

Sustainability criteria for biofuels



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EU Legislation



Directive 2009/28/EC

Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (**RED**)

- In force since 5th June 2009
- Member States shall transpose it into national laws, regulations and administrative provisions latest by 5th December 2010 (after 18 months)
- By June 30th 2010, member states will submit their National Action Plans for Renewable Energy
- **Target by 2020:** at community level **at least 20%** share of energy from renewable sources in the gross final consumption, §3 (1)
→ national target for Germany: 18%

Directive 2009/28/EC - II

- **Specific target by 2020: each member state shall ensure at least 10% share of energy from renewable sources in the final consumption of energy in all forms of transport, § 3 (4)**
 - road and rail transport are concerned; consumed petrol, diesel, biofuels and electricity are considered

Target can be met by:

- Biofuels: Bioethanol, Biodiesel, vegetable oil (blend and pure)
- Electricity produced from renewable sources (valued x 2,5)
- Biomethane (blended to CNG)
- Hydrogen from renewable resources

Directive 2009/28/EC - Flexibility

- Statistical transfers between member states are allowed (virtual trade)
 - e.g. when one member state over fulfills its target, it can transfer the excess energy from renewable sources to a member state which otherwise would not fulfill its national target (§ 6)
- Joint projects between member states (§ 7) and third countries (e.g. North Africa) (§ 9) to produce electricity, heating or cooling from renewable sources

Sustainability criteria for biofuels and bioliquids, § 17

All consignments of biofuels and bioliquids to be counted towards targets must comply with sustainability criteria:

1. Greenhouse gas emission saving shall be...

From 2010 (for installations that came into operation after 23.01.2008)	...at least 35%
From 01.04.2013 (for installations in operation before 23.01.2008)	...at least 35%
From 01.01.2017	...at least 50%
From 01.01.2018 (for installations in which production started on or after 01.01.2017)	...at least 60%

Sustainability criteria for biofuels and bioliquids, § 17 - II

2. To safeguard **biodiversity**, no raw materials are allowed from sensitive areas (reference: January 2008):
 - Primary forest or wooded land
 - Areas for nature protection
 - Highly biodiverse grassland (natural and non-natural)

3. To safeguard land with **high carbon stocks** no conversion of
 - wetlands, undrained peatland or
 - continuously forested areas

Sustainability criteria for biofuels and bioliquids, § 17(6) - III

- Agricultural raw materials cultivated in the EU for biofuels/bioliquids shall have „Cross Compliance“
- Protection of soil, water and air
- Restoration of degraded land
- Avoidance of excessive water consumption in areas where water is scarce
- Various social criteria (ILO conventions)

Sustainability and GHG emissions criteria have to be met, so that the biofuels in question

- can be counted towards the national targets and
- are eligible to receive financial support (e.g. tax reductions)

Verification of compliance with sustainability criteria, § 18

- Mass balance system shall be used
- Economic operators (EU and non-EU) shall submit reliable information regarding their compliance with the sustainability criteria
→ EU COM to provide list with necessary information
- Independent audits shall verify that the systems used by the economic operators to provide information are
 - accurate
 - reliable and
 - protected against fraud.
- Bilateral and multilateral agreements between EU and non-EU states regarding sustainability criteria → raw materials from such countries would be accepted in the community

Calculation of GHG emission (saving), § 19

1. Use of the default value in Annex V
 2. Calculation of actual values using EU methodology from Annex V, part C
 3. Mix of 1. + 2.: Use default values where actual values can not be obtained
- Values are relevant for EU (when production area on “list”) and non-EU states.
- Default values assume GHG emissions due to land use change = 0 (Commission will report to Parliament and Council by end of 2010 on iLUC: how to reduce it and how it could be considered in the calculation).

