

optibus



HOW TO SIGNIFICANTLY
REDUCE EMISSIONS
AND SAVE COSTS WITH
THE OPTIBUS PLATFORM



ABOUT OPTIBUS

A cloud-native SaaS company founded in 2014, [Optibus](#) is an end-to-end software solution for public transportation planning, scheduling, rostering, and operations. Public agencies, private operators, and consultancies in 1,800 cities across 28 countries use our software platform to plan and manage complex public transportation networks, leveraging our robust combination of artificial intelligence, advanced optimization algorithms and distributed cloud computing to improve service quality, promote transportation equity and access, reduce emissions and costs, and modernize operations.

Optibus powers 3 billion passenger trips annually for public and private sector clients including TransDev, RATP, Arriva, Abellio UK, Stagecoach, and AVTA, the US's largest electric bus fleet. In 2022, Optibus was valued at \$1.3 billion, making us the first unicorn start-up dedicated to the public transportation industry. Optibus was selected by the World Economic Forum as a 2020 Technology Pioneer and has more than 350 employees across the globe throughout Europe, the Middle East, and Africa (EMEA), Latin America, North America, and Asia Pacific (APAC).

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WHY PUBLIC TRANSPORTATION PLAYS A MAJOR ROLE IN SAVING THE CLIMATE

Stopping climate change is arguably the most important challenge for our entire world.

Our planet is experiencing an incomparable rise in average temperature, which has wide-ranging effects for all systems of nature. Scientifically-proven consequences of these rising temperatures include: droughts, floods, storms, extinctions, spread of infectious diseases, and more. These in turn affect millions of people worldwide, create famines and habitat destruction.

When it comes to solutions, public transportation plays a central role. Fundamentally, public transport vehicles offer a sustainable and environmentally-friendly form of transportation – with a significantly lower carbon footprint than private cars. They efficiently move many people on existing or easy-to-build infrastructure. Still, they emit millions tons of CO₂e each year worldwide, and therefore still contribute to climate change.

In this eBook, we'll show you two ways in which bus operators can reduce CO₂ emissions, while simultaneously reducing costs.

Public transportation and Climate change: Key stats and dates

Paris Agreement limits global warming to well below **2°C**

EU climate goals: **55%** reduction in greenhouse gas emissions by 2030

Overall CO₂ transport emissions are **20%** of total emissions

Road passenger transport emissions are **45%** of overall transport emissions

48% increase in electric buses registrations in 2021

Electric buses market share expected to rise to **83%** by 2040

¹Source: BNEF

<https://about.bnef.com/blog/electric-vehicle-sales-set-to-rise-faster-than-ever-but-more-policy-action-needed-to-get-on-track-for-net-zero/>

RIISING FUEL PRICES: AN ACCELERATING FACTOR TO REDUCE CARBON EMISSIONS

When considering greenhouse gas (GHG) emissions one inevitably has to focus on overall fuel consumption of an operation, as burning fuel is essentially the main cause of their emissions.

In 2022, fuel prices rose to an unprecedented level. The Ukraine conflict, the resulting sanctions on Russia, inflation, and the worldwide supply chain crisis can be seen as the most significant catalysts behind the recent spike in the oil price. Still, it can be argued that high fuel prices are here to stay, regardless of wars, conflict, and crises. There are several factors negatively impacting the future outlook of oil and gas extraction.

First, since oil and gas are scarce resources, one day their stock will be completely depleted. Second, many countries are trying to reduce their oil and gas consumption and reach Net-Zero, a point at which the overall amount of greenhouse gas emissions in the atmosphere does not increase. Third, the competition for alternatives to oil and gas (i.e. renewables) is growing, and will soon become a cheaper alternative. The price difference between the cost of energy produced by emitting resources vs the energy produced by renewables is defined as the “green premium”. Once this green premium becomes zero (or even negative), there are almost no reasons to still consume natural gas or oil.

