



ZELLER + GMELIN

CO₂-optimierte Schmierstoffe Überblick Produktlösungen

CO₂-optimised lubricants – product overview

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Agenda

+ Stand Product Carbon Footprint (PCF)

Berechnung bei ZG

Status of PCF calculation at ZG

+ Nachhaltige Produkte

Sustainable Products



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Stand PCF Berechnung bei ZG

Status of PCF calculation at ZG

Berechnungsleitfaden UEIL/atiel

Methodology by UEIL/atiel



Press Release

TÜV Rheinland validates the ATIEL and UEIL methodology to calculate and report Product Carbon Footprints (PCFs) for Lubricants and Other Specialities.

30th November 2023



Methodology for Product Carbon Footprint Calculations for Lubricants and other Specialities

UEIL: Union of the European Lubricants Industry / **atiel:** association technique de l'industrie europeenne des lubrificants

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- + TÜV zertifizierter Leitfaden für die PCF-Berechnung im Schmierstoffbereich welcher konform ist mit dem Greenhouse Gas Protocol und der ISO 14067:2018
- + TÜV certified methodology meeting the standards the Greenhouse Gas Protocol and the ISO 14067:2018

Berechnungsleitfaden UEIL/atiel

Methodology by UEIL/atiel

- + Enthält die zu betrachtenden Systemgrenzen und die Anforderungen an den PCF Bericht
- + *Includes suggested system boundaries and reporting requirements*

Table 1: Included and excluded activities as defined in the system boundary.

Included (if not excluded due to cut-off criteria)	Excluded
Production-related raw materials	Production of capital goods
Fuel and energy-related utilities (electricity, steam, natural gas, biomethane, oil, etc.)	Business travel or employee commuting
Direct emissions from manufacturing	Services such as engineering or infrastructure services, R&D activities
Other utilities consumed (process water, inert gas, etc.)	Downstream transportation
Production losses and treatment of waste and wastewater	Downstream packaging
Upstream transportation	
Upstream packaging	

