

Trends & Technology report: **Reducing the ecological footprint of beer.**

The challenges of CO₂ reduction on inner-city on-trade beer delivery.

- **Greenhouse gas emission reductions**
- **Inner-city weight limitations**
- **Electrified distribution.**



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Introduction

Driven by the Paris Agreement, the European EU climate action and the European Green Deal, a lot of actions are taken worldwide to lower the greenhouse gas emissions. By 2030 at least 40% cuts in greenhouse gas emissions must be achieved.

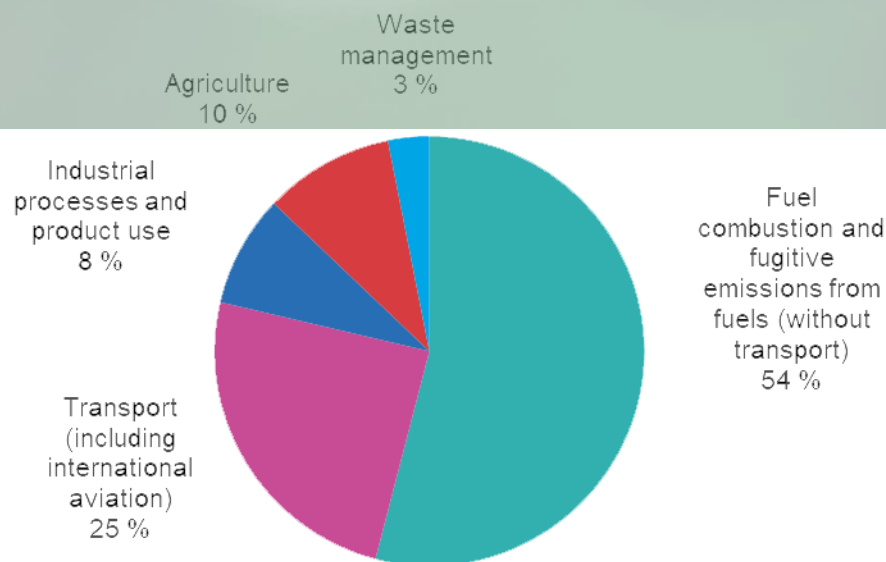
In 2017 54% of the Greenhouse gas emissions were caused by the production of energy (Fuel combustion)

Breweries are doing a lot to lower their greenhouse gas emissions. Projects to realize solar fields for green energy, water waste management and re-used energy from the brewing process are realized worldwide.

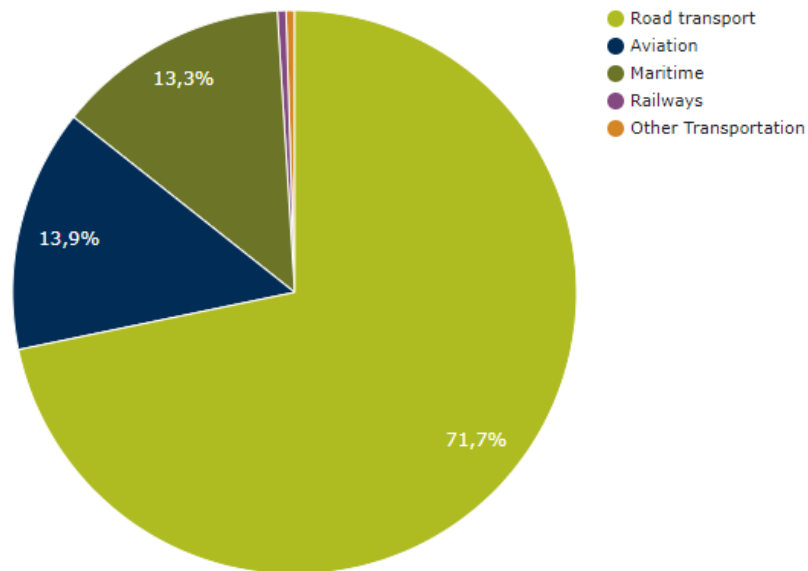
But besides brewing beer also the production of packaging's consumes a lot of energy. There is already a lot of focus on ecological packaging. But there also are possibilities to lower the greenhouse gas emission significantly. Especially in the on-trade beer market.

