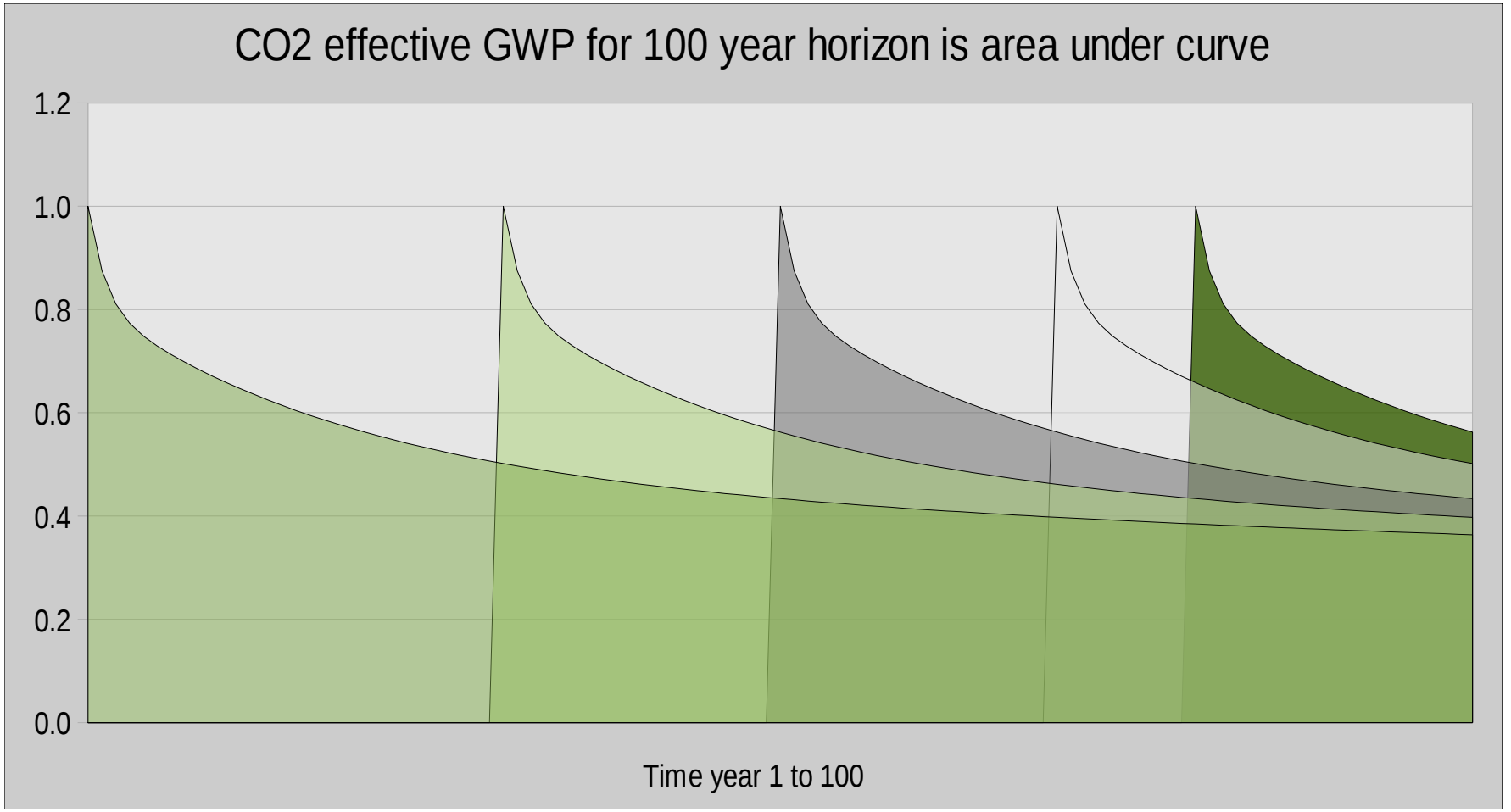
ILCD Handbook Linear approach for all GHG with characterization factors in kg CO2eq/(kg*a)

French BPX Part of the carbon foot print if required by specific PCR Linearized approach, but take into account life span of GHG