GHG emissions for main and co-products

- Greenhouse gas emissions shall be divided between the fuel (or intermediate product) and its co-products in proportion to their energy content:

Example rapeseed (1t):

430 kg Rapeseed oil: 15,94 GJ → 63 % of emissions*

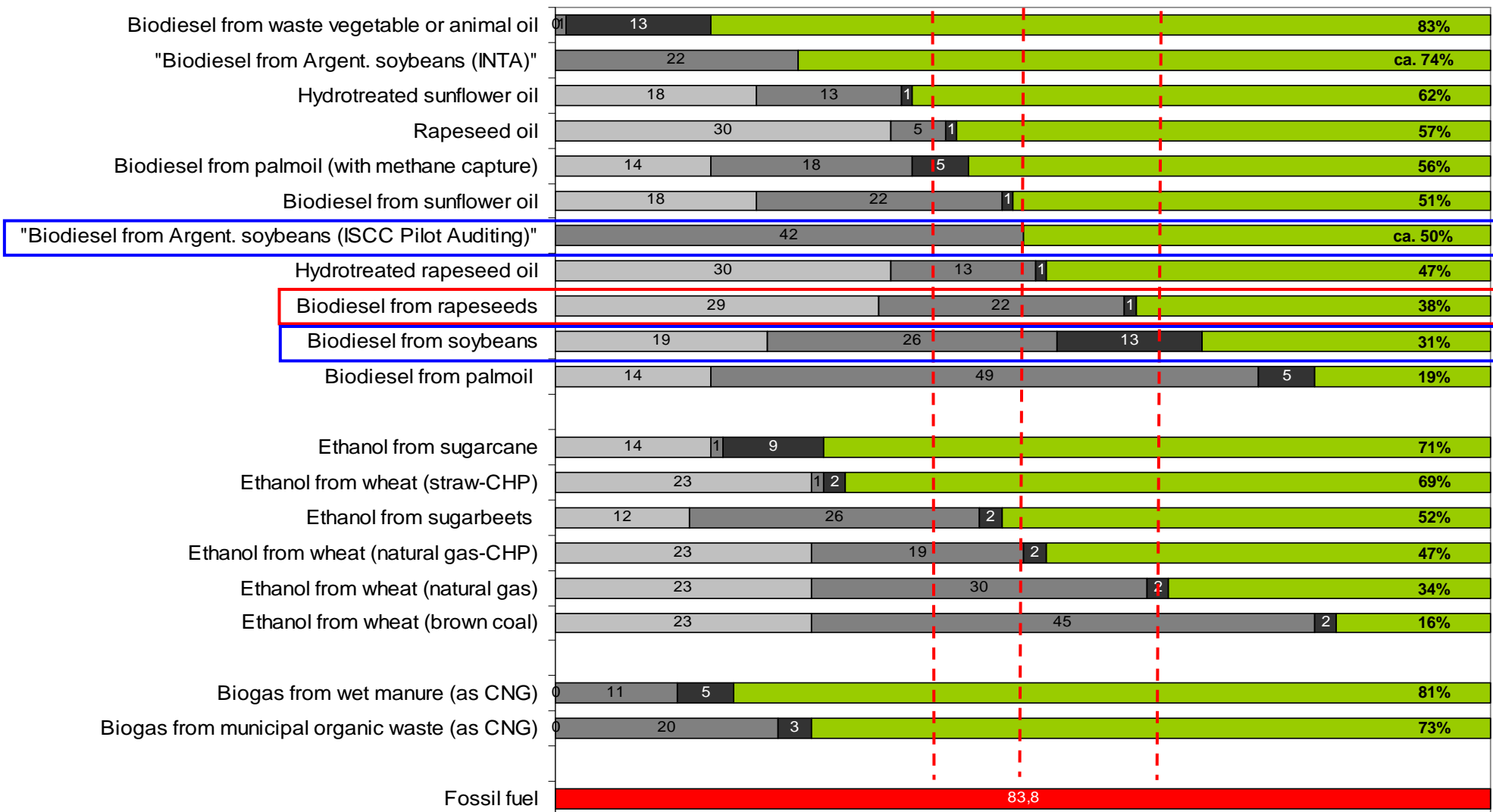
570 kg Rapeseed cake: 9,36 GJ → 37 % of emissions*

* Emissions that were generated until both products were produced.

