

Guesstimate carbon emissions

Warning: No exact science

“Strawberries from Spain are OK. Bought on foot.”

“Train? Too many emissions. Let's take the car.”

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Who?

- Dipl.-Ing. Gunnar Thöle
- HVAC planning, climate protection in local communities

Typical questions

Maria: “I’ve got LED lamps everywhere. So I made enough offset to be able to fly to Spain.”

Hubertus: “Strawberries from Spain aren’t so bad.”

Jonas: “Tofu tastes bad.”

Gesine: “I can’t afford 30cm of insulation on my home.
Also, walls need to breathe!”

Herbert: “Electric cars are equally bad.”

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What to do

- Use an algorithm.
- Find process chains.
- Calculate process.
 - Using physics (try not to do that)
 - Using software
- Only calculate what has relevant effect.
 - Energy use (=transport)
 - Metals, especially aluminum
 - Non-organic fertilizer

A physics example: Go up

- Elevator

- $m \cdot g \cdot h$
- $(80+330)\text{kg} \cdot 9,81\text{m/s}^2 \cdot 1\text{m}$
- 4022 Joule = 0,0011 kWh
- Renewable: 0 Gramm CO_2
- Normal electricity (DE): 0,6 Gramm CO_2

- Stairs

- $m \cdot g \cdot h$
- $80\text{kg} \cdot 9,81\text{m/s}^2 \cdot 1\text{m}$
- 785 Joule
- Human efficiency: 15%
- Energy use: 5233 Joule
- 1,8 gram potatoes = 1,9 Gramm CO_2
- 0,75 gram beef = 18,5 Gramm CO_2





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Datei Bearbeiten Daten Szenarien Extras Fenster Hilfe

Produkte

Prozesse

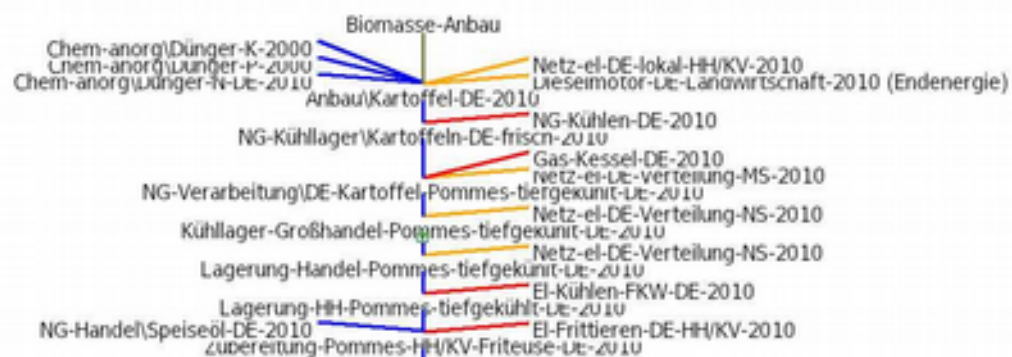
Szenarien

Referenzen

Standards

Prozesse (533/9766) Info Kommentar Filter Prozesskette Ergebnisse

erhaltung-mix\Mastbuehle-EU-2020
erhaltung-mix\Mastbuehle-EU-2030
erhaltung-mix\Masthaehnchen-EU-2010
erhaltung-mix\Masthaehnchen-EU-2020
erhaltung-mix\Masthaehnchen-EU-2030
erhaltung-mix\Mastschwein-EU-2010
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erhaltung-mix\Mastschwein-EU-2030
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mschlag-BR->EU\Orangen-OLUC-2020
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zubereitung-Pellkartoffeln-HH/KV-Koch
zubereitung-Pommes-HH/KV-Backofen
zubereitung-Pommes-HH/KV-Backofen
zubereitung-Pommes-HH/KV-Backofen
zubereitung-Pommes-HH/KV-Friteuse-I
zubereitung-Salzkartoffeln-HH/KV-Koch



4.9. Heizwert-bezogen

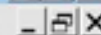
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Datei Bearbeiten Daten Szenarien Extras Fenster Hilfe



