

aurora
LAB
CARAVANA do FUTURO

ROUTES TO THE FUTURE

100 DAYS IN A 100% ELECTRIC TRUCK
ON BRAZILIAN ROADS

DATA AND REFLECTIONS





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summary

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Presentation

Shortly before 2025 began, the Aurora Lab team met to plan the following year's work and consider how to influence COP30, the 30th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), which was scheduled to take place in Belém in less than a year. We were coming from the excitement surrounding an event with over 100 people, where the **connection between work and climate** was debated, and leaders from both fields highlighted the unprecedented nature of such a meeting and their desire to continue dialoguing together to advance the theme of a **just transition**.

We also had the idea of somehow repeating an experience we had in 2004, when I traveled more than 14,000 kilometers across Brazil talking about **renewable energy**, aboard a display truck. Times were different then: nobody knew what it was all about and, in many places I passed through, that was people's first contact with a solar panel or a wind turbine. More than 20 years later, renewable energy is already a part of the daily lives of most people in the country, although not always in a fair, sustainable, and beneficial manner. But how would those territories and communities I passed through be like? What transformations have occurred due to the **energy transition** processes, and what has become of people's lives after these transformations?

With these questions in mind and a map of Brazil marked with sticky notes, we began to design the ***Caravana do Futuro***.

Our initial list of dreams was extensive: we wanted a truck to be usable as a stage, the stops to be themed, the driver to be a woman, and the truck to travel through all five regions... We wanted a **100% electric truck-tractor**, which would enable us to bring all these dreams to life across Brazil and, at the same time, experience firsthand the reality of **electrifying freight transport** in the country today.

Some of these initial dreams did not withstand the reality we encountered in the months that followed. Others were made viable, but not without

incurring **enormous challenges and learning valuable lessons** along the way. The journey from Porto Alegre to Fortaleza aboard a 100% electric heavy truck was one of them. If, on paper, the idea already seemed challenging, what we encountered on the roads forced us, day after day, into a colossal exercise in **flexibility, detachment, and responsibility**.

The original plan was to arrive in Belém, take the lessons learned, the voices, and the stage box itself of the *Caravana do Futuro* to COP30, so that it could serve as a collective platform for civil society during the conference. Throughout the journey, this proved to be impractical, and days before completing 100 days on the road, we made the tough decision **to anticipate the end of the Caravana's road sections**. Among the main reasons are safety and costs. The lack of charging infrastructure, the insufficient electrical grid, and the high cost of rescue vehicles would make it too risky and expensive to transport the truck from Fortaleza to Brasília and then to Belém. We therefore opted to say goodbye to our stage truck in Fortaleza at the beginning of September, about two months before COP30.

The purpose of this report is to share our experiences during the 100 days on the road and to highlight ways for the **decarbonization of transport** to continue advancing in the country.

We believe that practice and work in the real world generate knowledge and learning that are too valuable to be kept only to ourselves, and we hope that the experience of the *Caravana do Futuro* will inspire more people and organizations to think about **solutions and paths for a cleaner, fairer, and more collective future!**

Onwards!

Gabi Vuolo

Executive Director

Aurora Lab



Part of the team that participated in the second round of planning for the Caravana do Futuro, in March 2025. Photo: Aurora Lab

INTRODUCTION

The *Caravana do Futuro* was a journey that traveled across Brazil between May and November 2025, connecting territories, amplifying voices, and strengthening the fight for **climate justice, just transition, and decent work**.

Through interactive research, discussion groups, co-creation labs with workers, shows, and cultural presentations, we traveled through five Brazilian regions, collecting stories, strengthening struggles, and connecting communities.

One of the *Caravana's* main attractions was our **stage truck**, a truck that hosted debates and other activities, and featured a 100% electric tractor unit. We traveled **more than 6,000 kilometers over 102 days**, departing from Porto Alegre in May and arriving in Fortaleza, where we said goodbye to the stage truck in early September. To travel the same distance with a diesel truck, **2,400 liters of fossil fuel** would have been needed, and approximately **6.5 tons of CO₂ would have been emitted**¹.

In total, we made **91 stops for recharging** over those 102 days and needed to call for support vehicles twice. We had a field **team of three people for the truck's road operations and a base team of 21 people**. However, during the public stops, **more than 400 people were involved in the entire operation**.

To learn more about the *Caravana do Futuro*, visit: caravanadofuturo.com. There, we discuss the workers' agenda-building activities and the cultural and mobilization activities that took place in each of the cities, in addition to providing some information included in this report in other formats.

¹ The calculation considers a fuel efficiency of 2.5 km/l of diesel, which would give a total of 2,423 liters to travel the same distance. For the CO₂ emission calculation, the parameter of 2.68 kg CO₂/l was used. This value is widely used and derives from the carbon content of diesel and the stoichiometry of combustion.