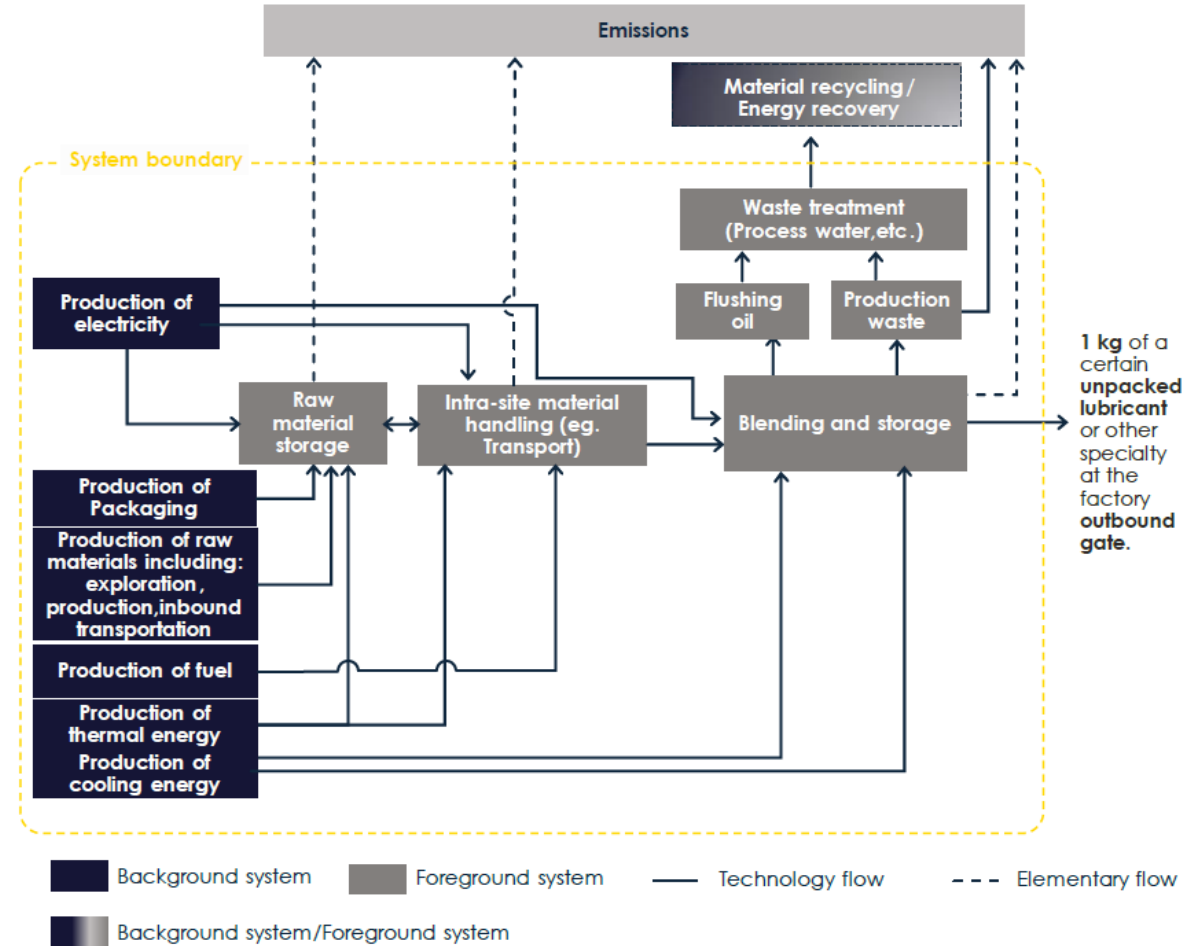


Figure 4: Illustrative process flow sheet of a lubricant manufacturer.

Kooperation mit *Cooperation with*



- + Entwicklung eines passenden excelbasierten Produktrechners
- + *Development of excel based calculation tool*
- + Implementierung von
 - + Unternehmensfußabdruckes (CCF) erstellt durch Fokus Zukunft
 - + *Corporate Carbon Footprint prepared by Fokus Zukunft*
 - + Rohstoffdaten von Lieferanten und Datenbanken (ecoinvent, Carbon Minds)
 - + *Data of raw materials from suppliers and data bases (like Ecoinvent, Carbon Minds)*
 - + Anlieferung und Verpackung des Rohstoffes
 - + *Logistics and packaging of raw material*

Kooperation mit *Cooperation with*



- + Berechnungen möglich, allerdings Datenlage bei den Rohstoffen sehr dünn (nur ca. 4% vorhanden)
- + Berechnung hochmineralöhlhaltige Produkte prinzipiell möglich
- + TÜV Zertifizierung der ZG Berechnungsmethode in Arbeit
- + *Calculation now possible, but not enough data from raw materials (only about 4%)*
- + *Calculation of products with high mineral oil content possible*
- + *TÜV certification of ZG tool currently in progress*

Berechnungen ZG PCF Rechner

Calculations with ZG PCF Tool

+ Beispiele für erste Richtwerte:

+ *First indications as examples*

+ Divinol B Classic PCI:

0,48 kg CO₂ eq/kg

+ Divinol Surface Premium KS:

1,01 kg CO₂ eq/kg

+ Multicast FE 100-0:

1,22 kg CO₂ eq/kg

+ Divinol HLP ISO 46 MWB ZF:

1,17 kg CO₂ eq/kg

Berechnungen ZG PCF Rechner

Calculations with ZG PCF Tool

Product Carbon Footprint (cradle-to-gate)

SN25060 Divinol ICL ISO 220 (1 kg unpackaged product ex. Eislingen)

02.01.2024

Calculated according to UEIL/Atiel Standard "Methodology for PCF Calculations of Lubricants and other Specialties" (fully aligned with ISO Standard 14067:2018 and the GHG Protocol Product Standard)