For oil and gas extractors, refiners, producers, and other players in the industry, this means that their core business model is at stake. Future profits will be harder and harder to achieve. Therefore these parties will have to do everything in their power to secure all the profits they can before they run out of business or lose to the competition. Oil and gas companies will try to keep the price as high as possible. (Wendover Productions, 2022)

For bus operators, this means they will have to pay these higher prices at the gas stations for a longer time in the future. Therefore, focusing on reducing emissions means less fuel consumption, which can save operators the high fuel expenditures.



HOW BUS OPERATORS CAN SAVE FUEL & REDUCE THEIR CO2 EMISSIONS

Bus operators have two ways to save fuel and reduce their overall emissions. The first approach is expensive, but completely eliminates tailpipe emissions. The second method can not eliminate all emissions, but it is able to reduce greenhouse gases effectively and cheaply.

Eliminating emissions by operating 100% zero-emission fleets

Zero-emission buses, more commonly referred to as electric buses or e-buses, have an electric powertrain and are fueled with either electricity or hydrogen. Due to these two properties, they do not release any greenhouse gas emissions into the atmosphere when operated.

That said, taking into consideration the production and charging of the zero-emission bus, carbon emissions do still occur, in comparison to the conventional diesel bus, an electric bus can reduce CO2 emissions by up to 24% over the life cycle (Mao et al., 2021). This value can be improved when using more renewable energy in production and while charging.

In 2020, approximately 600,000 electric buses were on the road, compared to 10 million buses in total (IEA, 2021) (SCI Verkehr GmbH, 2017). The acquisition cost of a new 12-meter solo electric bus is around 2.5 times higher than a new conventional diesel bus (Rohs & Krewerth, 2022).

Therefore, swapping out all non-electric buses in the short or medium term is a huge financial obstacle and not a feasible solution for most businesses. Still, together with government subsidies, electric buses can become price competitive to conventional buses. Operators, who have access to such funding, have already started introducing more and more electric buses to their fleets to lower their impact on the climate.

Since operating with only zero-emission buses will be a paramount factor in achieving Net-Zero emissions across the industry, every bus operator should ultimately aim to transition to a fully-electric fleet in the long term. Yet e-buses present non-trivial planning and scheduling requirements, such as charging times, location, battery levels, and many other factors. These must be taken into account, otherwise sub-optimal plans will require additional vehicles and drivers, requiring the addition of fossil-fuel-powered vehicles to preserve capacity.

Reducing emissions by increasing operational efficiency

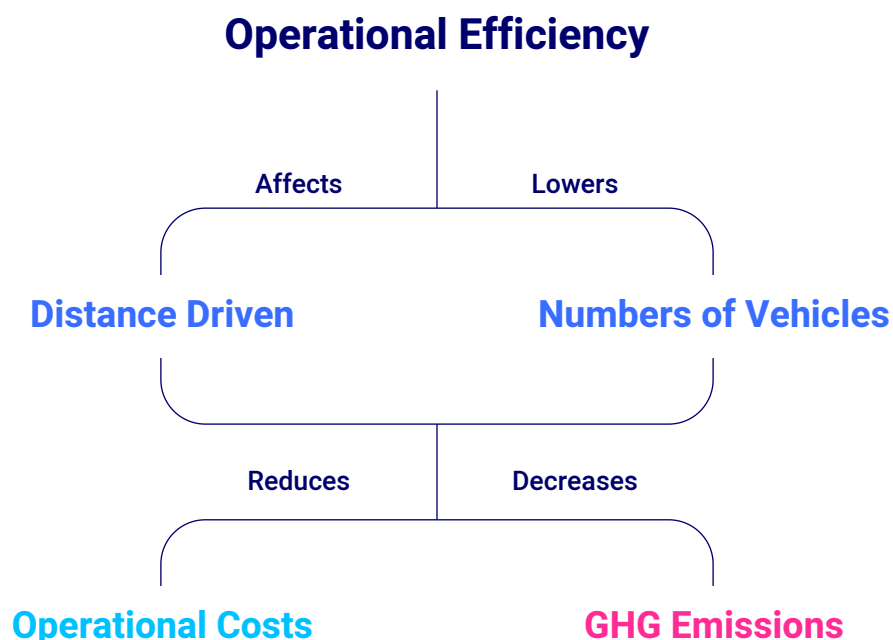
Enormous amounts of capital need to be invested into a fully-electric fleet in order to achieve a Net-Zero operation directly. Operators, who cannot afford this in the short and medium term, can reduce their carbon footprint by improving the way they utilize existing buses. This can often be the easier and cheaper solution.