And also transport is a major contributor to the greenhouse gas emission. It is the second biggest source of emission (25%). Of these 25%, 72% is caused by road transport.

Greenhouse gas emissions in 2017



Greenhouse gas emissions, by source sector, EU-28, 2017 (percentage of total)
Source: Eurostat (env_air_gge), European Environment Agency

EU (Convention) – Share of transport greenhouse gas emissions

National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism

Source: European Environment Agency (EEA)

Particularly inner-city transport is one of the major contributors to CO₂ emissions and air pollution in urban areas. This is also why European cities and towns have joined forces in the European Covenant of Mayors movement and are taking energy and climate action to secure a better future for their citizens.

With an average CO₂ emission reduction target of 47% by 2030, Covenant signatories show the ambition to go beyond the EU's objectives.

On top of that cities and urban areas all over the world are becoming increasingly congested, which is posing a serious challenge for anyone wanting to perform delivery services.

This makes that many cities are taking the lead in setting goals to improve inner city logistics.

New technologies in on-trade beer delivery not only make it possible to reduce the carbon footprint of beer packaging, innovative transport solutions make it possible to optimize supply routes, downsize delivery trucks, optimize weight ratios for cargo and pave the way for economical full electric delivery.



**// We must remember
our duty to nature,
by reducing our CO₂
footprint. //**

Greenhouse gas reduction on packaging

To supply beer to a bar there are a number of methods to package the beer. In the [whitepaper “Carbon footprint delivering beer to a bar”](#) different packaging materials and packagings are compared. Also the use of recycled materials and re-use of packaging is taken into consideration.

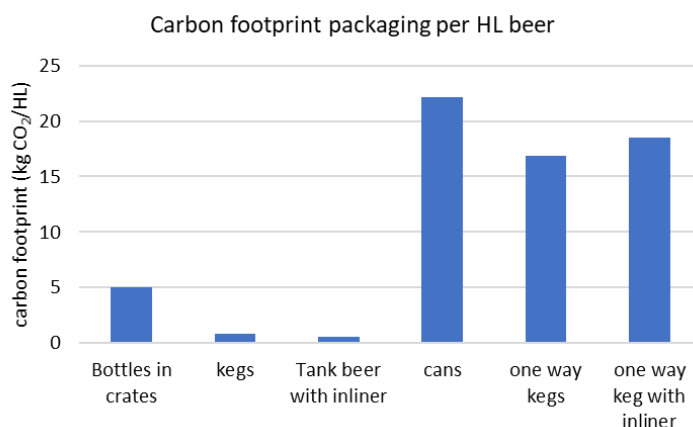
Interesting to see is that although glass bottles are very good recycled (76%) and reused 50 times, the carbon footprint still is much higher than stainless steel kegs. This is mainly because the weight of bottles to pack 1HL of beer is much higher than stainless steel kegs (72 kg vs 26 kg). As expected one way kegs have a very large carbon footprint. The carbon footprint of cans is even higher. Although over 75% is recycled still a lot of energy is needed to make new can's from recycled materials.

The not yet so commonly used tank beer system even has a smaller carbon footprint than stainless steel kegs. Although a one way plastic bag (called an inliner) is used, the amount of material needed is very limited and therefore the carbon footprint is very low.



