

CO₂ Emissions Report - CONMEBOL Libertadores Final

1. Introduction

The Copa Libertadores 2024 Final, as a landmark event in the world of football, demanded extensive transportation operations to ensure seamless logistics for players, staff, VIPs, and essential equipment. This report is dedicated to analyzing the CO₂ emissions generated by these transportation activities, with the dual aim of quantifying the environmental impact and identifying opportunities to enhance sustainability.

Leveraging granular data from operational logs, official vehicle specifications, and regulatory documents such as the *Boletín Oficial Argentina*, this analysis ensures precision and credibility. By grounding calculations in verified metrics, the report seeks to offer a robust understanding of the emissions footprint, enabling the event organizers to align their practices with international sustainability frameworks.

The primary goals of this report are to:

1. Quantify CO₂ emissions for each vehicle type, taking into account both kilometers traveled and operational hours.
2. Provide actionable insights that align with globally recognized sustainability standards, such as the IPCC guidelines and FIFA's Sustainable Sourcing Code.
3. Develop event-specific recommendations to reduce the transportation carbon footprint, including strategies for optimizing vehicle usage and transitioning to low-emission technologies.

By combining a data-driven approach with practical recommendations, this report not only assesses the environmental impact of the Copa Libertadores 2024 Final but also aims to set a benchmark for sustainable practices in the organization of future events.



2. Data Collection and methodology

The methodology employed in this report integrates detailed data collection, precise emissions calculations, and visual representation to ensure an accurate and comprehensive analysis of transportation-related CO₂ emissions during the Copa Libertadores 2024 Final.

2.1 Data Collection

To build a reliable emissions assessment, the following data sources were utilized:

1. Operational Logs: Detailed records from the event logistics team, including:
 - Vehicle types (e.g., sedans, hybrid vehicles, vans).
 - Total kilometers traveled per vehicle.
 - Hours of operation and the number of vehicles used per day.
2. Emission Factors: Extracted from a combination of:
 - Manufacturer Specifications: Verified through official URLs, such as Toyota, Mercedes-Benz and other technical specifications of carbon consumptions.
 - Government Resolutions: Regulatory data from the *Minister of environment and sustainable development*. Specifically the resolution 383/2021.
 - Efficiency Categories and Ratings: CO₂/km values assigned to each vehicle category based on certified documentation.

2.2 Emissions Calculation

The CO₂ emissions for each vehicle type were calculated using the following formula:

$$\text{Emissions (kg CO}_2\text{)} = \text{CO}_2/\text{km rating} * \text{Total Km Emissions (kg CO}_2\text{)}$$

Adjustments and Considerations:

- We consider an average occupancy per kilometer of 80%.
- Every vehicle used in the event successfully passed the *Vehicular Technical Verification (VTV)*, which includes a diagnostic assessment of CO₂ emissions. This ensures that the emissions data provided in the manufacturer's technical specifications accurately reflect the vehicles' actual performance, validating the reliability of the ranges used in this report.



3. Results

The total CO₂ emissions generated by transportation activities during the Copa Libertadores 2024 Final amounted to a significant portion of the event's overall environmental impact. These emissions were calculated based on detailed operational logs and verified emission factors for each vehicle type, ensuring accuracy and reliability.

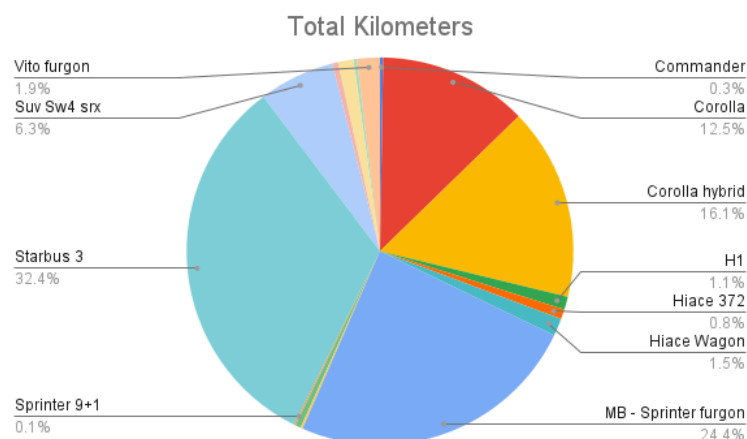
The total emissions generated during the transportation operations are summarized in a comprehensive table, including:

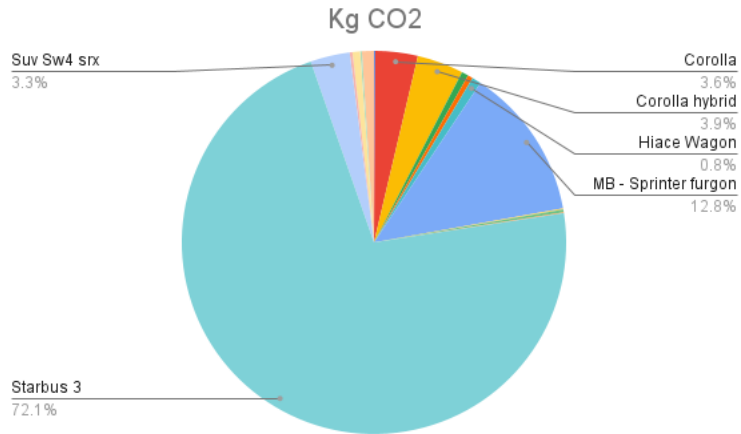
- Total kilometers traveled.
- CO₂ emissions per vehicle type.
- Contribution percentages by vehicle category (e.g., sedans, hybrids, vans).

The breakdown by vehicle type highlights significant differences in emissions between hybrid vehicles and their standard counterparts, showcasing the environmental benefits of hybrid technology in terms of reduced CO₂ output.

Key Highlights:

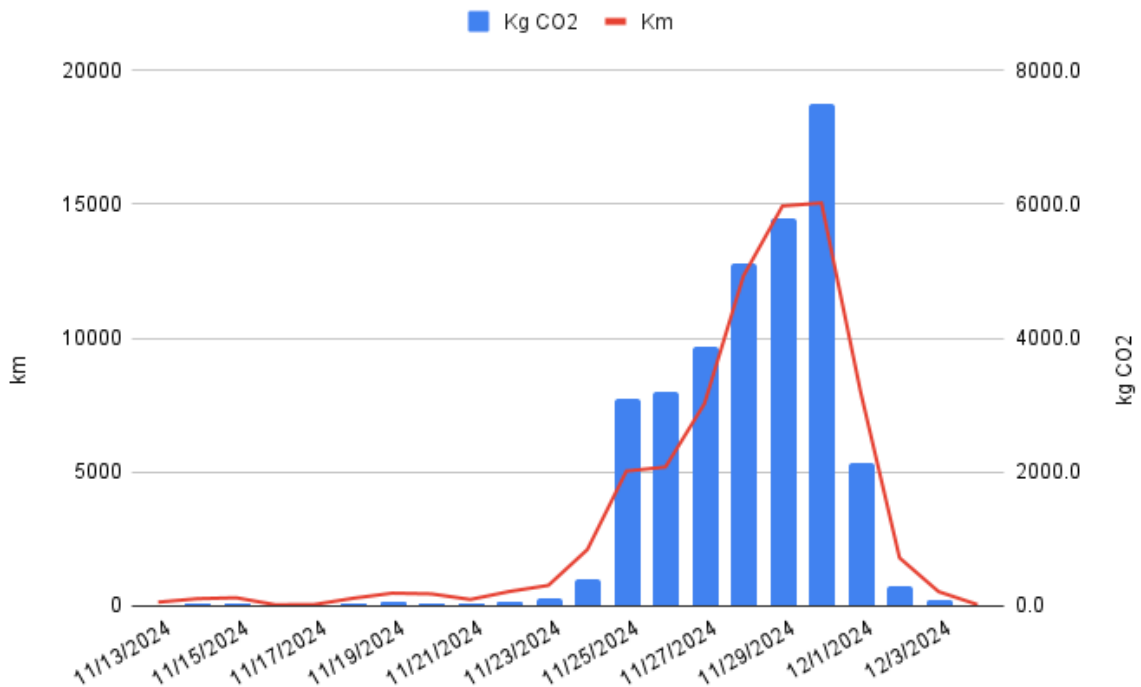
- The combined total emissions from all vehicles over the event period reached **31952.7 kilograms of CO₂**.
- **Buses account for the highest emissions**, contributing 72% of the total CO₂ output despite covering only 32% of the total kilometers traveled. However, it is important to note that when emissions **are measured on a per-passenger basis, the impact is significantly reduced**. While other vehicles carry an average of 4 passengers per trip, buses typically transport over 40 passengers, making them a more efficient option in terms of **emissions per person**. This highlights the importance of considering passenger capacity when evaluating the environmental impact of different vehicle types.
- Hybrid vehicles, like the **Corolla Hybrid**, demonstrated significantly lower emissions per kilometer, underscoring the environmental benefits of using fuel-efficient technologies.





