Data quality

Application guideline

Carbon Added Accounting

Demonstrated reliability of CO_2e footprints of products and services

Connekt

Topsector Logistiek

Content

1 Data quality

This guideline describes the importance of data quality for the application of Carbon Added Accounting. The reliability of CO_2e footprints must be manifest: were CO_2e levels accurately measured or based on general assumptions, or a mix of these two? This guideline explains how to establish data quality, how to process data and the insights that are provided as data quality is passed on up the chain.

The principle of data quality

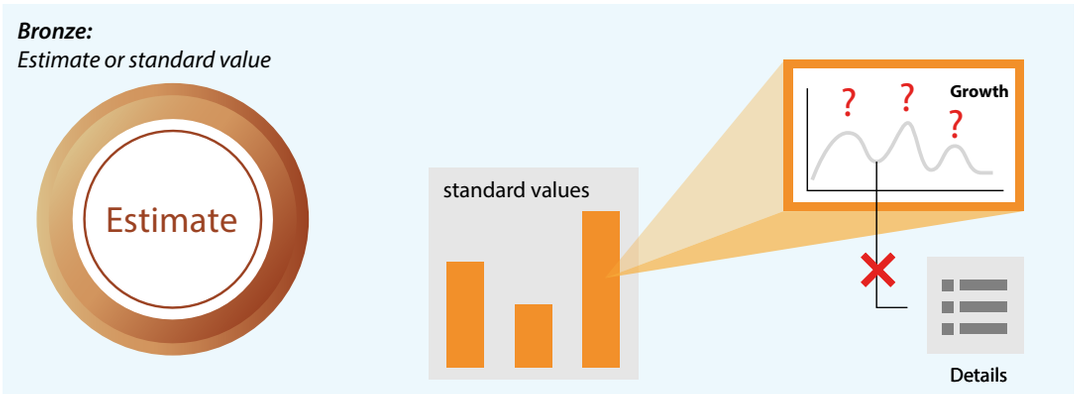
To indicate the reliability of CO_2e values, we have defined four levels of data quality within Carbon Added Accounting. They are Bronze, Silver, Gold and Gold+. The application of data quality levels allows us to deal with differences in data reliability. By dividing CO_2e output values into data quality levels and sharing this information with the next chain partner, the reliability of the reported CO_2e output remains transparent throughout the chain.

A key benefit is that this will lower the threshold for companies to start CO_2e calculations. Where there is little or no knowledge of the CO_2e values, estimates or characteristic parameters will be qualified as "bronze" after which one can further improve data reliability. Companies that develop their data quality level can distinguish themselves towards their customers. Auditors will be aware of the accuracy applicable to the CO_2e data.

2 Data quality levels

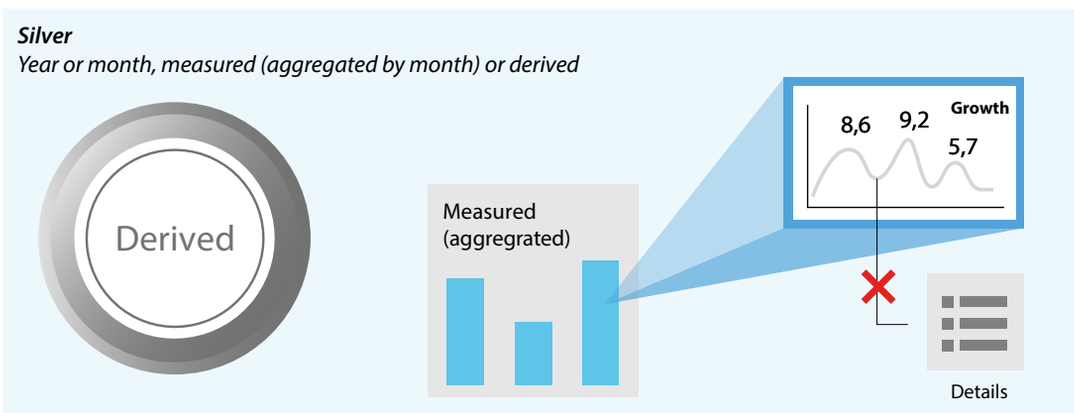
The four levels of data quality defined within Carbon Added Accounting are: Bronze, Silver, Gold and Gold+. Footprints with data quality Bronze have the lowest reliability and reliability will increase in Silver, Gold and Gold+ levels. Data quality therefore shows the accuracy of the figures being processed.

