

Direct and indirect land-use change issues in European sustainability initiatives

Workshop

IEA Bioenergy

Task 38 – Greenhouse Gas Balances
of Biomass and Bioenergy Systems

*Land Use Changes due to Bioenergy – Quantifying and
Managing Climate Change and Other Environmental Impacts*

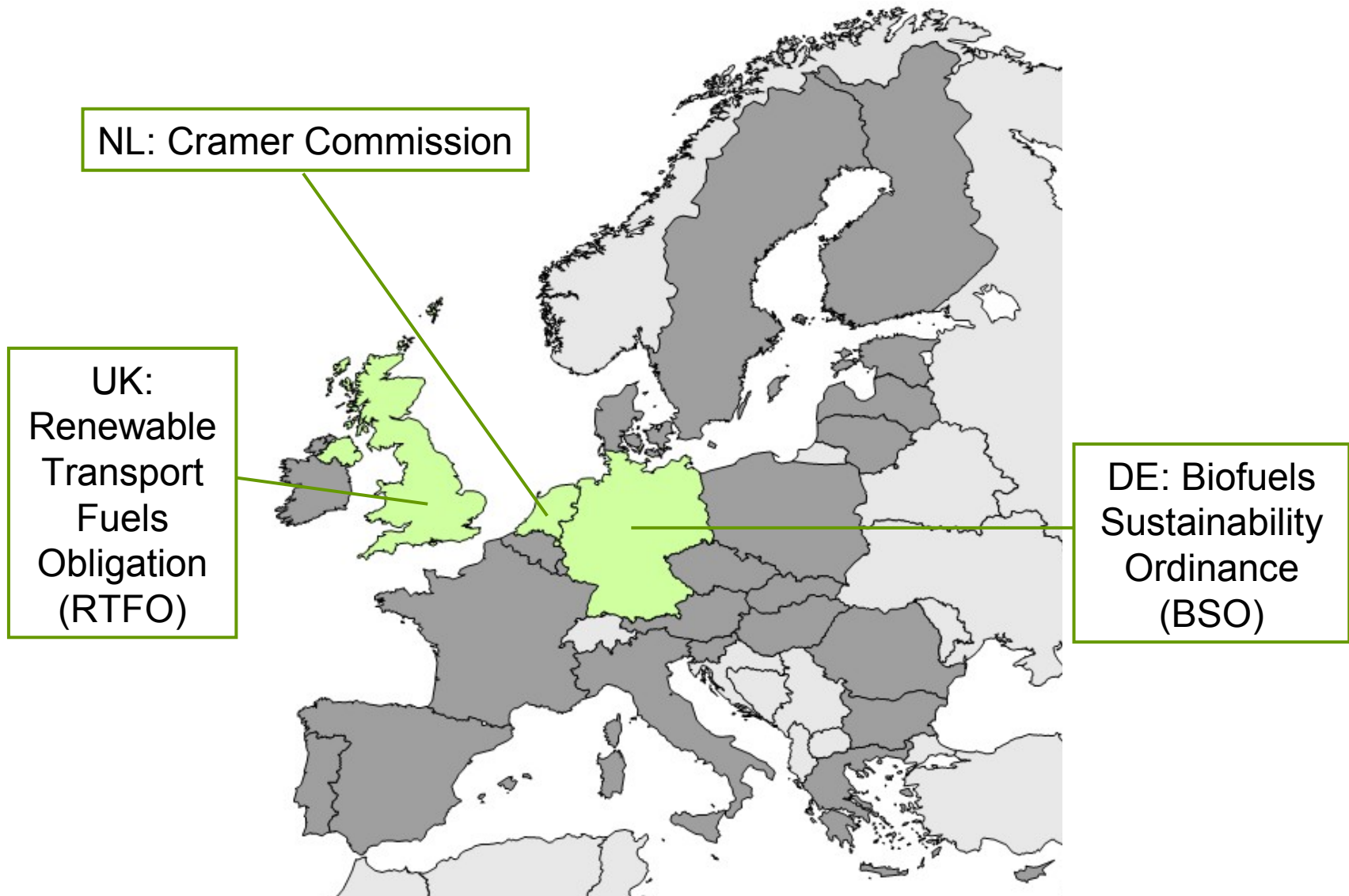
F. Van Stappen
Helsinki, 30 March 2009

Direct and indirect land-use change issues in European sustainability initiatives



- **European sustainability initiatives: background**
- **Direct land-use change issues in European sustainability initiatives**
- **Indirect land-use change issues in European sustainability initiatives**
- **Conclusion**

European initiatives on sustainability criteria for biofuels & bioenergy





Project group “Sustainable Production of Biomass”, commissioned by the Dutch Government, gathered representatives of private companies, social organisations, financial institutions and Government → **final report** in 2007.