Source: portalantigo.ipea.gov.br/agencia/images/stories/PDFs/TDs/td_1606.pdf.

Infrastructure and Team

our vehicle

This entire journey was undertaken using a truck as a platform. We traveled throughout Brazil, from South to North, carrying a 15-meter-long, 20-ton gross vehicle weight (GVW) truck that was adapted to transform into a stage for cultural events, seminars, and meeting spaces along the way.

This truck, pulled by a 100% electric heavy-duty tractor unit, was the icon of the *Caravana* during its first 100 days.



Images of the truck used by the project. Photos: Paulo Pereira/Teia Documenta

Our truck

The heavy-duty tractor unit, comprising the front part that contains the engine, chassis, and driver's cabin, is the E7-49T model from the Chinese manufacturer XCMG, with a total load capacity of 49 tons. It is equipped with a permanent magnet synchronous electric motor that offers 250 kWh of maximum nominal power (480 hp, compared to a diesel engine) and 2,000 Nm of torque, and can reach speeds of up to 84 km/h.

Its autonomy is 150 km per battery cycle, and the charging time at the factory, using a 2x GB/T-DC charger, is about one hour for a full charge under ideal conditions. The manufacturer provides this time, but, as will be indicated below, it is far from the reality observed on Brazilian roads.

The batteries, one high-voltage (637 V) and one low-voltage (24 V), are located at the rear of the cabin and together weigh three tons².

The truck-tractor was rented through Reiter Log, a logistics company, for R\$52,000.00 under a five-month contract.



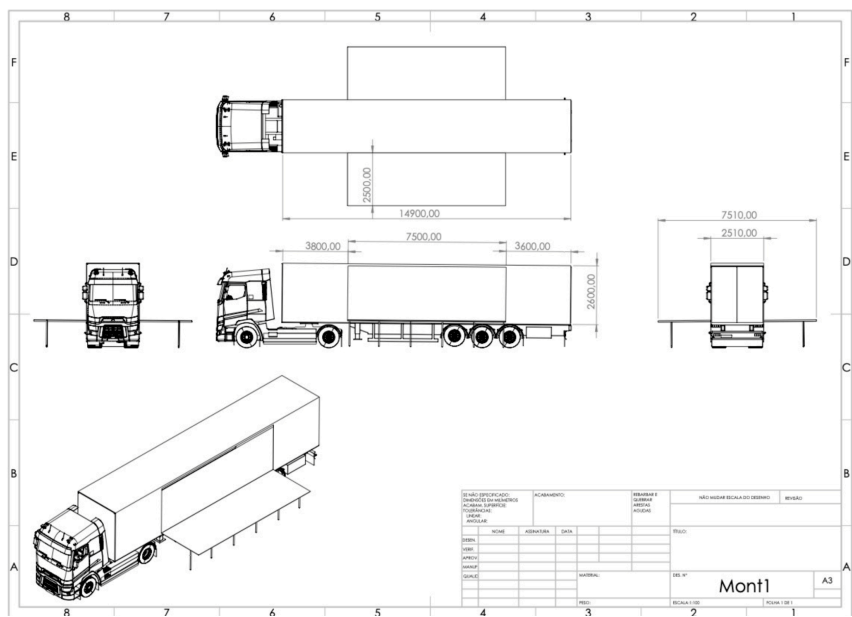
Vehicle details: the door indicating the energy used to power it, and the batteries, and a charging point at the rear of the cabin. Photos: Doug Souza / Quinze Vinte

² Technical information about the vehicle provided by the manufacturer can be found on the page xcmg-america.com/produtos/e7-49t/ and in the video youtube.com/watch?v=36MLCC-eK9c.

Our stage truck

The stage truck was a project commissioned by the logistics team and executed by a professional in the field, who customized a curtain-sider semi-trailer truck³, with a total length of 15 meters. The side walls of the box were cut, causing them to tilt. When closed, they are retracted to the sides. When open, these platforms become an extension of the floor of the box, which is originally 2.5 m wide.

Thus, there is a stage with a width of 7.5 m and a depth of 7.5 m, totaling an area of 56 m² when the two tilting platforms are added. When only one of them is open, the stage is 7.5 m wide by 5.0 m deep, with an area of 37.5 m². The stage is 1.5 m high in relation to the ground where the truck is parked.