Bronze



Data quality level Bronze means that the values are based on estimates, standard values or characteristic parameters. If the data quality is not known, any values must be assigned level Bronze.

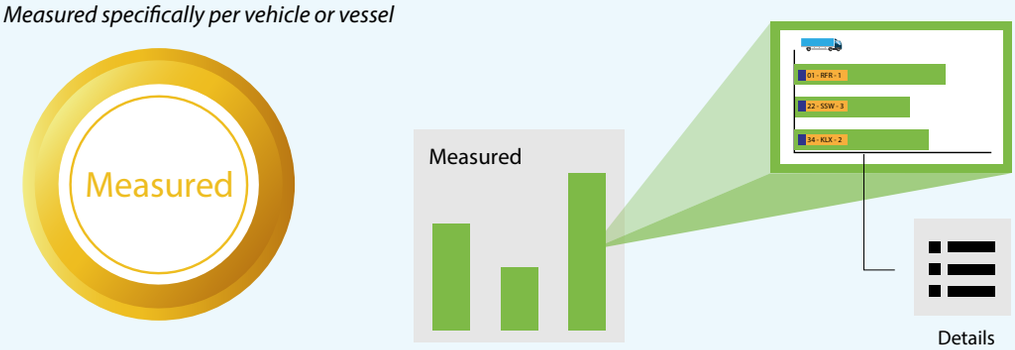
Silver



Data quality level Silver means that the values are based on measurements per period (week, month, year), either aggregated or not, or measurements per location.

Gold

Gold:
Measured specifically per vehicle or vessel



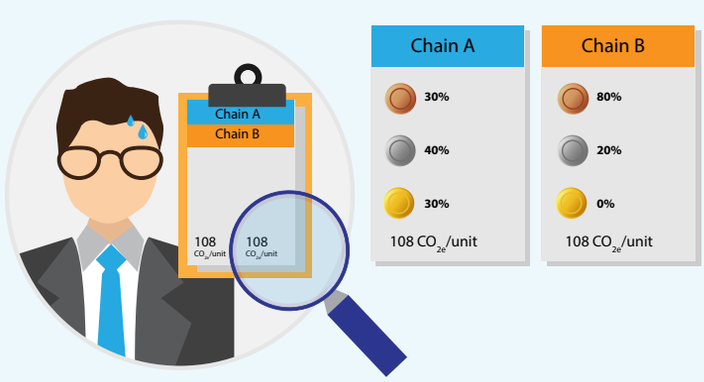
Data quality level Gold means that the values are based on measurements per period, aggregated or not, as well as measurements per location. These values have a higher data quality than level Silver.

Gold+

For very detailed measurements (e.g., per production batch, per day), level Gold+ may be applied as an excellent category of data quality. In modern production processes, especially those pursuing "operational excellence", the accuracy of energy consumption measurements by production line and time unit is increasing all the time and quality levels Gold+ are expected to be more frequent.

Insights

After the allocation calculation, the data quality of allocation is indicated for each (smallest) part of the allocation. Including the quality of the allocation in the data leads to meaningful analyses.



