

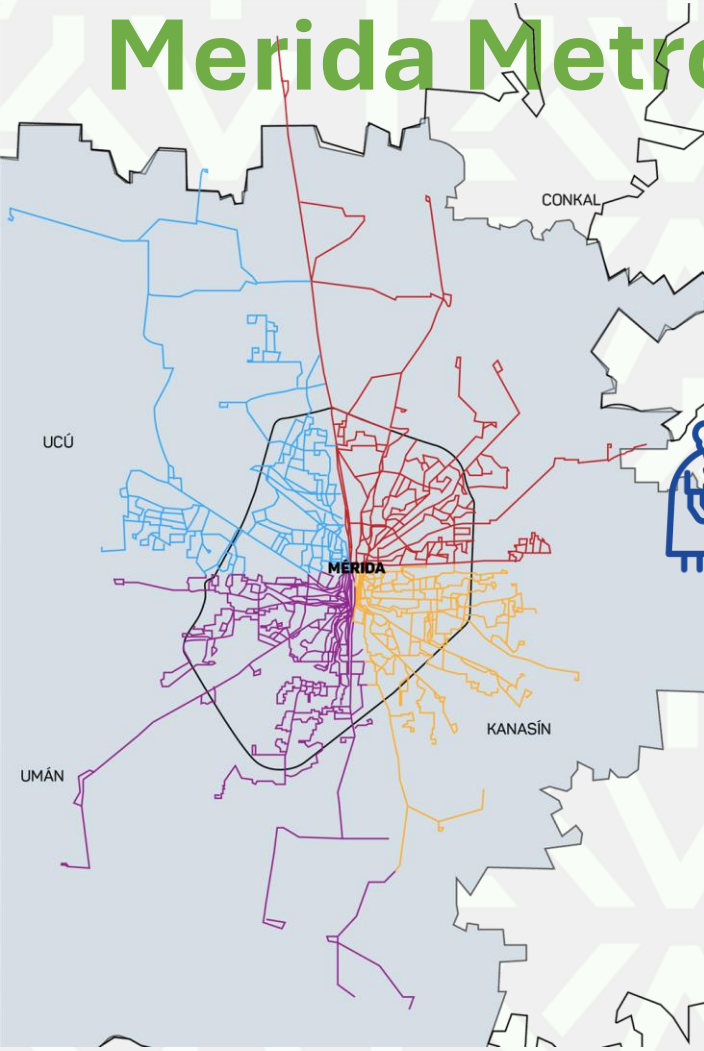
Why Charging and Implementation Matter Lessons learned from Yucatán, México

February 2025

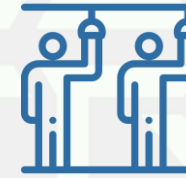


A little bit of context

Merida Metropolitan Area..



Inhabitants: 1.2 million



Daily Trips: 500 thousand



General population: 69%

Elderly people: 8%

Students: 19%

} 27%



Total Fleet: 900

Electric: 11%



People with disabilities: 4% → Free PT



Total Routes: 148

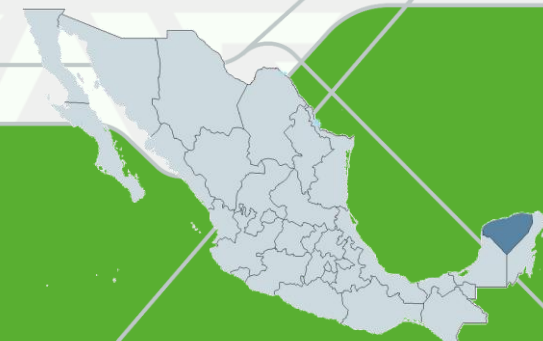
Coverage: 95%



Rate (leveled): 0.47 usd (9.24 MXN)

General Tariff: 0.61 usd (12 MXN)

Social Tariff: 0.25 usd (5 MXN)



Our first electric fleet was focused on..



