

# Smart urban on-trade beer delivery

**Solution for Innercity transport limitations,  
Greenhouse gas emission cut-back & roadmap to  
electrified distribution.**



# TABLE OF CONTENTS

Smart urban on-trade beer delivery	
Inner-city & Urban transport limitations	4
Classic transport options	5
- 7,5 Ton Beverage delivery truck	5
- 12 Ton Beverage delivery truck	5
- 12 Ton Tank beer delivery truck	6
- 18 Ton Beverage delivery truck	6
- 18 Ton Tank beer delivery truck	6
- 24 Ton Tank beer delivery truck	7
- Comparison	7
BE Combi concept	9
- 7,5 Ton BE tank beer trailer + truck	9
- 10,5 Ton BE tank beer trailer + truck	9
- 38 Ton tank beer trailer + truck	9
- Total overview delivery options	10
Additional advantages	11
- CO <sub>2</sub> Emission of transport per HL of beer	11
- CO <sub>2</sub> Emission in different delivery scenario's	13
- Total outcome	16
- Electrification possibilities	17
More information	18
Resources	18

# Inner-city & urban transport limitations

*“The trucking industry – the leading freight transportation mode in Western economies – has to brace itself for disruption. Vehicle automation, electrification and digitalization will radically change the trucking industry over the next decades, according to a new analysis. While disruption will unquestionably introduce major threats to incumbents, the industry as a whole could shift up a gear, and save up to **40% off operating costs.**”*

Trends in trucking - Consultancy EU

## City transport limitations

More and more cities have some kind of restriction on inner city transport. Almost every city or major town already have restrictions on exhaust emissions.

On top of that, a lot of especially older city centres have various weight and size limitations or have limited access.

Amsterdam and Paris for instance have a weight restriction of 7,5 Ton. Vienna even has restrictions above 3,5 Ton. Madrid and London have limitations over 12 Ton. Utrecht has an axle weight limitation of 2 Ton per axle. For now you can often get exceptional permits but you never know when a city decides to stop this.

Furthermore a lot of cities are reviewing their greenhouse gas emissions and are discussing to introduce CO<sub>2</sub> emission limits or even CO<sub>2</sub> neutral transport (for instance electric) in near future.

But what transport possibilities are there for on-trade beer delivery and how efficient are they? And what solutions are available to deal with the different transport limitations in cities?

In this whitepaper we compare current transport solutions on payload and CO<sub>2</sub> emissions

We also look at new developments to cope with today's and tomorrow's urban and innercity transport challenges.



Lightweight truck, Utrecht city center - Duotank (NL)

**“A lot of cities are reviewing their greenhouse gas emissions and are discussing to introduce CO<sub>2</sub> emission limits or even CO<sub>2</sub> neutral transport!”**

# Classic transport options

On trade beer delivery can be done per bottle, keg or tank. Bottles and kegs are usually transported by beverage delivery trucks. These come in various sizes. Tank beer can be transported either with a standard delivery truck in which a delivery unit and tanks are placed, or with a dedicated tank beer truck. Per truck variant we have compared what the nett payload will be.

- For bottles we take the weight of a German NRW bottle of 0,5 Litres, 0,36 kg. Per 20 bottles 1 crate of 2 kg is added.
- For stainless steel kegs we take the weight of a 50 Liter Euro keg, 13 kg.
- For tank beer we take the weight of delivery unit, 780 kg and 1375 kg per 1000 Liter transport tank or 825 kg for a 500 Liter transport tank.

In case of a dedicated tank beer delivery truck the weight of the delivery unit and tank are included in the average weight of the vehicle.

## 7,5 Ton Beverage delivery truck

Gross Vehicle Weight:	7,5 Ton	<u>Nett payload:</u>	
average weight vehicle:	4.650 Kg	0,5L bottles:	1.480 L
average power vehicle:	157 kW	50L SS kegs:	2.250 L
average payload:	2.850 Kg	tank beer:	1.500 L



## 12 Ton Beverage delivery truck

Gross Vehicle Weight:	12 Ton	<u>Nett payload:</u>	
average weight vehicle:	5.500 Kg	0,5L bottles:	3.380 L
average power vehicle:	165 kW	50L SS kegs:	5.150 L
average payload:	6.500 Kg	tank beer:	4.000 L



## 12 Ton Tank beer delivery truck

Gross Vehicle Weight:	12 Ton	<u>Nett payload:</u>	
average weight vehicle:	7.000 Kg	0,5L bottles:	n.a.
average power vehicle:	165 kW	50L SS kegs:	n.a.
average payload:	5.000 Kg	tank beer:	5.000 L



## 18 Ton Beverage delivery truck

Gross Vehicle Weight:	18 Ton	<u>Nett payload:</u>	
average weight vehicle:	8.700 Kg	0,5L bottles:	4.840 L
average power vehicle:	210 kW	50L SS kegs:	7.350 L
average payload:	9.300 Kg	tank beer:	6.000 L



## 18 Ton Tank beer delivery truck

Gross Vehicle Weight:	18 Ton	<u>Nett payload:</u>	
average weight vehicle:	11.000 Kg	0,5L bottles:	n.a.
average power vehicle:	210 kW	50L SS kegs:	n.a.
average payload:	7.000 Kg	tank beer:	7.000 L



