

Angers
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research group for environmental
life cycle & sustainability assessment

SOCLE: Soil Organic Carbon modelling in LCA to improve environmental assessments

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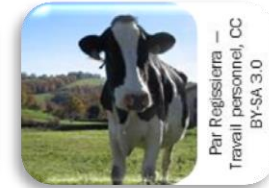
- *Context:* ADEME SOCLE project 2015-2017



- *Scope:* Soil Organic Carbon & Climate Change in LCA
- *Objective:* Towards a consensual LCIA model...
 - Review/recommendations on how to model in LCA:
LULUC x agri. practices \Rightarrow Δ SOC \Rightarrow GHG
 - Feasibility/sensitivity for various agricultural products

○ Investigated agricultural products

- 3 temperate crops
wheat-maize-vine
+ meat-milk
- 2 tropical crops
soybean-sugar cane



○ Tested parameters

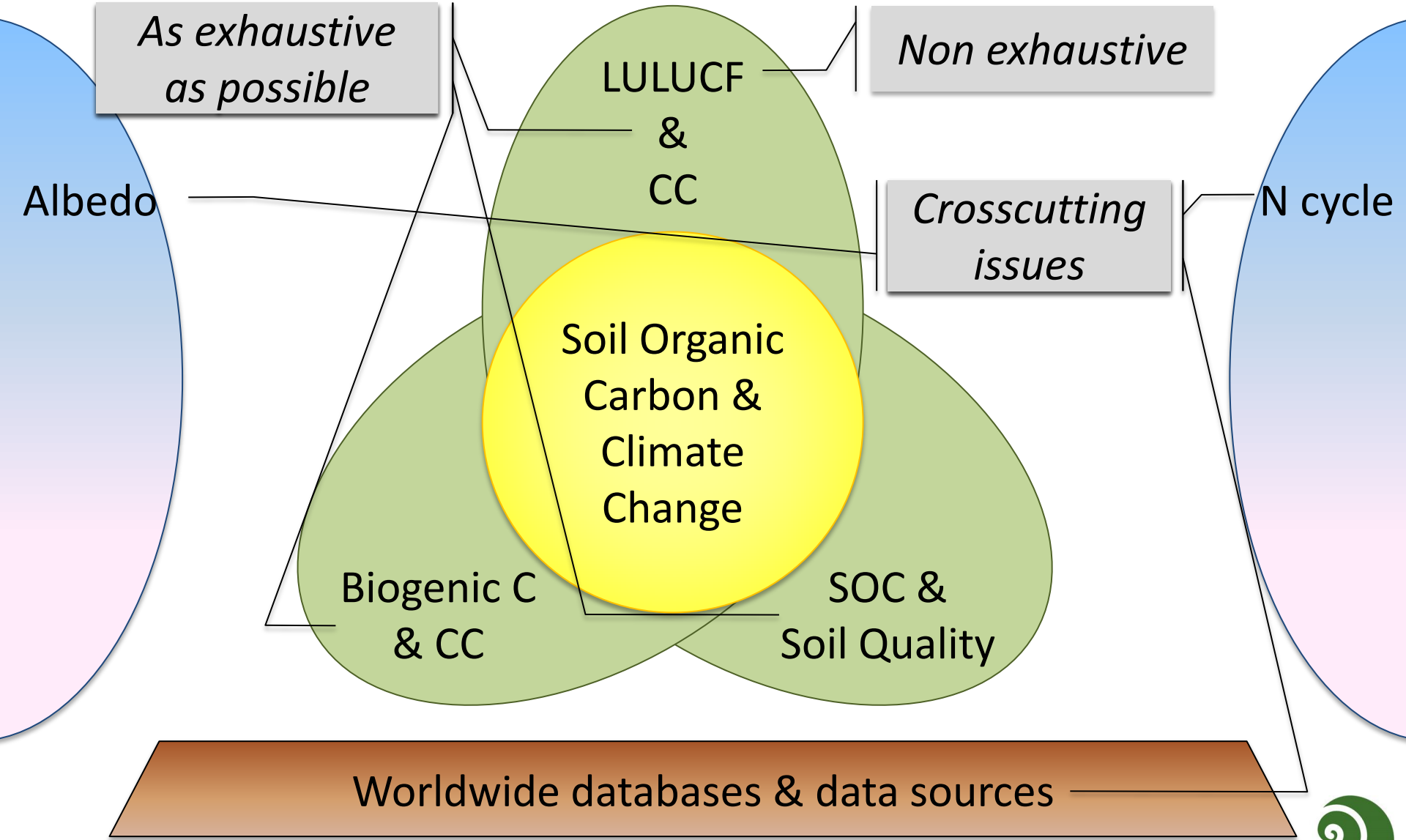
- Methods
- Changes in practices (at least 2 scenarios per crop)
- Reference state
- C stock data and relaxation time
- Temporal allocation of impact
- Link C/N