Va y Ven App



Cycleways and safe crossings



Vehicles with on board technology



Defined stops and modern stations



BUS RAPID TRANSIT (BRT)



Exclusive lanes

Electronic payment



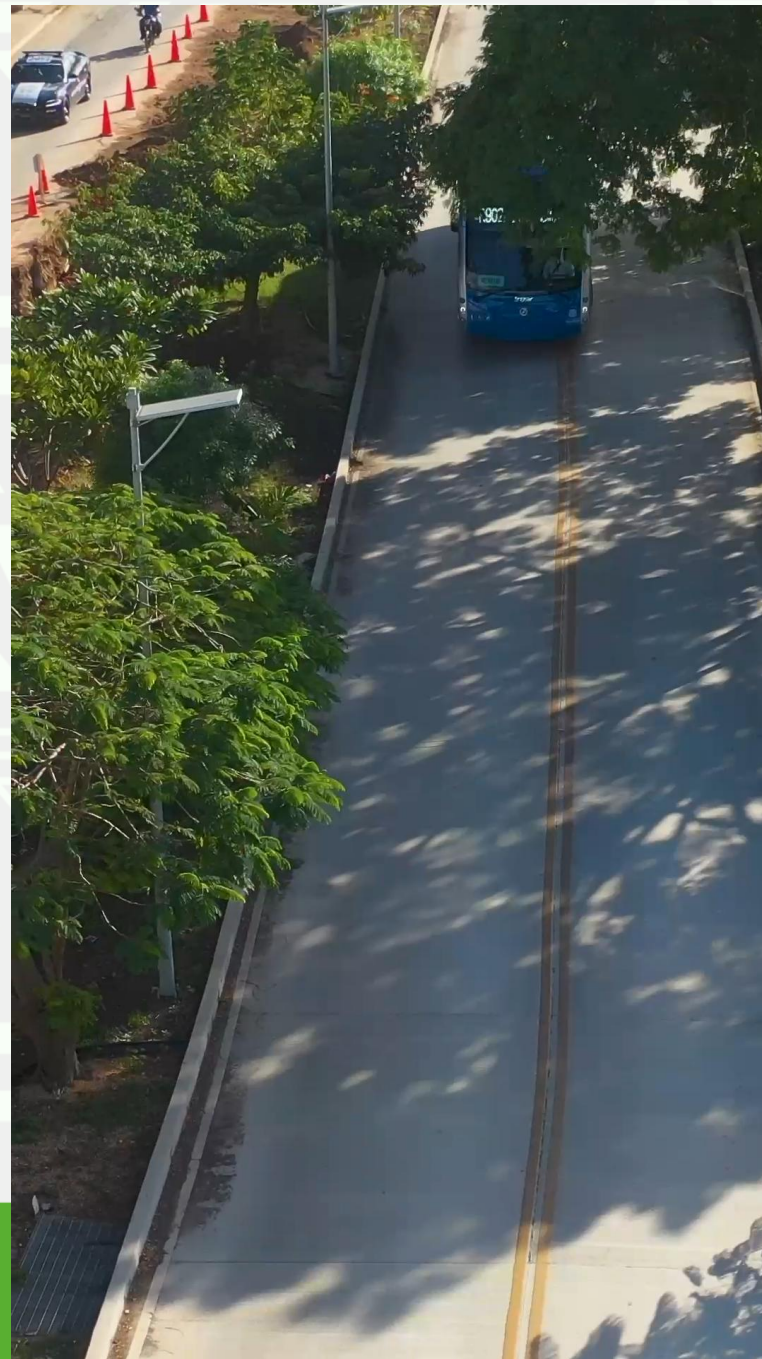
For the dedicated lanes we used old rail tracks.. It looked ugly at first..



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.. But we gave it a little bit of time...



1. PTA owns & manage charging stations

2. Standarize charging plugins

3. Optimize charging operations
(oportunity & fast charging)

E-Bus model



We are responsible for charging the buses...