## 24 Ton Tank beer delivery truck

Gross Vehicle Weight:	24 Ton
average weight vehicle:	12.000 Kg
average power vehicle:	285 kW
average payload:	12.000 Kg

### Nett payload:

0,5L bottles:	n.a.
50L SS kegs:	n.a.
tank beer:	12.000 L



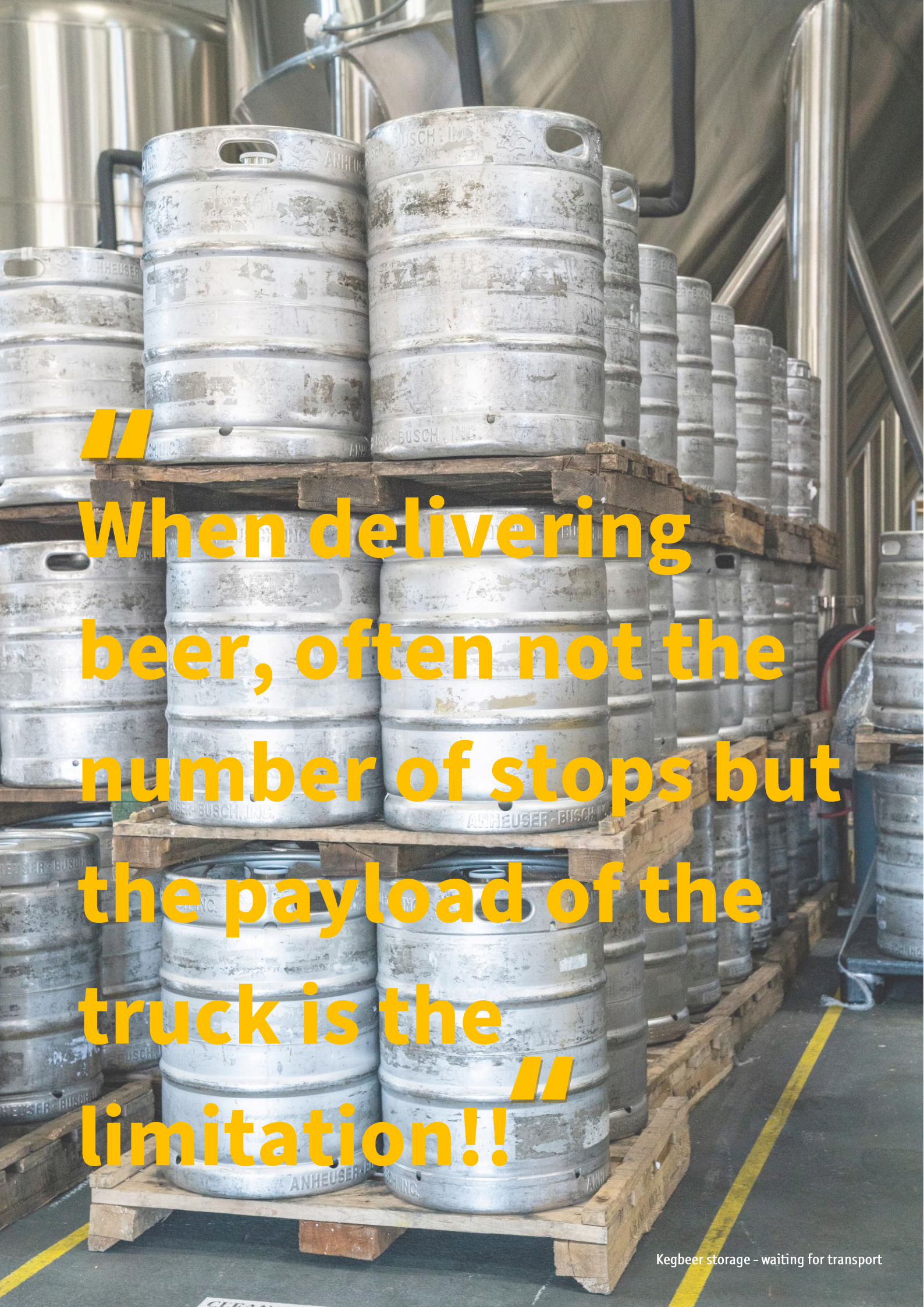
## Comparison

With a 12 Ton weight limit you can deliver approximately 5.000 Liters of beer in kegs or as tank beer. With an average drop size of 500 liter and an average delivery and drive time of 45 minutes per drop this is roughly an 8 hour working day.

If the weight limit is only 7,5 Ton the amount of beer you can deliver is limited, just above 2.000 Liters in kegs and around 1.500 Liters in tanks or bottles. This is only 3-4 drops which means that you need to reload your truck 1 or 2 times a day losing valuable time

With an 18 or 24 Ton vehicle the payload usually is not the limitation. In this case the number of drops you can do within a day becomes the limit.





**///**  
**When delivering**  
**beer, often not the**  
**number of stops but**  
**the payload of the**  
**truck is the**  
**limitation!!** **///**



# BE combi-concept

Duotank has come with a solution to deliver beer on-trade more efficient in city centres. This solution is specifically developed for tank beer and has a number of advantages. The concept is based upon a reasonable light pulling vehicle in which the delivery unit is incorporated. Attached to this truck is a light weight tank trailer which makes it possible to deliver up to 3.000 Liter of beer in a 7,5 Ton limited area.



