

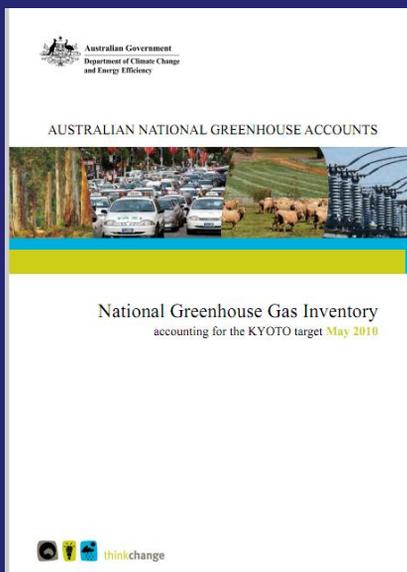
Dealing with time in LCA and carbon footprinting – current approaches, focus on bioenergy

Annette Cowie

University of New England



Inventory



- UNFCCC reporting
- Kyoto Protocol accounting



Emissions trading

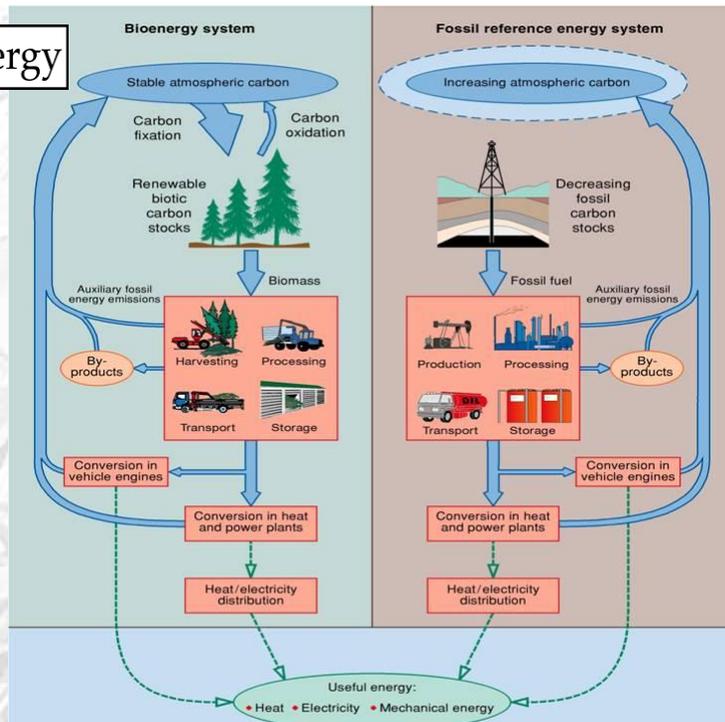
Project offsets

- International:
 - Kyoto Protocol Clean Development Mechanism
 - Verified Carbon Standard etc
- Regional/National:
 - European ETS
 - Eg Australia: Carbon Farming Initiative



IEA Bioenergy

Task 38

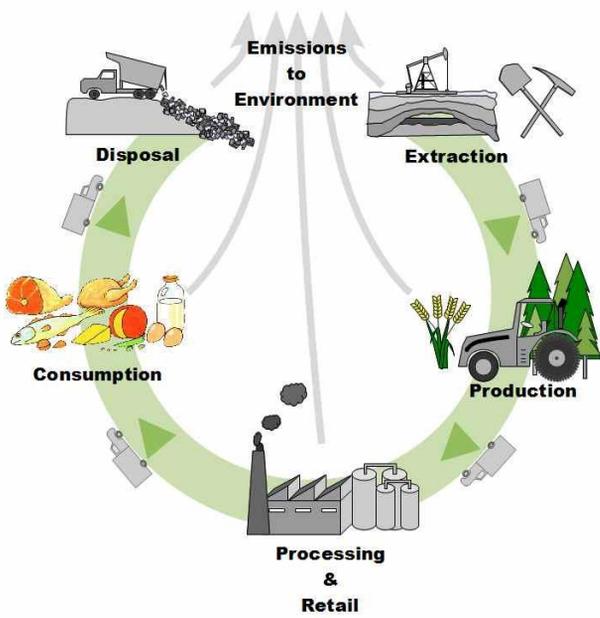




Life cycle assessment – Carbon footprint



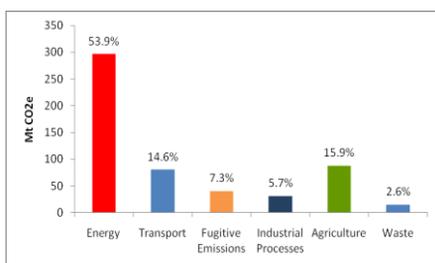
Life cycle assessment





International context

- Inventory reporting
- UNFCCC
- All parties
- GHG accounting
- Kyoto Protocol
- Annex I parties