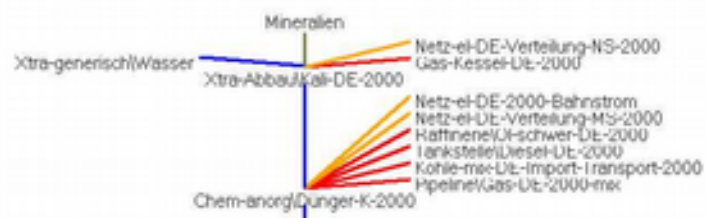
Produkte

Prozesse

Szenarien

Referenzen

Standards



4.9. Heizwert-bezogen Gemis 4.9 Copyright © 2012-2017 ifas

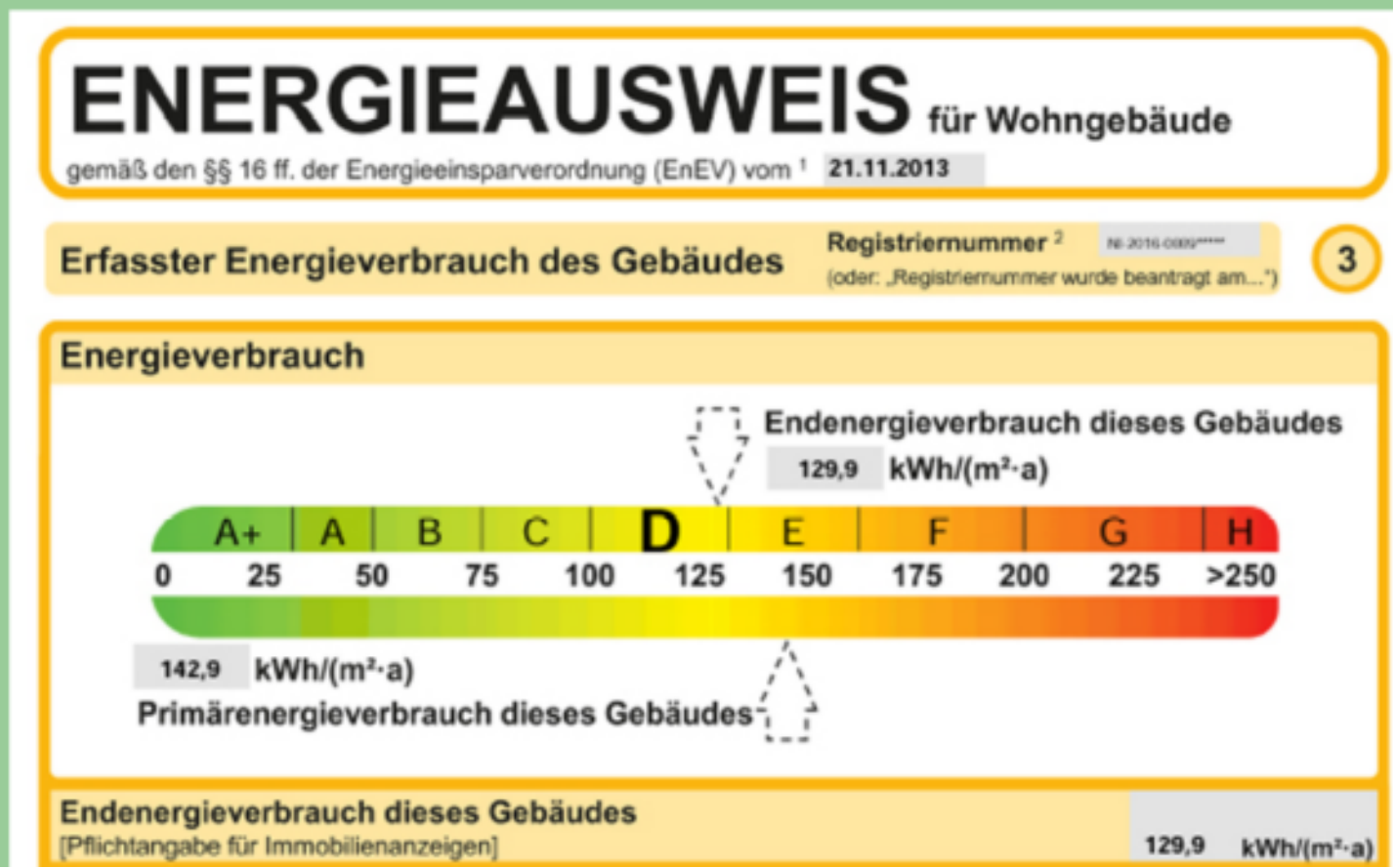
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Shortcut: EPDs

First: Google an EPD, if available.
("Umweltproduktklärung")

Shortcut: Buildings

- Find an energy performance certificate.
Read energy use.