Biofuels

Savings of GHG emissions in %

min. 60% 2018
min. 50% 2017
min. 35% 2010/2013



GHG emissions in g CO2 eq/MJ



Source: vTI after EU directive 2009/28/EC

Difference in default values for (Argentinean) soybean biodiesel

In general, default values in EU directive assume worst case situations.
Producers shall be encouraged to calculate individual values.

- Cultivation
 - EU default value does not consider no-till, double cropping and low fertilization
- Processing
 - Oil mills and biodiesel facilities are all very new, modern, large and thus efficient
- Transport
 - EU directive assumed that soybeans would be transported to Europe
 - ISCC calculated that final Biodiesel is shipped to Europe
 - In Argentina rather short inland road transport

→ Information based on conversation with meó Consulting Team, ISCC

Detailed values behind the EU default value for rapeseed biodiesel

- Fertilizer input/ha:
 - N: 137 kg
 - P: 34 kg
 - K: 50 kg
- Yield: 3,113 kg/ha

Preliminary results from a DBFZ project for UFOP on the optimization of GHG emissions in rapeseed production

Cultivation

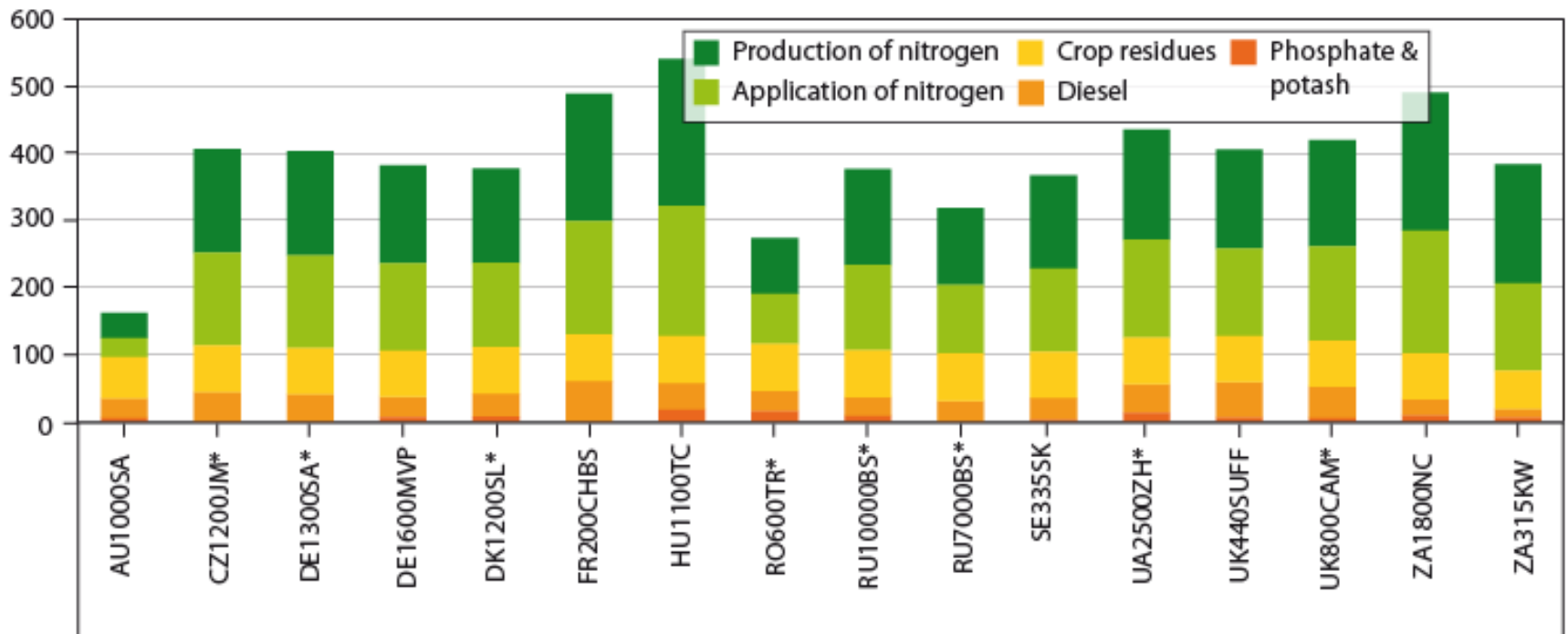
- GHG emissions of different N fertilizers vary between 2.8 – 15.9 kg GHG/kg N fertilizer
- Optimization strategies regarding type and intensity of fertilizer may result in 20-30% less GHG emissions in relation to default value