To effectively reduce the emissions of a bus operation, the sum of all vehicle-distance-traveled has to be minimized while maintaining the service level for the end-user. Compromising on service to reduce emissions would be environmentally friendly, but not sustainable for the business running the service. Dissatisfied customers will turn to other mobility options, such as personal vehicles, increasing traffic congestion and CO2 emissions.

In order to achieve a sustainable reduction in vehicle-distance-traveled, inefficiencies in the current operation have to be found and addressed. Planning, organizing, and scheduling a transportation network is extremely complicated, and almost impossible to perfect by manually doing so. With the support of tools like artificial intelligence, machine learning, and big data analysis, transportation companies are able to improve their routes, timetables, and vehicle schedules to use less vehicles, less vehicle distance, and to maintain or even improve their overall level of service.

In the end, both measures have to be taken in order to effectively eliminate all the emissions related to bus operations. Over a long period of time, operators will have to manage mixed fleets of conventional and electric buses, and optimize their planning, scheduling, and day-to-day operations for both.

This will become a difficult task that many companies in the industry already face. For this, end-to-end software solutions enable operators to manage special vehicle requirements, while optimizing their entire network to increase vehicle efficiency and reduce their emissions.



HOW OPTIBUS SUPPORTS BUS OPERATORS IN REDUCING THEIR EMISSIONS & SAVING COSTS

Optibus' end-to-end, cloud-native software-as-a-service (SaaS) platform for transportation planning, scheduling, rostering, and operations leverages artificial intelligence and powerful algorithms to rapidly reduce labor, fuel, emissions, and vehicle costs while improving passenger service and growing ridership for public transportation operators and agencies across the globe.

With the most intelligent platform in the industry, Optibus ensures an improved rider experience through expertly planned and controlled core operations. Optibus has been chosen by more than 1,800 cities worldwide to drive some of the most complex and large-scale transportation operations worldwide, streamlining operations while reducing congestion, emissions, and costs.

Our software platform ultimately helps operators improve their efficiency, and thereby significantly reduce greenhouse gas emissions. On top of that, our platform supports the specific needs of electric vehicles (EVs), helping operators in their inevitable transition to fully-electric fleets.

With our EV scheduling solution, bus operators can easily incorporate all the complex components of their EV fleets — not just in terms of their operations, but also in terms of strategic planning.

When it comes to EV fleet operations, operators often have many unknowns. For example, they don't know how much it will cost them to operate an EV fleet, where to locate chargers, how much electricity they'll need in order to operate their fleet, if they want to use more buses vs more chargers, and otherwise.