Our stage truck project, built on a curtain-sider semi-trailer

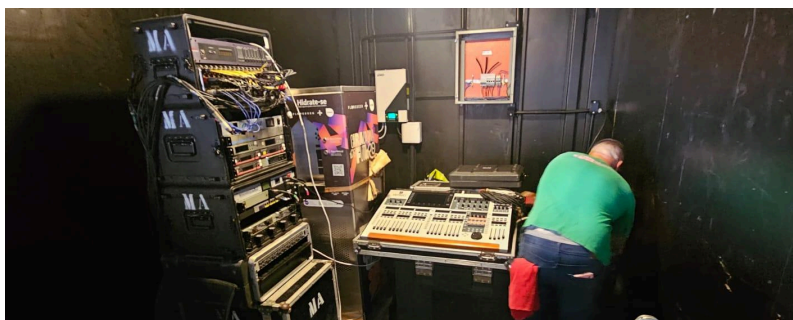
³ The curtain-sider semi-trailer truck has two sides made of flexible, sliding tarpaulin (a heavy-duty waterproof cloth, originally of tarred canvas), allowing both sides to be fully opened.



Open stage and side access ramp to the stage. Photos: Aurora Lab

Support Rooms

At each end of the box, two support rooms were created. At the end closest to the truck-tractor was the **infrastructure room**, where were installed the electrical panel — connected to the generators that powered the sound and lighting system for the events and the sidecar's outlets, and to the photovoltaic panel system equipment — the inverter/controller, batteries and cabling, and also transported the equipment and tools (LED panel, cables, etc.) between stops; and where the lighting, sound and LED operation support teams were located during the activities.



Infrastructure room, at one end of the truck. Photo: Aurora Lab

At the other end of the curtain-sider truck was the **dressing room/support room**, used by the communication and production teams during activities, for editing and processing the content produced during these activities, as well as storing materials.

Solar charging system

On top of the truck, six 550 W photovoltaic panels were installed. The charge produced by them was stored in a battery, which, in turn, powered the engine that opened and closed the sides of the stage.



Solar panels on the top of the box. Photos: Paulo Pereira/Teia Documenta

OUR CHARGING EQUIPMENT

To make the project viable and ensure the truck could be charged, even in locations without charging stations, it was necessary to use our own charging equipment. This is because the truck's original system was not compatible with the vehicle charging standard available in Brazil.

Furthermore, there was no ready-made solution on the market that met the specifications of our vehicle, especially regarding the 380 V three-phase voltage — since vehicles usually use 220 V single-phase or two-phase voltage — and in regard to the type of plug — in this case, two fast-charging connectors in direct current (DC) in the Chinese GB/T standard.



Pair of fast-charging connectors in direct current (DC) according to the GB/T standard, from our truck. Photo: Doug Souza / Quinze Vinte

This incompatibility made it impossible to directly use existing charging stations available in Brazil, which required the creation of a plug adapter and a custom-made transformer for our truck.



Truck's own charger in use. Photo: Doug Souza / Quinze Vinte

What does this charger do?

The equipment functions as a plug adapter. Additionally, it comes with a portable electrical transformer for use in locations with 220V three-phase power. The transformer allows converting the energy available in the electrical panels of commercial establishments — such as tire shops, stores, restaurants, and gas stations — to the standard required by the truck (380V). In practice, this pair of equipment allowed the truck to be charged in different locations, even when no charging station was available, or the plug was not compatible with the vehicle's original system, or the available voltage was insufficient to charge the truck.

How does it work?

The equipment captures energy from the 220V three-phase electrical grid and converts it to 380V, which is required by the truck's charging system. It also features an adapter tip that converts the European plug (CCS2) to the GB/T plug used by the vehicle. With this, it connects to the truck's charger, ensuring that energy is transmitted safely and compatibly, without overloading local installations.

Why, without it, would the project not be viable?

Without the equipment, the truck could not be recharged in most of the cities it passed through. The charging stations⁴ available in the country use different plugs and voltage standards, and the local power grids (especially in small towns) would not support direct high-power charging. The transformer and adapter were therefore essential to give the vehicle autonomy and allow travel between locations without access to charging stations, which were common along the route.

**Two-thirds of the charging along the route
was done using our equipment.**

What was the investment?

The equipment was developed in partnership with [Go Electric](#), a company based in São Caetano do Sul, SP, which specializes in electric car chargers. The company operates in the electric mobility sector, developing and installing chargers and charging infrastructure for residential, corporate, and public charging stations, including high-power equipment compatible with different international standards. They developed and manufactured the custom adapter for the truck in question. The equipment was rented for the duration of the *Caravana* and returned at the end of the project, for the amount of R\$50,000.00, corresponding to seven months of the contract.

What happens to this part after the project ends?

Since it is a rental, the equipment was returned to the lessor at the end of the contract.

⁴ An electric vehicle charging station is a charging point for electric and hybrid vehicles, functioning similarly to a gas station, but supplying electricity instead of fossil fuels.

OUR LOGISTICS AND OPERATIONS TEAM

For the smooth operation of the project, we have a logistics team composed of six people, divided between base operations and field operations. They were:

Marcelo Araújo | *Logistics and Operations Manager*

Responsible for coordinating the teams and making strategic decisions related to logistics, operations, and team management.