Conversion processes

- Use of eco electricity, eco heat and Biomethanol → save around 60% GHG emissions per conversion step

Specific CO_{2eq}-emissions from wheat production (kg CO_{2eq}/t wheat)

Source: agri becnamrk 2008



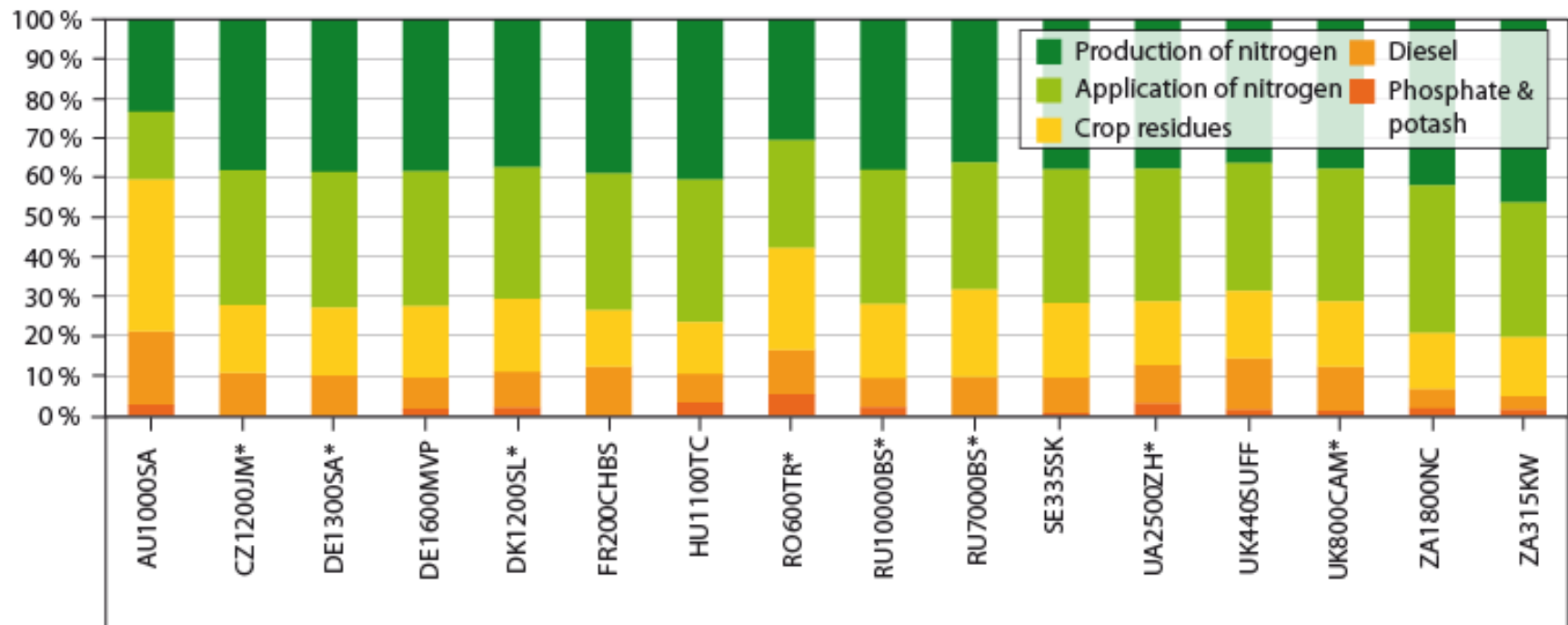
Calculation done for a „mean nitrogenous fertilizer“

