CONNECTING LAND USE TO TIMBER CONSTRUCTION

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CONTEXT

EU ambitions to achieve carbon neutrality by 2050

Requires GHG emissions reduction and carbon offsetting

	Emissions reduction	Carbon offsetting
Land based sector	Increase agricultural efficiencies	Increase forest cover
	Shift towards plant based diets	
Construction sector	Increase use of timber (and recycled materials)	
	Reduce waste	

What type of forests should we plant? - Biodiversity conservation vs commercial forestry

How significant is wood use in construction – would quantifying the benefits increase uptake?

Lack of comprehensive life cycle assessments (LCA) on whole commercial forestry value chains

GOAL & SCOPE

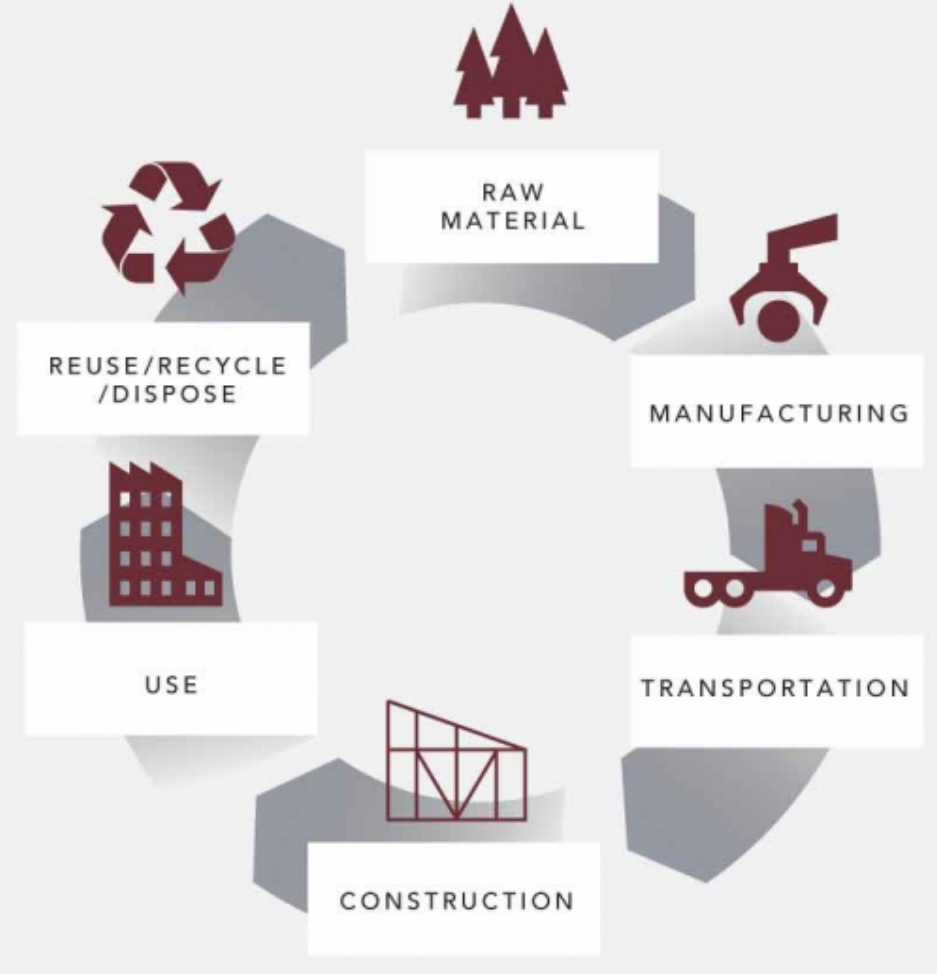
Quantify (consequential) GWP impact of afforesting 1 ha commercially managed forest on marginal grassland

- Establish key factors affecting climate change mitigation potential of wood
- Understand dynamics of C (capture and) storage in forest and HWPs
- Quantify environmental importance of wood use in construction
- Quantify potential impact of displacing extensive livestock production