- Scope of this presentation
 - Mapping of existing methods
 - Preliminary results for soybean and sugar cane:
 - Changes in practices
 - Reference state
 - C stock data and relaxation time
 - Temporal allocation of impact
 - Link C/N

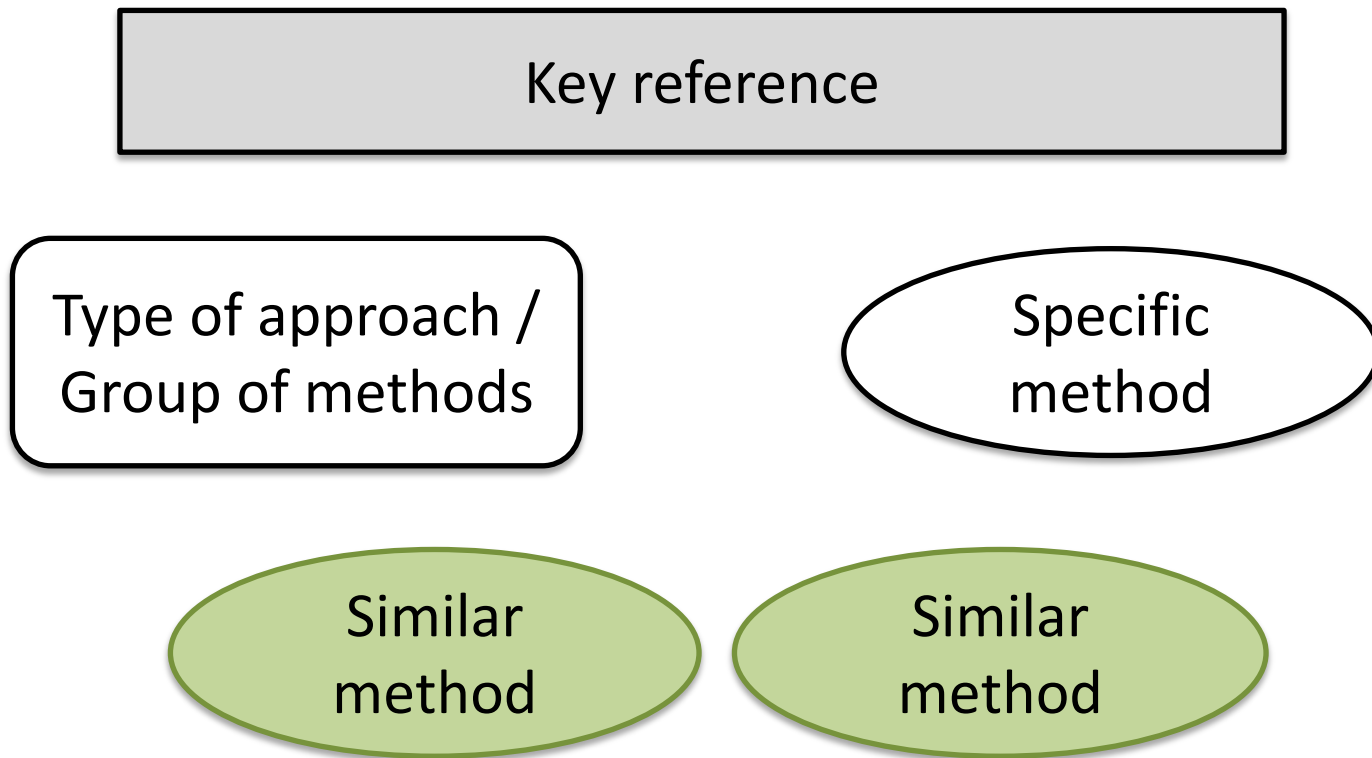
LUC: Land Use Change

LMC: Land Management Change

MW&B: Müller-Wenk & Brandão, 2010



- Mapping caption



Key institution or key guideline

Mapping: LULUCF & Climate Change

IPCC, Guidelines for National GHG inventories, 1996 / 2006

Stock difference method



Project assessment tools



Gain-loss method



ILCD, CO₂ emissions from transformation



CDM (UNFCCC)

VCS

EX-ACT (FAO)

...

