



ROAD TO ZERO EMISSIONS



TPA Governing Board Meeting Informational Item

To provide access to opportunity for everyone; safely, efficiently and courteously



Agenda

- Palm Tran *“Road to Zero Emissions”*
- Master Fleet Electrification Plan
- Palm Tran Service Modeling
- Technology Assessment and Selection





Palm Tran “Road to Zero Emissions”

Master Fleet Electrification Plan



Objective

Phased implementation of a battery electric fleet to **reduce Palm Tran’s carbon footprint** as identified on Palm Tran’s Transit Development Plan (TDP) “Accelerate 2031” Goal #2.



Palm Tran “Road to Zero Emissions”

Transition Plan - Funding

| Funding Source | Capital Funding | Description | Procurement Year | Supplemental Funding |
|----------------------------|-----------------|---|------------------|----------------------|
| TPA LI Funds | \$4,336,388 | 3 electric vehicles / charging stations | FY 2024 | Toll Revenue Credit |
| VW Settlement Funds | \$1,800,000* | 6 electric vehicles | FY 2024 | 5307/5339 Funds |
| TPA LI Funds | \$5,000,000 | 4 electric vehicles / charging stations | FY 2025 | Toll Revenue Credit |

* This funding is to cover the additional costs to purchase a BEB vs a diesel bus.

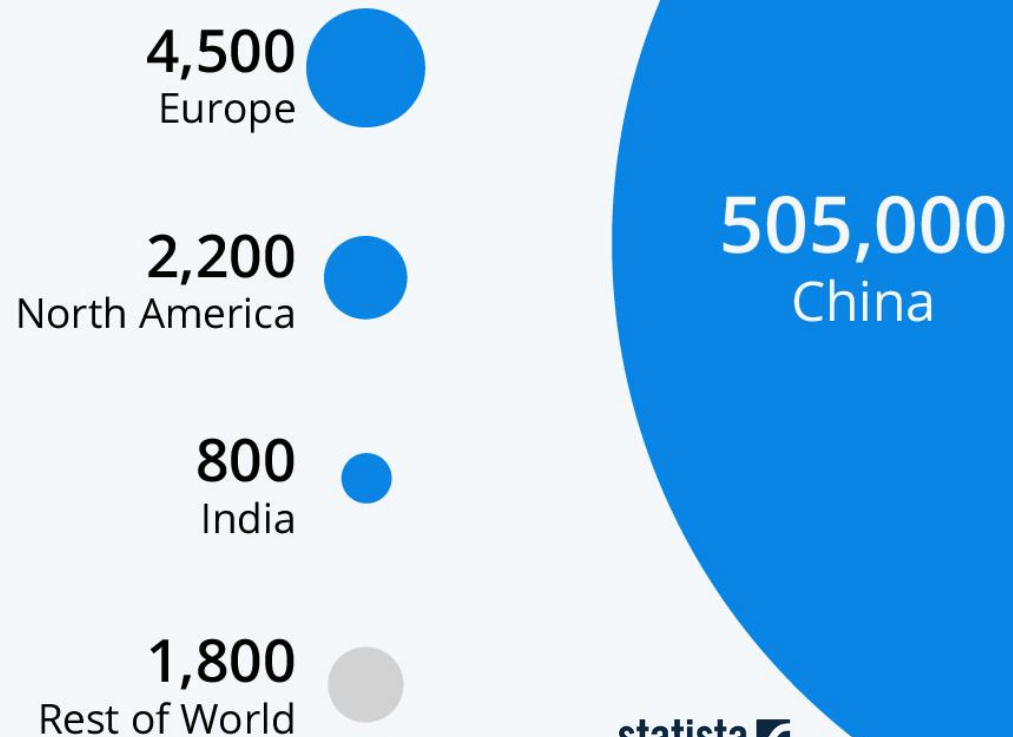
Thank you, TPA!