The use of plastic packaging is ecologically discussed. A lot of plastics are not yet recycled causing ecological challenges. To overcome this problem for tank beer, [Duotank](#) has started a recycling program to 100% recycle beer liners, including collection, transport and re-use of the material. This makes tank beer circular and **further reduces the carbon footprint.**

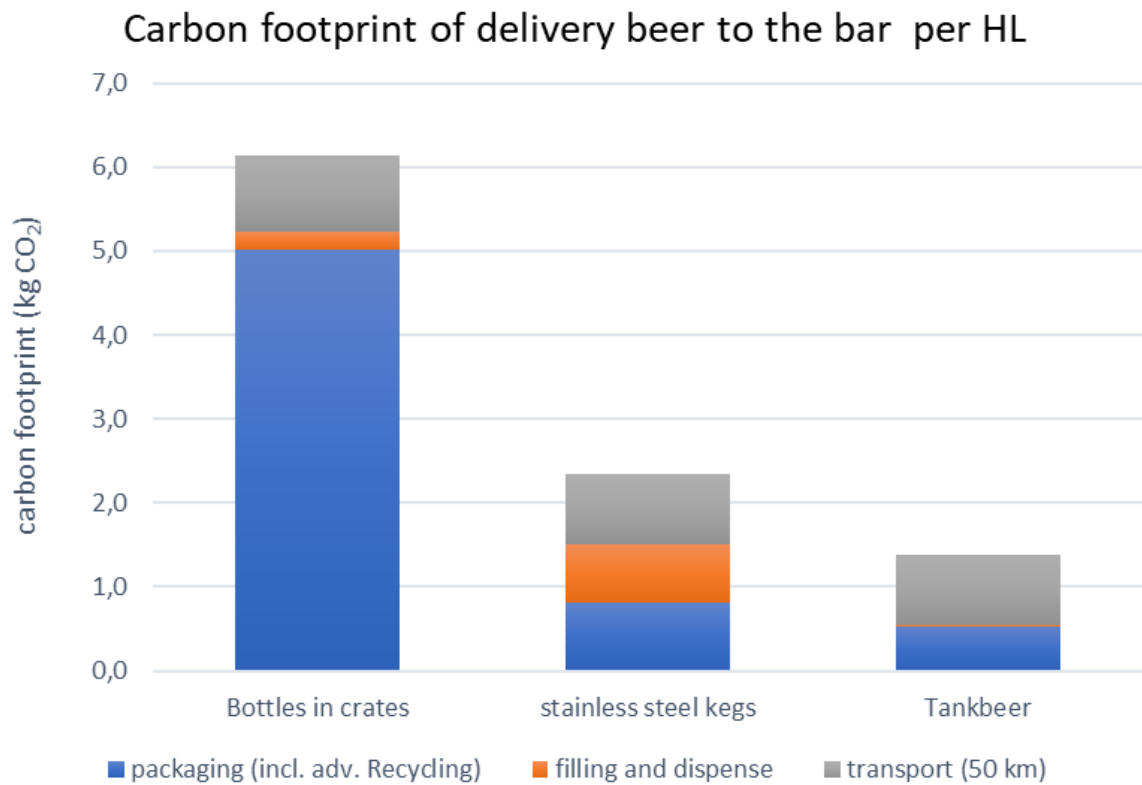
If you look at the total chain from the brewery to the glass also cleaning, filling and dispense needs to be taken into consideration. Also here the different packaging's show interesting differences. During filling of bottles and kegs CO₂ is used. To dispense beer from stainless steel keg's also CO₂ is used. Here tank beer also has an interesting difference. It uses an airtight bag that is pressurized by compressed air. Because no extra CO₂ is needed this again saves on the total carbon footprint.



Source: Whitepaper - Carbon footprint delivering beer to a bar



“Recycling of inliners makes tank beer circular and further reduces the carbon footprint!”



Source: Whitepaper - Carbon footprint delivering beer to a bar

If you look at the total carbon footprint of different packaging's commonly used to deliver beer to a bar you can lower carbon footprint with more than 75% using tank beer compared to bottles and more than 40% compared to stainless steel kegs (1-5kg savings on CO₂ per HL of beer)

“Tank beer has the smallest carbon footprint!”

Low-emission mobility strategy

With the global shift towards a low-carbon, circular economy already underway, the European Commission's low-emission mobility strategy, adopted in July 2016, aims to ensure Europe stays competitive and able to respond to the increasing mobility needs of people and goods.