Schmidinger & Stehfest, 2012



Benoist & Cornillier, 2016



Müller-Wenk & Brandão, 2010



UNEP-SETAC, Land use framework, 2007 / 2013

Biogenic Carbon & Climate Change

IPCC, Assessment Reports, 1990 / 1995 / 2001 / 2007 / 2013

Global Warming Potential

Carbon neutrality

Other metrics

Full accounting

Global Temperature change Potential

Lashof method
(Fearnside et al., 2000)

Dynamic LCA
(Levasseur, 2011)

Time-adjusted GWP
(Kendall, 2012)

Temporary C storage
Delayed emissions
(ILCD, PAS2050)

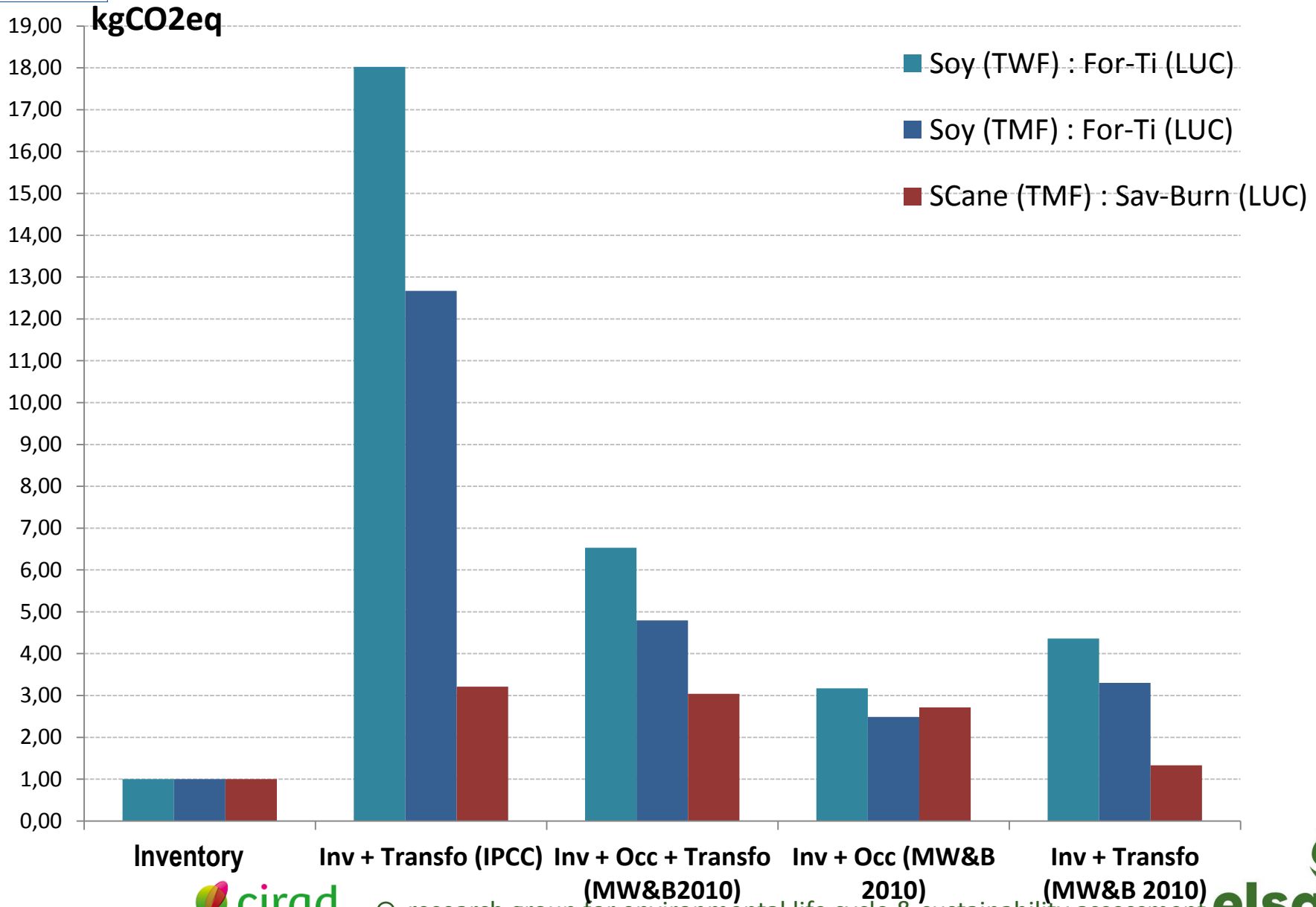
Petersen et al., 2013

Biogenic GWP
(Cherubini et al., 2011)