Sum of partial PCF's	1,06	Kg CO ₂ eq / kg product
Partial PCF, biogenic	-0,24	Kg CO ₂ eq / kg product
Partial PCF, fossil	1,30	Kg CO ₂ eq / kg product
Partial PCF, direct land use change	Currently not available	Kg CO ₂ eq / kg product
Biogenic carbon content	Currently not available	%
Total carbon content	Currently not available	%

Disclaimer

This statement regarding product carbon footprint is provided for information purposes only. While the PCF reported in this statement has been calculated to the best of our knowledge, the calculation of the PCF is based on certain assumptions and approximations. In addition the data used to calculate the PCF may be subject to limitations related to data collection, calculation and contributions from third party data or sources. This statement may not cover all emission sources or regional differences. Carbon footprints may change over time due to new knowledge and methodologies, and individual variations and factors may also affect the actual PCF.

THIS STATEMENT DOES NOT CONSTITUTE A WARRANTY, REPRESENTATION OR QUALITY AGREEMENT REGARDING THE PRODUCT REFERRED TO HEREIN OR ITS ENVIRONMENTAL IMPACT, AND ANY LIABILITY ON OUR PART IN RELATIOPN TO THE REPORTED PCF AND THE UNDERLYING DATA USED, INCLUDING BUT NOT LIMITED TO THE ACCURACY, QUALITY, COMPLETENESS OF THE STATEMENT OR ITS FITNESS FOR A PARTICULAR PURPOSE IS EXCLUDED TO THE FULLESR EXTENT PERMITTED BY APPLICABLE LAW.

By using this statement, you acknowledge the limitations set forth herein and agree to use the information at your own risk.

+ Beispiel für möglichen Ergebnisbericht
(noch in Arbeit – TÜV Zertifizierung notwendig)

+ *Example for possible result sheet
(currently in development – certification via
TÜV necessary)*

Einordnung der PCF Werte

Classification of PCF values

PCF Werte in kg CO₂ eq/kg / PCF values in kg CO₂ eq/kg

+ Mineralöl/ <i>mineral oil</i> :		0,45 – 1,2	kg CO ₂ eq/kg
+ Reraffinat/ <i>rerefined oil</i> :		~ 0,3	kg CO ₂ eq/kg
+ Biogenes Grundöl/ <i>biobased oil</i> :		-0,938 bis/to -0,05	kg CO ₂ eq/kg
+ Rüböl/ <i>rapeseed oil</i> :		2,49*	kg CO ₂ eq/kg
+ Glykol/ <i>glycol</i> :		1,3 – 4,7	kg CO ₂ eq/kg
+ EP/AW-Additive:	bis zu/ <i>up to</i>	9,6	kg CO ₂ eq/kg
+ Borsäure/ <i>boric acid</i> :		0,7	kg CO ₂ eq/kg



GHS08

Danger

H360FD - May damage fertility. May damage the unborn child.

*T. Alcock, D. Salt, P Wilson, S. Ramsden: More sustainable vegetable oil: Balancing productivity with carbon storage opportunities



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Nachhaltige Produkte

Sustainable Products

Nachhaltige Reiniger

Sustainable Cleaners

Divinol SPT Cleaner 1950 SU / Divinol SPT 1954 SU

SU: Sustainability

- + Spülmedium im Applikationsprozess von Lösemittellacken
- + Zu **100%** aus aufbereitetem Lösemittel
- + Nachhaltigkeit per Zertifikat vom Lieferant bestätigt
- + *Rinsing fluid for coatings application systems*
- + *Based on **100%** recycled solvents*
- + *Prove of sustainability by supplier via certificate*



TX5

Kabinenfett

Cabin grease SU

- + Divinol Cabin Grease SU besteht zu ca. **97%** aus recycelten Materialien
- + Divinol Cabin Grease SU kann als Schutzschicht in Lackierkabinen eingesetzt werden
- + Entwicklung für weitere Schmierfette auf Basis recycelter Materialien laufen