3.1 Analysis by Date

The daily emissions are analyzed to identify patterns and high-emission days throughout the event's timeline. These insights provide a clear understanding of how transportation demands evolved during the operation period.



4. Recommendations

The findings of this report underscore the need for strategic actions to reduce the carbon footprint of transportation activities in future events. The recommendations outlined below are categorized into immediate and long-term strategies, as well as considerations for carbon offsetting to address unavoidable emissions.

4.1 Immediate Actions

1. Transition to Low-Emission Vehicles:
 - Prioritize the use of hybrid or electric vehicles for high-frequency routes and VIP transfers.
 - Replace aging fleet vehicles with models that demonstrate lower CO₂/km ratings.
2. Optimize Routing and Trip Consolidation:
 - Leverage advanced route planning tools to minimize unnecessary travel distances.
 - Consolidate passenger trips where feasible to maximize vehicle occupancy and reduce emissions per person.
3. Fleet Allocation Efficiency:
 - Assign vehicles based on passenger load to ensure efficient use of buses and minimize the reliance on smaller, less efficient vehicles for bulk transportation.

4.2. Long-Term Strategies

1. Data-Driven Transportation Planning:
 - Invest in real-time GPS tracking and AI-based optimization software to monitor and manage transportation logistics.
 - Establish a centralized system for tracking vehicle emissions, distances, and usage trends to inform future decision-making.
2. Sustainable Vehicle Procurement Policies:
 - Develop procurement guidelines that align with global sustainability standards, such as FIFA's Sustainable Sourcing Code.
 - Encourage partnerships with manufacturers offering certified low-emission or zero-emission vehicles.
3. Infrastructure Improvements:
 - Advocate for the installation of electric vehicle charging stations at major venues and high-traffic locations.
 - Collaborate with local governments to improve public transit accessibility and reduce reliance on private vehicles.

4.3 Carbon Offsets: A Commitment for Future Events

To address the unavoidable emissions generated during large-scale events, adopting a robust carbon offsetting strategy is essential. This strategy involves engaging with certified carbon offset programs that align with international sustainability standards.

Examples of initiatives include:

- Reforestation Projects: Planting trees to absorb CO₂ from the atmosphere.



- Renewable Energy Investments: Supporting projects that generate clean energy, such as solar or wind power.
- Methane Capture Initiatives: Preventing greenhouse gases from entering the atmosphere through innovative technologies.