Duncan Shaw/science Photo Library

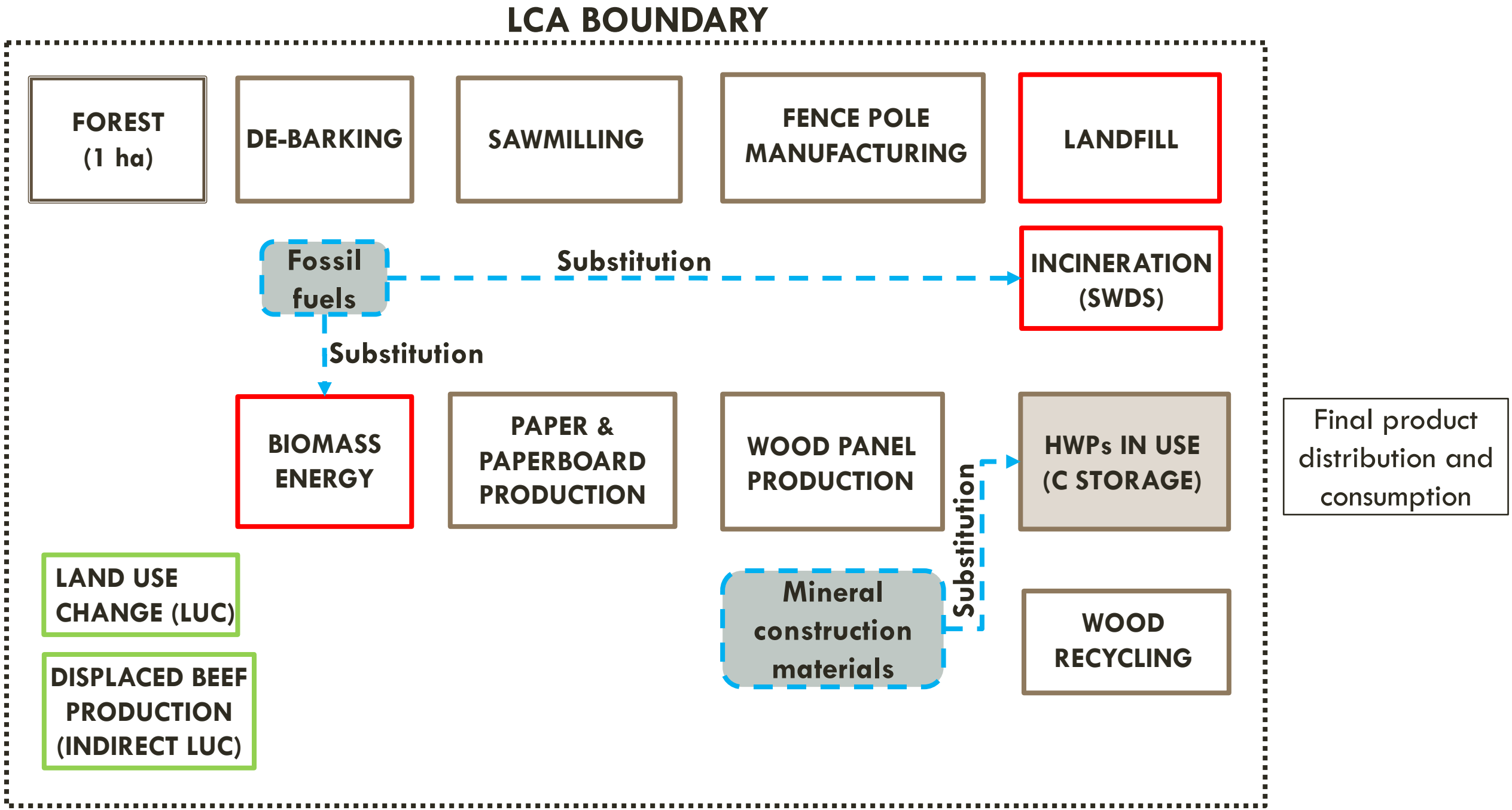
http://www.marksheehanconstruction.com

LCA OVERVIEW



https://www.naturallywood.com/wood-design/life-cycle-assessment

1. Define goal and scope
2. Calculate inventory (flows of inputs/outputs of materials and energy at each life stage)
3. Carry out impact assessment
4. Analyse results