The Communication identifies three priority areas for actionⁱⁱ:

1. Increasing the efficiency of the transport system by making the most of digital technologies and further encouraging the shift to lower emission transport modes,
2. Speeding up the deployment of low-emission alternative energy for transport, such as advanced biofuels, electricity, hydrogen and renewable synthetic fuels and removing obstacles to the electrification of transport
3. Moving towards zero-emission vehicles. While further improvements to the internal combustion engine will be needed, Europe needs to accelerate the transition towards low- and zero-emission vehicles.

Cities and local authorities will play a crucial role in delivering this strategy.



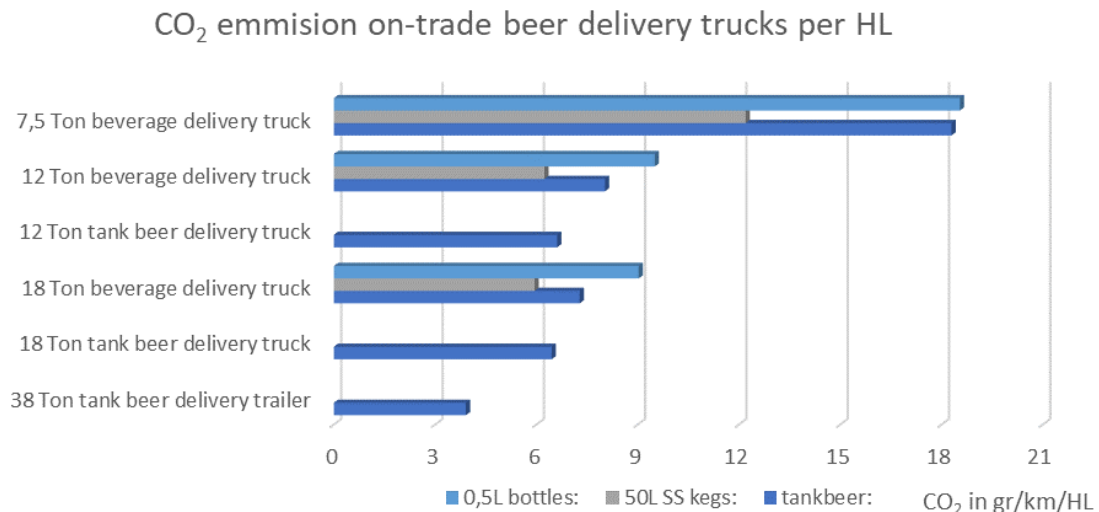
Lightweight fuel efficient transport solutions

Optimizing transport in urban areas is challenging. Especially in highly congested city centers. And exactly there the most bars and restaurants are located. Almost all major cities have exhaust emission regulations. On top of that, in many old city centers restriction are in place for (axle) weight limits, vehicle length and size .

As an example, Amsterdam and Paris 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. And many cities are to follow.

But these limitations limit the amount of beer you can transport into the city at once. Making beer delivery less efficient. Increasing CO₂ emission instead of decreasing them! New developments in light weight beer delivery trucks make it possible to reduce CO₂ and overcome city centre restrictions.

In the Whitepaper [“Smart Urban urban on-trade beer delivery”](#) different on-trade beer delivery transport methods are compared.



