Greenhouse gas savings by biofuels in Germany

Study commissioned by
Verband der Deutschen Biokraftstoffindustrie

VDB Zukunft tanken.

Carlo Hamelinck
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Fuels of the Future

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Germany 2019

3.3 million tonne of renewable fuel saved 7.3 million tonne CO_2 emissions *

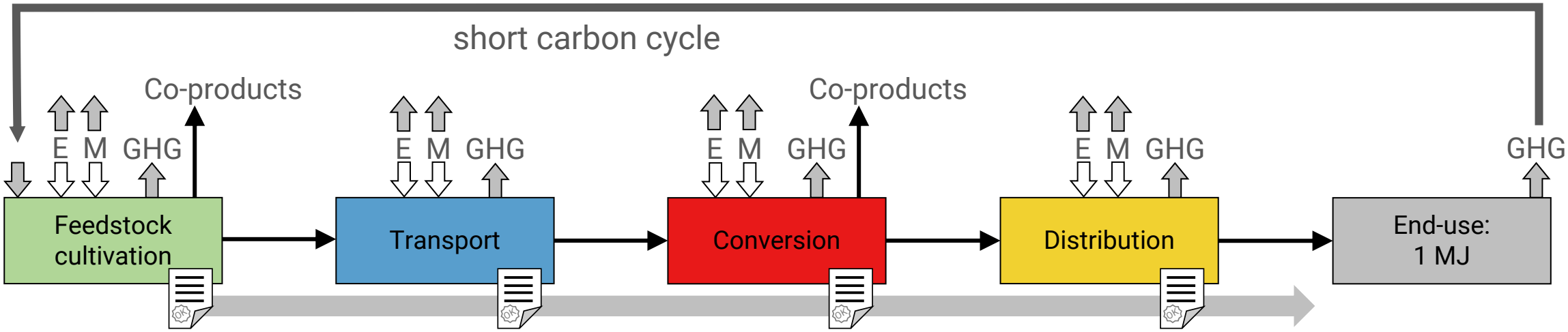
- More than 90% of total volume of renewable fuels used in Germany is biodiesel and bioethanol from only five feedstocks
- Each of these five fuels cause less emissions than fossil fuels, even when taking into account the potential indirect impacts
- As a result, on average, in Germany, 1 tonne of biofuel avoids about 2.2 tonne of CO_2 emissions when replacing fossil fuel
- In case rapeseed and used cooking oil were used instead of palm oil, then the avoided emissions would be about 2.6 tonne CO_2 per tonne of biofuel, reaching 8.6 million tonne total avoided CO_2 emissions *

* This includes the indirect emissions.

EU biofuels have to meet strict sustainability scheme

EU Renewable Energy Directive

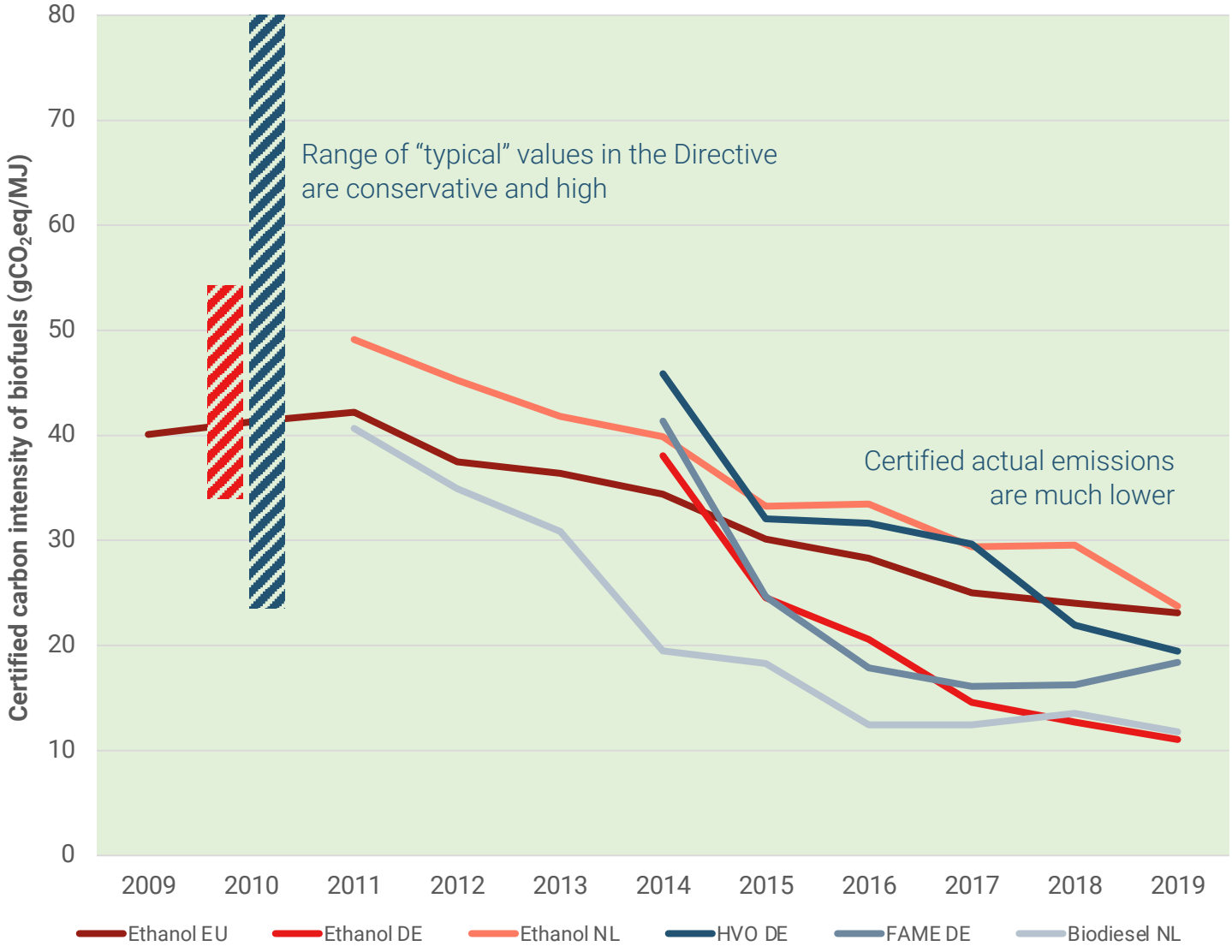
- Requires 50 or 60% emission reduction compared to fossil fuels, but generally fuels perform much better
- Includes detailed method for calculating the actual supply chain emissions
- Full supply chain of each biofuels batch sold in the EU market has to be certified