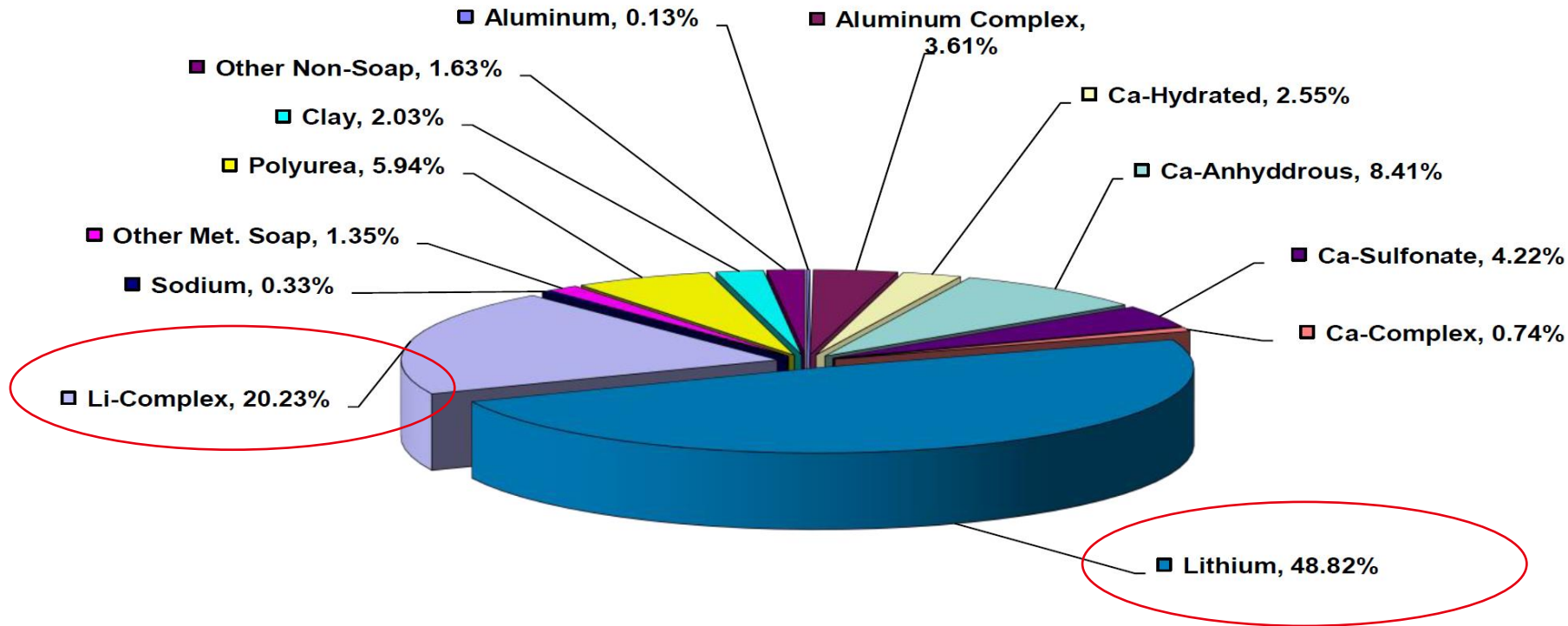


- + *Divinol Cabin Grease SU based on ~97% recycled components*
- + *Divinol Cabin Grease SU as protective layer in paint booths*
- + *Further products based on recycled components currently in development*



Marktanteil Lithiumfette

Market share of lithium based grease



+ Hoher Marktanteil lithiumbasierter Schmierfette

high market share of lithium based grease

2021 Global Grease Production (Thickener %)
REPORTED

Umweltbetrachtung Lithium

Environmental impact of lithium

- + Hauptabbaugebiete:
teils wasserarme Gegenden in Südamerika,
Australien, China
- + Lithium kommt nur in relativ geringen
Konzentrationen in verschiedenen Mineralien
vor
- + Zur Extraktion und Aufreinigung sind große
Mengen an Wasser und Energie nötig
- + *Main mining areas in arid places of South
America, Australia, China*
- + *Only low concentrations of lithium in
various minerals*
- + *High need of water and energy for
extraction*