Mariana Assis | *Logistics and Operations Assistant — BASE TEAM*

As the right-hand person to the logistics and operations management, her job was to update and keep the reimbursement and invoice spreadsheets organized; monitor the various types of financial releases; and provide support in demands related to the financial sector, contributing to the optimization of processes and the fluidity of communication between areas, and between the field team and the base teams (including administrative/financial, communication, production, and coordination).

Anderson Fonseca Zeferino | *Route Assistant — BASE TEAM*

His objective was to ensure that the truck followed the most suitable and efficient routes, taking into account the available charging points and traffic conditions. His activities consisted of researching the location of charging stations, as indicated on information-sharing platforms, according to the truck's autonomy. Additionally, he was tasked with establishing contact to identify and confirm the existence and operation of potential charging points, as well as monitoring road conditions, considering factors such as traffic and route interruptions, to contribute to the smooth operation of field activities.

Rafael Heyde | *Logistics and Operations Assistant — FIELD TEAM*

Also a right-hand man to management, but in the field. His activities included supporting the assembly and disassembly of the stage truck, assisting with the loading and unloading of equipment, assembling structures, and organizing spaces, as well as meeting technical and logistical demands. Another essential activity was to go as a "scout," ahead of the truck, to the points mapped by the Route Assistant, to verify if the charging points were active and suitable for the truck. If so, the truck was

cleared to go to the location. If not, it was necessary to find another location for charging.

Luciano Lima da Silva | *Electrical Assistant*

To ensure safety during truck charging and activities, he worked on inspecting and installing electrical systems. As support for the Logistics and Field Operations Assistant, he accompanied visits with the scout vehicle, in addition to taking care of the organization, separation, verification, movement, and maintenance of materials.

Luís Brasil | *Driver*

The heart of our truck, responsible for driving, maneuvering, and safely positioning the vehicle at pre-defined stopping locations. In addition, he served as a crucial support point in the integration of the teams, collaborating closely with the production team and tailoring the driving approach to the logistical and technical needs of the project.

ROAD DATA

Since May 1, the truck has been circulating under strict monitoring of charging activities. For several days, it was used for tests and verifications in the Porto Alegre metropolitan area. On May 12, the truck began its journey north.

During the 102 days on the road, 6,060 km were covered until the final stop in Fortaleza, where it arrived on August 22.

Throughout this journey, all data regarding recharges, distances traveled, and savings in fossil fuels that were not used were collected. Below, we provide an overview of what this journey was like and present the key figures and relevant information from the project.

ROUTE AND SCHEDULE

After leaving **Porto Alegre**, the *Caravana* followed the BR-101 and BR-116 highways to **São Paulo**, passing through Florianópolis and Curitiba. In the capital of São Paulo, the official launch of the *Caravana* do Futuro took place at an event attended by the project's team, partners, and funders.

From there, the truck continued along the BR-116 to **Rio de Janeiro**, where it stayed between June 6 and 7 at the Realengo Campus of the Federal Institute of Rio de Janeiro (IFRJ), where it served as one of the stages for the Rio Forum.

In one of the longest legs of the journey, the truck then headed towards **Salvador**, going up the coast of Rio de Janeiro and Espírito Santo to Mucuri, Bahia. Due to the closure of a bridge on BR-101 in Itapebi, Bahia, it was necessary to recalculate the route, resulting in an increase in total mileage. The truck then had to travel through Minas Gerais, passing through Nanuque, Carlos Chagas, Teófilo Otoni, Padre Paraíso, and Itaobim. Once in Bahia, it passed through Vitória da Conquista, Poções, Jequié, Itatim, Santo

Estevão, Feira de Santana, and Simões Filho before arriving in Salvador on June 27 for the events and activities scheduled for July 12 and 13.

 G1
[https://g1.globo.com/bahia/noticia/2025/05/23/r...](https://g1.globo.com/bahia/noticia/2025/05/23/rui-costa-anuncia-demolicao-da-ponte-sobre-o-rio-jequitinhonha.ghtml)



Ministro anuncia demolição de ponte sobre Rio ... - G1

23 de mai. de 2025 — **A ponte sobre o Rio Jequitinhonha, no km 661 da BR-101, em Itapebi, no sul da Bahia, será demolida e uma nova estrutura será construída no local ...**

G1

<https://g1.globo.com/ba/bahia/noticia/2025/05/23/rui-costa-anuncia-demolicao-da-ponte-sobre-o-rio-jequitinhonha.ghtml>