1. We choose the **business model** for the charging

2. We choose the **chargers**

3. We **schedule charging** spots for PTOs



Same type of plug-in charger... then...same chargers for all



1. We plan for charging as a system
(instead of isolated points)



2. We reduce CAPEX/OPEX by sharing
chargers (reducing TCO)



3. We open possibilities for other business



KING LONG

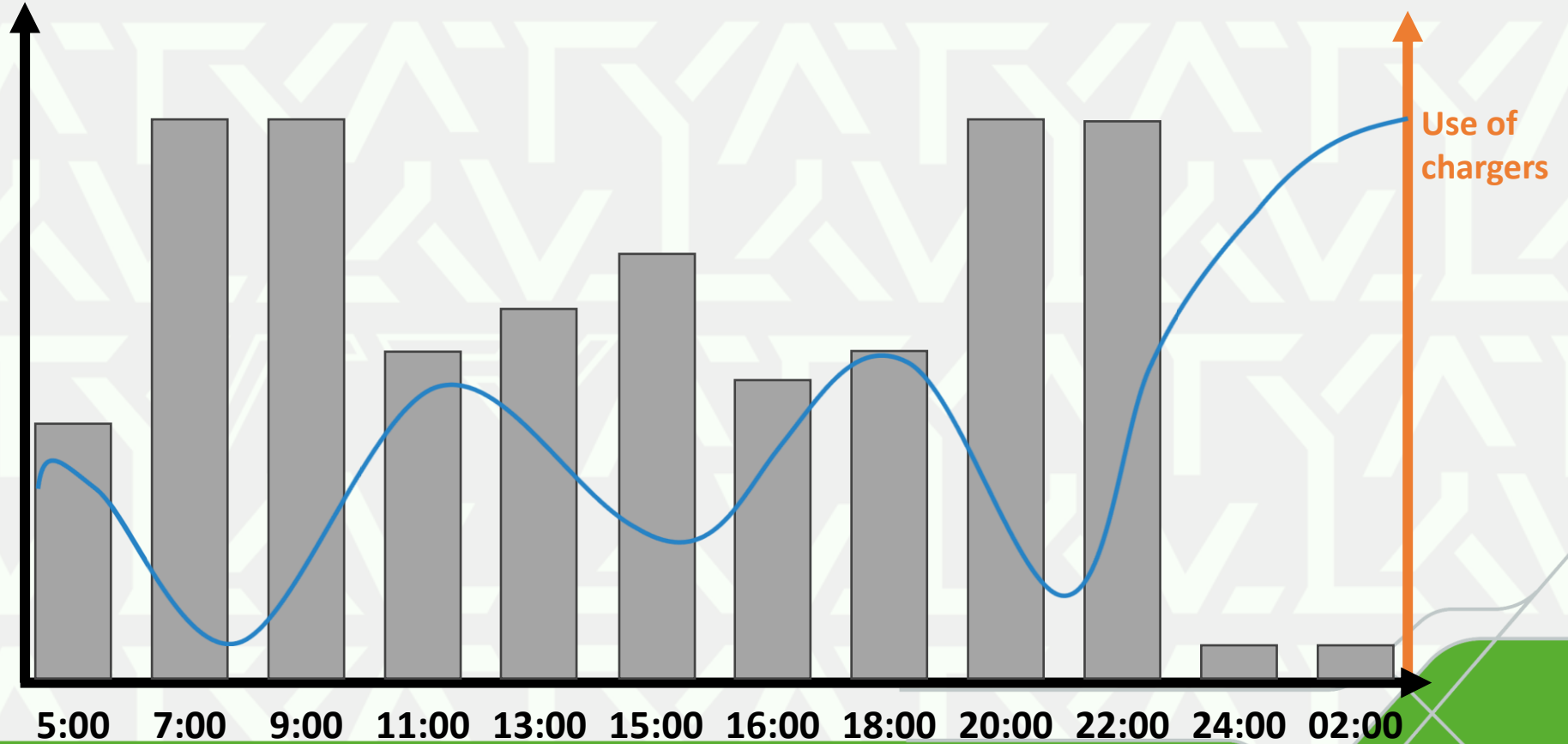


We optimize the use of charging

Km or #Buses

Make the most of:

1. Non-peak times
2. Time-off opportunities
3. Flexible scheduling





La Plancha

- 3 Pantographs (panto-down): 300 kW
 - 16 chargers: 120 kW (dual chargers 60/60 kW)
- } **2.8 MW installed capacity**
(can go up to 4.5 MW)