CO₂ equivalents:

CO₂: 1 N₂O: 296 CH₄: 23

Structure of CO_{2eq}-emissions in wheat production (%)

Source: agri becnhamrk 2008



Nitrogen fertilization accounts for 60-80% of total GHG emissions in wheat

Download Directive 2009/28/EC in the Internet

<http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:140:SOM:en:HTML>

- Select your language (right hand corner) and
- download directive via clicking on number 16

EU Directive 2009/30/EC – fuel quality

- Member states have to request suppliers of transport fuel to gradually reduce their life cycle green house gas emissions by a minimum of 6% until 31.12.2020
 - reference = EU average of fossil fuels in 2010
 - 2% by 31.12.2014
 - 4% by 31.12.2017
 - Needs to be translated into national law by 31.12.2010

If possible and after investigation, further

- 2% reduction via the use of CCS and electric vehicles and
- 2% reduction via the measures of the Kyoto protocol

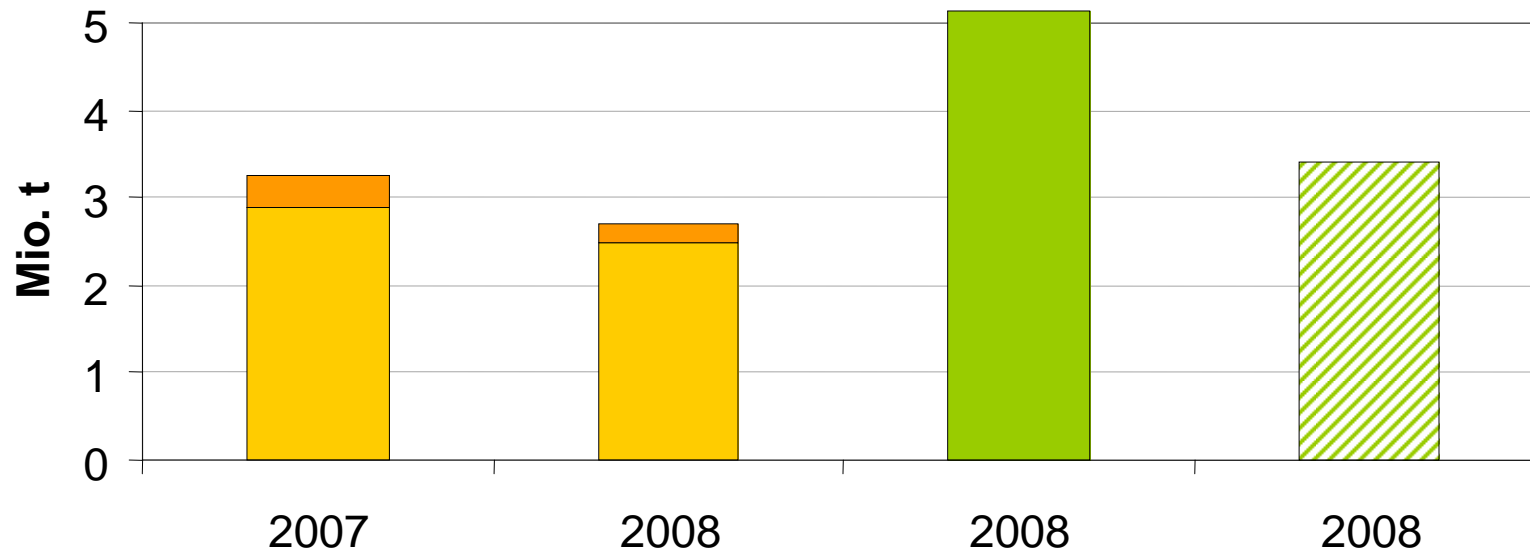
Possibilities to fulfill the fuel quality directive

1. Improve efficiency of fossil fuel exploration
 2. Improve conversion process (refinery efficiency)
 3. Use of biofuels
 4. Use of alternative fuels (electricity, CNG+Biomethan etc.)
- Options 1 and 2 have only very little impact
- Options 3 and 4 will play major role to fulfill requirements
- biofuels with larger GHG saving potential will gain in importance