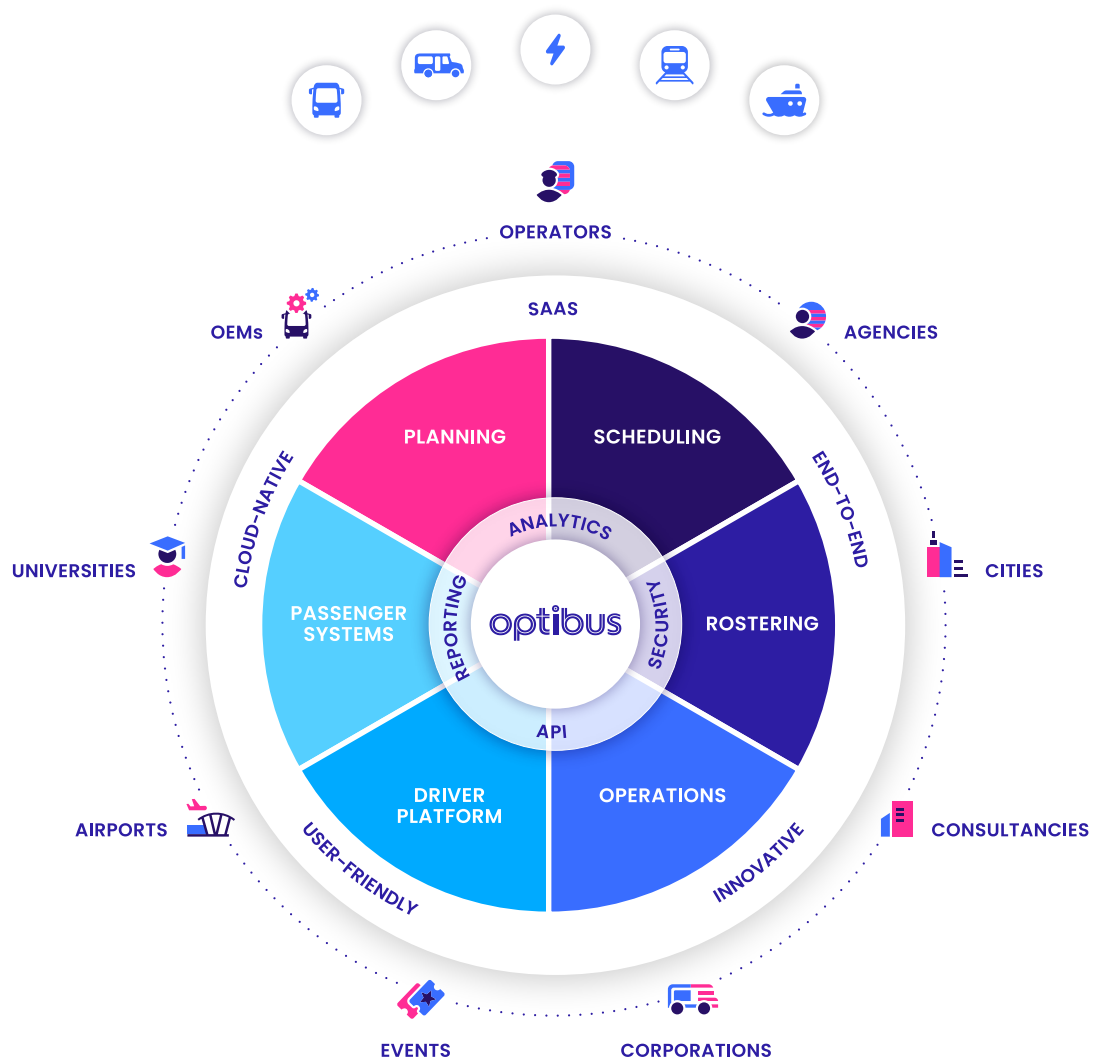
Using our EV solution, operators now have greater visibility, and can make their EV investments more profitable and worthwhile investments. This ultimately helps them get funding and/or tenders from the government, while also considering all the implications of their EV investments, including capital costs (e.g. fixed costs) and operational costs (e.g. drivers and vehicles), charging costs, and otherwise.

All of this provides operators with greater visibility, along with the ability to simulate how their service will be affected if they're running EVs — so they can strategically and effectively plan for successful EV fleets. The end result is not only a significant reduction in carbon emissions, but also major cost savings, making it a total win-win.