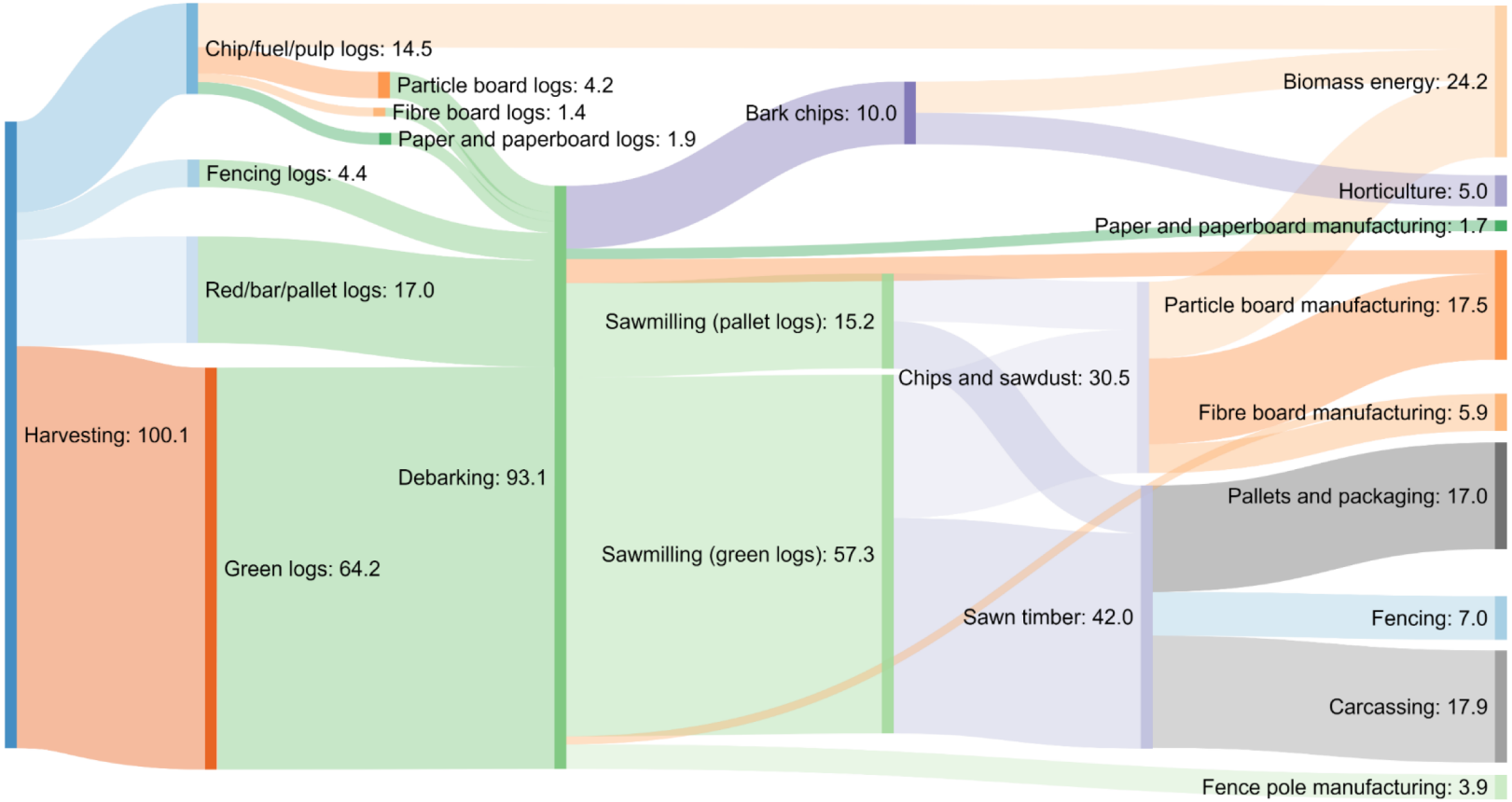

LCA BOUNDARY
FOREST (1 ha)
DE-BARKING
SAWMILLING
FENCE POLE MANUFACTURING
LANDFILL
Fossil fuels
Substitution
INCINERATION (SWDS)
Substitution
BIOMASS ENERGY
PAPER & PAPERBOARD PRODUCTION
WOOD PANEL PRODUCTION
HWPs IN USE (C STORAGE)
Substitution
Mineral construction materials
WOOD RECYCLING
LAND USE CHANGE (LUC)
DISPLACED BEEF PRODUCTION (INDIRECT LUC)
Final product distribution and consumption

METHODOLOGY – WOOD FLOW (C BALANCE)