In this way, the fact that emission values across a chain are composed of data quality will remain visible:

- 30% Gold
- 40% Silver
- 30% Bronze

If another chain has a similar emission value with data quality consisting of:

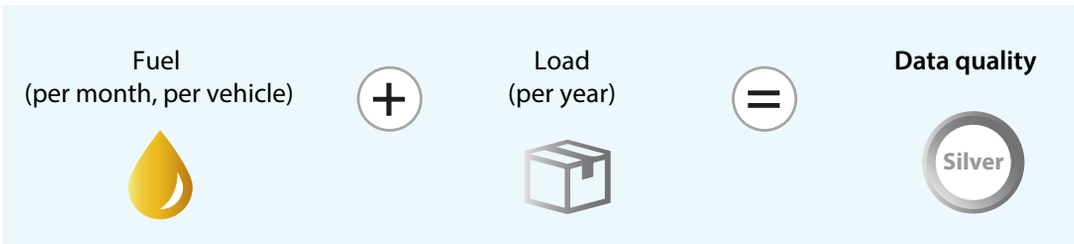
- 20% Silver
- 80% Bronze

this shows the different valuation to the comparison of the two values. in the latter case, 80% of the 108 kilograms (86.4 kg) were calculated from standard values at the base data. Chain A has seen considerably more measurements or derivations and its emission value is more reliable. This fact is very important in auditor's verifications: how reliable is the calculated value ?

For different types of organizations, data quality levels are defined differently. The following is the procedure for logistics companies on the one hand and manufacturing companies on the other.

3 Data quality for logistics companies

In logistics companies, the level of data quality is determined by the data quality of energy (e.g., fuel) on the one hand and the data quality of cargo loads on the other. The lowest level is the primary level.



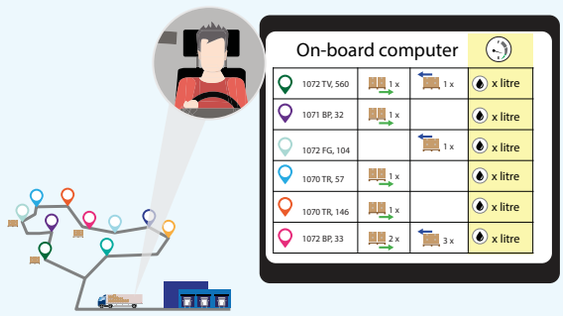
In the example above, the data quality of fuel is level Gold and the quality of cargo load is level Silver so that the overall data quality obtains level Silver.

For fuel, the following classifications and notations are used (See: link for further details).

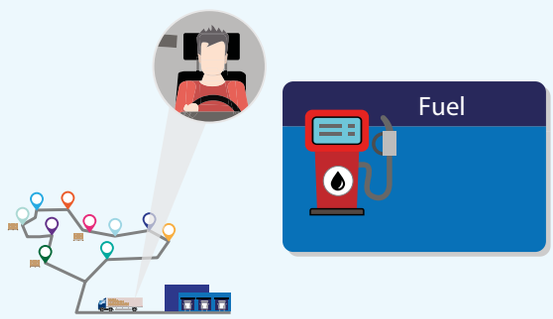
Data quality fuel or energy

Period[A]	Fuel/energy **total**	Fuel/energy **per vehicle registration**	Fuel/energy **per location**
Year	B_y	B_y	B_y
Month	B_m	B_m	N/A
Year	S_y	S_y	S_y
Month	S_m	G_m	G_m
Week	N/A	G_w	N/A
Trip	N/A	G_t	N/A

Measure

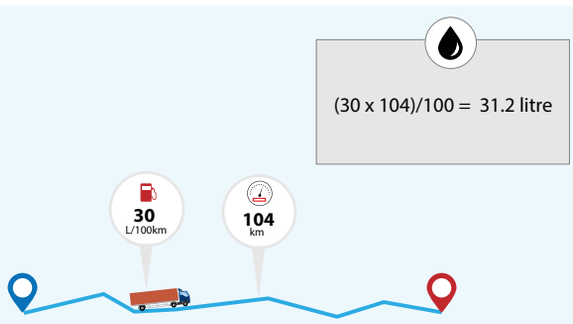


Modern on-board computers in trucks can record how much fuel has been used per trip or stop.