**PCF Lithiumhydroxid
(Südamerika-Australien):
5,0 – 14,8 kg CO₂ eq/kg ****

** J. C. Kelly et al, Resources, Conservation & Recycling 174, 2021, 105762

Umweltbetrachtung Calcium

Environmental impact of calcium

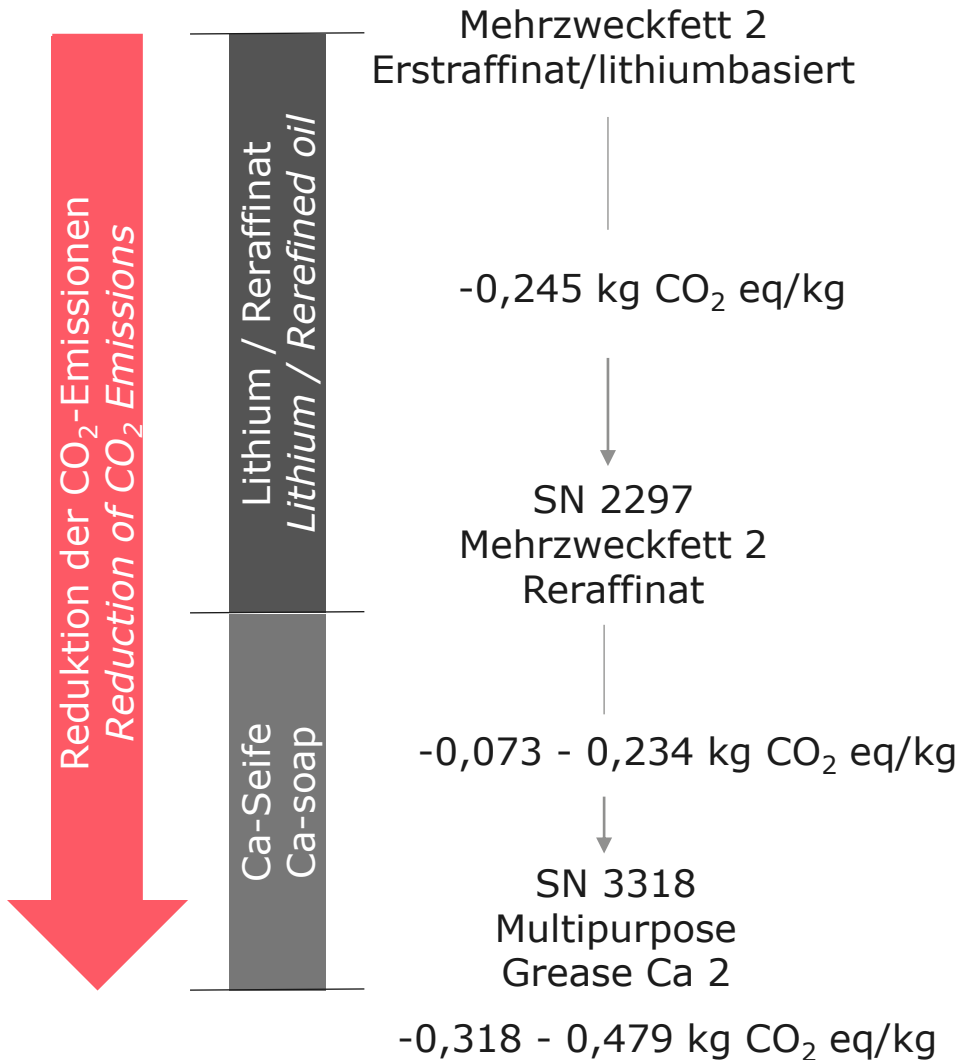
- + Calciumcarbonat ist weltweit in großen Lagerstätten verfügbar, z.B. als Kalkstein auf der Schwäbischen Alb
- + Calciumcarbonat lässt sich in einem etablierten zweistufigen Prozess in Calciumhydroxid umwandeln, was zu Herstellung von Schmierfetten verwendet werden kann
- + *High worldwide reservoir of calcium carbonate e.g. as limestone in the Swabian Alb*
- + *Calcium carbonate can be easily converted into calcium hydroxide which is needed for the formulation of greases*

PCF Calciumhydroxid:

0,629 kg CO₂ eq/kg *

* Aussage eines Lieferanten von Zeller+Gmelin.