Sustainability criteria and indicators formulated around **6 themes**:

3 themes specific to biomass:

- **Greenhouse gas balance;**
- **Competition with food, local energy supply, medicine and building materials;**
- **Biodiversity;**

3 themes relating to the triple P approach (People, Planet, Profit):

- 7. Environment;**
- 8. Economic prosperity;**
- 9. Social well-being.**

→ 9 principles with 1 or more criteria → indicators or reporting obligations



Working group of 25 experts from industries, NGO's, Government, research and certification bodies developed a **national standard** (the Dutch Technical Agreement **NTA 8080**)

= **minimum requirements for the production of biomass for energy applications**, based on the Cramer sustainability criteria (March 2009).

Target organisations:

- Producers → sale sustainably produced biomass
- Conversion plants → sale sustainably obtained and converted biomass
- Traders → sustainably produced, obtained and converted biomass

Standard includes:

- Sustainability criteria, the so-called **operational Cramer criteria**;
- Requirements for **certification**;
- Requirements for the **chain-of-custody** and **logo use**.

+ GHG calculation methodology to be adapted to RED methodology





UK – RTFO: background & aim



UK's Renewable Transport Fuels Obligation (RTFO)

+ Criteria & indicators according to environmental and social sustainability principles

→ **Carbon & Sustainability (C&S) Reporting** scheme

- ✓ Start: 15 April 2008
- ✓ 1st reporting period from 15.04.2008 to 14.04.2009
- ✓ Legal obligation for suppliers of fossil fuels for road transport to produce Renewable Transport Fuel Certificates (RTFCs)
- ✓ RTFCs granted according to reports submitted by suppliers on net GHG savings and sustainability of the biofuels they sale
- ✓ Quota = 2.6% (1st year), 3.9% (2nd year) and then 5.3% of total fuel sold





Reports contain information regarding (detailed for each batch):

1. Fuel type (e.g. bioethanol, biodiesel, biomethane)
2. Quantity of fuel (litres)
3. Biofuel feedstock
4. Feedstock country of origin
5. Sustainability information:
 - Qualifying standard or RTFO meta-standard respected on environmental and social levels
 - Land-use on 30 November 2005
6. Carbon information:
 - Carbon intensity including direct LUC (g CO₂ eq. / MJ)
 - Accuracy level

But possibility to claim « unknown »





Germany – Biofuels Quota Act: background & aim

01.01.2007: **Biofuel Quota Act (BQA)** enters into force in Germany
→ Share of biofuels in total amount of fuel sold (on energy basis)

Initial quota (01.01.2007):	➔	Revised quota (24.10.2008):
2009: 6.25 %		2009: 5.25 %
2010: 6.75 %		From 2010: 6.25 %
2011: 7.0 %		→ 2011: quota revision according to sustainability requirements
2012: 7.25 %		
2013: 7.5 %		
2014: 7.75%		
From 2015: 8.0 %		

Biofuels Quota Act has provision for sustainability requirements

→ **Biofuels Sustainability Ordinance** drafted 05.12.2007

= Legally binding confirmation of:

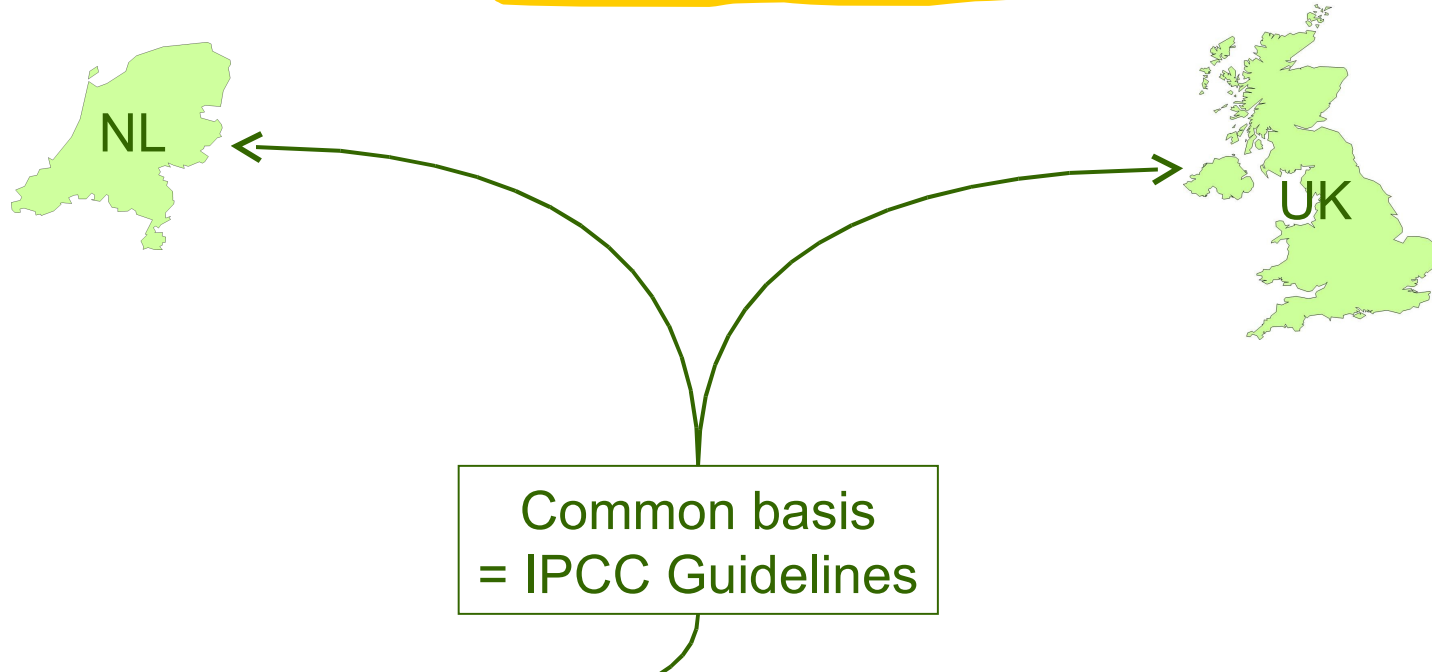
- Sustainable management of agricultural areas
- Protection of natural habitats
- Specific CO₂ reduction potential



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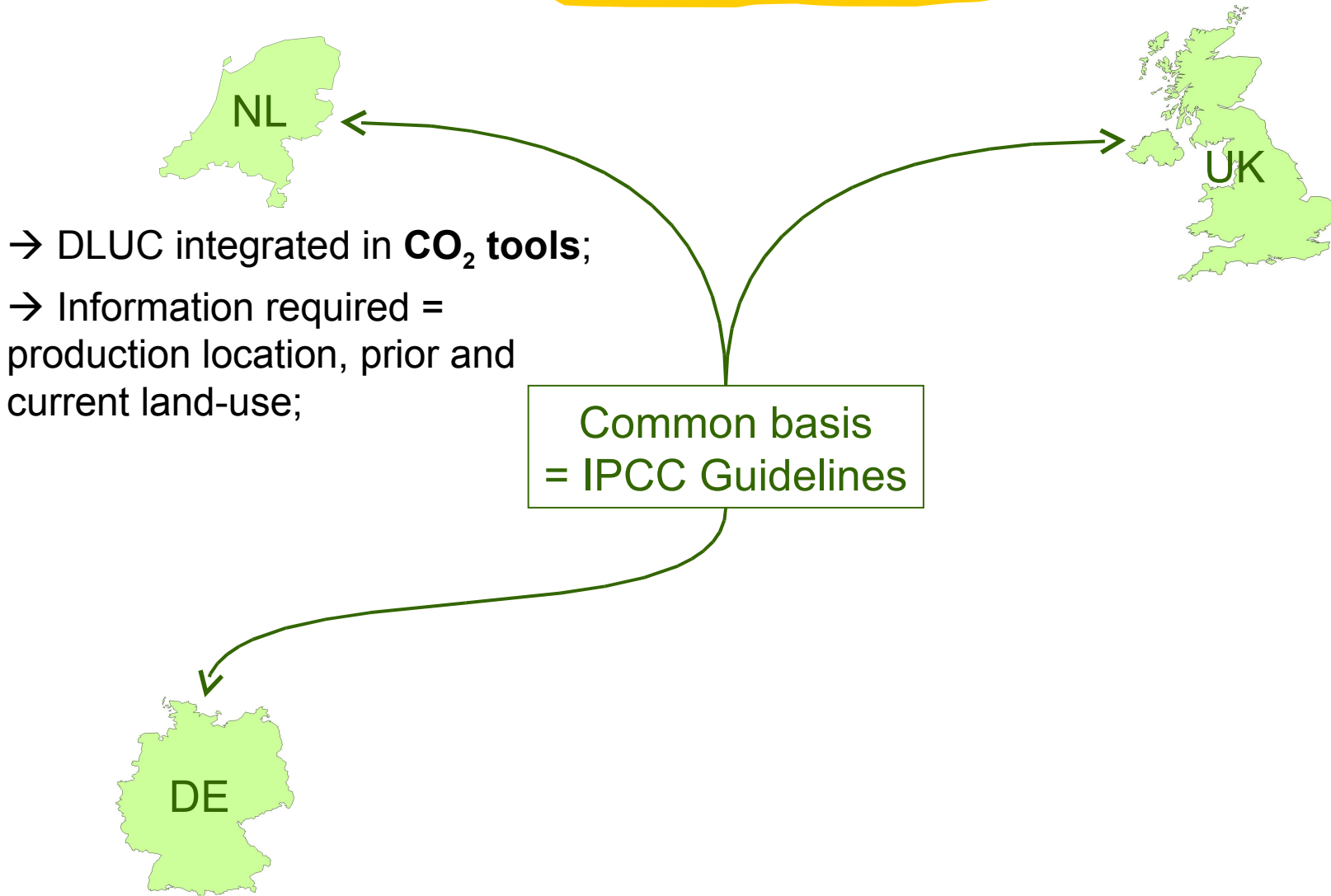