China Charging Ahead With Electric Bus Rollout

Electric bus stock in 2019 by country/region



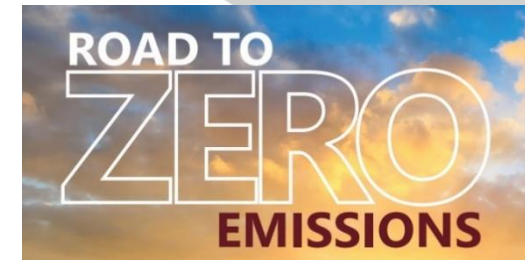
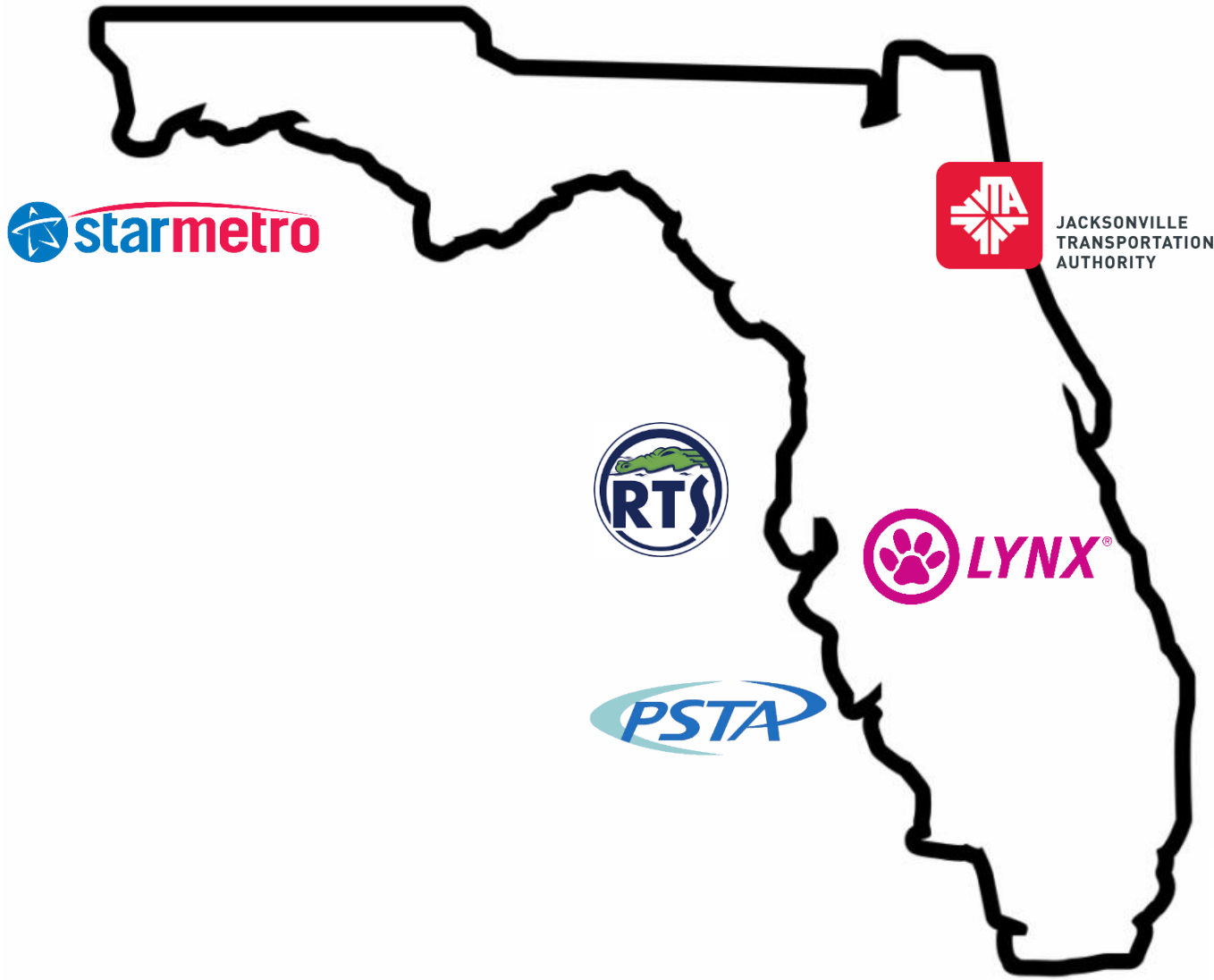
statista





