GREENPLAN™
ROUTE PLANNING AND EXECUTION

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WHITEPAPER

THE NEW CO_2-TAX – NIGHTMARE OR UNEXPECTED COMPETITIVE ADVANTAGE?

HOW INTELLIGENT ROUTING
REDUCES TIME, KILOMETERS, AND TOLL COSTS

As an extension of the amended Eurovignette Directive, another initiative for climate protection in road freight launched on December 1, 2023: the introduction of additional CO_2 pricing in the truck toll.

Since December 2023, all commercial vehicles over 7.5 tons in Germany must pay a CO_2-dependent truck toll; similar regulations for 3.5 ton trucks will follow in July 2024. In Austria, the new toll tariffs have been in force since January 1, 2024.

The surcharge amounts to €200 per ton of CO_2 – a significant cost factor in an already struggling industry. No wonder that the so-called CO_2 toll is currently the subject of controversial debate in the media and among experts.

Climate change is progressing quickly. Old regulations were too weak to slow the pace, so new parameters aim to further scale down emissions. Within the transport sector, road freight transport is responsible for around a third of CO_2 output. The tax is intended to accelerate the switch to climate-neutral transport and make the use of trucks with eco-friendly fuel more attractive for the freight transport industry.

However, charging infrastructure is still limited and the purchase price of e-trucks is too expensive, especially for smaller haulage companies. As a result, companies must bear the additional 50 cents per liter of diesel, around 20 cents per km, themselves or pass the cost on to customers – a daunting upcharge for an industry struggling with high competition and low margins.

Because the climate component of the truck toll is calculated on distance driven, there is only one sensible solution for the transition phase:

Reducing distance traveled while maintaining order volume.

At Greenplan, we call this emission-optimized route planning. AI-supported route planning can save distances, routes and costs, considering overlapping delivery areas and relaxed time windows – let us show you how.

Dr. Clemens Beckmann, CEO Greenplan

THE BEST COMPROMISE – EMISSION-OPTIMIZED TERRITORIAL PLANNING WITH OVERLAPPING DISTRICTS

The implementation of the new CO_2 tax is forcing logistics companies, freight forwarders, and CEP service providers to re-examine their route planning, prioritizing efficiency and lowered costs per kilometer without harming quality of service. In an industry characterized by high competition, slow deliveries and imprecise delivery times can be deadly.

In view of these challenges, efficient route planning is faced with a dilemma:

1.) On the one hand, processing times need to be optimized; customers simply expect a fast and reliable service.

2.) On the other hand, companies are striving to use their vehicle fleets as efficiently as possible to minimize additional costs incurred.

These goals necessitate intelligent area planning as a first step. Area planning often falls into one of two approaches: fixed districts with better handling times and dynamic approaches which prioritize shortened driving times.

FIXED DISTRICTS
AND EMPTY MILES

Companies that rely on fixed districts benefit from optimized handling times. The clear division of districts enables drivers to memorize the streets in their assigned area and navigate easily. This saves valuable time, shortening the search for addresses and the overall time taken to make individual deliveries.

However, this focus on fast end delivery only addresses part of the problem – route planning that minimizes distances is severely limited in fixed areas.

Model calculations clearly show that route planning in fixed districts is several percentage points worse for odometer metrics. Considering the new CO_2 tax, this leads to a high-cost burden. In addition, strict districts place more vehicles on the road. When vehicles of the same size transport a constant maximum number of packages per district, at least one of the vehicles in each district will be half full. When volumes fluctuate, but capacities and districts are rigid, companies drive empty miles and waste resources.

FULLY DYNAMIC ROUTES
AND FRUSTRATED DRIVERS

In line with Occam's rule, the scholastic among route planners could simply point to the next extreme: dynamic route planning. Fully dynamic planning enables companies to optimize their delivery areas without referencing geographic districts. Vehicle capacities can be utilized efficiently because routes can be flexibly assigned. This leads to the shortest routes, lowest transport costs, and lowest toll charges.

However, district-independent planning leads to significantly longer handling times, especially for non-local drivers. Those driving unfamiliar routes must adapt to constant inconsistency. More complex routes, more frequent stops, and foreign delivery points (where to turn, park, drop-off) increase handling times. The following therefore applies:

To reduce driving distance while maintaining order volume and handling efficiency, emission-optimized route planning must jointly optimize driving times and the delivery process.