THE OPTIBUS PLATFORM

The Optibus platform is end-to-end, intuitive and easy-to-use, and allows for one seamless, interconnected user experience. With its cloud-native architecture and robust, flexible capabilities, Optibus' platform enables transportation companies around the world to model their entire operation on a high level, as well as at the most granular level. The Optibus platform can be used from anywhere — all you need is an internet connection. This means that there's no need for IT support or internal servers, and everything is backed up to the cloud. Optibus' customers are always using the most recent, up-to-date version of the platform, with frequent software updates every few weeks.

The platform also offers advanced security, reporting and analytics, and artificial intelligence (AI) capabilities, allowing users to evaluate complex scenarios in minutes or even seconds. Optibus' platform can uniquely perform both vehicle optimization (blocking) and driver optimization (run cutting) at the same time, delivering better optimization results and saving time. With the ability to effectively model and optimize scenarios quickly, operators can easily create optimal scenarios that reduce their overall emissions at scale.



ELECTRIC VEHICLES

Battery Electric Vehicles (EV) are a crucial component of the move toward zero emissions. Yet they present significant planning and scheduling challenges that require elements such as charging times, charging location, and battery levels be taken into account.

Optibus offers a specialized electric vehicle scheduling solution, using EV-specific metrics to create the most integrated and optimal operational and charging plan.

Our EV scheduling solution offers the ability to:

- Build and optimize an EV or mixed-fleet schedule — that includes trips and charging events — to get the full value out of your electrical miles and reduce PVR.
- Make adjustments (add charging breaks, move trips) to fine-tune the schedule.
- Define your preferences for batteries, charges, and vehicle types.
- Optimize your schedules to account for battery discharge profiles and charger locations and capacity.
- Get automatic alerts for insufficient battery power and preference violations.
- See stats showing CO2 emission reductions, costs, and vehicle efficiency.
- Operate EV routes, meet regulatory requirements, and bid for new EV business.
- Gradually transition to a 100% EV fleet, by starting with a mixed fleet of diesel and electric vehicles.

All of this ultimately helps organizations significantly reduce their overall emissions.

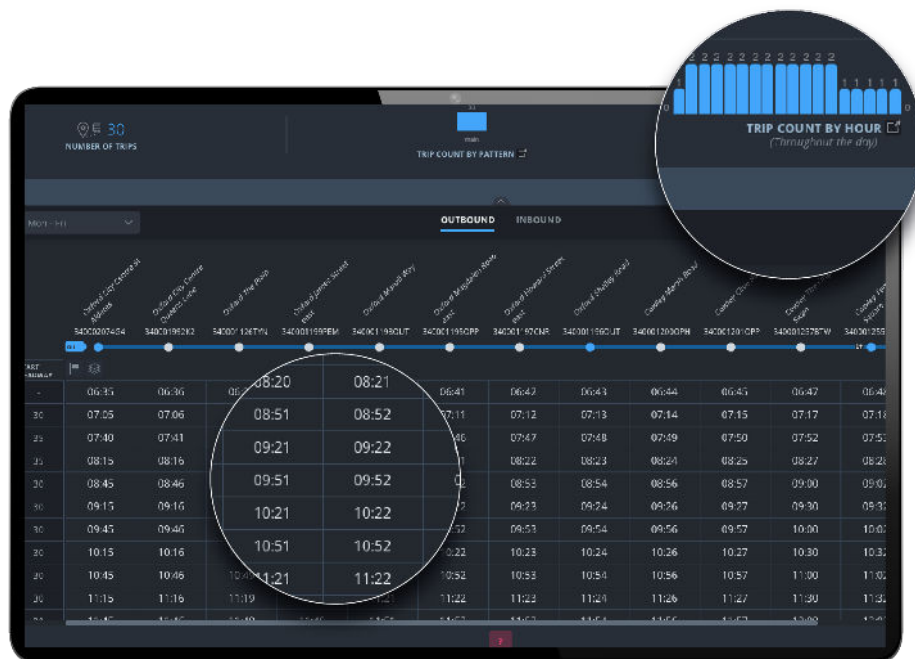


PLANNING

With Optibus Planning, you can easily plan, analyze, and optimize your entire network with unprecedented speed and accuracy, and create more equitable, accessible routes. From adding stops and timepoints on the map, to creating timetables, our Planning product offers a holistic solution for all your strategic and operational planning needs, in one convenient place — improving visibility and efficiency across your organization.

