

# *Adapting and Creating "Change"*

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# Change the Game by *Going Green* Began November 2014

Pilot Program.....Procure 2 BYD 40' Battery Electric Buses  
Data Data Data.....Collect incredible amounts of data  
What will our fleet look like past 2019.....50 Local & 35 Commuter  
How will we run them in route all day?.....Charging Infrastructure  
Training.....Operators and Technicians  
Technicians vs. mechanics!!!



# Results Were Favorable



- Two BYD 40' battery electric buses
- 90% availability for service
- Average range 150 miles @ 2.2kw/mile
- 15,000 Miles between service interruptions
- Average operating cost:

*Maintenance + Electricity \$.55/mile*

# Hold On, Here We Go!!

## February 2016 Board of Directors meeting

- AVTA awarded a contract for 85 Battery Electric Buses to BYD
  - 35 – 45' Commuter Coaches
  - 13 – 60' Articulated Buses
  - 37 – 40' Local Transit Buses
- \$5 Million infrastructure project for 89 Depot Charging Stations at main facility
- \$10 Million infrastructure project for High Power Wireless Inductive Charging Systems







# Mitigating the "CHANGE" Factor

- Infrastructure
- Route Planning and Execution
- Operations
- Organizational Change



# Infrastructure

- Four inductive chargers at main transit centers
  - Owen Memorial Park
  - Palmdale Transportation Center
- Additional chargers will be installed at strategic locations in support of regional service routes structure
  - Metrolink Station
  - Healthcare Facility



# Infrastructure Inductive/Enroute Charging

*AVTA's 1200 square miles of service area provides CHALLENGES to cover our local transit routes*

*Inductive chargers extend mileage ranges sufficient to cover all routes*

## **50kWh Chargers...one located at each transit center**

10 min charge times = 4 miles of added range

4 miles X 10 = 40 miles range extension

180+40=220 potential miles of range

## **250kWh Chargers...3 located at each transit center**

10 min charge times = 15-18 miles of added range

20 mile X 10 = 150 to 180 miles of daily range extension

180+150 = 330 potential miles of range





# Infrastructure Depot Charging

- 89 Depot Chargers
  - 43 200kWh
  - 40) 100kWh
- Energy Required Daily...40,500kW
- Peak Available...NTE 10,000A
- Emergency standby power...1.5MW
  - 25 buses



# Route Planning



# Route Planning

- Planning principles become critical
  - Long-term view
  - Charging facilities must be carefully located for support of routes today and into the future
- Must incorporate careful timing of schedule
  - Allow for appropriate time in service schedule for charging process
  - Minimize wasted deadhead miles, excessive dwell time, etc.
- Plan for growth patterns within the region



# Operations

- Battery Electric Buses need to be driven differently
  - *Acceleration & Braking*
  - *Driving technique*
  - *"Anxiety" @ 25% Charge*
- Operations Procedures
- Training for Success
- Technicians vs. Mechanics
- Recognize performance





# Organization

- Organizations must have a clear vision for operating electric buses in their fleet
- Change the mindset of every person within the organization
  - Transit Agency
  - Contractor, Consultants, Vendors, etc.
  - Work in progress
- Do it for the right reasons
  - Environmental stewardship and a sustainable future
  - Healthier environment for operators and technicians
  - Enhanced customer experience





# Summary

- “Change” is a part of the process. *Well worth it!*
- Bus procurement is the “easy” part of the process
- Plan the infrastructure
- Adjust route planning
- Align the organization to a new “Customer Experience Mindset”
- Reach out to those agencies that have taken the leap...





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