Modelled forest growth/timber production using CBM-CFS3 (100yr period, 50 yr rotation, clear fell, Sitka spruce, yield class 18, conversion from grass land)

Produced wood flow - real harvest and sawmill data (primary wood use), UK wood/paper recycling data

Calculated HWP C storage - decay factors (IPCC & Dymond, 2012)

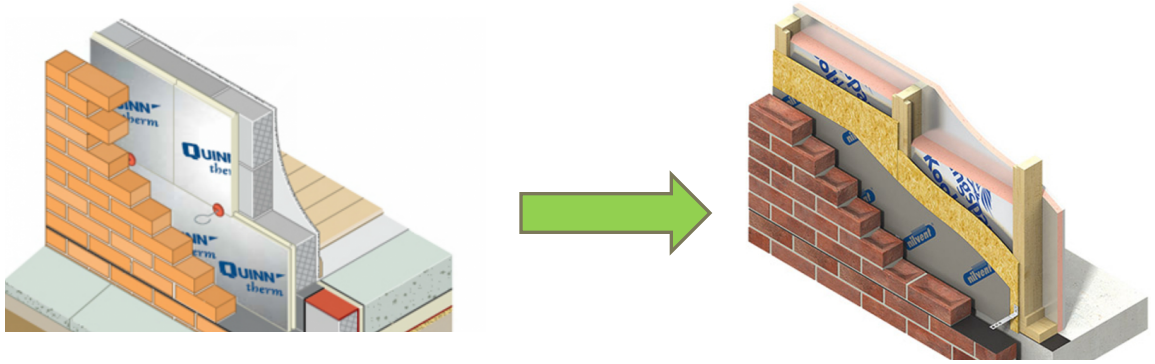


METHODOLOGY – INVENTORY

Inventory calculated from Ecoinvent unit processes (scaled from wood flow)

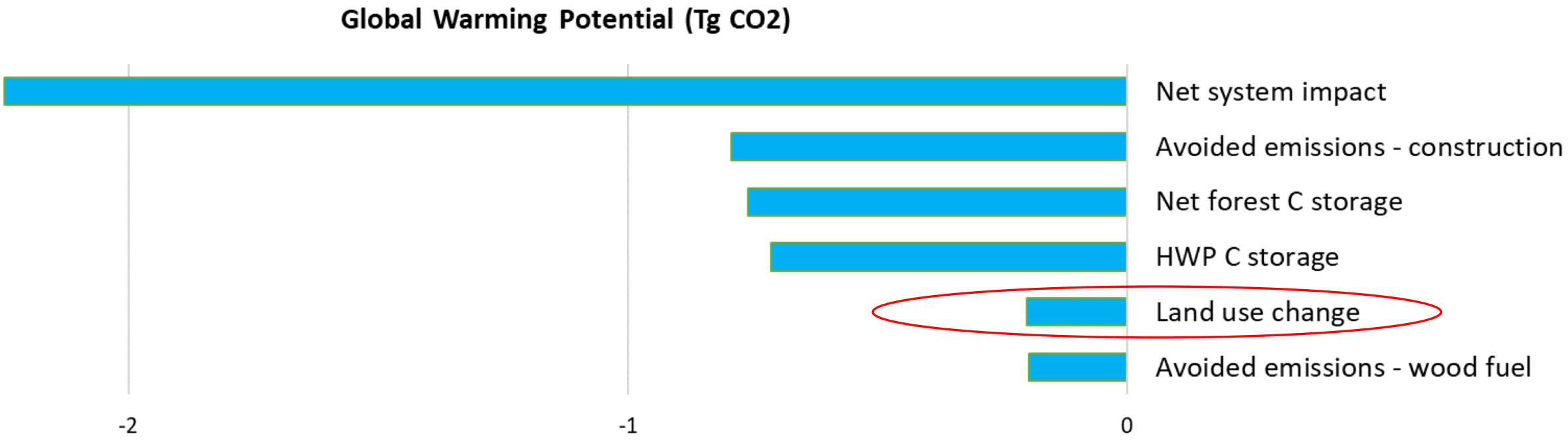
Avoided emissions fossil fuels – as above