Multipurpose Grease Ca 2 PCI



+ Einsparung durch anteiligen Einsatz des Reraffinats:
Savings due to usage of reraffined base oil:

-0,245 g CO₂ eq/kg

+ Einsparung durch Wechsel von Lithium- zu Calcium-
Verdicker:
Savings due to exchange lithium to calcium:

-0,073 - 0,234 kg CO₂ eq/kg

+ Mögliche Gesamteinsparung
Total possible savings

-0,318 - 0,479 kg CO₂ eq/kg



Kennzahlenvergleich

Comparison of performance

Kennzahl / Property		Multipurpose Grease Ca 2 PCI	Mehrzweckfett 2 (Lithium/Erstraffinat)
DIN-Kennzeichnung	<i>DIN labelling</i>	K 2 K-30	K 2 K-30
Temperatureinsatzbereich	<i>Operating temperature range</i>	-30 °C bis +130 °C	-30 °C bis +130 °C
Tropfpunkt [°C]	<i>Dropping point</i>	150	190
Fließdruck -30 °C [hPa]	<i>Flow pressure</i>	1000	800
Wasserbeständigkeit	<i>Water resistance</i>	Bewertungsstufe 0 <i>Evaluation level 0</i>	Bewertungsstufe 1 <i>Evaluation level 1</i>
Kupferkorrosion 100 °C	<i>Copper corrosion 100°C</i>	1	1
Korrosionsverhalten (EMCOR-Test)	<i>Corrosion protection behaviour</i>	0/0	0/0

+ Multipurpose Grease Ca 2 in vielen Labortest vergleichbar zum Li-basierten Mehrzweckfett
Comparable performance of Multipurpose Grease Ca 2 PCI to Mehrzweckfett 2 in most cases

Südöl Portfolio

Portfolio Südöl



Breites Portfolio an Reraffinat Produkten mit bereits berechneten PCF Werten

Broad portfolio based on rerefined oil with existing PCF calculations

+ HLP PCI	22, 32, 46, 68, 100
+ HLP-DHG PCI	22, 32, 46, 68
+ CLP PCI	68, 100, 150, 220, 320

Südöl Raffinat 30

Aktuelle Produktion:
V40 = 30 cSt
Estergehalt = 0,01 %
Viskositätsindex = 122
Farbe = 1,0

Produkte auf Basis Reraffinat (PCI)

Products based on rerefined oil

PCI: „**p**roduct **c**arbon footprint **i**mproved“
(für leichtere Zuordnung)

PCI: „**p**roduct **c**arbon footprint **i**mproved“
(for clearer assignment)

+ Beispiele (Einsparung „bis zu“)

+ *Examples (savings „up to“)*

	Multipress RK 15 PCI	Multicor LF 65 Plus PCI	Divinol B Classic PCI	Multicut SE 22 PCI	Multidraw ZS 2 Basic PCI	Multidraw CF 4 PCI
% Reraffinat <i>% rerefined oil</i>	93	92	88	77	57	43
PCF Handprint [kg CO ₂ eq /kg]	-0,55	-0,54	-0,35	-0,42	-0,33	-0,19

Multicut Stamp FSB 20 V1

Projekt mit HS Kempten (Ergebnisse aktuell noch vertraulich)

- + Vergleich der Leistung (Verschleißkennzahlen) gegen ein gleich additiviertes Erstraffinatprodukt

Ergebnis: **gleiche Leistung bei deutlicher CO₂ Einsparung**

Project along with HS Kempten (results currently confidential)

- + *Comparison of performance (regarding wear) to a product based on conventional mineral oil*

Result: ***similar performance with high potential of CO₂ savings***

Multidraw PL 61 SE

Prelube 2. Generation / *2nd generation prelube*

+ Höhere Leistung bei geringerer Beölungsmenge
higher performance and less oil needed