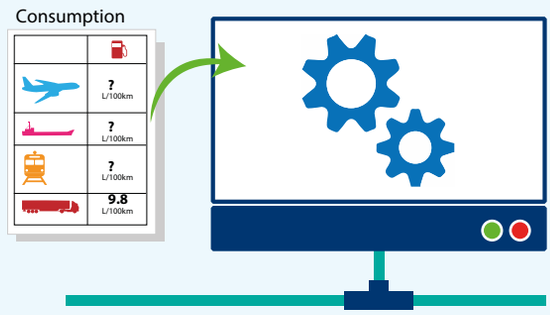
But fuel card totals card also indicate a measured quantity, over a period of time.

Deduce

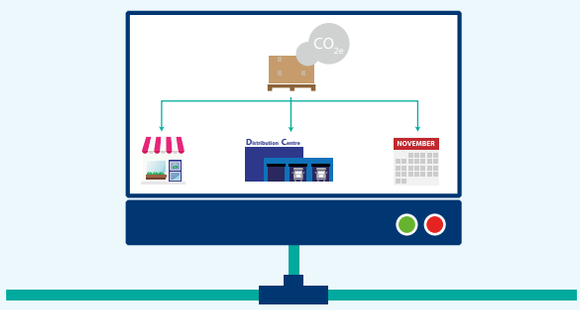


The amount of fuel consumed can be deduced from the mileage driven or sailed, based on standard consumption figures for each type of vehicle/vessel. Those consumption figures must then be provided for calculation.

Estimate



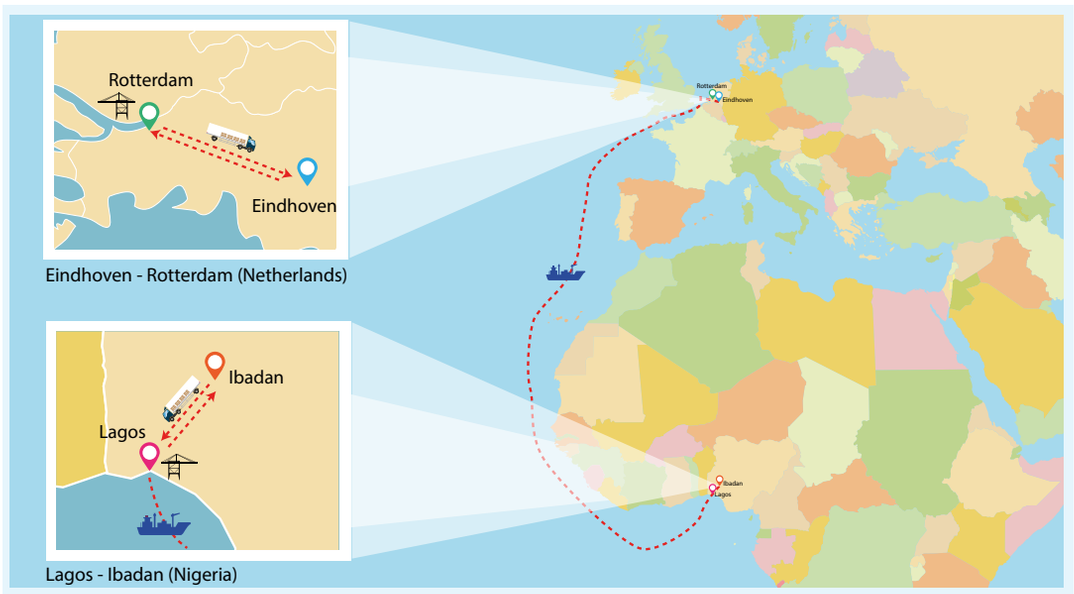
Advanced forecasting systems[1] provide very accurate estimates of the amount of fuel to be consumed based on planned transportation. On the basis of planned mileage, it is possible to estimate how much fuel was consumed, based on standard consumption figures by type of vehicle/vessel. Those consumption figures must then be provided for calculation.