Avoided emissions construction – substitution concrete block wall with timber frame



Land use change – conversion beef grazing; displace beef production to Europe (intensive), Brazil (extensive), or no displacement)

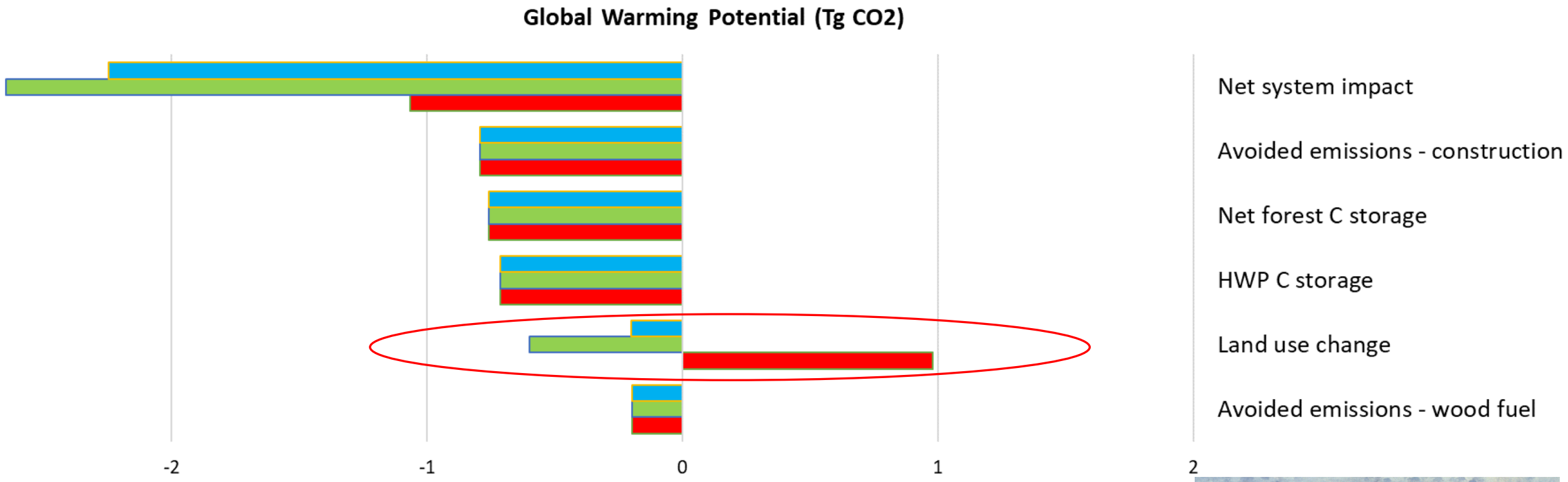
IMPACT ASSESSMENT



Scenario 1 (Baseline) – extensive beef production displaced to intensive beef production (Europe)

- GWP impact = -2.25 Gg CO2 eq.
- 86% of impact contribution comes from top 6 factors