Dynamic approach

Carbon dioxide

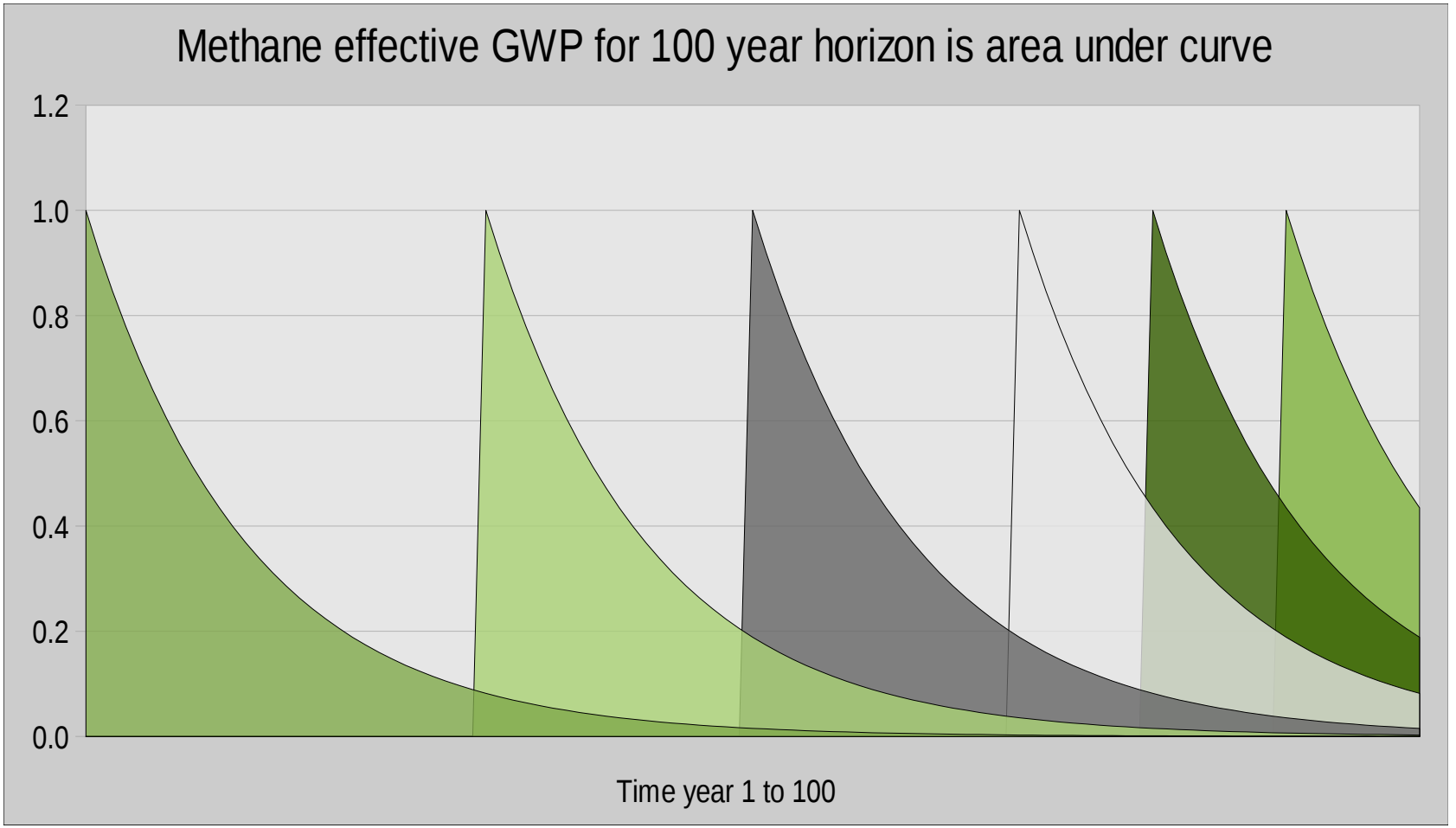
Strong effect for time horizon = 100 yr even with delay < 50 yr