A SOLUTION TO COMPROMISE –
THE CONCEPT OF OVERLAPPING DISTRICTS

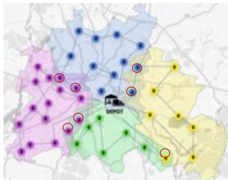
Dual optimization is not theoretical; many companies already use Greenplan's concept to reduce driving distances while maintaining service quality. Overlapping districts are the sweet spot. Overlapping districts retain the advantages of district-based planning but add the flexibility of dynamic planning. The districts are deliberately designed so that they overlap and include adjacent districts at their edges.

Fixed districts
Optimal processing times

Similar routes, drivers are familiar with them, low processing times

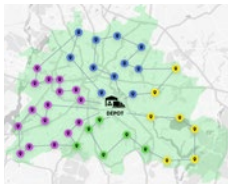
But: longer travel times, more vehicles in use

Overlapping districts
Optimal solution to the trade-off



Optimal compromise between processing and travel times – drivers will continue to work in familiar areas; good processing times

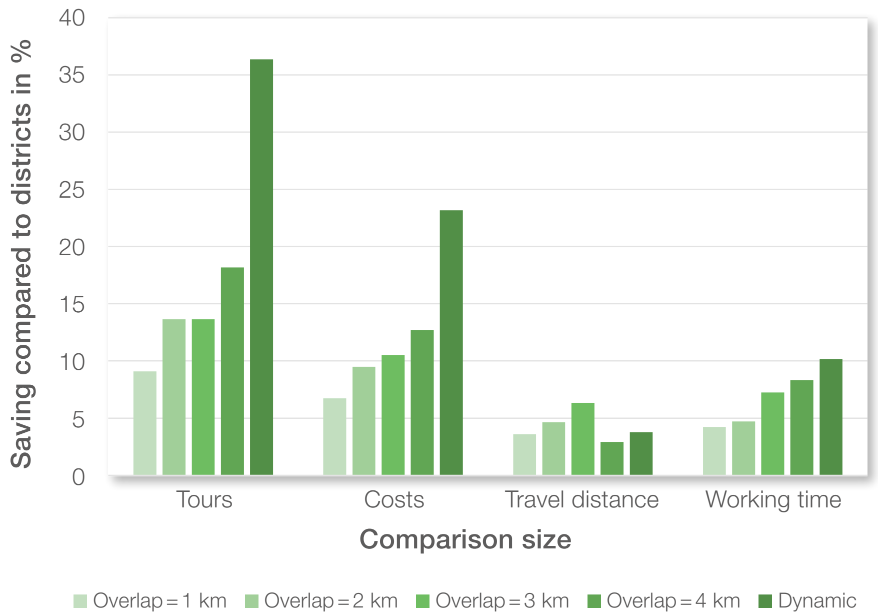
Dynamic planning
Optimal travel times



Complete optimization of travel time, route, costs, emissions

But: longer processing times, as drivers may not be familiar with the area. Low acceptance

Route planning in overlapping districts enables a balance between route reduction and handling times. The concept leverages the adaptability of dynamic planning but preserves driver familiarity and address repetition rates. While driver acceptance is often low with fully dynamic planning, overlapping districts have high satisfaction rates. Route planning with overlapping districts reduces emissions and CO_2 taxes without costly changes to the vehicle fleet.



Even small overlaps of the areas lead to…

… 9 – 18% fewer tours,

… 7 – 13% lower costs,

… 3 – 7% less travel distance,

… 4 – 8% less working time

The model calculation, conducted with Berlin and its districts while considering various overlap sizes, illustrates the effect of reducing vehicles (tours), shorter driving distances, and less working time. In summary, this results in a cost saving of 7 to 13%.

RELAXATION ON THE RAMPS –
THE ROLE OF RELAXED TIME SLOTS

Effective handling and efficient processing of delivery areas play a decisive role in emission-optimized route planning. But conditions on the road (and above all the forecasts of these conditions) are often overlooked, mostly due to a lack of data. The day-to-day business of CEP service providers and freight forwarders is largely determined by the actual speed of the traffic flow, delivery time windows, and labor regulations.

In the context of emission-optimized route planning, relaxed time windows play an important role when considering real road conditions. There are various reasons for this:

1 INCREASED FLEXIBILITY IN ROUTE PLANNING

If the time windows are less strict, routes can be optimized so that fewer detours have to be taken. This can be achieved, for example, by arranging stops in a sequence that minimizes the total driving distance instead of planning them strictly according to predefined time windows.