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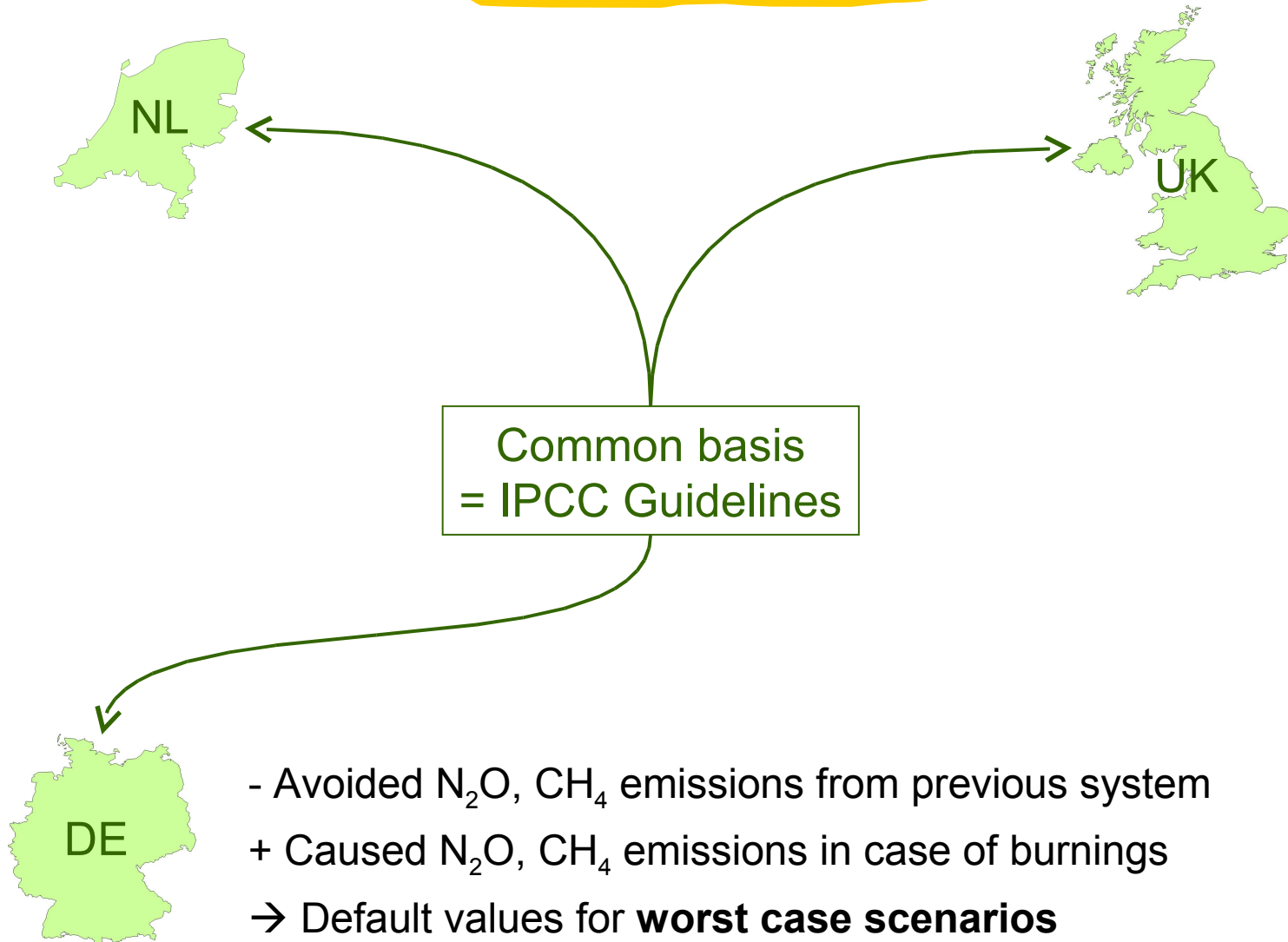