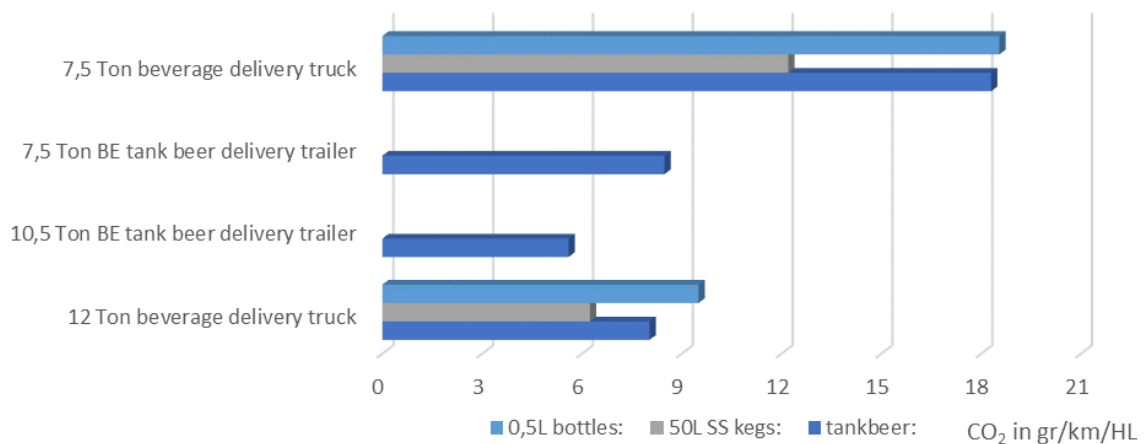
Source: Whitepaper “Smart urban on-trade beer delivery”

“City limitations make transport less efficient and increase CO₂ emission!”

Although cities are promoting smaller vehicles in the city centre this works contra productive regarding greenhouse gas emissions for heavier goods such as beer.

To overcome this problem Duotank has developed a light weight beer delivery solution for 3.000 (7,5 Ton) to 5.000 liter (10,5 Ton).

CO₂ emission on-trade beer delivery trucks per HL

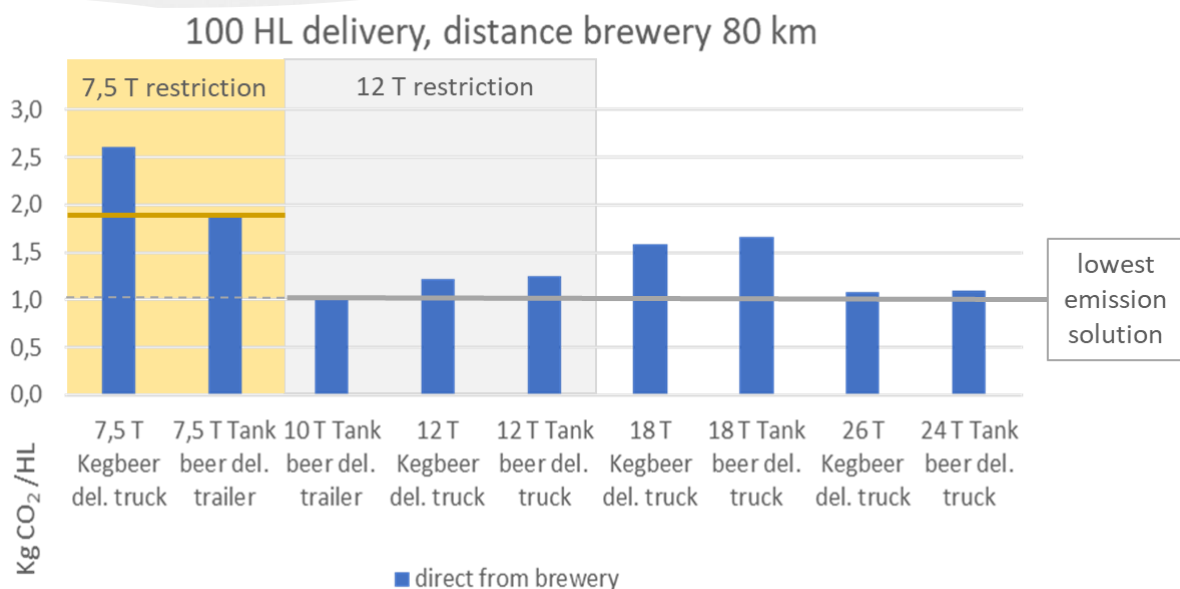


Source: Whitepaper "Smart urban on-trade beer delivery"

This light weight beer delivery solution lowers the CO₂ emission for a 7,5 Ton truck with 30% per HL of beer compared to stainless steel kegs and 54% compared to bottles.