For future events, we propose to offset double the total CO₂ emissions generated during the event. This includes not only emissions from transportation but also:

- Personal transportation for staff and stakeholders.
- Electricity usage at venues and operational hubs.
- Any additional emissions from the planning and execution stages of the event.

The use of reliable platforms like the Co2nsensus system ensures the effectiveness and traceability of these efforts. Doubling the offset accounts for indirect emissions that may not have been captured in the primary calculations, reinforcing a commitment to environmental responsibility.



5. Conclusion

The transportation operations during the Copa Libertadores 2024 Final resulted in total CO₂ emissions of 31,952.7 kilograms, highlighting the significant environmental impact of large-scale events. Key contributors to these emissions were buses, which, despite covering only 32% of the total kilometers, accounted for 72% of the total emissions. However, their high passenger capacity mitigates this impact when measured on a per-passenger basis. Hybrid vehicles, such as the Corolla Hybrid, demonstrated the environmental advantages of fuel-efficient technologies, offering a viable path toward reducing emissions in future events.

This report underscores the critical need to adopt sustainable practices in event logistics. Immediate measures, such as transitioning to low-emission vehicles and optimizing routes, can lead to significant reductions in the carbon footprint. Long-term strategies, including investments in sustainable infrastructure and data-driven planning, further emphasize the role of innovation in creating greener events.

By taking actionable steps to mitigate emissions and committing to offsetting more than double the CO₂ generated during the event, the organizers have set a precedent for environmentally responsible event management. These efforts not only align with global sustainability standards but also pave the way for future events to adopt a more eco-conscious approach, ensuring that the impact on the environment is minimized while maintaining operational excellence.



6. References

6.1 Manufacturer technical reports

Vehicles	URL manufacturer
MB - Sprinter furgon, Sprinter 131, Sprinter 200, Sprinter 711, Sprinter 901, Vito Furgon, Viano	https://www.mercedes-benz.com.ar/vans/vans-guide/brochures-download.html
H1	https://www.hyundai.com.ar/publicfiles/datasheets/fichatecnicaall-newstariasafetycomparativa_1718040997.pdf
Hiace 372	https://media.toyota.com.ar/4bc098b6-8ea3-49f1-8dda-ee51557b0f66.pdf
Hiace Wagon	https://www.toyota.com.ar/modelos/hiace-wagon
SW4 672	https://media.toyota.com.ar/468dde05-cabe-4078-9ddf-04689622fabd.pdf
Commander	https://www.jeep.com.ar/content/dam/cross-regional/latam/jeep/es_ar/2023/commander/desc-general/Etiquetas-de-Consumo-Commander.pdf
Starbus 3	https://www.metalsur.com.ar
Suv Sw4 srx	https://media.toyota.com.ar/e10016c4-24e8-44b6-943a-81f0fe0faaca.pdf
Corolla Hybrid	https://media.toyota.com.ar/8cf6fdec-9913-4d53-934d-c5b377d6f51c.pdf
Corolla	https://media.toyota.com.ar/7d4b9170-f329-4cc2-9b3c-1427faf4c421.pdf

6.2 Local Resolution for CO₂ Emissions and Energy Efficiency Measurement

- **Resolution Number:** 383/2021
- **Source:** Boletín Oficial de la República Argentina
- **Link:** <https://www.boletinoficial.gob.ar/detalleAviso/primera/253008/20211117>



7. Appendix

The table will include the following details:

- **Date:** The specific day of the event operations.
- **Vehicle:** The category or model of the vehicle used (e.g., sedan, hybrid, bus).
- **Amount of vehicles:** The total amount of that vehicle on a specific day.
- **Total Kilometers:** The total distance traveled by each vehicle type in kilometers.
- **Total CO₂ Emissions:** The total CO₂ emissions generated, measured in grams and calculated per kilometer traveled.

This comprehensive breakdown provides a clear and detailed overview of the transportation activities and their environmental impact, serving as a foundation for analysis and recommendations.