GHG emissions from direct LUC t CO ₂ / MJ . year	=	(<table border="1" style="display: inline-table; margin: 0 10px;"> <tr><td style="text-align: center;">Carbon stock reference (date)</td></tr> <tr><td style="text-align: center;">t C / ha</td></tr> </table> - <table border="1" style="display: inline-table; margin: 0 10px;"> <tr><td style="text-align: center;">Carbon stock current LU</td></tr> <tr><td style="text-align: center;">t C / ha</td></tr> </table>)	Carbon stock reference (date)	t C / ha	Carbon stock current LU	t C / ha	X	<table border="1" style="display: inline-table;"> <tr><td style="text-align: center;">Molecular weight CO₂</td></tr> <tr><td style="text-align: center;">44.010</td></tr> </table>	Molecular weight CO ₂	44.010
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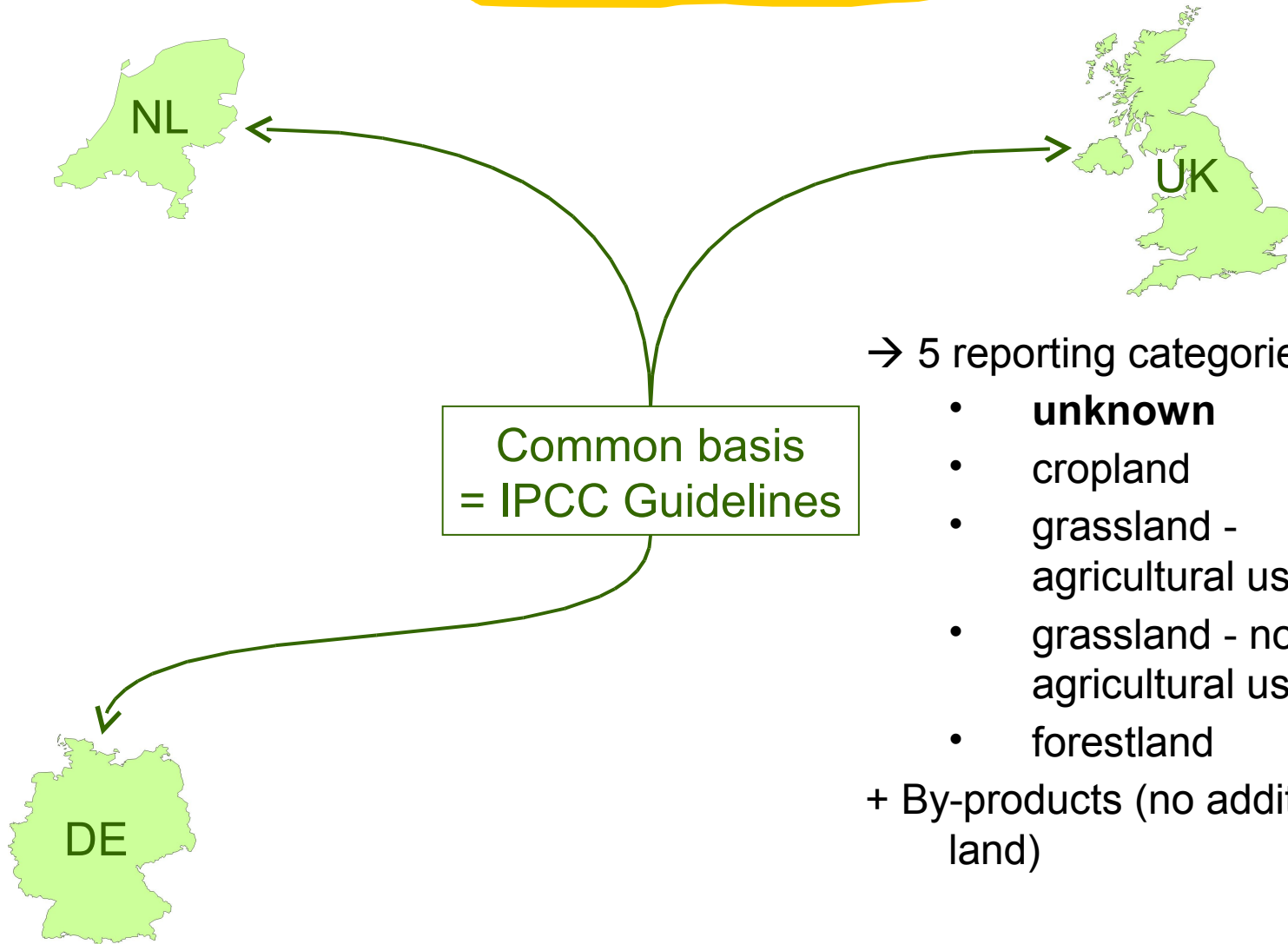
Biofuel chain	GHG emission savings		Change in land-use
	Without DLUC	With DLUC	
Ethanol			
- Sugar beet	65%	55%	Set aside land to agricultural cropland
- Wheat	54%	28%	Set aside land to agricultural cropland
- Corn (USA)	29%	11%	Set aside land to agricultural cropland
- Sugar cane	88%	-190%	Tropical rainforest changed to sugar cane plantation
- Wheat straw	98%	98%	Set aside land to agricultural cropland
Biodiesel (FAME)			
- Rapeseed (NL/D)	39%	16%	Set aside land to agricultural cropland
- Palm oil	48%	-23%	Tropical rainforest changed to palm oil plantation
- Used oils and fats	88%	n.a.	None
- Soy (USA)	71%	27%	Set aside land to agricultural cropland (USA)
- Soy (ARG)	70%	-568%	Tropical rainforest changed to soybean plantation