A carrier that self-allocates CO_2e according to these guidelines can automatically have a characteristic parameter calculated (emissions per unit). If the client multiplies that characteristic parameter by the amount of cargo load, this will equal the amount of CO_2e emitted on that trip/route. Software can allocate CO_2e emissions to customers/carriers/time period.

1 Like EcotransIT

Standard values



Route	km_{gcd}	Consumption or emissions	Number	Kilometers	Liters of diesel	per 40 ft container	Total
Eindhoven - Port of Rotterdam	**112**	**90** Measured fuel consumption per container incl. empty kilometers	**40** trips		**3,600**	**290.7** kg CO_{2e} per container	**11,628** kg CO_{2e}
Port of Rotterdam transshipment		**8** Measured emissions per transshipment 40 ft container	**40** x transshipment			**8** kg CO_{2e} per container	**320** kg CO_{2e}
Port of Rotterdam - Port of Lagos	**5,065**	**77** Standard value for container shipping* CO_{2e}/TEU_{km} (sailed)	**40** x 2 TEU	**7,708** estimated km sailed		**1,187** kg CO_{2e} / container	**47,481** kg CO_{2e}
Lagos transshipment		**12** Standard value for emissions per transshipment 40 ft container	**40** x transshipment			**12** kg CO_{2e} per container	**480** kg CO_{2e}
Lagos - Ibadan	**108**	**42** Standard value for truck (liters/100 km)	**40** trips	**260** estimated km driven	**4,368**	**353** kg CO_{2e} per container	**14,109** kg CO_{2e}

Cargo
40 ft container 25 tons per container — **40 containers** 1,000 tons total

Measured · Indicator · Estimated

1,850 kg CO_{2e} per container

74,018 total kg CO_{2e} of which 62,070 on basis of indicators

74 kg CO_{2e} per ton of which 62 kg CO_{2e} on basis of indicators

For the emission factor for diesel the figure indicated at www.co2emissiefactoren.nl is used

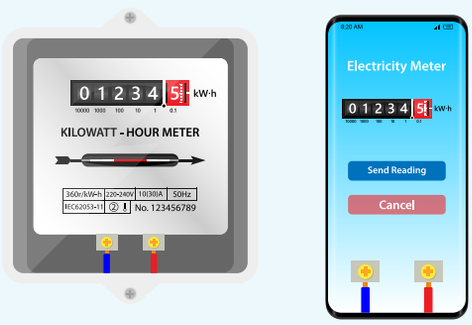
* *The standard value for container shipping to Lagos is trade-lane dependent. There is much imbalance in shipping to Lagos, which is why this figure is almost twice the standard value for Rotterdam Shanghai, for example: that is 47 grams $CO_{2e}/TEU \cdot km$*

In practice, especially in long international transport chains, all variants occur simultaneously. The basis must be specified by fuel or CO_2e number.

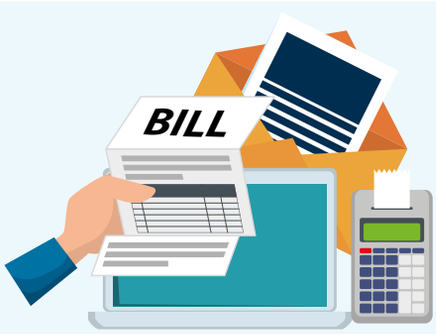
4 Data quality for manufacturing companies

Adding data quality levels is a solution for manufacturing companies in their efforts how to deal with different data reliabilities. This solution includes dividing the CO_2e output values into the classes Bronze (estimates, characteristic parameters), Silver (measured per period or location), Gold (measured per period and location) and Gold+ (measured in great detail).