## 7,5 Ton BE tank beer trailer + truck

*Because the trailer can be swapped you do not need to wait until the beer is loaded again. And because the delivery-unit is built on the truck itself the trailer is kept simple*

Gross Vehicle Weight:	7,5 Ton	<u>Nett payload:</u>	
Average weight vehicle:	4.500 Kg	0,5L bottles:	n.a.
Average power vehicle:	140 kW	50L SS kegs:	n.a.
Average payload:	3.000 Kg	Tank beer:	3.000 L



## 10,5 Ton BE tank beer trailer + truck

*To complete the concept it is also possible to connect a 5.000 Liter trailer to further increase the payload when you want to deliver beer outside a 7,5 Ton weight limit perimeter.*

Gross Vehicle Weight:	10,5 Ton	<u>Nett payload:</u>	
Average weight vehicle:	5.500 Kg	0,5L bottles:	n.a.
Average power vehicle:	140 kW	50L SS kegs:	n.a.
Average payload:	5.000 Kg	Tank beer:	5.000 L



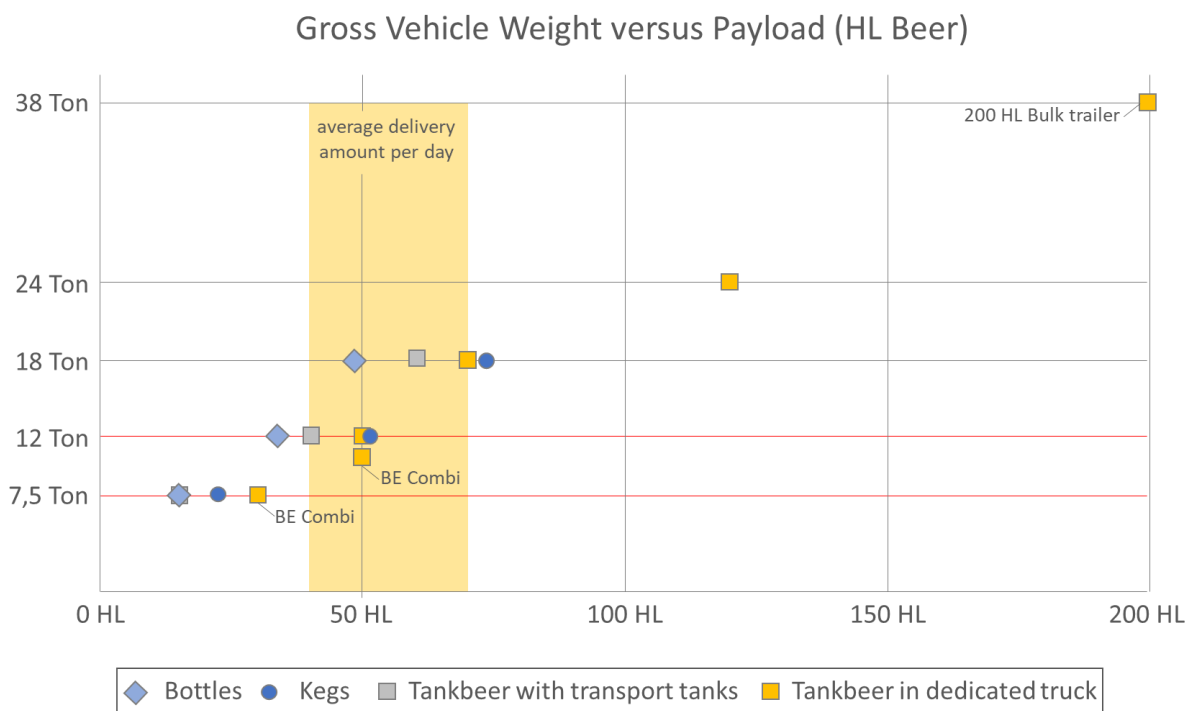
## 38 Ton tank beer trailer + truck

*If the brewery is further away from the city centre it is also possible to load the small BE trailers from a bulk tank trailer.*

Gross Vehicle Weight:	38 Ton	<u>Nett payload:</u>	
Average weight vehicle:	18.000 Kg	0,5L bottles:	n.a.
Average power vehicle:	335 kW	50L SS kegs:	n.a.
Average payload:	20.000 Kg	Tank beer:	12.000 L



# Total overview delivery options:



Above an overview of the payload of the different transport options. The payload in HL of beer of bottles is the lowest due to the weight of the bottles. The payload of tank beer is limited if you use transport tanks and a delivery unit in separate transport frames that can be placed on any truck. This because of the weight of the frames.

The payload for stainless steel kegs (50 Liter) and dedicated tank beer trucks is roughly the same. With the 7,5 Ton lightweight BE trailer concept for tank beer you can increase your volume by 50% compared to stainless steel kegs.