In a delivery simulation the CO₂ emission of delivery trucks for kegs and tank beer are compared. In this simulation you can see that even when the brewery is 80 km away from the city centre and there are no weight restrictions the lightweight 10,5 Ton tank beer solution still has the lowest CO₂ emission of all options, even when it has to travel twice to the brewery and a large 24 ton truck only once.



Source: Whitepaper "Smart urban on-trade beer delivery"

More variations can be found in the whitepaper "[Smart Urban urban on-trade beer delivery](#)"

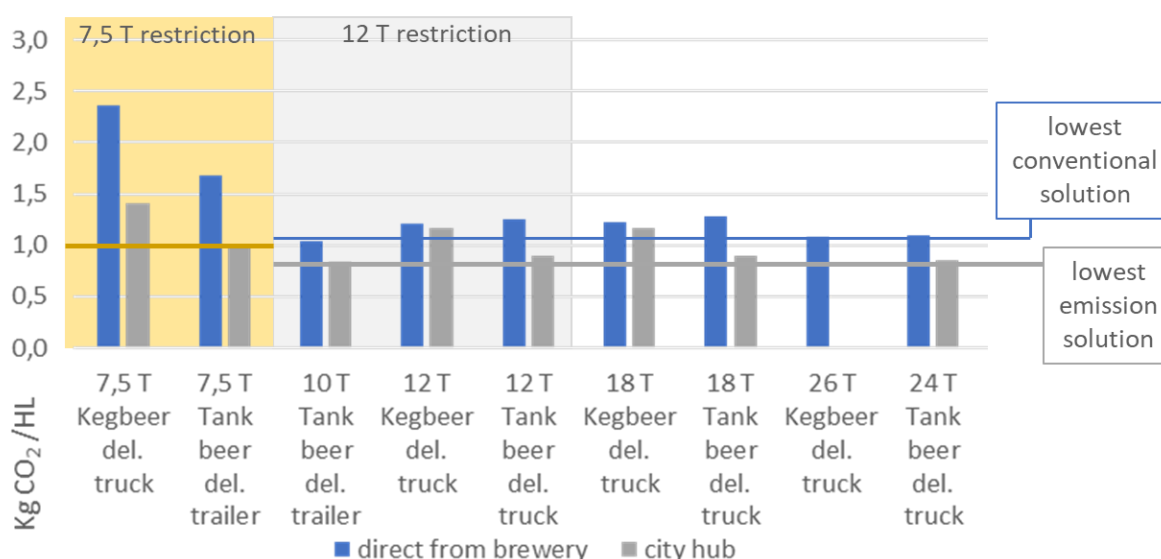
If you combine the lightweight trucks with a city hub (an area at the outskirts of the city where a bulk trailer from the brewery is located) **efficiency can be improved further.**

Mobile City Hub

A city hub normally is a distribution center at the outskirts of a city where cargo is collected from bulk transport trucks, combined and shipped out on smaller vehicles which drive into the city. This to avoid half empty trucks driving around the city centre. This is especially interesting if there are a lot of different suppliers and a lot of different delivery addresses (sometimes more than 100 per delivery truck).