Using our Timetable Optimization feature, you can quickly optimize your timetables to increase efficiency and reduce your operational costs, while maintaining your ridership and service level needs. With our Performance Suite, you can easily predict and improve your on-time performance (OTP), generate new trip times based on your OTP goals, and analyze your real-world performance with detailed insights.

You can also view ridership data directly on the map as you plan your network with our Ridership Insights feature, or view demographic data via our Geospatial Suite — which helps you to create equitable routes and understand how different demographic groups will be impacted — along with custom GIS data to view safety hotspots, low clearances, bike paths, rail networks, schools, and more.

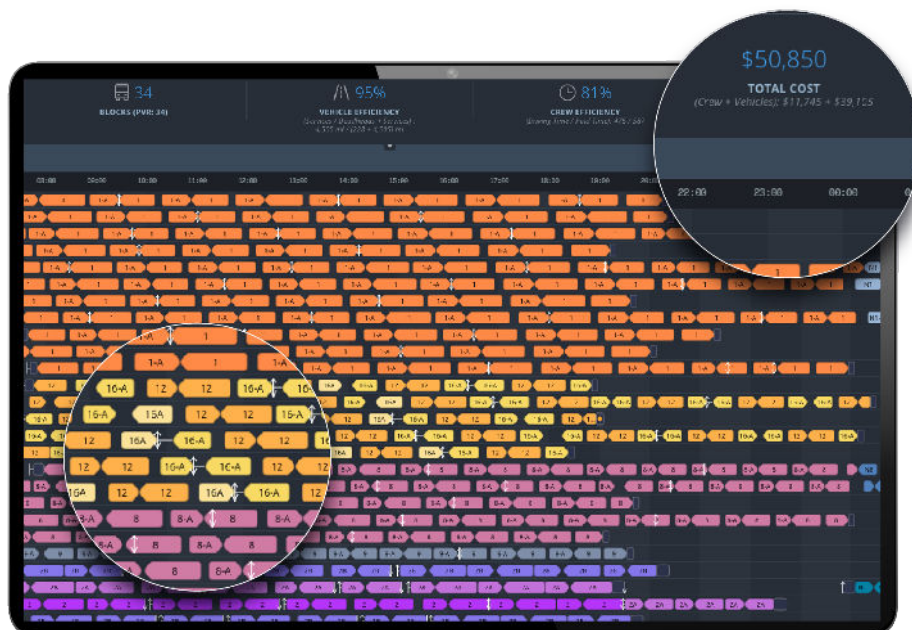


SCHEDULING

Optibus Scheduling provides all the tools you need to easily create optimal vehicle and crew schedules – thus improving the quality of service and efficiency, and streamlining operations.

Using predefined and custom preferences and constraints for the vehicle, driver, depot, relief trips and relief vehicles, and other global preferences, the cost-based optimization engine produces a fully optimized vehicle and driver schedule in a matter of seconds or minutes.

The scheduler can then review the schedule, easily make any manual changes on the spot, change their preference parameters, and run the optimization again to produce additional scenarios. These can then be compared with previously saved scenarios by reviewing predefined KPIs such as total cost, paid time, overtime, etc.



ROSTERING

Optibus' Rostering product uses the driver schedule created within the Scheduling product to produce a roster for each work week (or any other working cycle). As with the Scheduling product, you simply define your preferences and constraints and our solution produces a fully optimized schedule, allowing schedulers to review any violations and compare it to multiple scenarios by predefined KPIs and overall cost.