Sectoral boundaries
National scale
IPCC Guidelines

Annual emissions / removals



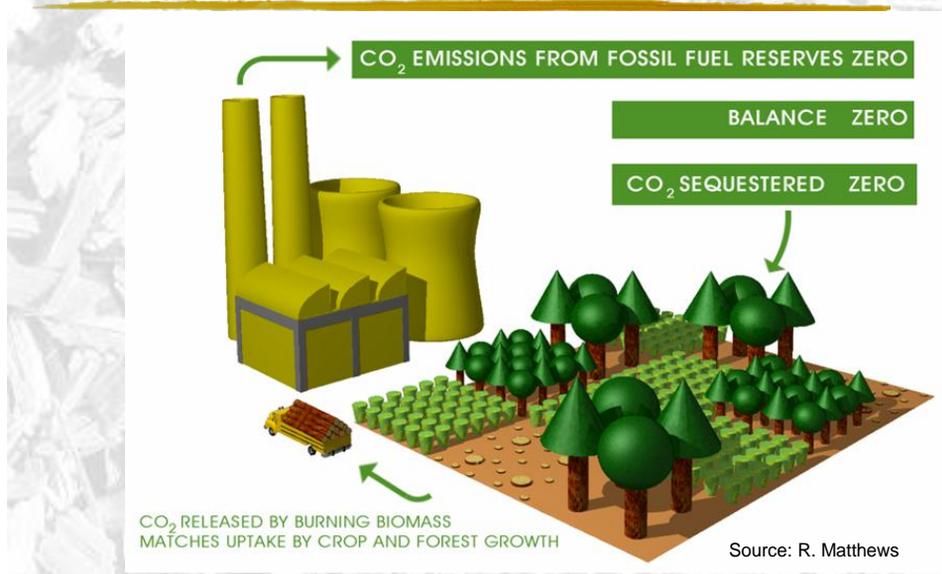
Industry context

- Offsets
- Project credits
- Businesses
- LCA
- Carbon labels
- Products or organisations

Cradle to grave boundaries
Farm/forest scale
Scheme Guidelines, Standards

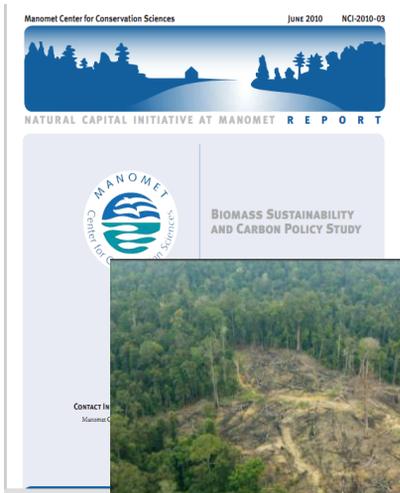
Emissions reduction, removal enhancement

Bioenergy: carbon neutral?



Not carbon neutral because:

- Production chain emissions
- Non-CO₂ GHGs
- C stock change in biomass, soil (direct effects, may involve dLUC)
- C stock change in biomass or soil thru ILUC
- New challenges – climate neutrality?
 - Atmospheric impacts
 - Albedo and other biophysical effects on climate



Biomass better than coal? War over carbon accounting erupts

In Washington, the [Environment Working Group](#) has released a study that claims the impacts of the [American Clean Energy and Security Act \(ACESA\)](#)—which has already passed the House of Representatives—would require the equivalent of cutting between 18 and 30 million acres by 2025, and up to 50 million acres by 2030.

"From Maine to Washington state, from Ohio to Florida," the EWG report says, "electric utilities have been embracing "biomass power" as a way to reduce dependence on coal and other fossil fuels and to meet ambitious goals for limiting greenhouse



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CLIMATE CHANGE

Fixing a Critical Climate Accounting Error

Timothy D. Searchinger,^{1*} Steven P. Hamburg,^{2*} Jerry Melillo,³ William Chamé-Petr Havlik,³ Daniel M. Kammen,⁴ Gene E. Likens,⁵ Ruben N. Lubowski,⁶ Michael Oppenheimer,¹ G. Philip Robertson,⁶ William H. Schlesinger,⁷ G. Davi

Rules for applying the Kyoto Protocol and national cap-and-trade laws contain a but fixable, carbon accounting flaw in assessing bioenergy.

The accounting now used for assessing compliance with carbon limits in the not count changes in emis use when biomass for energ



Kyoto context

- Bioenergy treated as CO₂ neutral in energy sector
- Assumes C stock changes included in LULUCF
- Assumes fossil energy inputs in energy sector
- Assumes non-CO₂ included in agriculture
- Correct where these assumptions are valid

But

- Only Annex I countries covered
- Most countries don't count forest C stock change (but will in future)

Could:

- limit C neutral status to sources that meet assumptions
- Use other policy measures



Challenges for bioenergy systems

- Sources and sinks
- (im)permanence
- C stock change in biomass and soil
- Non-CO₂ emissions
- Timing of emissions/removals
- Carbon storage in products



Does time matter?