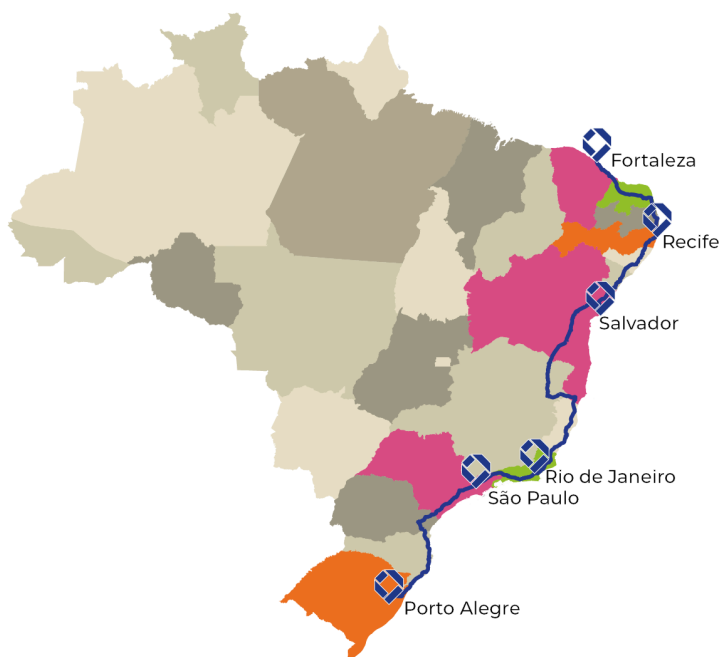
Minister announces demolition of bridge over Jequitinhonha River... - G1

May 23, 2025 — The bridge over the Jequitinhonha River, at km 661 of BR-101, in Itapebi, southern Bahia, will be demolished and a new structure will be built on the site...

*Print of a news article reporting the closure of the bridge,
generating the need to recalculate the route (translated version below).*

Leaving Salvador on July 16, the truck traveled along the BR-101 to Recife, arriving in the capital of Pernambuco, on July 26. There, cultural and mobilization activities took place between August 2 and 3, at the Cais do Sertão Cultural Center.

The truck departed from Recife, heading towards **Fortaleza**, the capital of Ceará, on August 13, en route to the Festival of Resistances, which took place in Fortaleza from September 5 to 7. After leaving Recife, it continued to Natal, capital of Rio Grande do Norte, via BR-101, then westward along BR-304, passing through São Pedro, Lajes, and Mossoró. In Ceará territory, it also passed through Aracati and Pindoretama before arriving in the capital on August 22.



Map of the truck's route, with stops for activities.

The truck's public events took place in five cities:

Data	Cidade	Local	Agenda pública
May 26	São Paulo	9 de Julho Occupation	Launch of the Caravana do Futuro
Jun 6 and 7	Rio de Janeiro	Federal Institute of Rio de Janeiro (IFRJ) – Realengo	Rio Forum
Jul 12 and 13	Salvador	Cairu Square	Shows Roundtables Cultural activities
Aug 2 and 3	Recife	Cais do Sertão Cultural Center	Shows Roundtables Cultural activities
Sep 5 to 7	Fortaleza	Belchior Cultural Center	Festival of Resistances

RECHARGING AND REFUELING

Throughout the route, **91 recharging stops** were recorded, all of which were monitored by the field team to ensure data accuracy, efficiency, and process safety. **Of these, 34 were made at charging stations, while 57 were made using the electrical grid of partner establishments.**

During the charging process, 6,400 kWh of energy were consumed to enable the truck to travel 6,060 km.

To cover all the charges, R\$14,900.00 was spent, which averages R\$2.30 per kilometer driven. If the same route had been covered using diesel, the cost would have been R\$14,665.00.

Complete information about the truck's charging throughout the project, as well as the calculation report, can be found on the website caravanadofuturo.com.

What was the process for the truck to travel?

The route planning was conducted by the base team using the PlugShare⁵ platform. This platform brings together a community of electric vehicle drivers, where users contribute information, analyses, and photos of stations to help other drivers make safer charging decisions.

After surveying possible stopping locations, based on the location and compatibility of charging stations, all relevant information was collected, including exact locations, contact phone numbers, road restrictions, and details related to truck traffic. The locations were contacted to find out if it would be possible to charge there.

If there was a positive indication regarding charging, the location would be consolidated in the planning. If there was any reservation regarding the possibility of charging, possible alternatives were mapped (both charging stations and places that had some charging infrastructure). In both cases,

⁵ plugshare.com

the field team was informed of the destination, and the support vehicle would proceed to the location as a scout to verify if the information was correct and if the area was indeed suitable for charging the truck.

If not, the scouts were responsible for finding another nearby point for charging. Upon finding a suitable spot, the location was shared with the truck driver, who accompanied them there.

The next step, if the location only had three-phase charging, was to verify with the partner whether they had authorized the electrical connection for a previously agreed-upon fee. Only after the partner's approval and the completion of some tests to verify that the electrical system was adequate was the truck released to charge.