German legislation



Biodiesel overview Germany 2007 - 2008



**In the long run:
Biodiesel: 2 – 3,5 Mio. t**

- Production in DE
- Net Imports (estimate)
- Production capacity in DE
- ~ 10% of DE 2008 diesel consumption (energetic)

German Sustainability regulations

Germany realizes EU directive in 2 regulations:

1. Biomassestrom – Nachhaltigkeitsverordnung (electricity)

- Passed on 23.07.2009; relevant from 01.01.2010
- Ministry of Environment (BMU) in charge
- Liquid Biomass has to comply in order to get the financial support through the renewable energy law (EEG)

2. Biokraftstoff – Nachhaltigkeitsverordnung (biofuels)

- Passed on 30.09.2009; relevant for biofuels from 01.07.2010 with temporary arrangements until 31.12.2010; fully in force from 01.01.2011
- Ministry of Finance in charge
- Biofuels (+ biogas) have to comply in order to get tax reduction and count for the national biofuel target

German Sustainability regulations - II

- Same GHG emission saving targets and requirements where and how biomass shall be cultivated as compared to EU directive
- Proof of sustainability through “sustainability certificates” (for German and foreign biomass)
 - Can be issued by an environmental auditor or the last company/interface (“Schnittstelle”) in the supply chain
 - This issuing company needs to be certified
 - Certifying institutions and certification systems (e.g. ISCC) shall be registered and accredited with BLE

Certification systems

- Certification systems can be used that have been accepted by other EU countries, the Commission, or due to bilateral or multilateral agreements on the ground of EU directive 2009/28/EC.
- Example certification systems under development:
 - ISCC (DE) www.iscc-system.org
 - Received accreditation by the German Authority BLE in January 2010; want to apply for accreditation with EU
 - REDcert GmbH (driven by German associations)
 - RSB, Roundtable on Sustainable Biofuels (CH)
 - Renewable Transport Fuel Obligation (UK)
 - Etc.

German quotas and GHG emission saving targets

	<i>Quota to replace Diesel</i>	<i>Quota to replace Petrol</i>	<i>Combined quota</i>	<i>GHG saving quota*</i>	<i>Min. EU net GHG saving</i>	<i>Biofuels in the mix approx.</i>
Year	<i>cal %</i>	<i>cal %</i>	<i>cal %</i>	<i>%</i>	<i>%</i>	<i>cal %</i>
2008	4,4	2,0				
2009	4,4	2,8	5,25			5,25
2010-14	4,4	2,8	6,25		35%	6,25
2015				3,0	35%	8,5
2017				4,5	50%	9,0
2020				7,0**	50-60%	10-12

* Based on EU Fuel Quality directive

** 1% higher than mandatory EU value

Coalition agreement – German government October 2009

- Latest by 2013 the extent of tax reductions for biofuels shall be designed according to their specific greenhouse gas emission saving

Thanks for your attention!!