+ Einsparung Zusatzbeölung
no need for spot lubricants

+ Einsparung an Reinigungsschritten
reduced cleaning steps

+ **Nachhaltigkeit durch Leistung**
Sustainability via performance

<https://www.audi-mediacycenter.com/en/photos/detail/audi-to-become-first-car-manufacturer-to-launch-second-gen>

<https://www.audi-mediacycenter.com/de/pressemitteilungen/audi-fuehrt-als-erster-automobilhersteller-prelube-oele-der-zweiten-generation-ein-13952>

<https://www.automobil-produktion.de/produktion/audi-reduziert-im-presswerk-den-oelkonsum-um-40-tonnen-127.html>

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05/05/21 | Ingolstadt | Company

Audi to become first car manufacturer to launch second-generation prelube oils



- > New basic lubrication for steel coils in the press shop saves 40 metric tonnes of oil every year
- > Volkswagen Group set to roll out this Audi-initiated product development
- > Board Member for Production, Peter Kössler: "Every contribution to increasing resource efficiency helps"

14. Mai. 2021 | 08:55 Uhr | von Götz Fuchslocher

Source: Audi Media Center

Neue Grundbeölung bei Stahlcoils

Audi-Presswerk reduziert den Ölkonsum um 40 Tonnen

Mit dem Produktionsstart des Q6 e-tron führt Audi die zweite Generation der Stahlcoilbeölung Prelube II ein. Im Presswerk sollen damit pro Jahr 40 Tonnen Öl eingespart werden. Die Idee stammt von Audi-Mitarbeiterinnen und Mitarbeitern.



Source: Automobil Produktion



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Letzte Zahlen

last figures

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Letzte Zahlen

Last figures

- + PCF Hopfen/*hops*: 4 kg CO₂ eq/kg
- + PCF Malz/*malt*: 0,77 kg CO₂ eq/kg
- + PCF Bier/*beer*: 0,7 kg CO₂ eq/kg



Vielen Dank für Ihre Aufmerksamkeit!
Thank you for your attention!

<https://www.zevero.earth/post/malt-and-barley-carbon-emissions>

[https://lcpshop.net/product/large-glass-1-liter-beer-mug/?gad_source=1&gclid=EAIaIQobChMIpvnJ9qCjgwMVD5FoCR3XugybEAQYBiABEgL7z_D_BwE#googtrans\(de\)](https://lcpshop.net/product/large-glass-1-liter-beer-mug/?gad_source=1&gclid=EAIaIQobChMIpvnJ9qCjgwMVD5FoCR3XugybEAQYBiABEgL7z_D_BwE#googtrans(de))