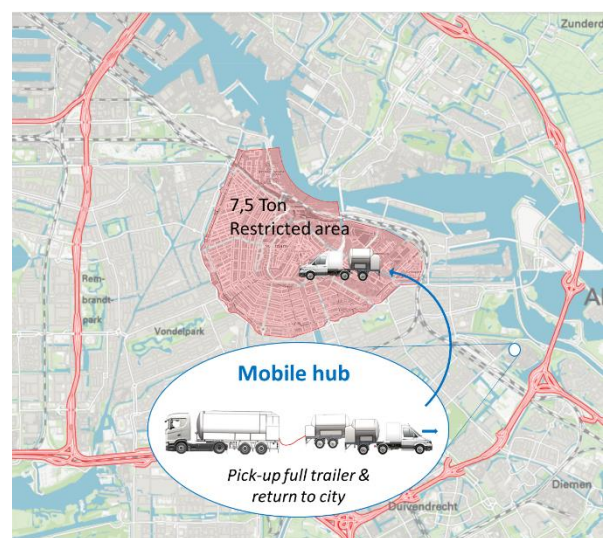
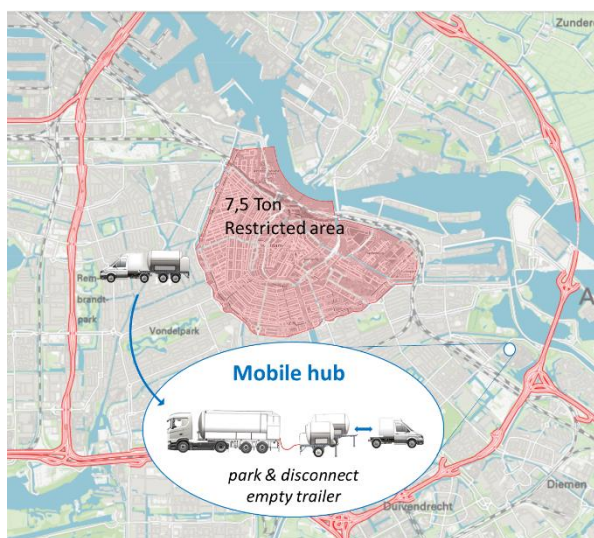
For on-trade beer delivery the situation however is a bit different. Here the limitation is the payload of the transport vehicle. If you deliver beer to 4-6 mid-size bars your 7,5 Ton truck is already empty. This means that you do not need to combine cargo from several different suppliers to optimise your payload for on trade beer delivery, you only need to make it possible to pick-up beer just outside the city centre.

200 HL delivery, distance brewery 80 km



Especially in weight restricted area's the gain on CO₂ reduction is tremendous. You can save over 40% on CO₂ emission by using a city hub. To make it economic interesting you just need to make the reloading of the truck efficient & fast. For kegs this can be done using a city distribution centre that can unload and load a vehicle quickly.

For tank beer there is an alternative solution. The minitrailer concept makes it possible to swiftly load beer. The trailer is simply detached at a city hub. A full trailer is attached and delivery can continue with minimum loss of time. At the same time the empty trailer can be filled by the bulktrailer at the outskirts of the city.



Combining a 30 HL and 50HL trailer the route can be optimised to deliver beer with the same truck to weight restricted area's and non-weight restricted areas.

With this concept delivery inside a 7,5 Ton restricted area is almost as CO₂ efficient as delivery outside the weight restriction areas. And always more efficient than with the conventional delivery trucks! On top of that the hub is a mobile solution which can go from city to city!

“With a mobile hub concept beer delivery inside a 7,5 Ton restricted area is even more CO₂ efficient as with a conventional delivery truck in a non-restricted area!”

Beer delivery with electric trucks

A next step to further reduce CO₂ emission is to electrify delivery trucks. A lot of truck manufacturers are doing field tests or are delivering the first vehicles.

The size and weight of the battery is one of the main topics of electric trucks. A truck that needs to travel outside the city centre usually needs a range of more than 200 km. Small trucks that drive from a city hub not need to travel big distances. Here 100 km usually is more than enough. This makes the trucks lighter and more affordable.

Weight optimization for transport in weight restricted area's coincides with the preparations that need to be done to electrify transport in the future in an affordable way.

As you can see in the city hub topic, mid-range trucks (7,5-12 Tons) are very interesting for city logistics of beer, especially in combination with a city hub. Also from investment point this is more interesting. A 16 ton electric truck costs around 3 times more than a 7,5-10 ton electric truck, but the payload is only 20% higher than a 10 Ton trailer combi.