You can also use custom rules to create rosters that better reflect your drivers' needs and preferences, including: day-off patterns, reducing split shifts, overtime, guaranteed time, rest time between shifts, and more.

All of this saves you from excessive manual work, helps you meet your business goals, and increases driver satisfaction and happiness – thus increasing driver retention and reducing driver shortages.



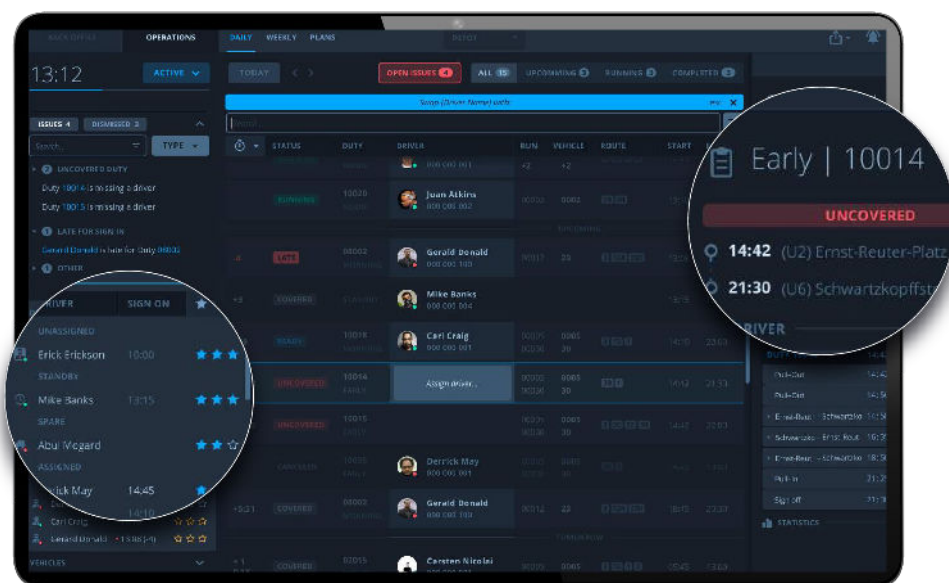
OPERATIONS

Our customers have told us that even though they can create an optimal schedule, their day-to-day operational inefficiencies can easily ruin that schedule. Our vision is to create a core engine for public transportation – a complete end-to-end platform. Operations is the final piece of the puzzle.

With Optibus Operations, our newest product, you can easily manage, analyze, and validate all your depot operations in one convenient place. From real-time driver allocation to predictive alerts, it helps you ensure that your optimized schedules stay intact, while saving significant time, effort, and headache.

Optibus Operations offers a complete set of tools for all your real-time, real-world operations, including:

- Driver and vehicle management
- Long-term planning
- Weekly and real-time daily allocation
- Flexible payroll and timekeeping
- Reporting and validations



CLOSING

We hope you enjoyed reading this eBook, and that the above information proved valuable to you.

Here at [Optibus](#), sustainability and reducing emissions — by making public transportation better, together — is a topic that's very close to our heart, and we sincerely hope that we've equipped you with some helpful strategies and tangible tactics to help your organization reduce your overall emissions going forward.

Here's to a more sustainable future for all, with ample access to public transportation in communities across the globe.

If you'd like to learn more about Optibus' solutions for reducing emissions — whether it's transitioning to an electric fleet, or simply increasing operational efficiency, so you'll have fewer vehicles out in the field at once — we'd love to help you in your journey to becoming a more sustainable operation.

We look forward to hearing from you, and making public transportation better, together.

To learn more about the Optibus platform and how it can help you reach your emission-reduction goals, we welcome you to book a personalized, one-on-one demo of our platform by clicking the button below.

BOOK A DEMO

www.optibus.com | info@optibus.com

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