Florida Public Transportation

Fleet Electrification Efforts

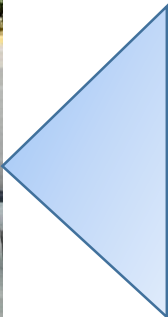




Peer Exchange – Transition Plan



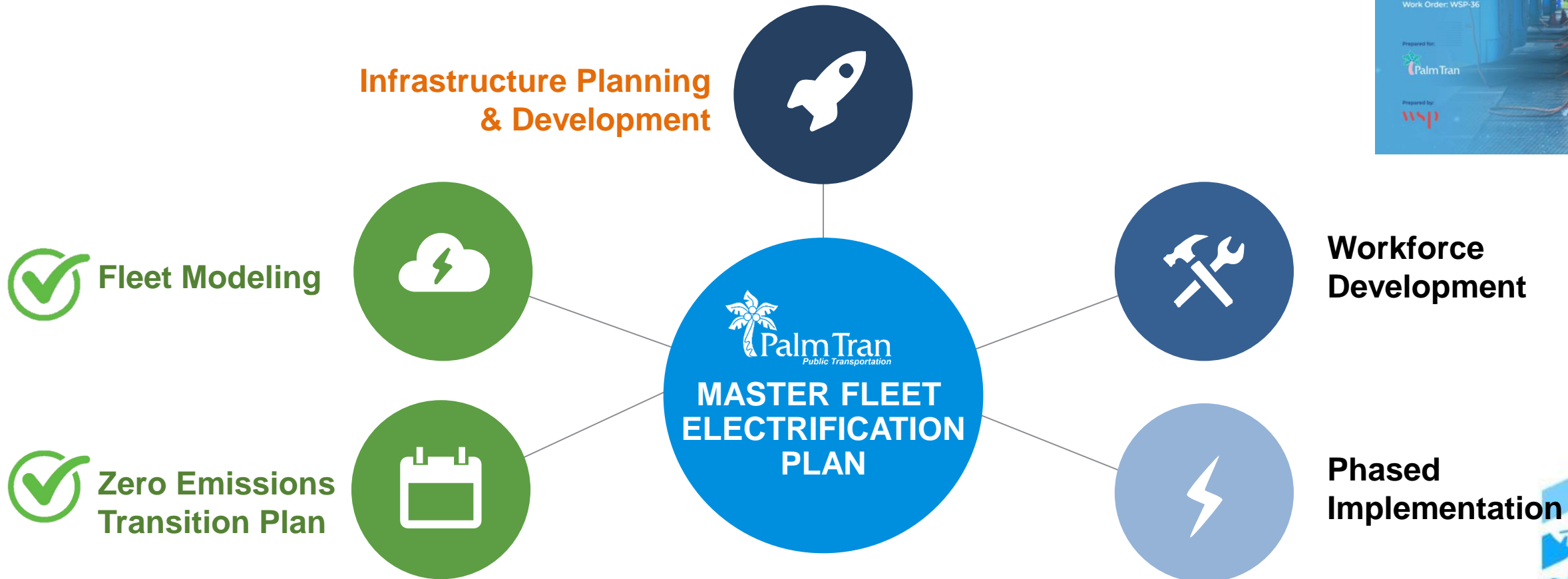