Measure



Meters and intermediate meters indicate how much gas (scope I GHG Protocol) and electricity (scope II GHG Protocol) was consumed at any moment. These meter readings can usually be allocated to production locations and sometimes even to (individual) production lines.

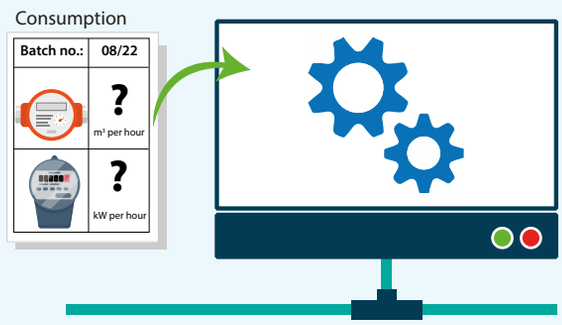


Meter readings can be compared with paid energy bills (correlation checks) so that accurate insight is gained into the energy data used.

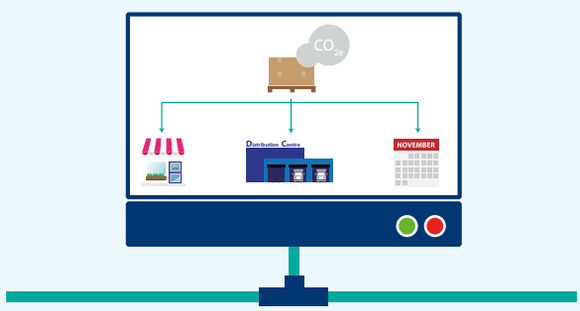
Deduce

From the running hours of a diesel generator, it can be deduced how much fuel (scope I GHG protocol) was consumed, based on standard consumption figures per machine type. Those consumption figures must then be provided for calculation.

Estimate



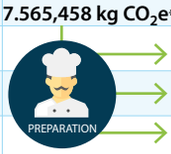
Advanced forecasting systems can make a good estimate of the amount of energy that will be consumed based on production batches. This is particularly important in energy-intensive production processes. Those consumption figures must then be provided for calculation.



A producer who self-allocates CO_2e according to these guidelines can automatically calculate a characteristic parameter (or emission factor) (emissions per unit produced). Buyers multiplying that characteristic parameter by the quantity of products purchased, have calculated the total purchased CO_2e for that product (scope III GHG protocol).

Standard values

Components	GHG Scope I CO_2e (kg)	GHG Scope II CO_2e (kg)	GHG Scope III CO_2e (kg)	Production	Emission factor per product
Gas	96,336 kg				
Electricity		1,623,349 kg			
Raw materials			5,059,563 kg		
Packaging			360,416 kg		
Lubricants and cleaning agents			420,528 kg		
Commuting			5,265 kg		
Sum	**96,336 kg**	**1,623,349 kg**	**5,845,772 kg**		
Production				3,585,525l in 293 batches **7.565,458 kg CO_2e***	
Product A					2,118 kg CO_2e/l
Product A					2,112 kg CO_2e/l
Product C					2,100 kg CO_2e/l
Waste				76 tons	



Measured (Silver, Gold, or Gold+)

Standard value Bronze

Estimated Bronze

** Of which 5,265kg was estimated, 5,840,507 kg based on standard values and 1.719,685 kg measured*

Data quality	Total kg CO_2e	Bronze kg CO_2e	Silver kg CO_2e	Gold kg CO_2e	Gold+ kg CO_2e
Product A	2.118 (100.0%)	1.605 (75.8%)	0.032 (1.5%)	0.481 (22.7%)	0.000 (0.0%)
Product B	2.112 (100.0%)	1.600 (75.8%)	0.032 (1.5%)	0.480 (22.7%)	0.000 (0.0%)
Product C	2.100 (100.0%)	1.591 (75.8%)	0.032 (1.5%)	0.477 (22.7%)	0.000 (0.0%)