What happened if it wasn't possible to charge the truck?

In that case, as a last resort, a dedicated tow truck was used to transport the electric truck-tractor, and a combustion engine tractor to move the stage truck.



Truck-tractor being transported by tow truck between stops where charging was not possible. Photo: Aurora Lab

This solution had to be adopted on two occasions, between Campos dos Goytacazes, RJ and Iconha, ES, and from Águas Altas and Cachoeira do Pajeú, MG to Vitória da Conquista, BA.



Illustrative map of charging points. Source: Aurora Lab

CHALLENGES FACED

The main challenges faced by the field team in recharging and operating the vehicle will be discussed below.

LOW VEHICLE AUTONOMY

The vehicle's autonomy, when running on a full charge, is 150 km, under flat road conditions, with good pavement and no traffic. To ensure that it would not be stranded on the road due to a lack of electrical charge, the team operated with a safety margin, limiting travel between charging stations and ensuring that the battery always had at least a 20% charge.

Even so, considering road conditions and the possibility of not finding charging locations, especially in areas farther from large cities, a greater safety margin was sought. Therefore, on average, the truck traveled up to 70 km between charges and, when it needed to travel at its limit, up to 120 km.

LACK OF INFORMATION ABOUT CHARGING STATIONS AND SUPPORTING INFRASTRUCTURE

Although online platforms providing details on charging points for electric vehicles have become increasingly popular in recent years, much of the available information is outdated, incomplete, incorrect, or limited to cars and motorcycles. Furthermore, there are no reliable maps or road signs indicating the location of these charging points.

UNAVAILABILITY OF COMPATIBLE PLUGS AT CHARGING STATIONS

The equipment found on the roads had different types of plugs, with the vast majority being the CCS 2 type (the European standard), while the vehicle used the GB/T type. The only station with a GB/T plug along the entire route was found in Curitiba. For the others, it was necessary to use the project's own adapter.

	Japan	North America	Europe	China	All markets (except UE)
AC Alternating Current	 J1772 (Type 1)	 J1772 (Type 1)	 Mennekes (Type 2)	 GB/T	
DC Direct Current	 CHADEMO	 CCS1	 CCS2	 GB/T	 Tesla

Types of plugs used for electric vehicles. Source: Evesco, edited by Aurora Lab

LACK OF STANDARDIZATION IN CHARGING SYSTEMS AT CHARGING STATIONS

Different companies managed the charging stations, each operating with different values, power ratings, and systems. Furthermore, each had its own registration, credit systems, and payment methods. Throughout the route, charging stations from 16 different companies were used. These were:

- BR Super Carga
- Charge On
- Corredor Verde
- On Charge
- Easy Volt
- Eletricaar
- Eletrogral
- Now Charge
- On Energy
- Plugreen
- RJ Eletropostos
- Spott
- Vapt Mob
- Volvo
- We Charge
- Wemob

Due to this decentralization, it was also necessary to download several different applications. These applications depended on internet access, which, in turn, was not always available, either via mobile phone or at the establishment.



Different operators and types of charging stations. Photos: Aurora Lab

DIFFICULTIES IN MAKING PAYMENTS FOR CHARGING AT CHARGING STATIONS

Significantly different prices were found along the route for kWh, ranging from R\$1.26/kWh to R\$5.00/kWh, corresponding to a variation of almost 300%. These prices were generally obtained through prepaid credits. As different companies managed the charging stations, this prevented the credits from being refunded or used for future charging at other locations if they were not used at other charging stations of the same company.

Among the possible payment methods — including PIX (a real-time instant payment system developed by the Central Bank of Brazil), credit card, or debit card — on several occasions, the charging stations only accepted one or two of these methods. Not every charging station accepted all three payment methods. This created insecurity in planning and could even make the operation unfeasible, as it was not possible to pay in the form accepted at each location.

INADEQUATE CUSTOMER SUPPORT AT CHARGING STATIONS

In addition to the previous challenge, there was a lack of user assistance. If there were any problems with payment, surplus credits, or discrepancies in amounts, communication with the company responsible for the charging station was quite poor.

In most charging stations, the attendants were not trained to handle any issues with charging. This is because charging stations are operated by electric charging companies that use commercial spaces or traditional gas stations to install their equipment.

The problem was not limited to local support, but also affected support offered through messaging apps and by phone. In several cases, the charging station operators did not respond. When they did respond, there were situations in which they stated that the system was unstable and that they could do nothing about it. In others, they said they didn't know what the problem was. In some cases, they said that everything was normal in their system and that the charging station was working correctly. And there was even a situation where they reported that the charging station was not listed in their system.

Even without any problems, in some cases, it was necessary to contact customer service to adjust the power of the available charging points. Since the truck's maximum charging power was 120 kWh, if a charging station offered a higher power, it was necessary to contact support to request a remote adjustment of the charging point's power.