“Weight optimization for transport in weight restricted area's coincides with the preparations that need to be done to electrify transport in the future in an affordable way!”

Smart online platforms to map beer demand and optimize delivery routes

Another step in optimizing urban delivery and reduction of greenhouse gas emissions is to optimize delivery routes and drop sizes. Ideally you want to deliver as much as possible in one drop, and always start with a full truck.

To do this you need to know exactly which customer has which supply demand. However, on trade customers often do not order the ideal delivery sizes, but rather the ideal volume for their bar.

More stock only consumes more space (in case of kegs) and it limits cash flow because a lot of money is stuck in beer-stock.

The first step is to monitor beer demand. With kegs this needs to be done manually. Since kegs can be moved around, you are depending on the bar owner to inform you in time if he needs beer and how much.



“A DSO-system makes it possible to visualize your tank beer conditions anywhere you want.

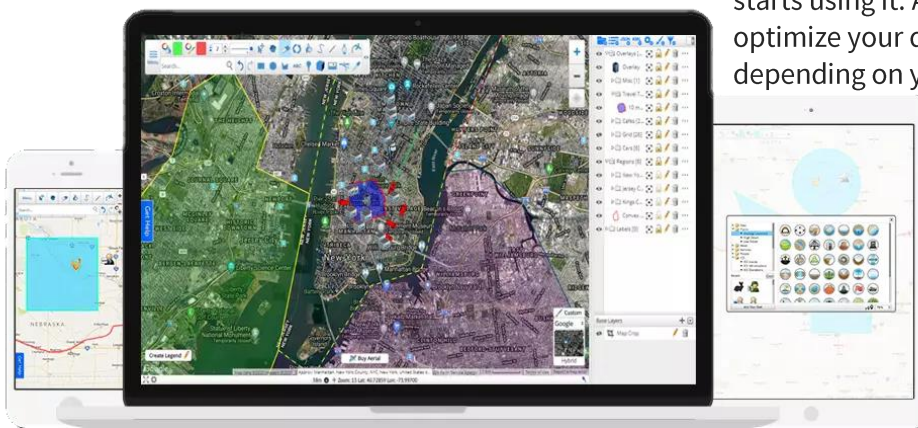
Volume and Temperature of the beer is constantly measured and shown at a digital display as well as an online platform.”

[Source: Duotank System Online](https://www.duotank.com/en/online)

With tank beer systems there are beer volume measuring systems that can tell you how much beer there is in the tanks. At this moment this is done measuring the flow of the beer going in and coming out. This data is then sent to a server or cloud environment. With this info you can see up front where beer is running low and proactive plan your route accordingly.

New on the market are sensors build into the tank (done by the tank manufacturer) telling you how much beer is inside. This not only makes the system less vulnerable for operating errors, it also makes it possible to see when a tank is empty at your customer and when he starts to use another tank.

This does not only help you optimizing your route, you can also optimize your drop size and charge your customer for the beer at the moment he starts using it. And that gives you the possibility to optimize your deliveries from your side instead of depending on your customer's needs.

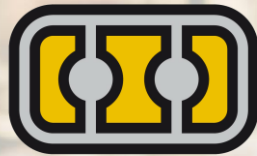


More information:



Resources:

- i. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>
- ii. https://ec.europa.eu/clima/policies/eu-climate-action_en
- iii. <https://energy-cities.eu/9700-european-local-governments-47-less-co2-emissions-by-2030/>
- iv. Glass recycling at 76% in the EU - Food Packaging Forum - Ksenia Groh - 2019
<https://www.foodpackagingforum.org/news/glass-recycling-at-76-in-the-eu>
- v. Mehrwegflaschen – Umweltbundesamt Germany - 2020
<https://www.umweltbundesamt.de/umwelttipps-fuer-den-alltag/essen-trinken/mehrwegflaschen#hintergrund>
- vi. <https://urbanaccessregulations.eu/>



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