**“With the 7,5 Ton lightweight BE trailer concept for tank beer you can increase your volume by 50% compared to stainless steel kegs!”**

# Additional Advantages

*Making your city distribution vehicles lighter not only makes it possible to transport more beer, when done wisely it can also reduce your carbon footprint of transport. The CO<sub>2</sub> emission of transport depends on two major factors: weight and engine size. This means that if you optimize the weight ratio of cargo versus truck weight you can lower CO<sub>2</sub> emissions:*

## CO<sub>2</sub> emission of transport per HL of beer

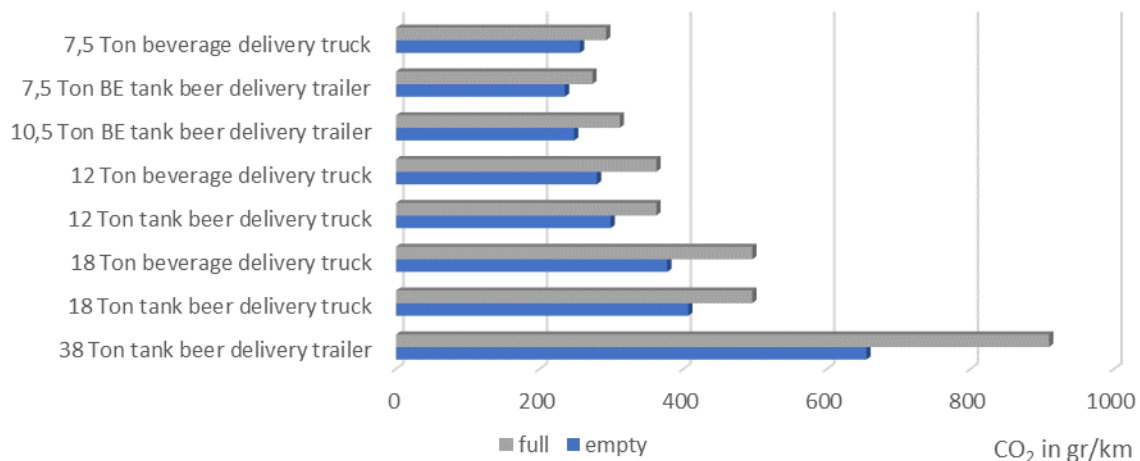
To calculate the CO<sub>2</sub> emission of different beer delivery trucks, the bottom-up emission calculation method<sup>i</sup> developed by the Dutch research organisation TNO is used.

The used formula is based upon underneath variables:

<b>Weight vehicle:</b>	Weight of the different trucks
<b>Cargo weight:</b>	The cargo weight depends on the different packaging
<b>Power of the truck:</b>	The engine power of the different trucks
<b>Correction:</b>	The formula is based upon fuel consumption data of 2011, but also gives the possibility to adjust the data for other years, this correction value is calculated on 0,96 <sup>ii</sup> .
<b>The formula is:</b>	$\text{CO}_2 \text{ emission (gr/km)} = 0,96 \text{ (correction factor)} \times (13,25 \times \text{weight truck \& cargo (tons)} + 1,325 \times \text{engine power (kW)})$

**“The CO<sub>2</sub> emission of transport depends on two major factors: weight and engine size.”**

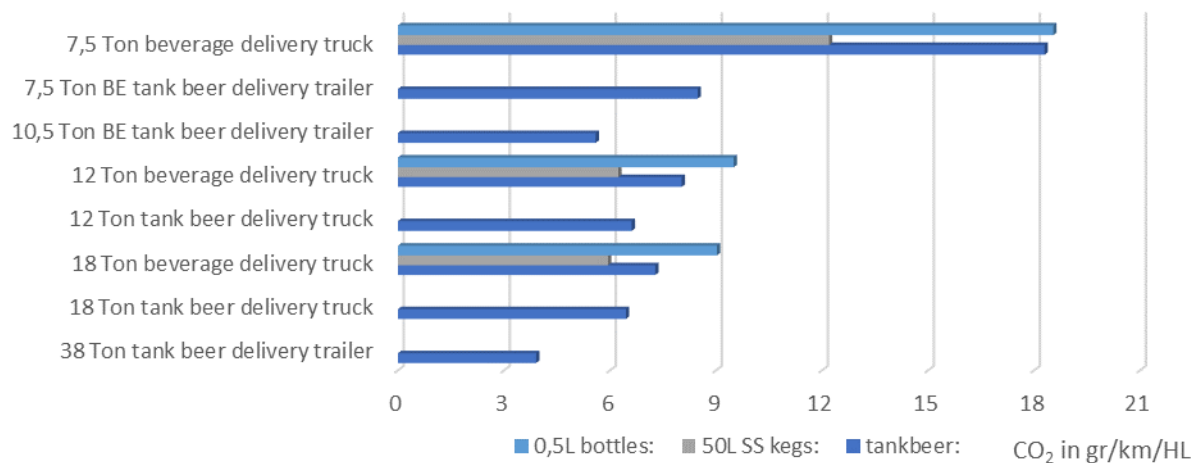
### CO<sub>2</sub> emission on-trade beer delivery trucks



As you can see the CO<sub>2</sub> emission increases when the weight of the truck increases.

However, also the amount of beer that can be transported increases. If you compare the combination of the outcome is the other way around:

### CO<sub>2</sub> emission on-trade beer delivery trucks per HL



In this case the 20 HL tank beer delivery trailer has the lowest CO<sub>2</sub> per km per HL. And a standard 7,5 Ton truck has a very high CO<sub>2</sub> emission per HL.