Dynamic approach

Methane

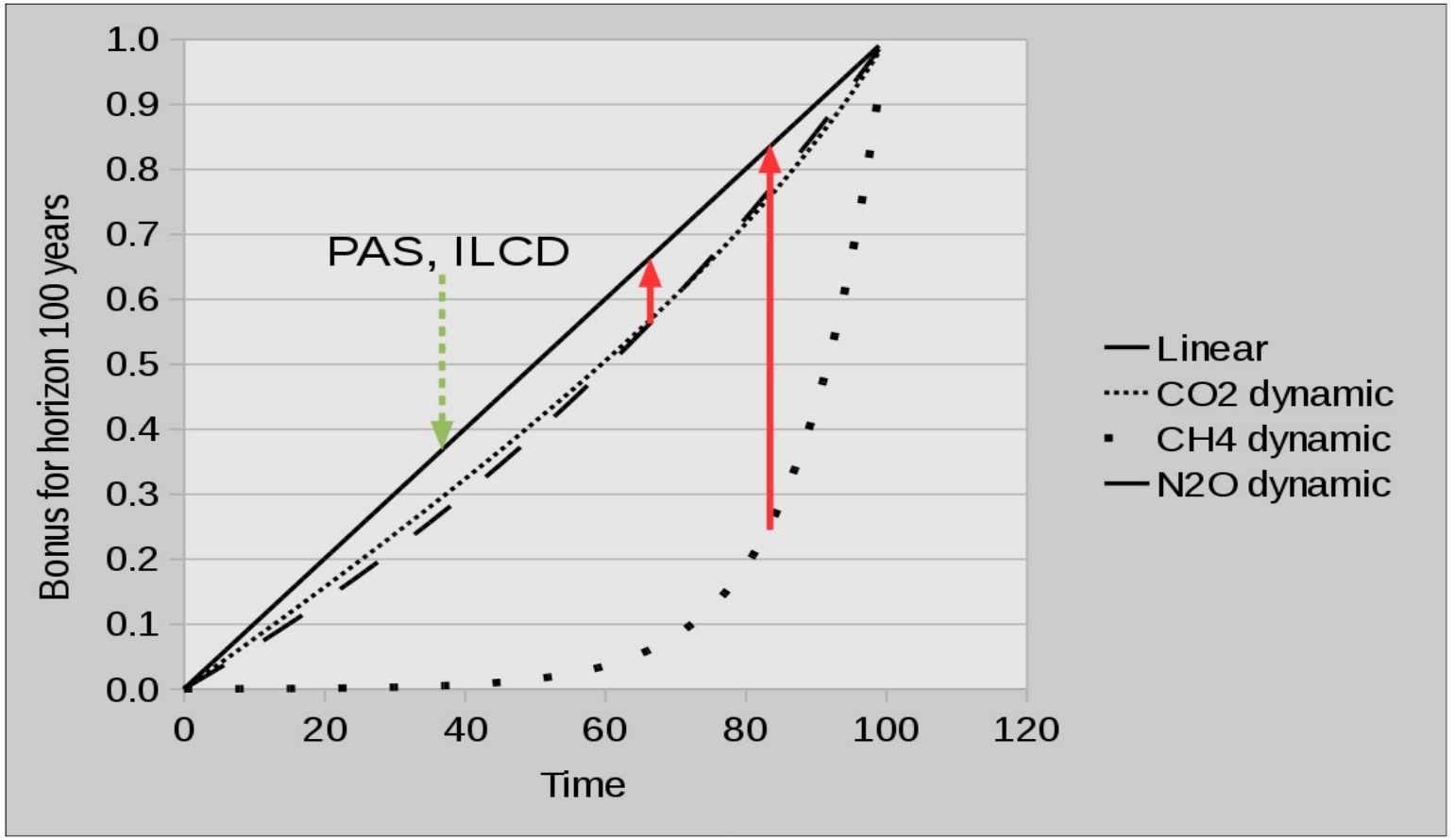
No effect for time horizon = 100 yr for delay < 50 yr