BCT Technical Visit





Master Fleet Electrification Plan

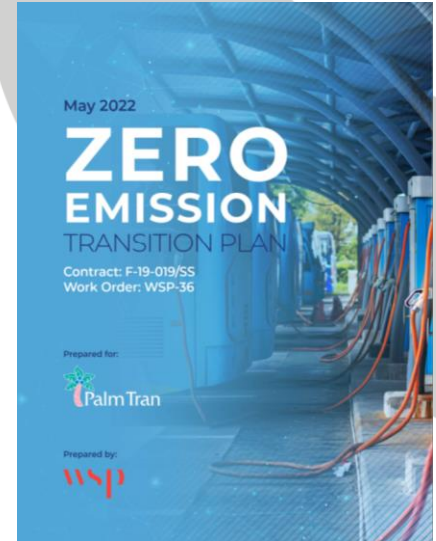
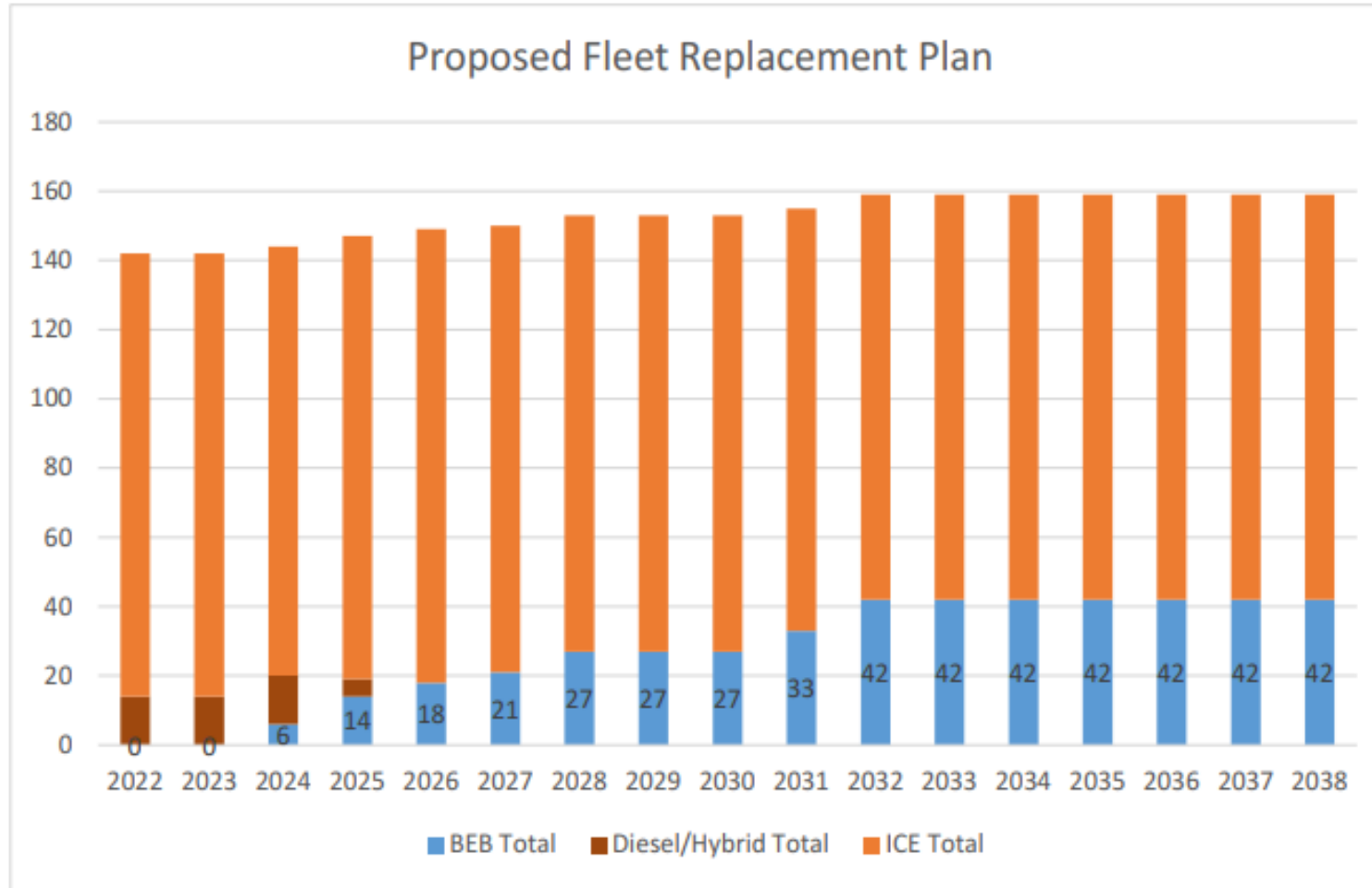
Components