- Credit for temporary storage or delayed emissions?
- Is there a value in temporary storage / delaying emissions?
- Buys time.... for technology development
- Avoids tipping points?
- Includes value judgment
 - Assumes next generation better able to cope
- Why bother?
- Incentive for behaviour change

PUBLICLY AVAILABLE SPECIFICATION

PAS 2050:2011

Specification for the assessment of the life cycle greenhouse gas emissions of goods and services



defra
Department for Environment, Food and Rural Affairs

DEPARTMENT OF ENERGY
CLIMATE CHANGE

BIS
Department for Business, Innovation & Skills

BSI

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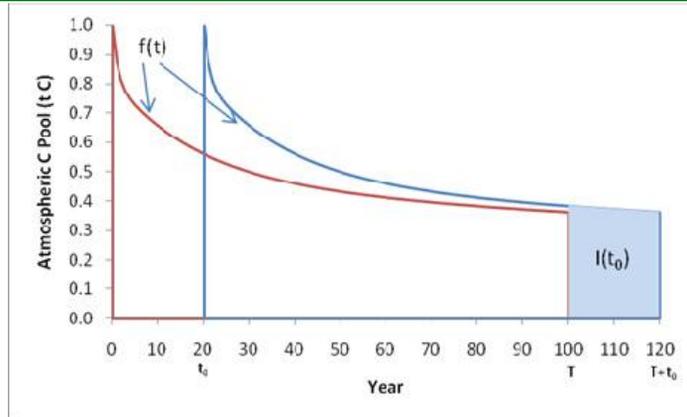
PAS 2050 (2008): Temporary storage

- 100-year assessment period
- factor to determine impact of period the emissions are present in the atmosphere during the 100-year assessment period
- Credits delayed emissions by excluding emissions beyond the assessment period
- Only for products where C sequestered intentionally

- Revised PAS (2011): time not included; supplementary figure can be reported



Lashof approach



P.M. Fearnside, D.A. Lashof and P. Moura-Costa (2000).
 “Accounting for time in mitigating global warming through land-use
 change and forestry”. *Mitigation and Adaptation Strategies for
 Global Change* 5: 239-270

DRAFT INTERNATIONAL STANDARD ISO/DIS 14067

ISO/TC 207/SC 7 Secretariat: SCC
 Voting begins on Voting terminates on
 2012-01-06 2012-06-06

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • MÉTHODES INTERNATIONALES D'ÉLABORATION DE NORMES • ORGANISATION INTERNATIONALE DE NORMALISATION

**Carbon footprint of products — Requirements and guidelines
 for quantification and communication**

Empreinte carbone des produits — Exigences et lignes directrices pour la quantification et la communication

ICS 13.020.40

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ISO 14067
 Carbon footprint of products

Nearing completion
 Vote and comments on DIS
 due 4 January 2013



ISO 14067 Land use change - direct

direct land use change (dLUC)

change in human use or management of land at the location of the production, use or disposal of *raw materials, intermediate products and final products* or *wastes in the product system being assessed*

The GHG emissions and removals occurring as a result of **direct** land use change **shall be assessed** in accordance with internationally recognized methods such as the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

LUC GHG emissions shall be documented separately in the CFP study report.



ISO 14067 Land use change - indirect

indirect land use change (iLUC)

change in the use or management of land which is a consequence of the production, use or disposal of *raw materials intermediate products and final products* or *wastes in the product system, but which is not taking place at the location* of the activities that cause the change

Indirect land use change **should be considered** in CFP studies, once an internationally agreed procedure exists.



ISO 14067 Time period for assessment

- CFP calculated over the entire lifetime, including end-of-life;
 - < 10 yrs treat as immediate
- > 10 years include in CF, and additionally, the timing of emissions and removals, relative to the year of production of the product, shall be documented separately in the CF report.



ISO 14067 Carbon storage in products

- Carbon stored in a product is reported separately.
- CFP is calculated without impact of time
- Allows impact of time to be included as supplementary figure
- No guidance on method





ISO 13065 Sustainability criteria for bioenergy

- Due for completion 2014
- Follows same process for GHG calculation as ISO 14067

Except

- Excludes indirect effects
- Foreshadows inclusion of other climate forcing effects
- Discusses reference system
- Discusses allocation of “up-front” emissions to the products
- Includes comparison with (fossil fuel/replaced) system



Purpose of estimation - What matters?

Quantify emissions/abatement

Assess compliance with targets

Calculate credit payable

- Consistent
- Accurate vs Conservative
- Reflect anthropogenic drivers
- Incentive to change behaviour