# CO<sub>2</sub> emission in different delivery scenario's

The best transport solution for your specific situation depends on your specific circumstances:

- Delivery volume
- City infrastructure / city regulations
- Distance from the brewery to the city

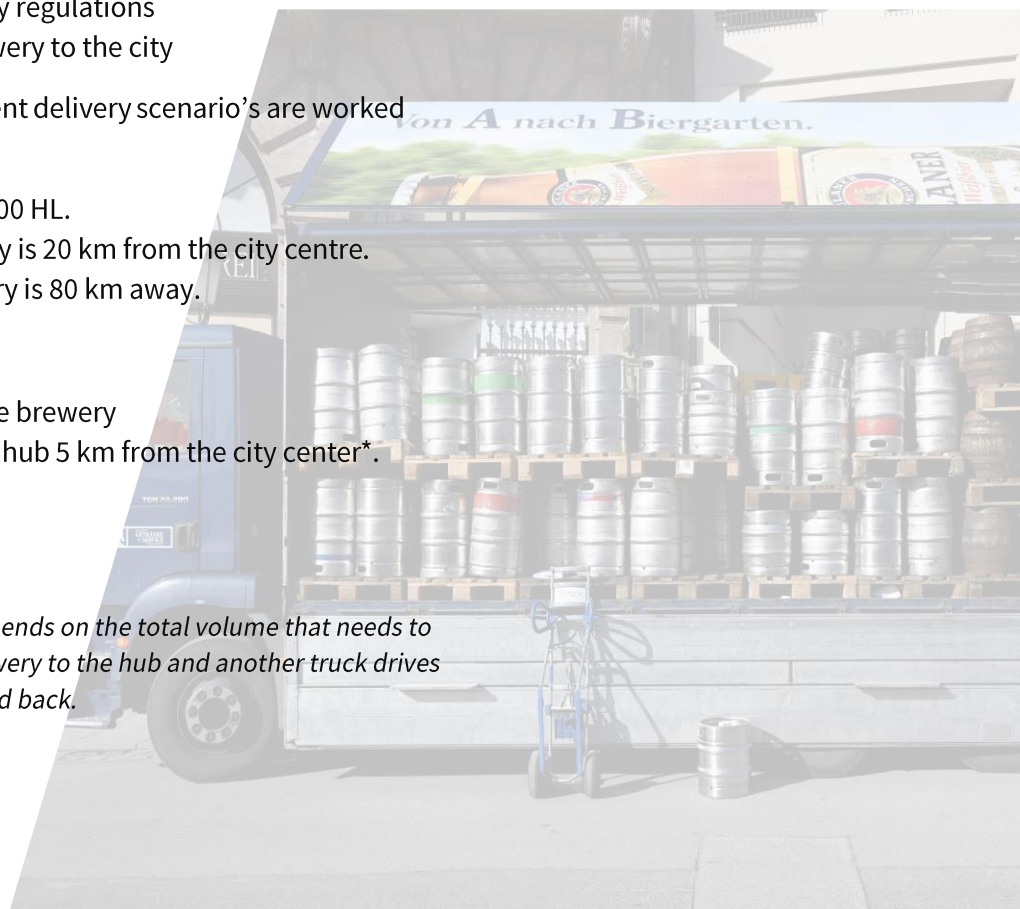
On the next pages a few different delivery scenario's are worked out:

1. Delivery of 50, 100 or 200 HL.
2. 1<sup>st</sup> scenario the brewery is 20 km from the city centre.
3. 2<sup>nd</sup> scenario the brewery is 80 km away.

In both scenario's:

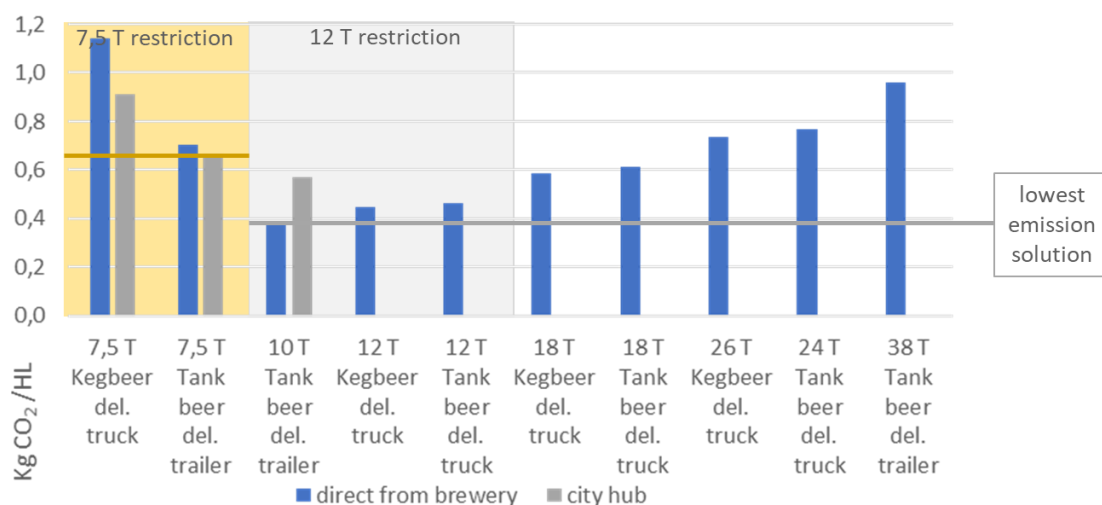
- Delivery direct from the brewery
- Delivery through a city hub 5 km from the city center\*.