IMPACT ASSESSMENT – LAND USE CHANGE



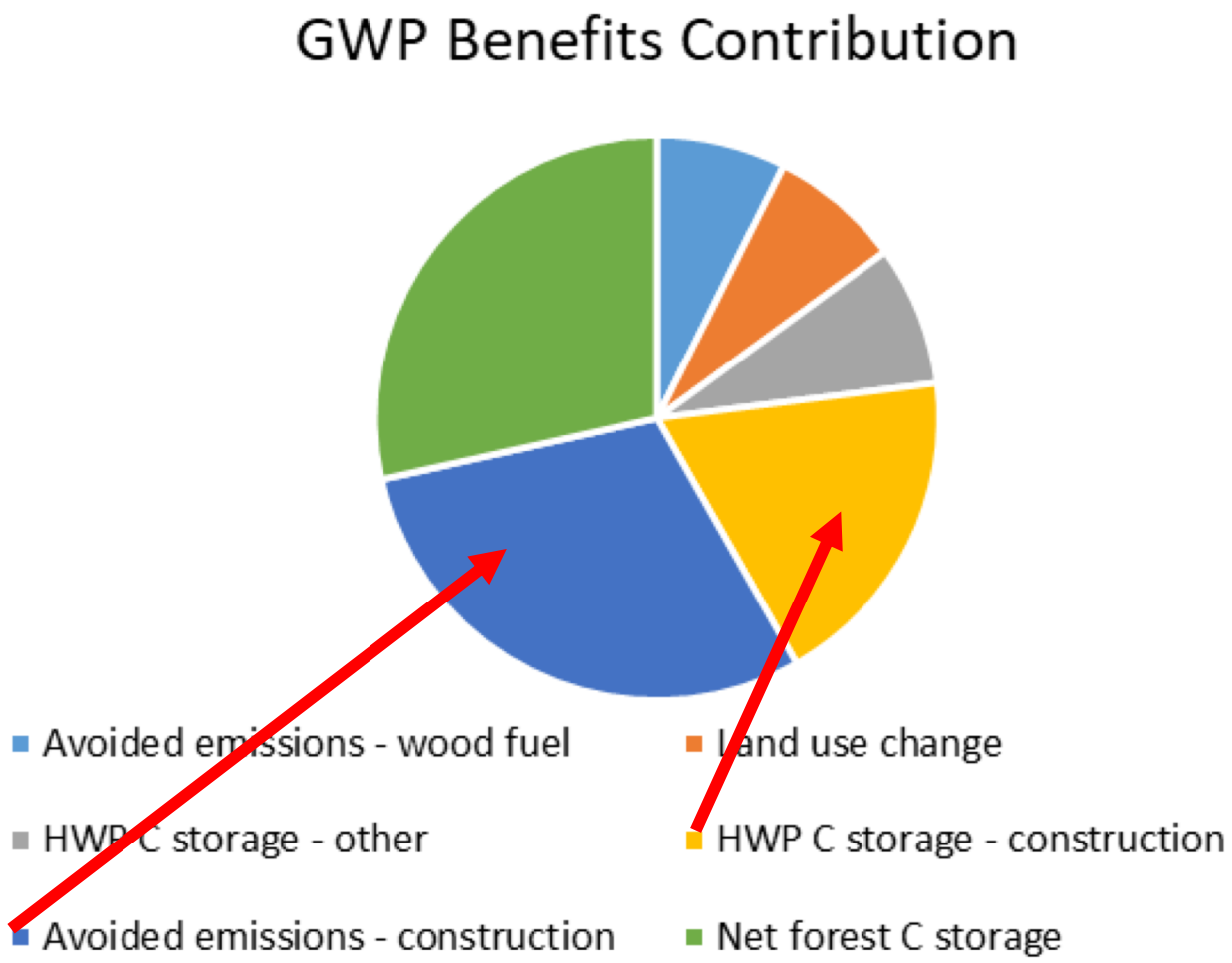
Red: extensive beef production displaced to Brazil