<i>Date</i>	<i>Vehicle</i>	Amount of vehicles	Total Kilometers	Total emissions
11/13/2024	Corolla	2	143.00	17.2
11/14/2024	Corolla hybrid	2	271.00	27.6
11/15/2024	Corolla	3	308.00	37.0
11/16/2024	Corolla hybrid	3	46.00	4.7
11/17/2024	Corolla	3	54.00	6.5
11/18/2024	Corolla hybrid	3	289.00	29.5
11/19/2024	Corolla	3	479.00	57.5
11/20/2024	Corolla hybrid	3	452.00	46.1
11/21/2024	Corolla	3	243.00	29.2



11/22/2024	Corolla hybrid	4	443.00	45.2
	MB - Sprinter furgon	1	97.92	21.5
11/23/2024	Corolla	4	574.12	68.9
	MB - Sprinter furgon	1	97.92	21.5
	Suv Sw4 srx	1	97.89	21.5
11/24/2024	Corolla hybrid	4	582.67	59.4
	MB - Sprinter furgon	14	1379.04	303.4
	Suv Sw4 srx	1	97.89	21.5
	SW4 672	1	48.95	10.0
11/25/2024	Corolla	3	292.00	35.0
	Hiace 372	1	97.89	21.5
	MB - Sprinter furgon	15	1468.80	323.1
	Sprinter 200	1	130.00	28.6
	Starbus 3	29	2838.83	2651.5
	Suv Sw4 srx	1	97.89	21.5



11/26/2024	SW4 672	1	114.21	23.4
	Corolla	1	72.60	8.7
	Corolla hybrid	4	320.00	32.6
	Hiace 372	1	97.89	21.5
	MB - Sprinter furgon	16	1566.72	344.7
	Starbus 3	30	2936.72	2742.9
	Suv Sw4 srx	1	97.89	21.5
11/27/2024	SW4 672	1	97.89	20.1
	Corolla	6	903.00	108.4
	Corolla hybrid	4	525.35	53.6
	Hiace 372	1	97.89	21.5
	MB - Sprinter furgon	21	2064.48	454.2
	Starbus 3	34	3328.29	3108.6
	Suv Sw4 srx	4	420.11	92.4
	SW4 140	1	110.13	22.6
SW4 672	1	106.05	21.7	



11/28/2024	Corolla	10	3016.67	362.0
	Corolla hybrid	6	817.00	83.3
	Hiace 372	1	130.00	28.6
	Hiace Wagon	1	118.28	26.0
	MB - Sprinter furgon	28	2912.84	640.8
	Sprinter 711	1	350.00	77.0
	Starbus 3	40	3915.63	3657.2
	Suv Sw4 srx	9	946.28	208.2
	SW4 140	1	0.59	0.1
	SW4 672	1	122.36	25.1
11/29/2024	Commander	1	97.89	16.3
	Corolla	8	979.00	117.5
	Corolla hybrid	16	3897.69	397.6
	H1	3	399.78	88.0
	Hiace 372	1	97.89	21.5
	Hiace Wagon	1	138.68	30.5



11/30/2024	MB - Sprinter furgon	30	3157.29	694.6
	Sprinter 131	1	8.16	1.8
	Sprinter 9+1	1	97.89	21.5
	Starbus 3	44	4307.20	4022.9
	Suv Sw4 srx	11	1166.53	256.6
	SW4 140	1	122.36	25.1
	SW4 672	1	97.89	20.1
	Viano	1	97.89	21.5
	Vito furgon	2	277.36	61.0
	Commander	1	97.89	16.3
	Corolla	7	1547.49	185.7
	Corolla hybrid	5	497.00	50.7
	H1	4	399.72	87.9
	Hiace 372	1	106.05	23.3
	Hiace Wagon	5	757.88	166.7
MB - Sprinter furgon	28	2974.29	654.3	