- Ethanol from wheat, Europe: from **grassland** to **cropland**;
- Ethanol from maize, North America: from **grassland** to **cropland**;
- Ethanol from sugarcane, Latin America: from **humid subtropic savannah** with high carbon content to **cropland**;
- Ethanol from sugar beet, Europe: from **grassland** to **cropland**;

- FAME from rapeseed, Europe: from **grassland** to **cropland**;
- FAME from soybean, Latin America: from **humid subtropic savannah** with high carbon content to **cropland**;
- FAME from soybean, North America: from **grassland** to **cropland**;
- FAME from palm oil, South-East Asia: from **tropical rainforest** to plantation **crop**.





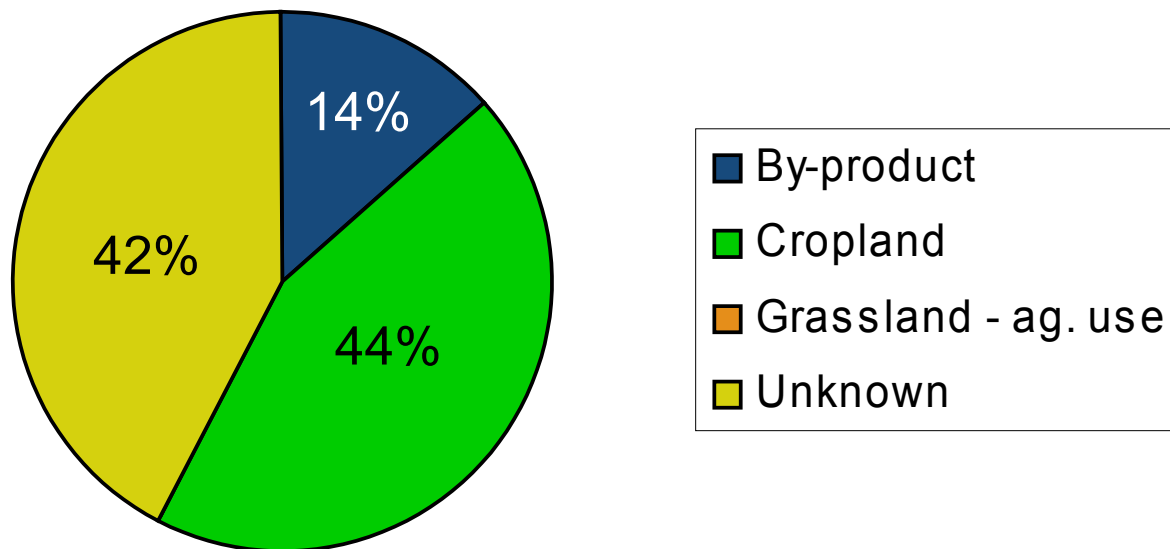
→ 5 reporting categories:

- **unknown**
- cropland
- grassland - agricultural use
- grassland - non-agricultural use
- forestland

+ By-products (no additional land)



Proportion of biofuel in each previous land-use category



(source: RFA, 2008)





Ex-post analysis by UK RFA for DLUC



- Determine **country** of origin for all biofuels feedstocks which have no land-use change information reported;
- Establish the **risk** of biofuels having caused land-use changes in these countries (e.g. based on the extent of land-use change in these countries, the growth in biofuel feedstock production and the influence of other factors such as expanding food production);
- Estimate the **area** and **types** of land-use change which might have been caused by biofuels;
- Convert into **GHG impact** (g CO₂ eq. / MJ), based on the default values derived from the IPCC Guidelines.





Common basis
= IPCC Guidelines



Open issues:

- ! High variability of C content in biomass and soil, in natural or agricultural systems
- ! N₂O emissions from agricultural systems



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Common basis
= Monitoring

- Start dialogue with biomass exporting countries
- Implement monitoring recommendations
- Set up international monitoring system → follow effects at macro level



- Raw material
- Production location
- Cultivation surface area
- Information on land-use changes in the region + future developments
- Information on changes in land & food prices in the region + future developments
- Information on biomass availability for food, energy supply, construction materials, medicines on local & regional levels, and relation if any with cultivation of energy crops