Comparison

Dynamic versus linear

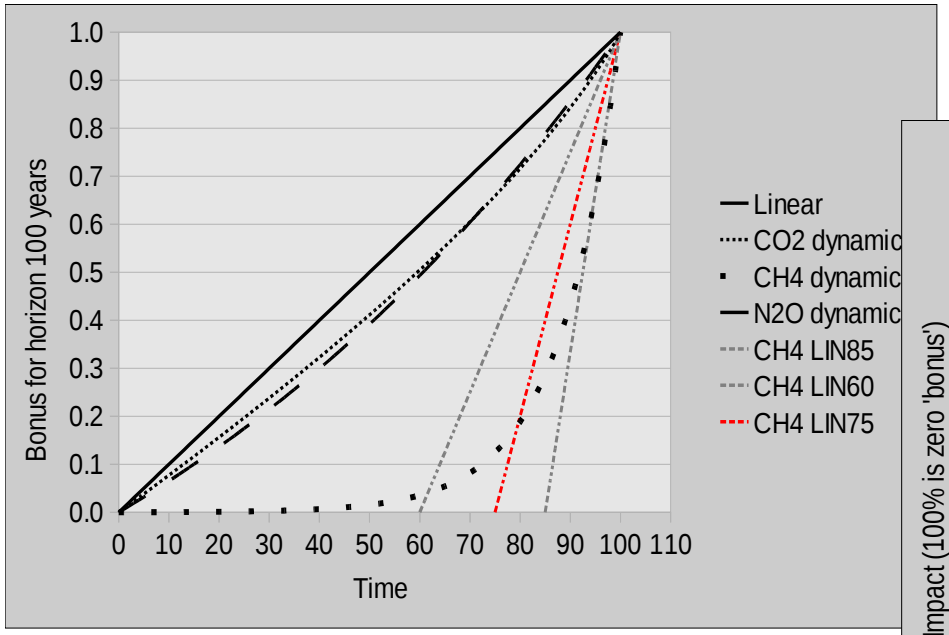
For time horizon = 100 yr linear approach (as in PAS, ILCD) small deviation for CO2, N2O but huge deviation for CH4

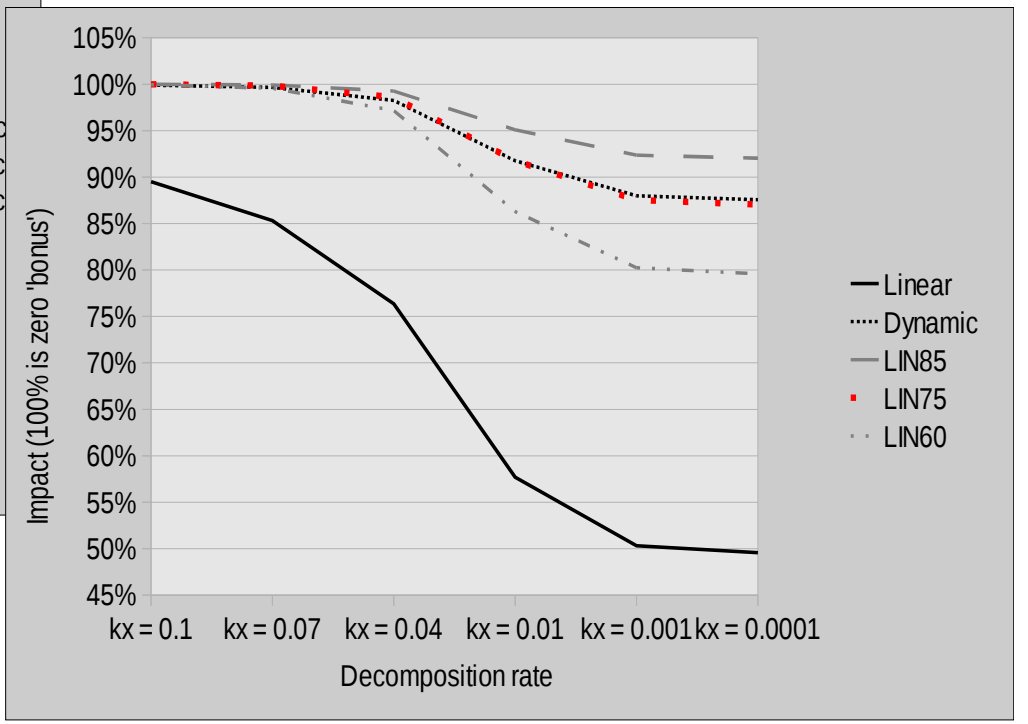


Linear 2.0

No accounting period

Assume a linear approach for methane from t=75 instead of t=0
Good fit in many circumstances and a better estimator than ILCD approach in all cases





Modified linear approach

Methane, time horizon = 100 yr

French BPX guidelines : impact = GWP * (100-T_{emit})/100 only if life span of gas > (100-T_{emit})

Mean life CH4 = 12 yrs (half life 8 yrs), but even for emission at t=90 the linear approach gives an overestimate (slide 6)

*Modification for CH4 : impact=GWP *(100-T_{emit})/25 if T_{emit}>75*

ILCD Handbook : correction flow is mass(T_{emit})*(T_{emit}-0), characterization 0.25 kg CO2eq/(kg*a)

Modification for CH4 : correction flow is mass(T_{emit})(T_{emit}-75) if T_{emit}>75, characterization 1.0 kg CO2eq/(kg*a)*