Use GEMIS

- If no EPD, no building: As a last, but very common, resort: Use GEMIS.

Now you work

- Ask if help needed.
- Prove me wrong. Please!

Ride a train

- This train is called "Bombardier Talent 2" and has an EPD. Find it.
- Find grams of CO₂ per passenger-km.

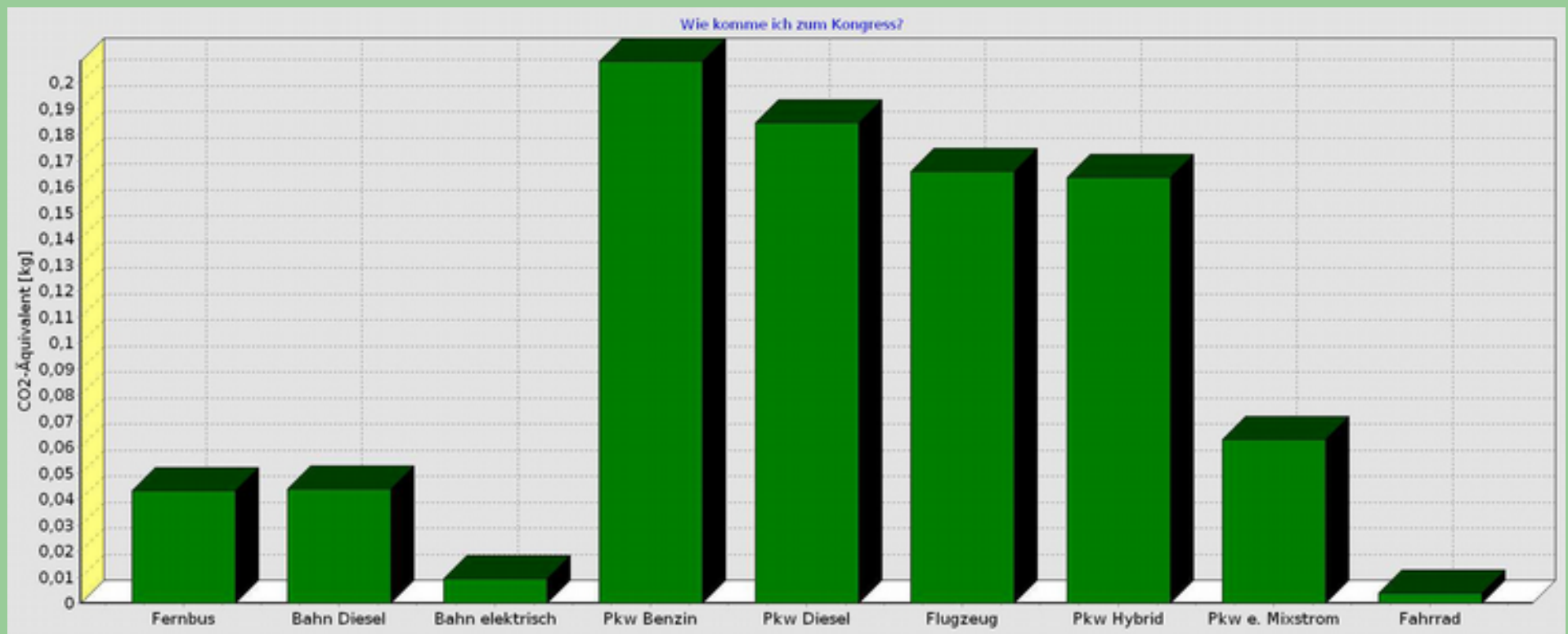


Ride a train

- This train is called "Bombardier Talent 2" and has an EPD. Found it:
- 38,6 grams of CO₂ per passenger-km.



Travel



Water

- Tap water
- 1l = X,X g CO₂
- Bottled water
 - Tap water
 - Bottle: 20 g PET = XX g CO₂
 - Transport, truck, 200km = XX g CO₂
 - Transport home, walking = 0g
 - Sum XX,X g CO₂