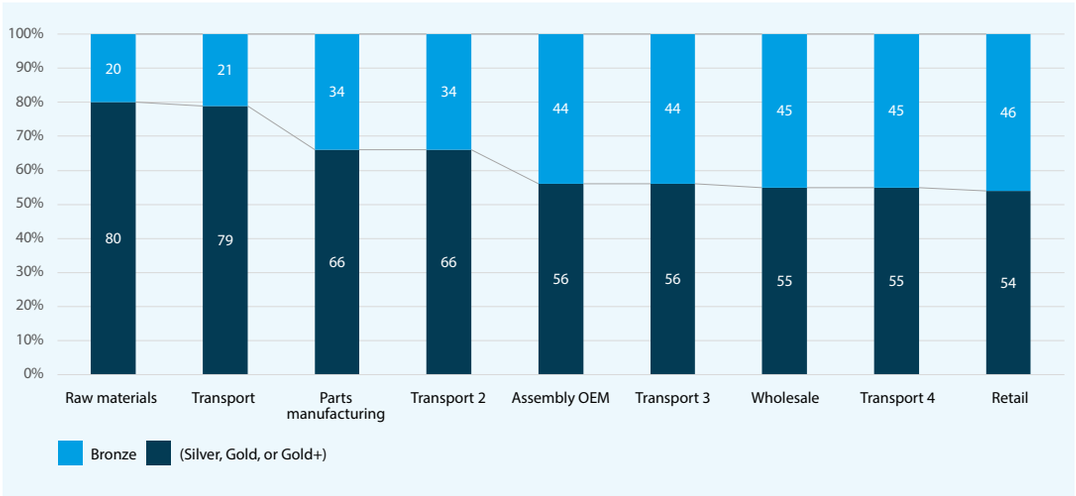
Based on the above data, the CO_2e per product can then be expressed in data quality levels. In this way, the reliability of the emission factors for each product is transparent.

5 Data quality in the value chain

Besides the importance of data quality to individual organizations, the application of data quality in chain administrations is even more important. Generally each chain party can establish the consumption of scope I and II accurately and with high data quality (mostly Gold), and the data quality of the final footprint in chain administrations will increase automatically. See the table below for example of calculations.

The CO_2e of purchased goods such as raw materials and packaging materials, or scope III, can often not be accurately determined in practice. After all, this requires reliable data from suppliers, sometimes from far abroad, at the expense of the accuracy of the CO_2e values. That is why scope III is often calculated on the basis of the average emission factor per unit (e.g. from technical data sheets), multiplied by the purchased quantity.

CO_2e value (kg)	Raw materials	Transport	Parts	Transport	Assembly	Transport	Wholesale	Transport	Retail
Scope I	10	1	10	1	10	1	1	1	1
Scope II	10	0	10	0	10	0	1	0	1
Scope III	80	100	101	121	122	142	143	145	146
Total CO_2e footprint	**100**	**101**	**121**	**122**	**142**	**143**	**145**	**146**	**148**



This calculation example assumes that scope I and II have higher data qualities than bronze in all cases, and that scope III has the data quality bronze as an input for the first step in the chain (raw materials through agricultural processes or extraction). If each chain partner passes on its added CO_2e to the next step in the chain on the basis of Carbon Added Accounting, then the final data quality in this calculation example will rise from 20% higher than bronze to 46% higher than bronze, which is more than double, by merely sharing Carbon Added with the next chain partner. In short, the more chain partners add their scope I and II based on such data sources to the CO_2e output data, the higher the final data quality of the CO_2e footprint to the consumer will be.

Providing the data quality along with the CO_2e values at each step of a value chain, will lead to the final CO_2e footprint for end-users indicating the relevant data reliability.

Data quality
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Demonstrated reliability of CO_2e footprints of
products and services,

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