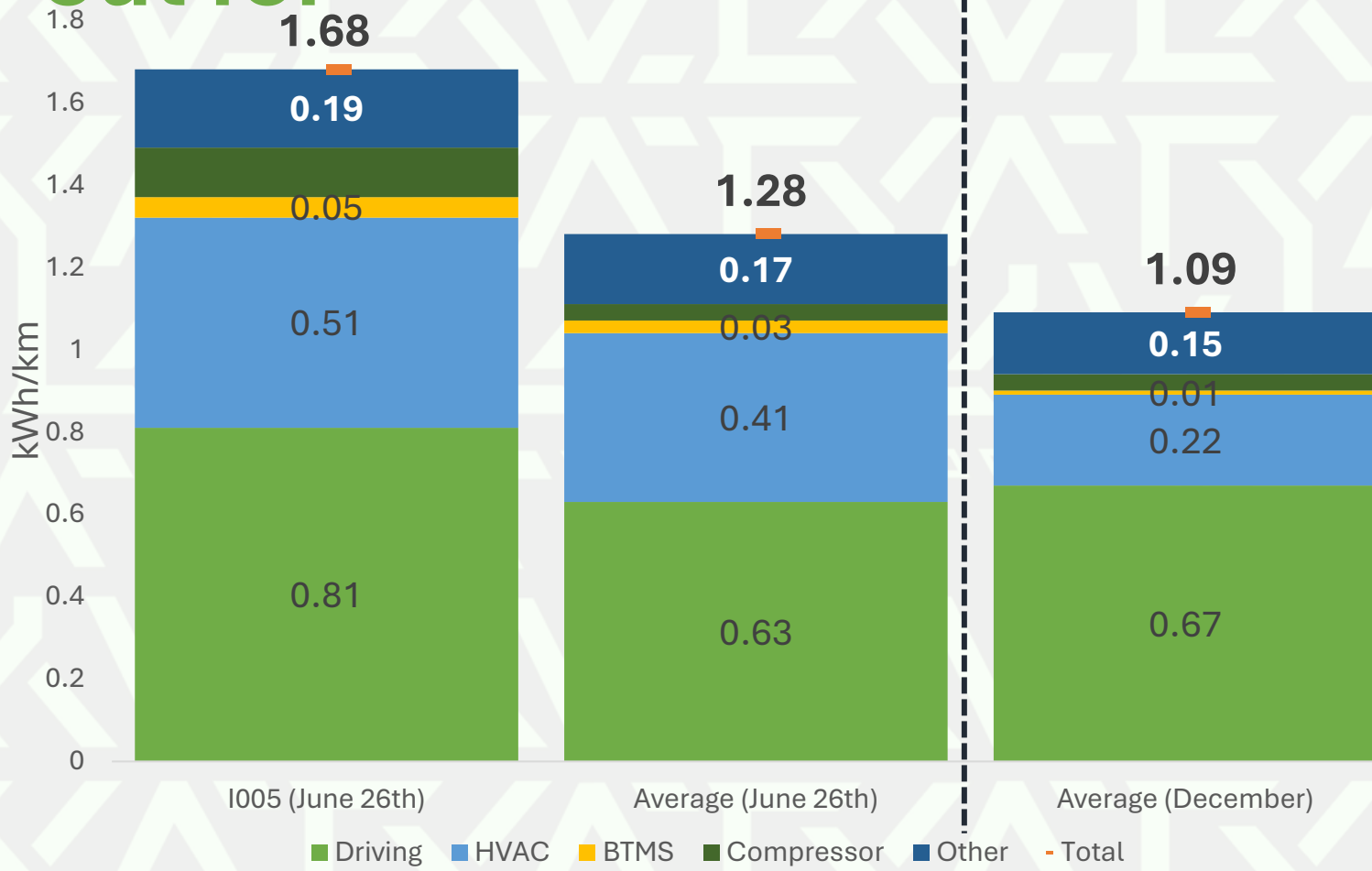
- We will charge over 100 buses daily
- 4 brands (2 with pantos)

5 additional pantos on route (terminals)



E-buses mean.. more variables to watch

out for



- **Climate matters:**

- Affects performance 15%, it also depends on other circumstances (type of lanes)
- Affects con HVAC consumption and BTMS

- **Driving affects more on performance**



Challenges & Lessons learned

- **Electric buses/lines tend to be inflexible and ever changing**
 - More charging hubs can help
 - Monitoring is indispensable (CANBUS + charging monitoring systems) → predict
- **Do not be afraid of battery autonomy (battery/charging anxiety)**
 - **Opportunity charge** can help
 - **Smaller battery packs allow for:**
 - **Reducing the price** of the bus.
 - **Increasing** the number of **passengers per unit.**
 - **Increasing performance** (km/kWh) due to the weight of the bus.
- Financial sustainability of electromobility
 - Keep operating costs low and implement new business model for charging services



Thanks!



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