Water

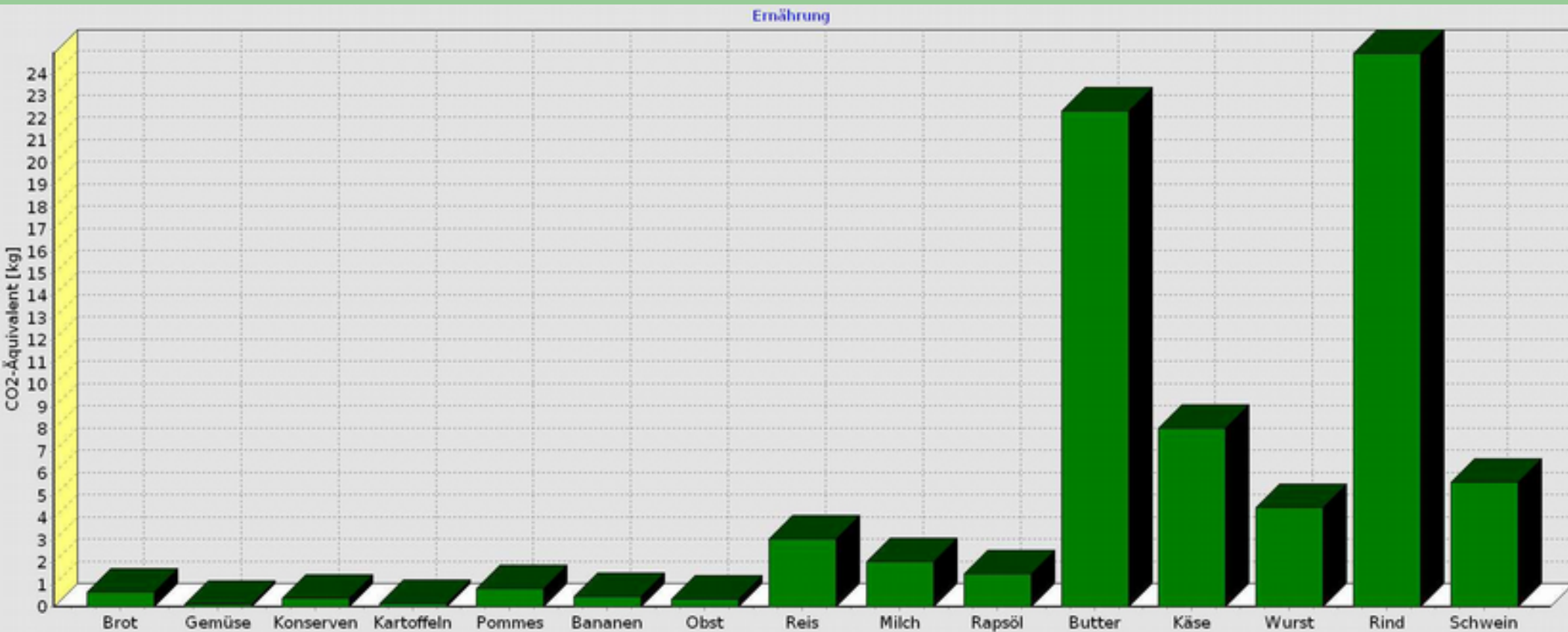
- Tap water
- $1\text{l} = 0,4 \text{ g CO}_2$
- Bottled water
 - Tap water
 - Bottle: $20 \text{ g PET} = 64 \text{ g CO}_2$
 - Transport, truck, $200\text{km} = 10 \text{ g CO}_2$
 - Transport home, walking = 0g
 - Sum $74,4 \text{ g CO}_2$

Water



Food

- If you love it – it's bad.