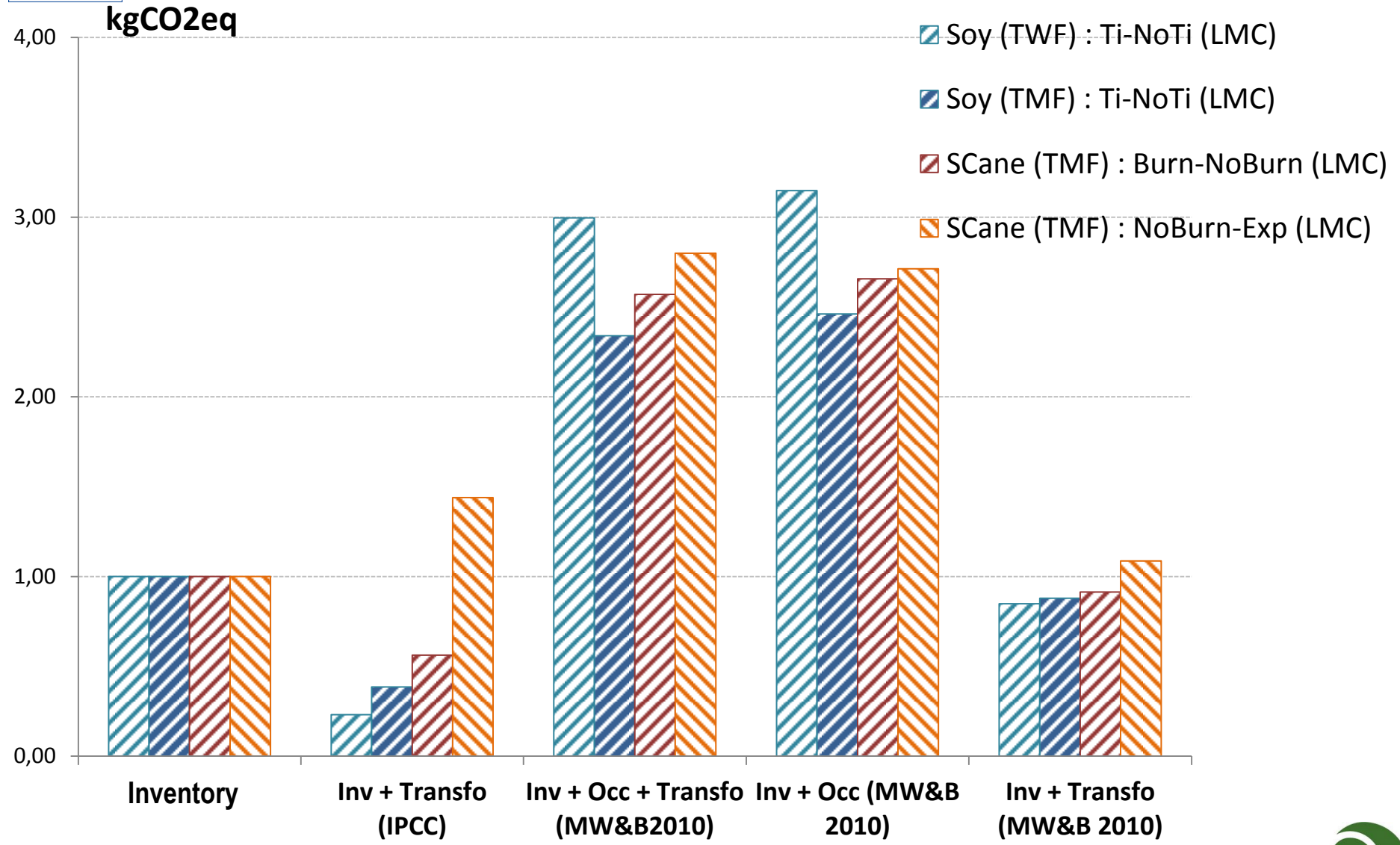
Vogtländer et al., 2014

Biogenic Assessment Factors (EPA)