*\*In this case a bulk truck (size depends on the total volume that needs to be delivered) drives from the brewery to the hub and another truck drives from the hub to the city center and back.*

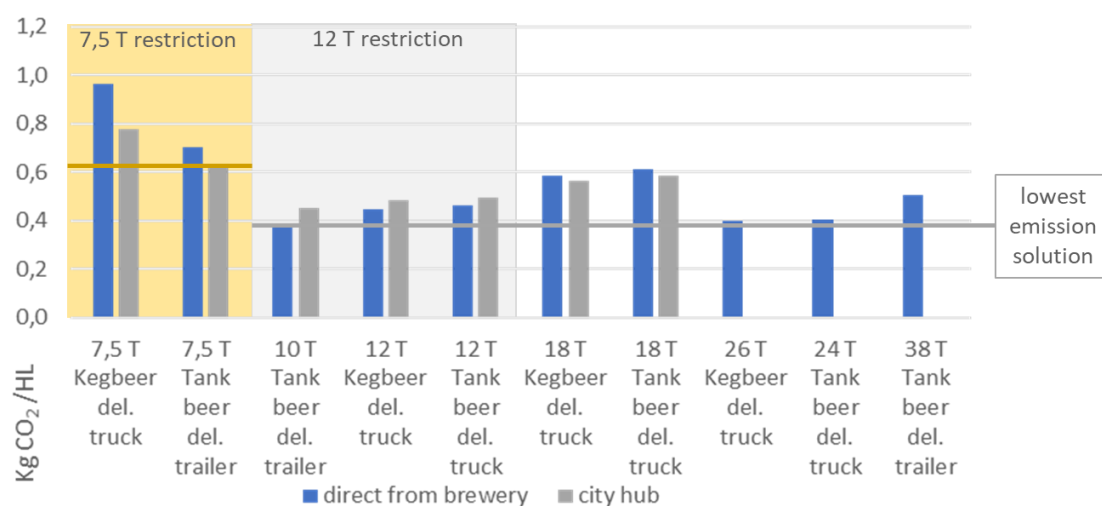




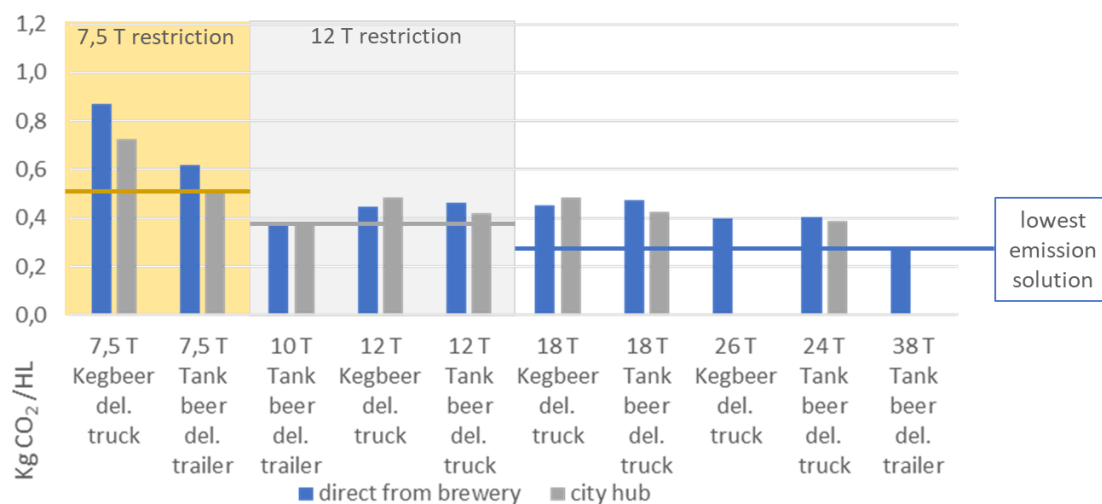
## 50 HL delivery, distance brewery 20 km



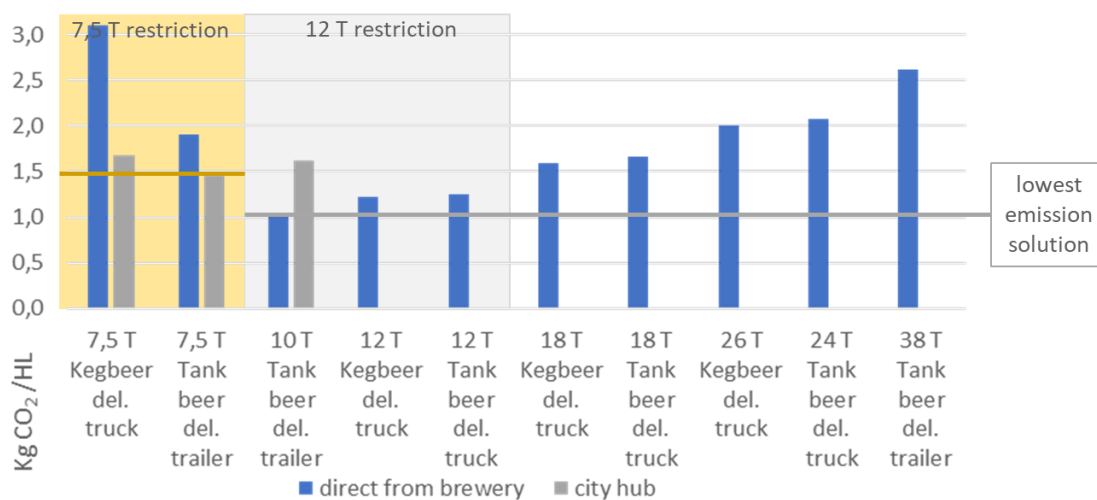
## 100 HL delivery, distance brewery 20 km