<https://www.co2everything.com/co2e-of/beer>

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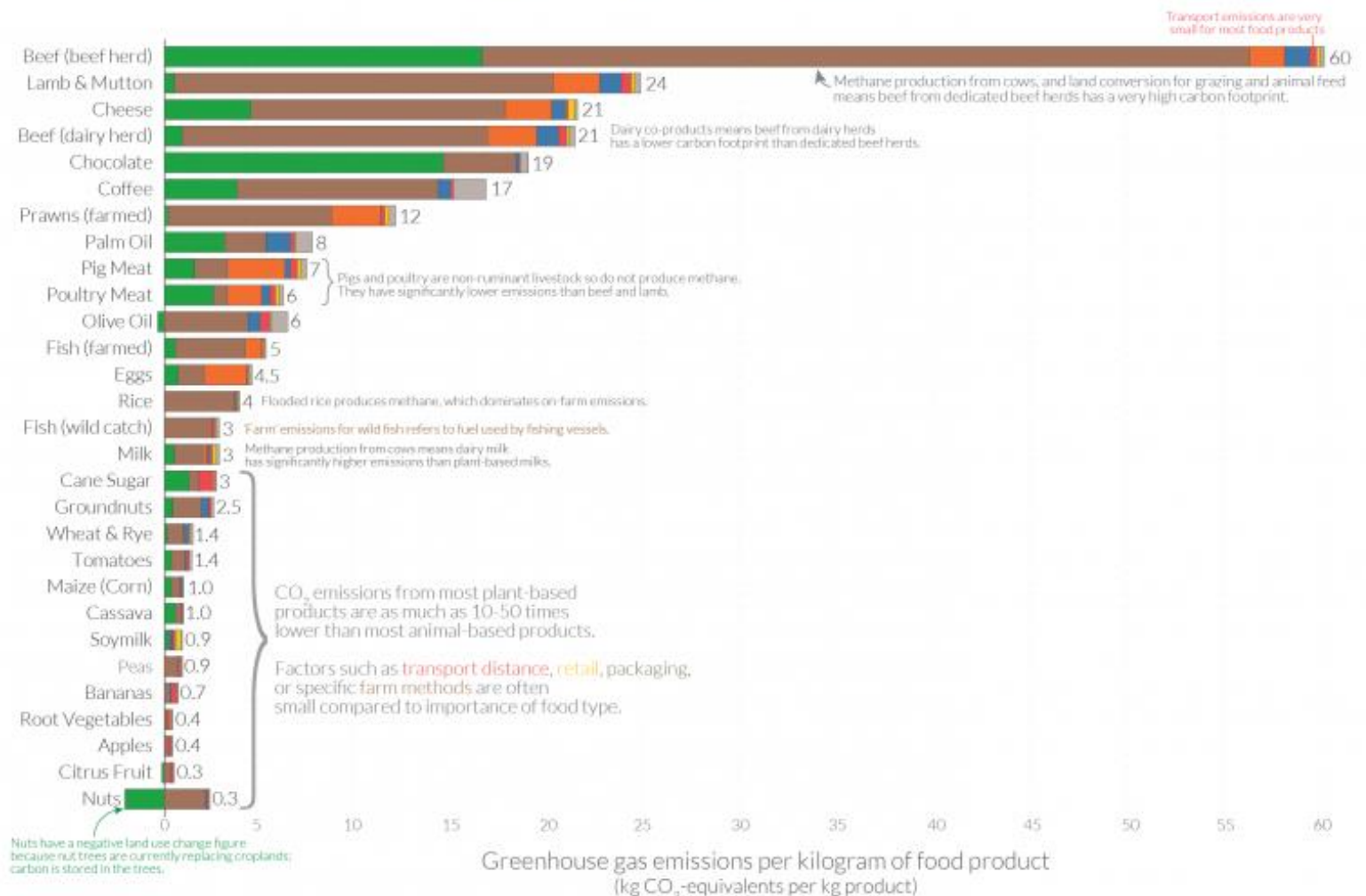
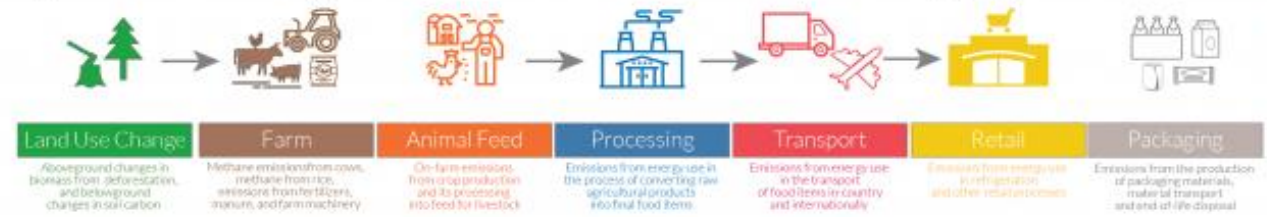
**Vielen Dank für Ihre
Aufmerksamkeit!**

Letzte Zahlen

Last figures

https://static.wixstatic.com/media/dbd48b_093fc6a559c041d2a188c7eb7117c615~mv2.png

Food: greenhouse gas emissions across the supply chain



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Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries. Data source: Poore and Nemecek (2018), Reducing food's environmental impacts through producers and consumers, Science. Images sourced from the Noun Project. OurWorldinData.org - Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Hannah Ritchie.