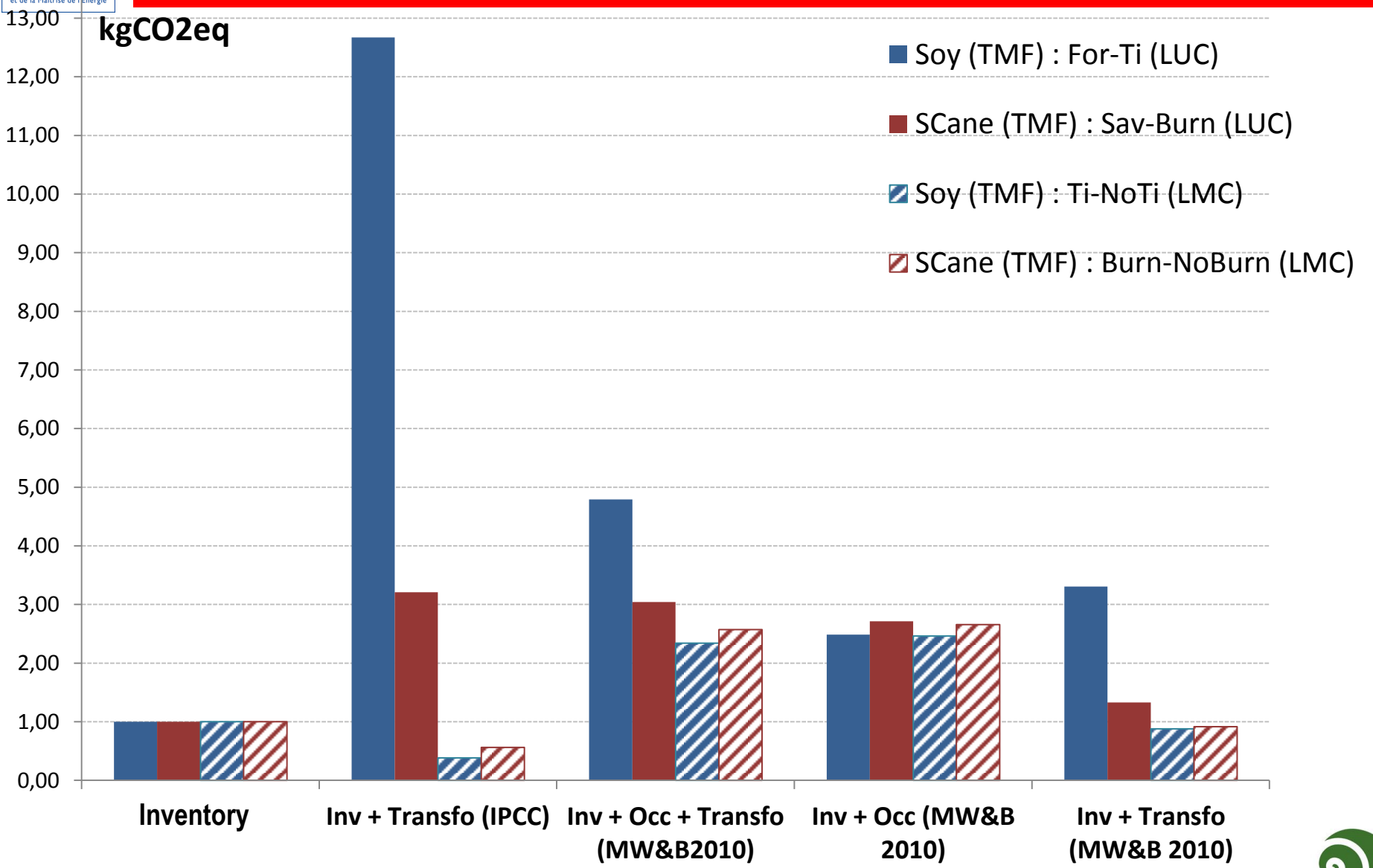
IPCC & MW&B: impacts of LUC



IPCC & MW&B: impacts of LMC

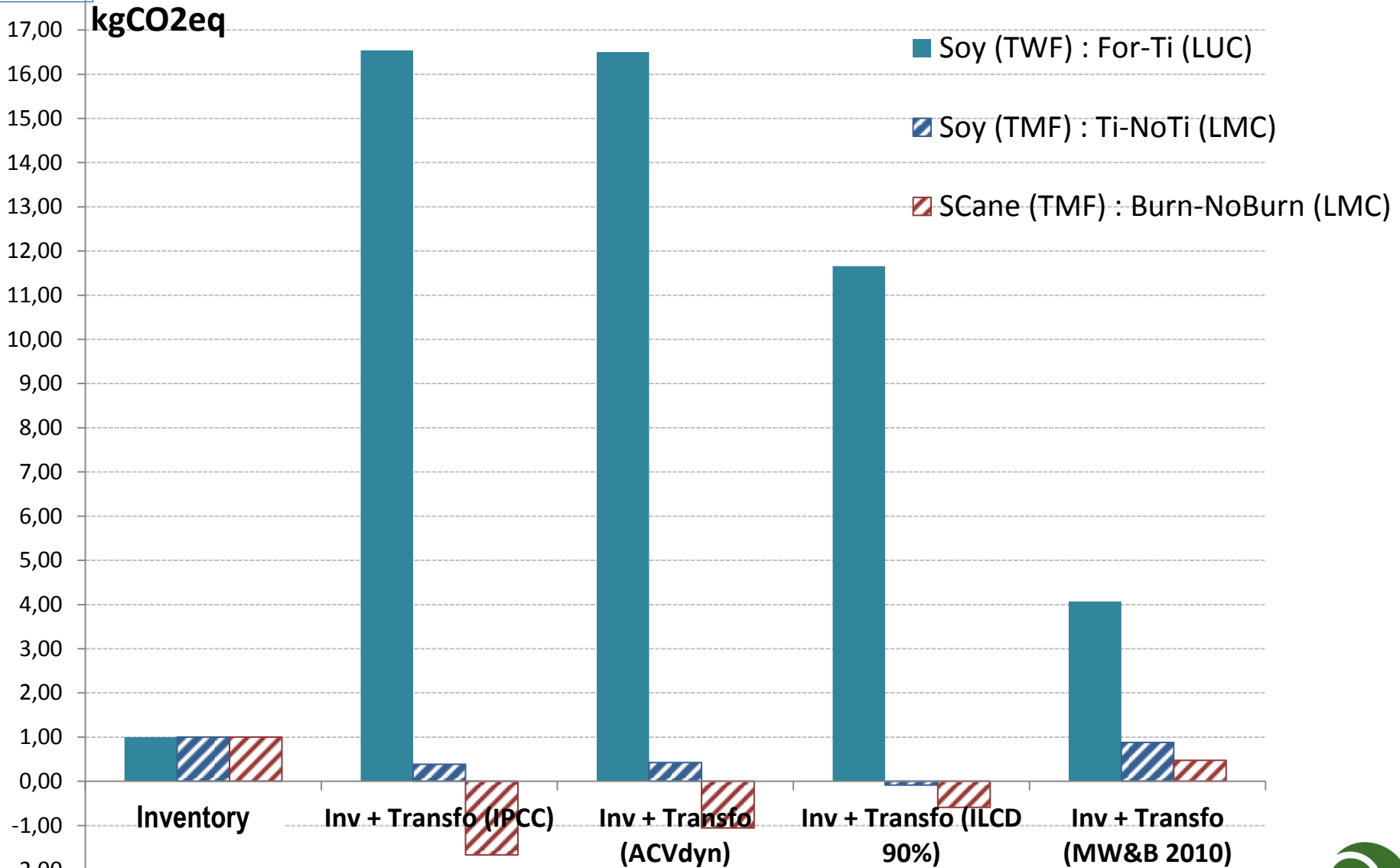


IPCC & MW&B: LUC & LMC





Impacts of LUC time allocation



- Mapping
 - an abundance of published methods
 - many redundancies, few operational ones
 - we targeted those allowing for linking LULUC-SOC-CC
- Results of case studies
 - LUC & LMC influence CC impact
 - Occupation & transformation MW&B are both significant
 - The method choice influences LUC results
 - All tested methods are sensitive to practices
 - Accounting of C/N is not negligible for some LMC
- More results to come



Thank you for your attention!

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