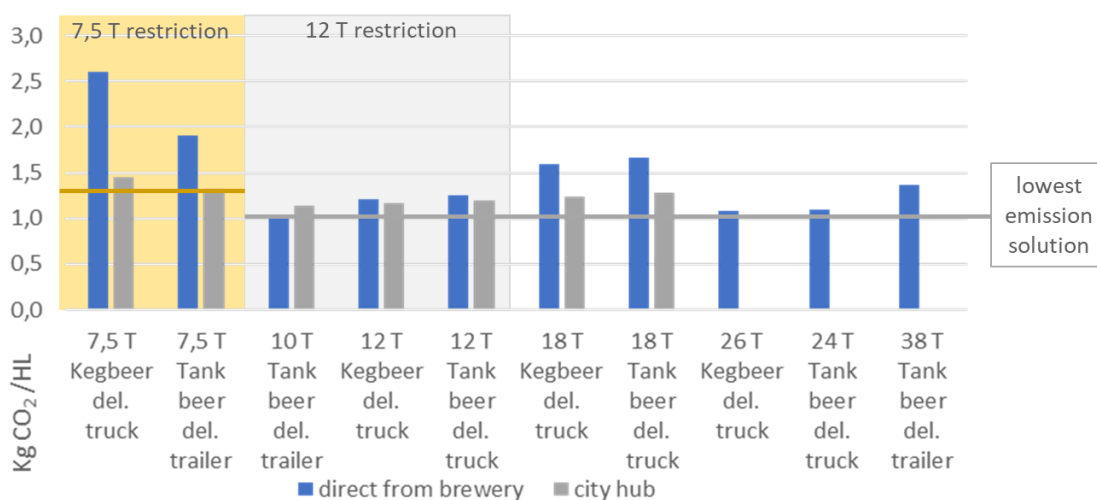
## 200 HL delivery, distance brewery 20 km



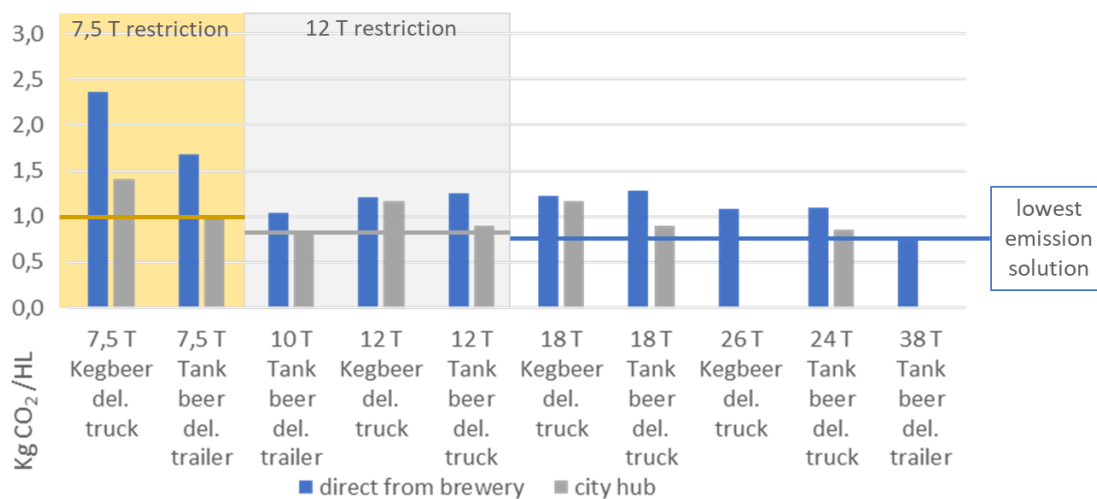
## 50 HL delivery, distance brewery 80 km



## 100 HL delivery, distance brewery 80 km



## 200 HL delivery, distance brewery 80 km



# Total outcome

When there are no weight restriction in the city the differences between a standard beverage delivery truck for 50 Liter kegs and a tank beer truck are minimal. The most ideal transport volume is around 5.000 Liter. You can save 15% CO<sub>2</sub> emission with a light weight tank beer delivery truck.

Interesting is to see that also when larges volumes need to be delivered especially the lightweight 5000 Liter variant still has a low CO<sub>2</sub> emission. Only when you need to deliver 200 HL at once theoretically it is better to do this with a 200HL truck and trailer. If this is practical is another question. (driving into the city centre with a 38 Ton truck)

When there is a weight limit of 7,5 Ton the CO<sub>2</sub> emission drops when you use the light weight tank beer trailer. Savings of 27-38% are possible!

Especially with weight limitations and a longer distance from the brewery to the city it is interesting to work with a city hub. With such a hub you can save again 23% up to 42%.

A city hub combined with a light weight delivery truck can save up to 60% on CO<sub>2</sub> emission.