INADEQUATE SUPPORT INFRASTRUCTURE AT CHARGING STATIONS

On several occasions, the charging stations had low roofs or canopies. Although these are pretty convenient and offer more safety for car and motorcycle users by protecting them from the rain, this, combined with the short length of the charging cables, made it impossible for the truck to approach and thus use the charging station.

uneven DISTRIBUTION OF CHARGING STATIONS
across BRAZIL

Throughout the route between the South, Southeast, and Northeast regions, a reduction in the availability of charging stations was observed.

While the truck traveled in the South region, 7 out of 9 charges were made at charging stations, which is equivalent to 78%. In the Southeast region, 59% of charges were made at charging stations – that is, 20 out of the 34 charges carried out.

Meanwhile, in the Northeast region, only seven of the 48 charges were made at electric vehicle charging facilities, totaling 15% of the region's charges. Of these seven, five occurred at the same station, which served as a base for the truck in Vitória da Conquista.

In other words, this means that, from Rio de Janeiro onwards, there are practically no charging stations for trucks.

Region/ Charging Type	Charging Station	Three-phase	TOTAL
South	7	2	9
	78%	22%	
Southeast	20	14	34
	59%	41%	
Northeast	7	41	48
	15%	85%	
TOTAL OVERALL CHARGINGS			91

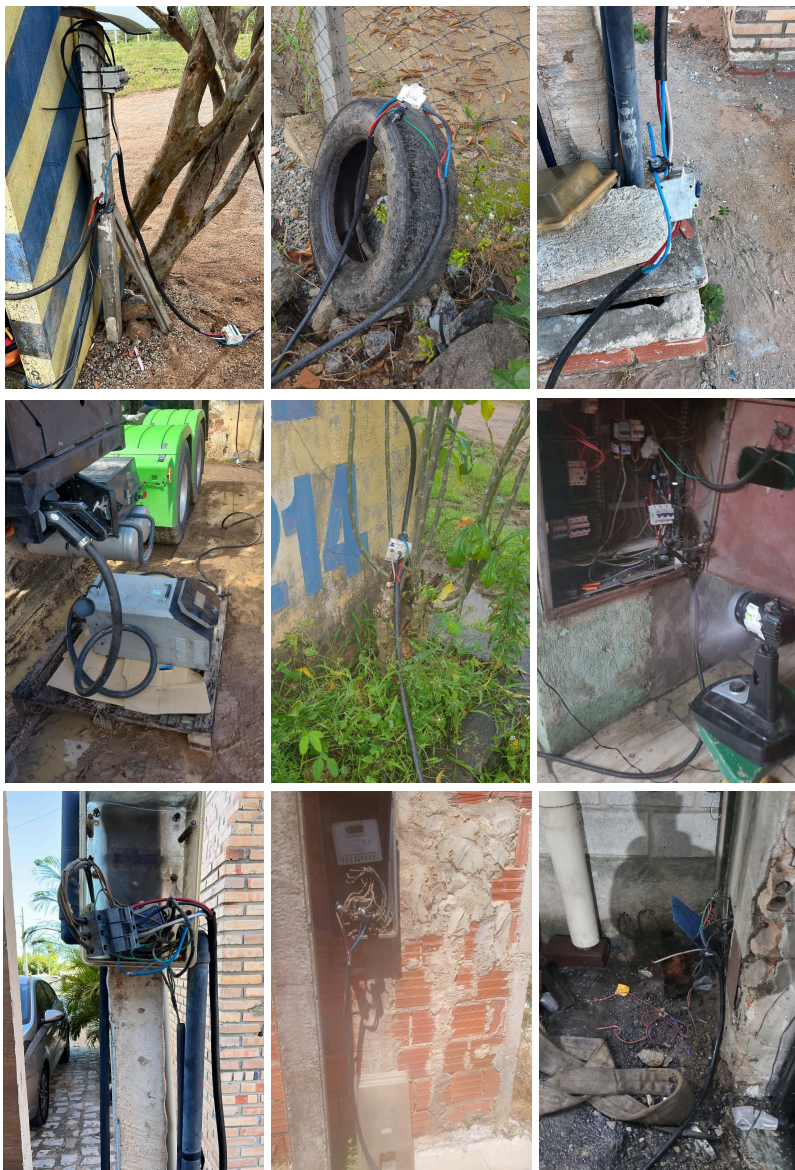
POOR ELECTRICAL INFRASTRUCTURE

In addition to the poor conditions of the charging locations planned for electric vehicles, our journey also encountered the overall poor state of the electrical grid infrastructure. On several occasions, we found very precarious electrical panels and wiring.