- GWP benefit reduced by 55%

Green: reduced meat consumption, no displaced production

- maximum benefit (18% improvement from baseline)

CONTRIBUTION BY CONSTRUCTION SECTOR

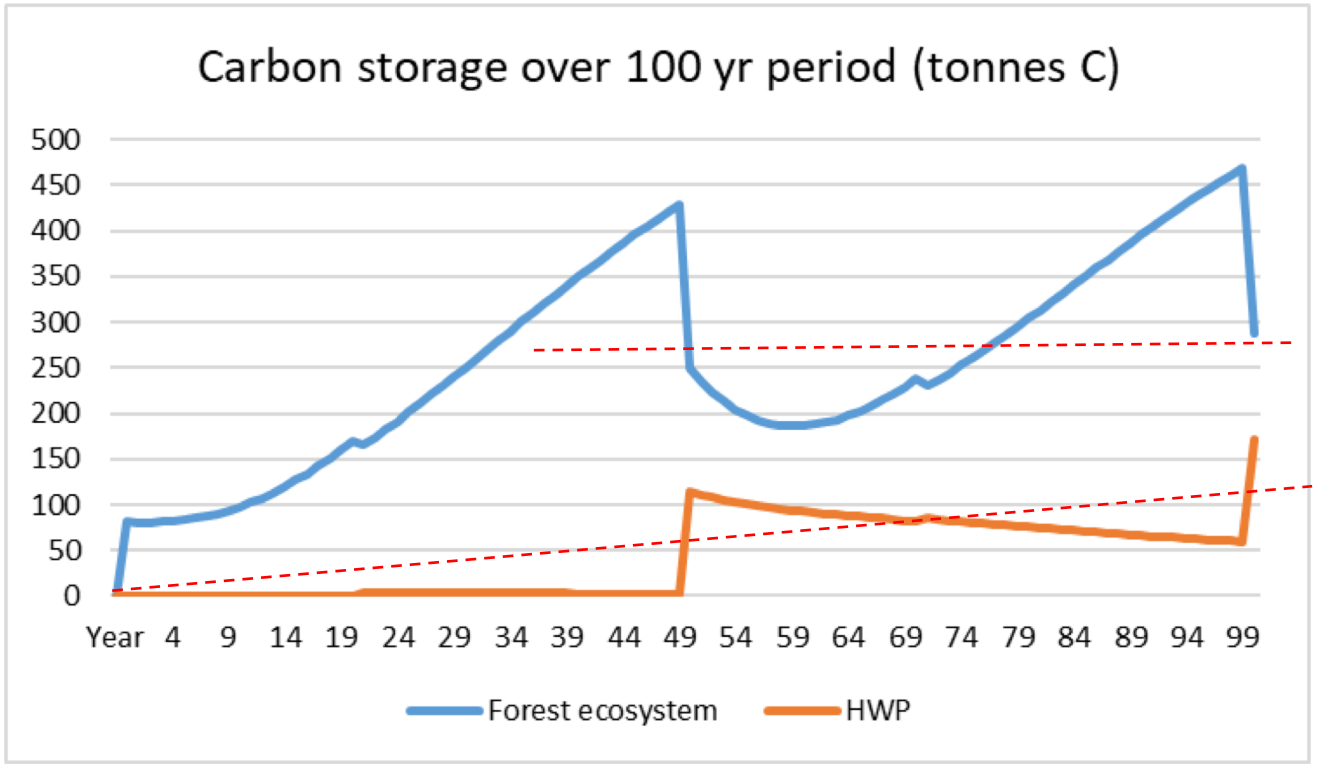


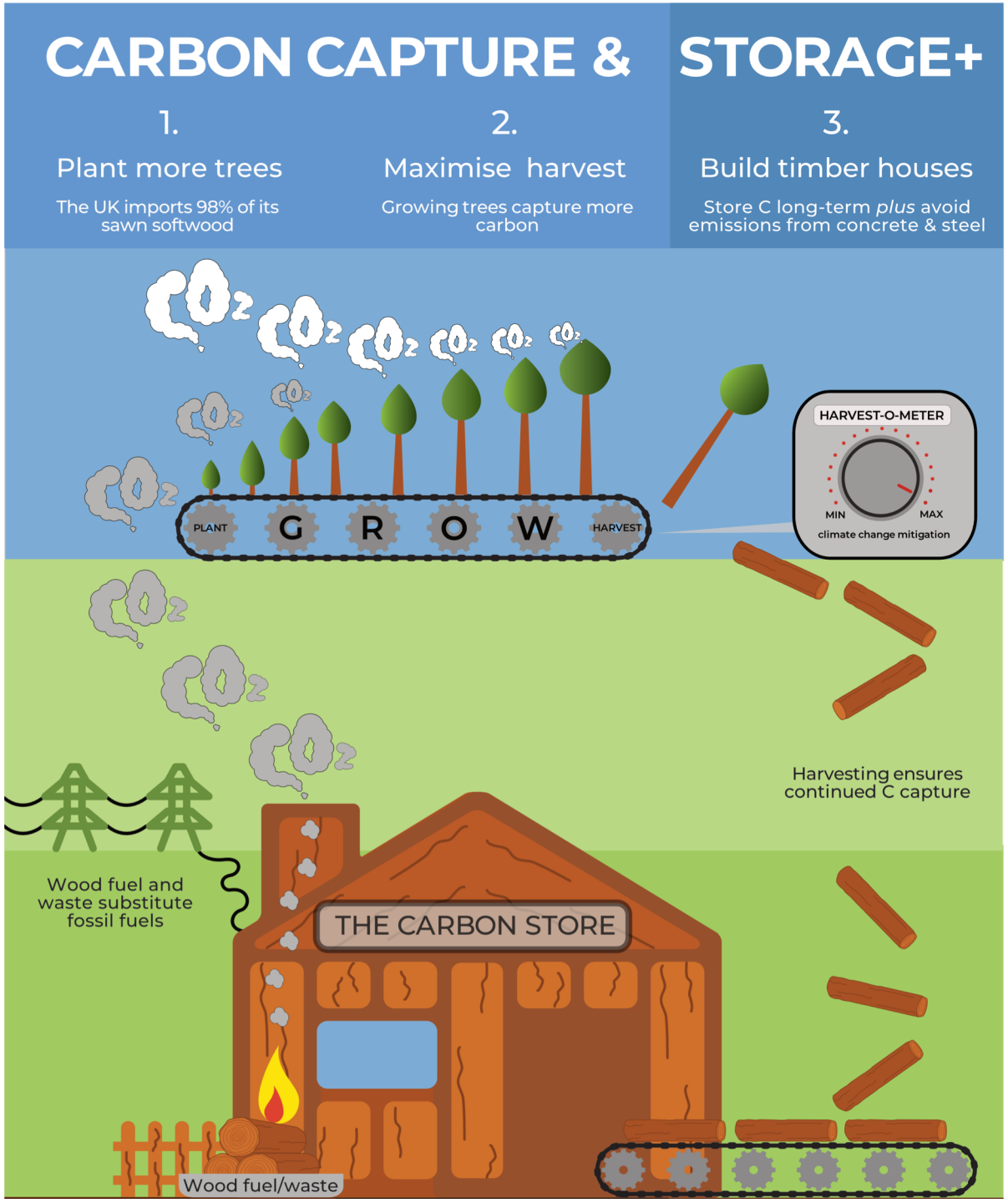
- 70% HWP C storage is in construction products
- 50% of total GWP impact benefits come from construction

CARBON DYNAMICS

Forest C pool relatively stable on average

HWP C pool grows over time as C transfers from forest to long term HWP storage (construction)





ONGOING WORK

Building on this LCA to:

1. Evaluate different timber value chain scenarios - range of timber product mixes (and product displacement scenarios)
2. Evaluate different forest management and land use change scenarios

THANK YOU

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