Biofuel supply-chains have improved their performance over time. As a result, direct emissions have decreased strongly over past decade.

Factors that improve climate performance

- Higher yields
  - Remote sensing, precision farming
  - Smart fertilisation
  - Reduced loss at harvesting
- Fuels and fertiliser with lower carbon footprint
- Improved land use, smart rotations
- Sequential cropping
- Less invasive cultivation techniques
- Renewable energy during processing



What could cause indirect land use change (ILUC) emissions

What is the issue of Indirect land use change?

- Additional demand for biofuels could lead to additional land use elsewhere
- Such indirect land use change could have carbon impacts
- This could limit greenhouse gas savings from biofuels application
- Main concern in policy debate since 2008

What makes this issue so difficult to comprehend?

- ILUC cannot be observed or measured directly, it can only be modelled.
- It is beyond the control and direct responsibility of biofuels feedstock producers
- Policy makers want to understand the broader context in which biofuels are produced in their decision-making process.
- The impact of possible indirect land use change is only applied in this biofuels policy and calculations. We are not aware that this is applied in other policies with possible spatial impacts.

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ILUC impact has been modelled by different studies
Results differ because assumptions differ and global developments change

Factors for Indirect emission in gCO_2eq/MJ	Mirage 2011	GLOBIOM 2015	ICAO 2019 (New GLOBIOM)	ICAO 2019 (GTAP)
Rapeseed Biodiesel	54	65	24	18
Palm biodiesel	54	231	53	31
Soy biodiesel	56	150	104	20
Maize ethanol	10	14	15	15
Wheat ethanol	14	34	-	-

GLOBIOM 2016 study calculated factors for specific situations

- Model assumed a 1%-point demand “shock” (increase in demand) for each crop-fuel combination
- Model was based on understanding of <2010 to predict 2010-2020 developments
- Outcome was theoretical: shows what could happen in a certain specific situation – not what will happen
- Updated GLOBIOM modelling concludes much smaller numbers

Therefore it is necessary to revisit the direct and indirect emissions

1 In how far have predicted impacts come true?

2 What is the average impact of fuels in the market today?

The certified emissions are smaller than the typical emissions *and* the ILUC emissions are much smaller than the ILUC factors