Zero Emission

Transition Plan – Replacement Schedule



Goal: 25% Zero Emission Fleet by 2032



Service Modeling

BEB Modeling Methodology,
Inputs, Assumptions, and Outputs

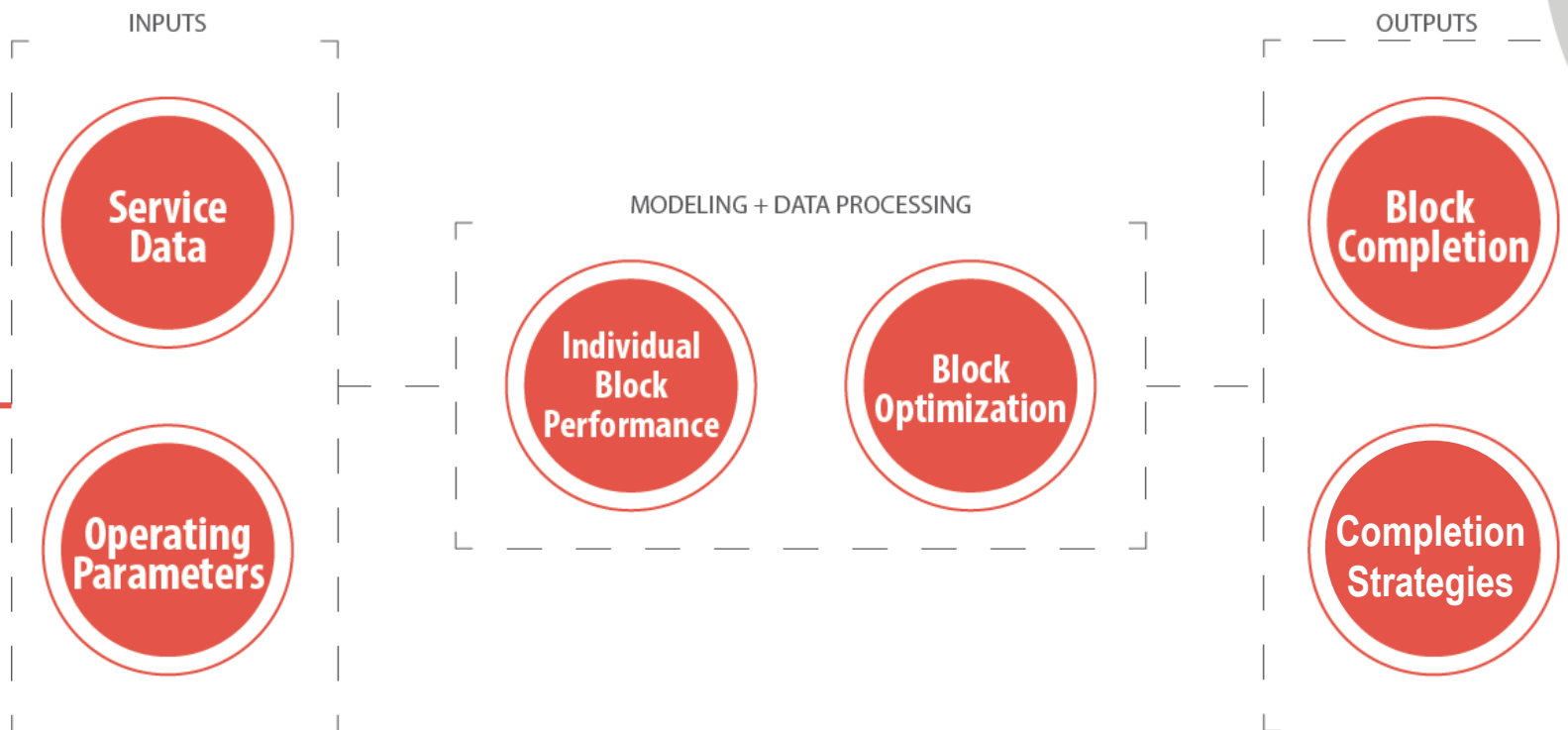
WSIP





Lightning Bolt Modeling

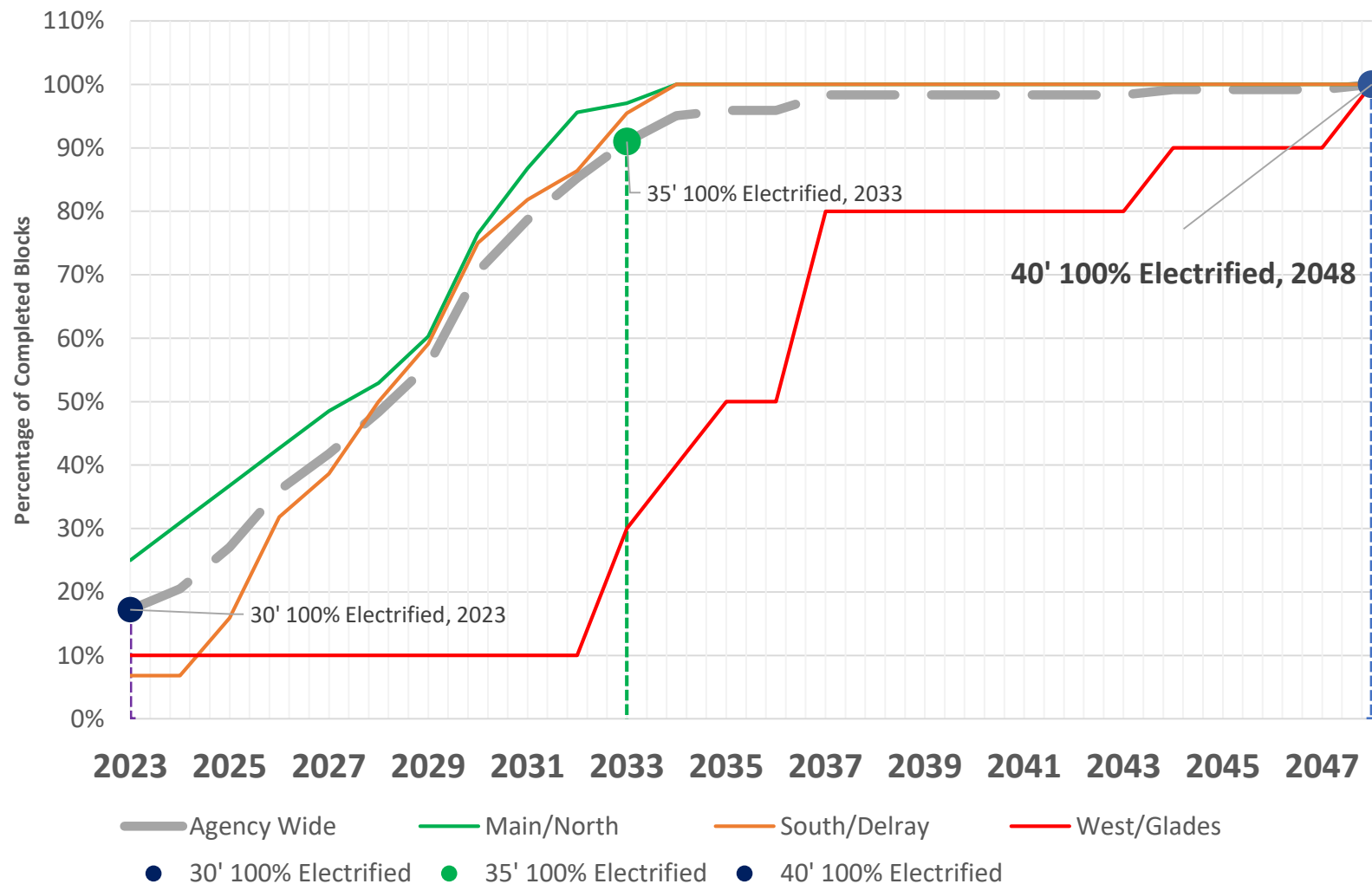
- Service Data (GTFS & January 2023 Block Summary)
- Battery Capacity
- Efficiency
- Safety Buffer
- Temperature
- Slope
- Stops



- Passing/Failing Blocks
 - Degree of Failure
 - Energy Consumption
 - Estimated Year of Completion
-
- Operating Parameters Adjustments
 - Strategic Phasing
 - Service Changes
 - Opportunity Charging
 - Additional buses



Technology Forecasts



- Assuming 5% annual range growth, and no other mitigation strategies
- **All service blocks from the Main/North and South/Delray facilities will be able to be completed by BEBs by 2034**
- Blocks from Glades/West will be the last to be fully electrified due to the longer range and duration
- The technology forecast will need to be aligned with the expected vehicle replacement schedule.