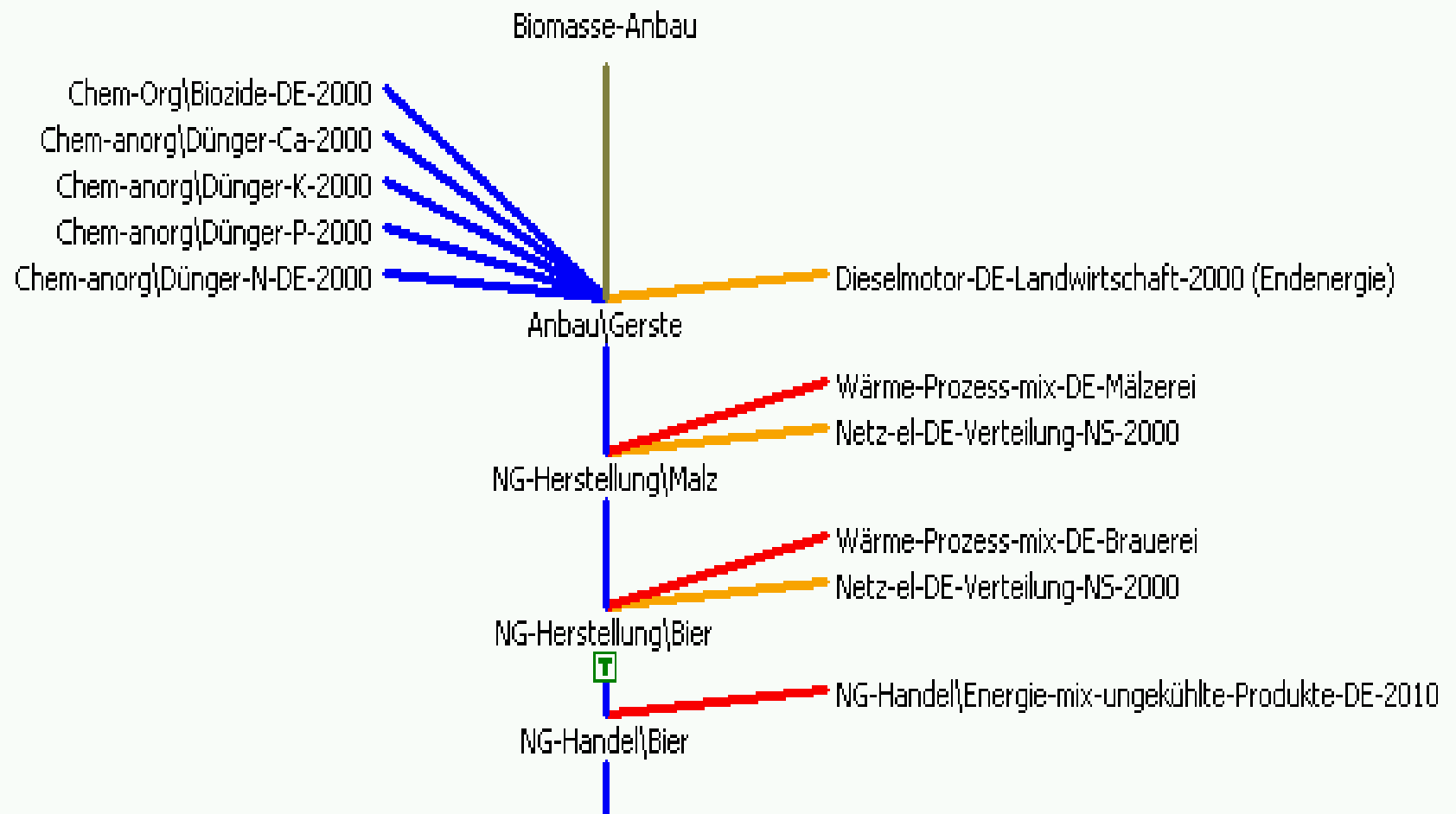
Strawberries from Spain

- 500g Strawberries = XXXg CO₂
- 20g plastic = XXg CO₂
- 1500 km Transport = XXg CO₂

Strawberries from Spain

- 500g Strawberries = 133g CO₂
- 20g plastic = 40g CO₂
- 1500 km Transport = 40g CO₂

Bier. So wird's gemacht.



Zahlensalat.

- 457 g CO₂ / kg Bier. Und das kommt so:
- 4x Dünger + 1x Biozid (28g gesamt): 70 g CO₂
- Trecker: 0,0315 kWh mech. Energie=10 g CO₂
- Wärme-Mälzerei (180g Malz): 0,09 kWh=26 g CO₂
- Wärme-Brauerei: 0,433 kWh=140 g CO₂
- Stromnetz: 0,133 kWh=90 g CO₂
- Handel (Strom+Heizung): 0,25 kWh=109 g CO₂
- LKW: 100km=12 g CO₂
- Biomasse-Anbau (225g Gerste): 0g, denn das geht von alleine.

Jetzt alle zusammen! Kräftig pusten!

- 457 g CO₂ pro Maß = 99 Ballons
- Dünger + Biozid: 70 g CO₂ = 15 Ballons
- Trecker: 10 g CO₂ = 2 Ballons
- Wärme-Mälzerei: 26 g CO₂ = 6 Ballons
- Wärme-Brauerei: 140 g CO₂ = 30 Ballons
- Stromnetz: 90 g CO₂ = 20 Ballons
- Handel: 109 g CO₂ = 24 Ballons
- LKW: 12 g CO₂ = 3 Ballons