Common basis
= Monitoring



ILUC assessment: « risk adder » or iLUC factor



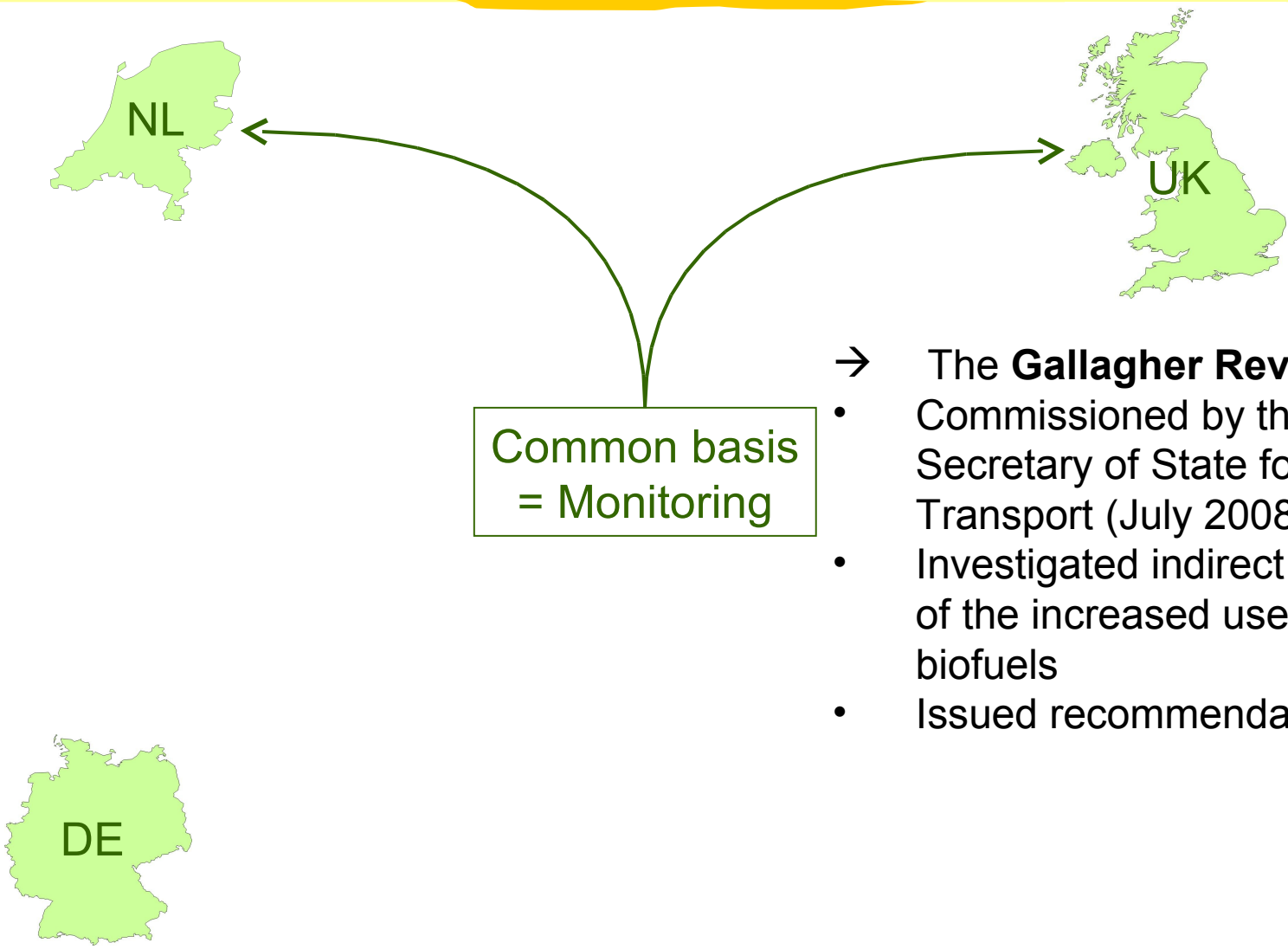


Accounting for indirect land-use changes: the « risk adder » or iLUC factor:



- Developed by the Öko-Institut
- Assumes that the country shares in global agro- and bio-trade are indicators of potential indirect LUC
- Global impacts from indirect land-use changes are distributed between the countries participating in cross-border trade
- iLUC factor is dynamic: the more biofuel feedstocks are produced from non-zero risk sources, the higher the risk of displacement will become.



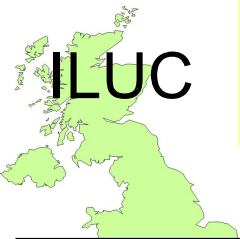


- The **Gallagher Review**:
- Commissioned by the Secretary of State for Transport (July 2008)
 - Investigated indirect effects of the increased use of biofuels
 - Issued recommendations.



- **GHG saving from biofuel for transport:**
 - Exclude feedstocks from land where carbon losses lead to a **payback time** longer than 10 years;
 - Exclude feedstocks from land designated as of **high conservative value**;
- **Demand for food, feed and bioenergy:**
 - Use feedstocks that do not cause a net additional **pressure** on current agricultural land;
 - Reassess the amount of appropriate **idle land** available within the EU to 2020;
- Use biofuels necessarily achieving a **high level of GHG saving** (possibly greater than 75%) such as biofuels from **waste** and **residues** or from feedstocks grown on **marginal** land;
- Further examination of the role of **co-products** in **avoiding land-use change**;
- **Extend** sustainability standards beyond biofuels to **all agricultural uses**;
- **Policy** and regulatory mechanisms:
 - Reduce targets until sustainability is demonstrated.





Principal areas of further work	Priority level		
	Global	EU	National
Improved datasets & tools to monitor & evaluate land-use & land availability globally	high	medium	
Clear definitions for land that will not otherwise be used for food production: idle & marginal land, etc.		high	high
Improve methodologies to quantify emissions from indirect LUC through equilibrium modelling approaches	high	high	high
Impact assessment of EU biofuels policy on LUC, biodiversity & GHG emissions		high	
Improve knowledge on N₂O emissions due to different farming practices		medium	high
Improve knowledge on GHG emissions from conversion of set-aside land & permanent grassland using different cultivation techniques		medium	medium





UK – RTFO: future steps

- **Consultation process:** from 17 December 2008 until 12 February 2009 = Revision of C&S Technical Guidance after 1st reporting year
- **Approach to indirect effects:**
 - build up an evidence base on the GHG impacts of the indirect effects of biofuels (ILUC and indirect effects of using wastes and by-products as biofuel feedstocks)
 - inform future development of lifecycle methodologies for biofuels, incl. RED, CEN/TC 383, GBEP, RSB, etc.
 - develop a work programme for indirect land-use change, together with stakeholders, in the coming months.



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Conclusions

Direct LUC: IPCC guidelines = basis
but open issues regarding soil carbon, N₂O emissions, etc. →
case-by-case calculation?



Indirect LUC: global monitoring system urgently needed



European initiatives regarding sustainability criteria for biomass and bioenergy:

The Netherlands – Cramer Commission: www.senternovem.nl,
www2.nen.nl

UK – RTFO: www.renewablefuelsagency.org/aboutthertfo.cfm,
www.dft.gov.uk/pgr/roads/environment/rtfo/

Germany – Biofuels Sustainability Ordinance:
www.ifeu.org, www.oeko.de, <http://www.umweltbundesamt.de>



Thank you for your attention!



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