Annex

Mass balance system (RED Directive), § 18

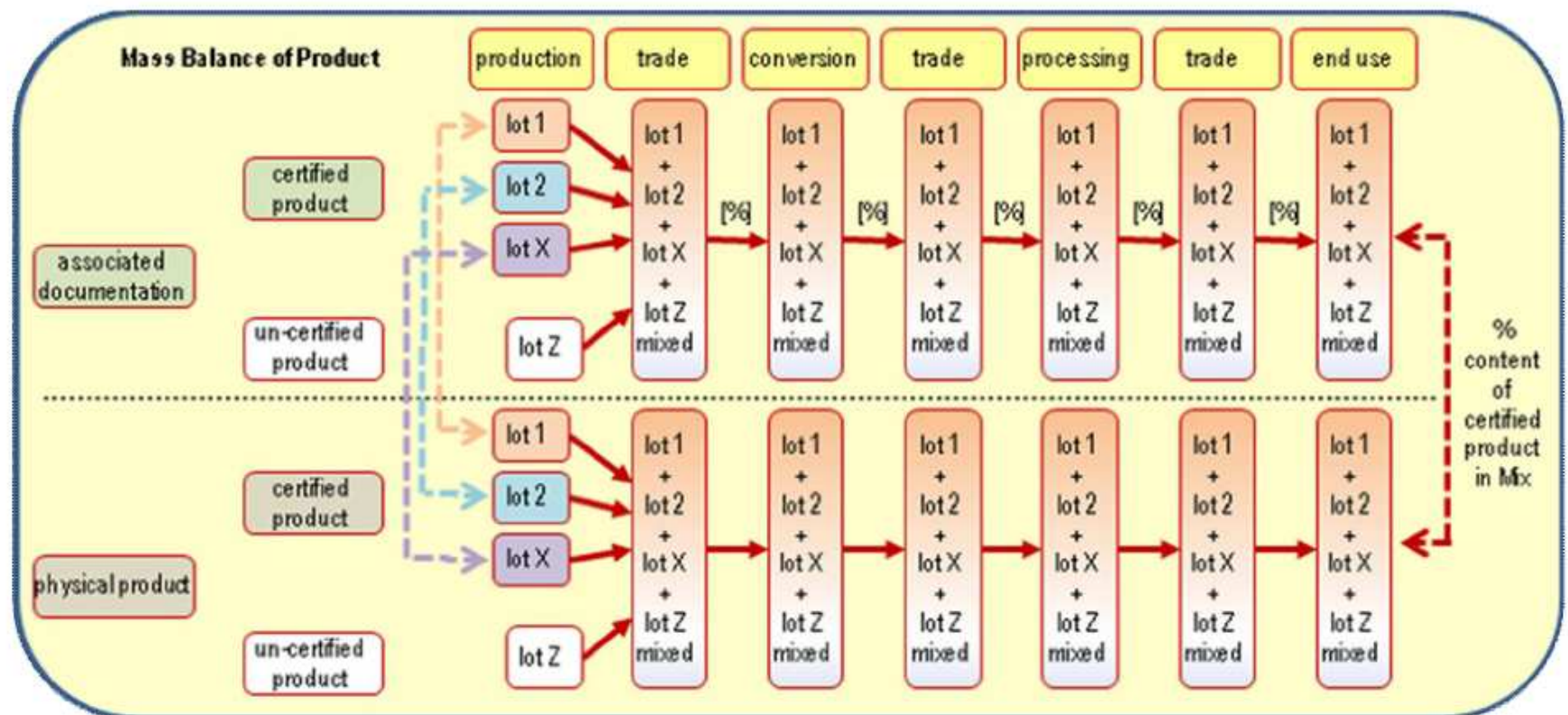
- Allows consignments of raw material or biofuel with different sustainability characteristics to be mixed
- Requires information about the sustainability characteristics and sizes of the consignments to remain assigned to the mixture
- Provides for the sum of all consignments withdrawn from the mixture to be described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture
→ Physical link between production and consumption

Mass balance system, § 18

Commission to report in 2010 and 2012

- on the operation of the mass balance verification method and
 - on the potential for allowing for other verification methods
 - Assess methods in which information about sustainability characteristics need not remain physically assigned to particular consignments or mixtures
- System shall be with integrity and effective however not put an unreasonable burden on the industry.

Schema – Mass Balance System



RSB 2009, <http://cgse.epfl.ch>

Methodology - equation

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee}$$

E	total emissions from the use of the fuel
e_{ec}	emissions from the extraction or cultivation of raw materials
e_l	annualized emissions from carbon stock changes caused by LUC
e_p	emissions from processing
e_{td}	emissions from transport, distribution and storage
e_u	emissions from the fuel in use (for biofuels = 0)
e_{sca}	emission saving from soil carbon accumulation via improved agricultural management
e_{ccs}	emission saving from carbon capture and geological storage
e_{ccr}	emission saving from carbon capture and replacement
e_{ee}	emission saving from excess electricity from cogeneration

Source: RED Directive, Annex V