Informal charging was done in commercial establishments that kindly provided their electrical panels for our charger to be connected, in exchange for a previously agreed-upon fee. Many of these panels operated with outdated circuit breakers and had a capacity limited to the establishment's own operations. In some cases, there wasn't even a panel, just the circuit breakers attached to a pole. As for the wiring, we found poorly made splices; wiring with a diameter smaller than necessary to operate safely; and even low-quality wiring that overheats very easily.

Additionally, the infrastructure of the electrical system itself in some areas was quite precarious, featuring old and/or insufficient equipment. The voltage measured in some locations was also much lower than necessary for charging the vehicle, indicating limitations in the local electrical system.

It is important to emphasize that the team had a qualified professional to make the electrical connections. In all cases, the risks were carefully assessed in relation to the benefits, thereby minimizing the risk of accidents to the team and our partners.



Poor charging conditions: circuit breakers without a panel; area around the panel lacking structure and protection against water; cables overheating and requiring external cooling; old circuit breakers; cables with repairs. Photos: Aurora Lab.

CHARGING TIME

Although the manufacturer indicates that, under ideal conditions, it is possible to charge the truck in up to one hour, this was not observed in real-life situations on the road, where conditions are far from ideal and charging time could reach 10 hours. The variation in charging time was significant and unpredictable, as it depended on the availability of a compatible plug, the charging power, the number of available plugs, and the electrical grid's conditions.

Some charging stations distribute the charging power among several charging points. That is, a charging station that reported 150 kWh of power, with two connectors, divided this power equally among them, causing each to consume 75 kWh and the charging time to take twice as long.

Our truck had a maximum nominal power of 250 kW. Thus, the average charging times found were:

Charger	Power	Charging time	Note
GB/T charging station	120 kWh	2 hours and 10 minutes	120 kWh is the maximum truck charging power
Standard charging station	40 to 70 kWh	6 hours and 15 minutes to 3 hours and 30 minutes	Average power found at charging stations along the route
Our charger connected to a charging station	30 kWh	7 hours	Considering the truck always had a 20% charge under ideal conditions
Our charger connected to a more precarious electrical grid	20 to 25 kWh	8 hours to 10 hours	Considering the truck always had a 20% charge

Our truck had a maximum nominal power of 250 kW. Thus, the average charging times found were: This time only considers the period in which the truck was connected to the charging point. In addition, in the case of charging stations, there was also the parking time, the download of the application, the registration, the purchase of credits, the conversation with the partner, the electrical connection, and the safety tests of the equipment, if it was necessary to charge at a commercial establishment.

This generated driver downtime that exceeded what was sufficient for a rest stop or meals, and ultimately resulted in the entire day (or night) being lost to carry out the charging. Considering the reality in the field, it is possible to affirm that the current charging technology makes the professional activity unfeasible.

conclusions

The *Caravana do Futuro* was more than just a journey across Brazil in a 100% electric truck — it was a collective experience of learning, experimentation, and listening. At each stop, we confirmed that a just energy transition will only be possible if the realities and challenges of the territories are taken into account.

The data and reports gathered here reveal the extent to which Brazil still needs to advance to make the electrification of freight transport viable on a large scale. The absence of adequate infrastructure, the uneven distribution, the lack of standardization in charging systems, and the precariousness of the Brazilian electricity grid still constitute significant barriers.

The differences between what was planned and what was achieved were also part of the learning process. The decision to end the journey in Fortaleza, instead of continuing to Belém, represented a responsible choice given the infrastructure and safety limitations encountered. Even so, the journey fulfilled its mission: to test, document, and share the possibilities and limitations of heavy electric mobility in Brazil.

By replacing diesel with electricity, the *Caravana* stopped emitting approximately 6.5 tons of CO₂, demonstrating that every possible route to the future must be built on concrete and sustainable choices.

More than a project about technology, this was an experience about people, territories, and transitions. May the lessons learned from the *Caravana do Futuro* inspire new public policies, collaborations, and initiatives that accelerate the decarbonization of transportation and bring the country closer to a cleaner, fairer, and more collective future.

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We thank Reiter Log, our truck-tractor rental partner, and all the establishments that kindly allowed us to charge our truck, enabling us to continue our journey with peace of mind.

We thank Dona Márcia, our Cristal⁶, who accompanied us on this journey from the driver's cabin, along with Mr. Luís.

Our gratitude also extends to everyone who contributed, in different ways, to making this project possible — with time, dedication, ideas, enthusiasm, and resources.



The Caravana do Futuro team in Fortaleza, the truck's last stop.

Photo: Rafael Luz / Quinze Vinte

⁶ In the trucking community, “Cristal” is a Brazilian slang term used to refer to the wives or long-term partners of truck drivers.

TECHNICAL DATA SHEET

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SUBTITLE: 100 days in a 100% electric truck on Brazilian roads — Data and Reflections

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