**“A city hub combined with a light weight delivery truck can save up to 60% on CO<sub>2</sub> emission.”**

# Electrification

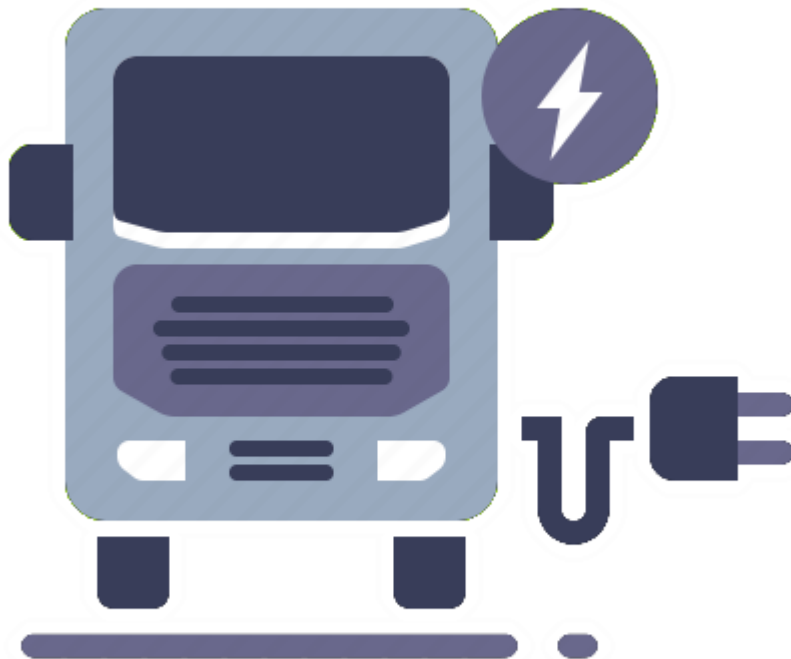
## possibilities

The demand to switch to alternative energy for inner city distribution increases. The first projects with small electric vans are in operation. For bigger trucks the first pilots are in progress, however the costs are still very high.

The weight and range determine the size of the battery. If you want to travel big distances or transport heavy loads you need a bigger battery. Which again weighs more. Also here lightweight vehicles have a big advantage. They can be electrified with much smaller batteries to achieve the same range.

And this saves a lot of money. To electrify a 16 Ton which can transport around 6.000 Liters and has a range of approximately 200 km is very expensive.

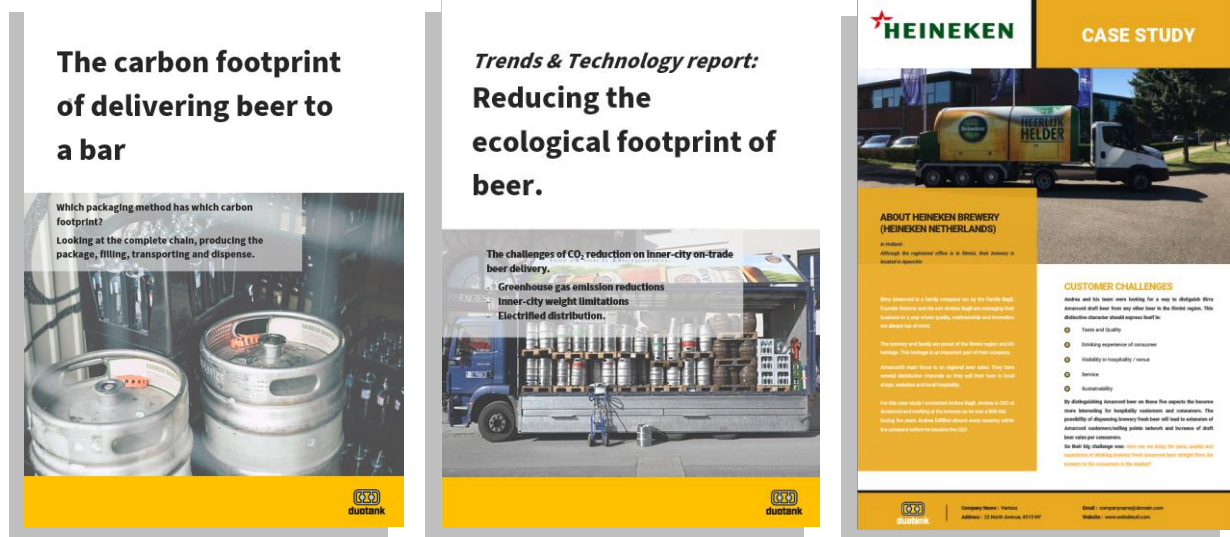
An electric lightweight BE Combination truck which can transport 3.000 (7,5 Ton) or 5.000 Liters of beer (10 Ton variant) is expected to cost less than 1/3 of an electric 16 Ton truck!





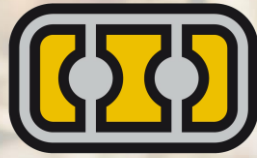
# More information:

For more information about different beer package and transport options also see the following whitepapers:



# References:

- i. [http://www.emissieregistratie.nl/erpubliek/documenten/Lucht%20\(Air\)/Verkeer%20en%20Vervoer%20\(Transport\)/Wegverkeer/CBS%20\(2014\)%20Bottom%20up%20berekening%20CO2%20vrachtwagens%20en%20trekkers.pdf](http://www.emissieregistratie.nl/erpubliek/documenten/Lucht%20(Air)/Verkeer%20en%20Vervoer%20(Transport)/Wegverkeer/CBS%20(2014)%20Bottom%20up%20berekening%20CO2%20vrachtwagens%20en%20trekkers.pdf)
- ii. Whitepaper *"The carbon footprint of delivering beer to a bar"*, paragraph calculation method



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