2 BETTER CONSOLIDATION OF DELIVERIES

With greater flexibility in time slots, it is easier to bundle multiple deliveries on one route. This leads to a reduction in the number of trips as more orders can be completed in a single trip.

3 REDUCTION OF IDLE TIME AND DETOURS

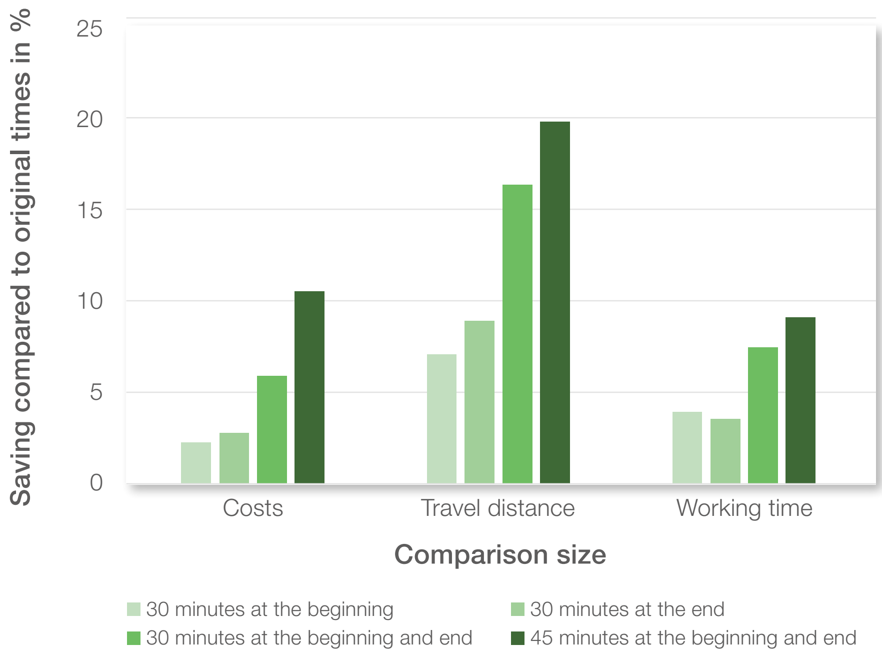
Tightly defined time slots can result in vehicles having to wait until they can make a delivery or having to make detours to be on time. Relaxed time slots reduce these waiting times and unnecessary detours, which leads directly to a reduction in kilometers driven.

4 INCREASED VEHICLE UTILIZATION

Relaxed time slots also enable better vehicle utilization. The flexibility in scheduling minimizes empty runs, as deliveries are better adapted to the available capacity. This leads to higher vehicle utilization and thus to a reduction in overall transport costs and kilometers.

Relaxed time windows

Relaxed time slots refer to flexible time intervals in which certain tasks or deliveries can be carried out without causing delays or disruptions. In the context of route planning, this means that deliveries no longer have to be made within strict time windows, but offer a certain amount of leeway for adjustments and optimizations.



A relaxation of the time windows leads to…

… 4 – 11% lower costs,

… 7 – 9% less travel distance,

… 4 – 8% less working time

The model calculation, conducted with Berlin and its districts while considering different lengths of relaxation of time windows, illustrates the effect of reducing vehicles (tours), shorter driving distances, and less working time. In summary, this results in a cost saving of 7 to 19%.

THE “GREEN TOLL”
AS A SPRINGBOARD FOR INNOVATION?

With the introduction of CO_2 pricing in the truck toll, the logistics industry has a new hurdle to overcome. The debate as to whether this represents an additional burden or an opportunity for competitive advantage is heated. Regardless of your stance, the situation has encouraged many to seek a stronger antidote for cost increases – superior route planning. The law encourages players to break new ground and rethink their current operations.

The CO_2 tax is a politically desirable step in the fight against climate change. It is intended to accelerate the switch to climate-neutral transport and make alternative technologies more attractive. However, the transition to these technologies is not without its hurdles. Purchase prices for e-trucks are high and charging infrastructures are often inadequate. Small haulage companies face particularly great financial challenges.

The predicament demands innovative solutions. Intelligent and emission-optimized route planning can help to reduce time, distance, and toll costs. By reducing the kilometers traveled while maintaining the same order volume, companies can save costs while protecting the environment. Well-known companies are already successfully using overlapping districts and the consideration of relaxed time windows to reduce fleet emissions.

Companies that are prepared to invest in innovative technologies and planning methods help their budget, their planet, and their competitive advantage. It’s now up to the industry to seize these opportunities and shape the future of road freight transport in a sustainable way.