Misunderstanding of ILUC factors

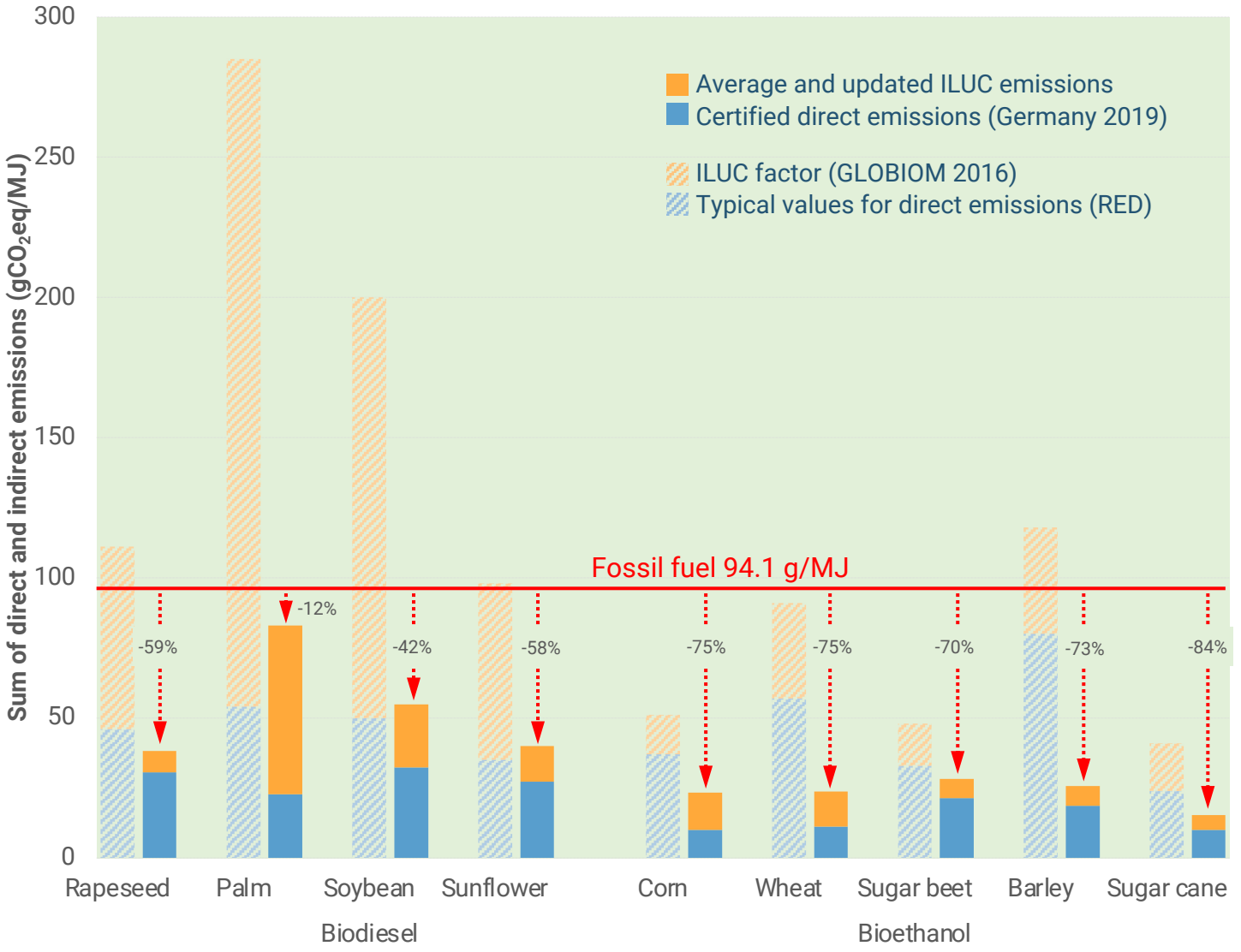
- Some studies added ILUC factors to "typical" direct emission factors

However

- Actual direct emissions are much lower than typical in RED
- GLOBIOM calculated specific situation
- But reality developed differently
- Most of the EU crop based biofuel volume was developed before 2010 and hardly caused ILUC
- Growth after 2010 was << 1%-point → ILUC impact much smaller than ILUC factor
- Recent GLOBIOM for ICAO: lower impacts

Result

- Combined ILUC emissions << ILUC factors



Role of crop-based biofuels could further increase
How to produce additional feedstock with low ILUC risk

Increasing crop yield above the trendline
- Improvements on the crop and field level
- Innovation, organisation, know-how, inputs, machines

Direct and low-carbon Land Use Change
- Expand into land with low carbon stocks and low biodiversity value
- Unused land, abandoned agricultural land, waste land

These options are introduced by RED II and are clarified further by ILUC Delegated Act

Inserting additional crop in existing cultivation system
- Create additional space/time within the current crop rotation
- Through multi-cropping, sequential cropping

Food-fuel synergy?
- Bridging yield gap of food crops, thereby making land available for fuel crop
- Very much desired, but not stimulated

Actions that directly reduce deforestation and peatland oxidation
- Is actually most important option to reduce the carbon impact from ILUC
- Not addressed in RED II (or III)

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Key messages

Greenhouse gas savings

- biofuels lead to significant emission reduction when replacing fossil fuels, with or without indirect emissions

Insights

- Direct, observed emissions have greatly improved over the past decade
- Modelled ILUC factors do not represent reality
- Recent ILUC insights: less impact than estimated before
- Average ILUC of crop-based biofuels in the German market is limited
- It is possible to increase the role of crop based biofuels with limited indirect impacts
- Moreover, volumes of waste based and advanced renewable fuels will increase without ILUC

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More information

The study for VDB can be found here.

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