Previous Technology Presentations



Electric Bus Visits

Hosted By: Palm Tran



May 2019



July 2019



June 2019



August 2019

COMPLETED IN 2019





Battery-Electric Bus (BEB) Technology

| | | |
|---|--|--|
|  <p>NEW FLYER Monday May 15, 2023 9:00 a.m. to 12:00 p.m.</p> |  <p>PROTERRA Wednesday May 24, 2023 1:00 p.m. to 4:00 p.m.</p> |  <p>GILLIG CORPORATION Tuesday June 6, 2023 1:00 p.m. to 4:00 p.m.</p> |
|---|--|--|

All demos will be performed at Palm Tran’s Delray facility
100 N. Congress Ave., Delray Beach, FL



Palm Tran "Road to Zero Emissions"



Battery-Electric Bus (BEB) Technology Demos





Technology Selected Overview

5X More Efficient than a Diesel Bus



PROTERRA

| CNG | DIESEL | HYBRID | PROTERRA |
|----------|----------|----------|----------|
| 2.8 | 3.6 | 5.1 | 25.1 |
| MPG | MPG | MPG | MPGe |
| 83¢ | 91¢ | 63¢ | 21¢ |
| PER MILE | PER MILE | PER MILE | PER MILE |



Up to **230,000 lbs.**

Less greenhouse gases per bus per year, vs. diesel



Up to **\$433,000**

In operational savings per bus vs. diesel, over 12 years

ZERO
Tailpipe emissions





Palm Tran "Road to Zero Emissions"



Technology Selected

The top transit operators are going electric



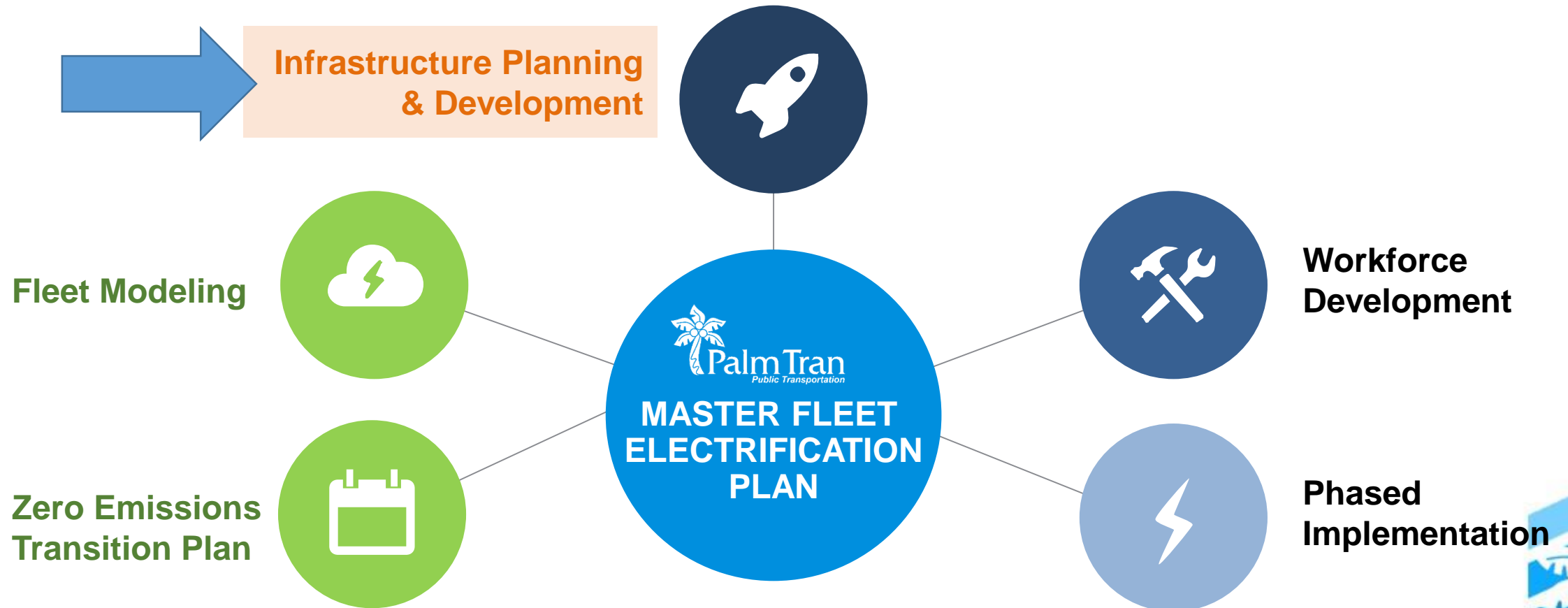
PROTERRA





Master Fleet Electrification Plan

Next Step – Infrastructure Planning & Development



ROAD TO

Thank you!

ZERO



EMISSIONS

