Zero Emission Truck Projects

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Agenda

- Status of Transpower heavy duty electric truck project
- Status EVI/UPS zero emission goods movement medium duty truck project
- Proposal for a zero-emission catenary system with heavy duty CNG hybrid electric truck

Transpower Heavy Duty Battery Electric Truck Project

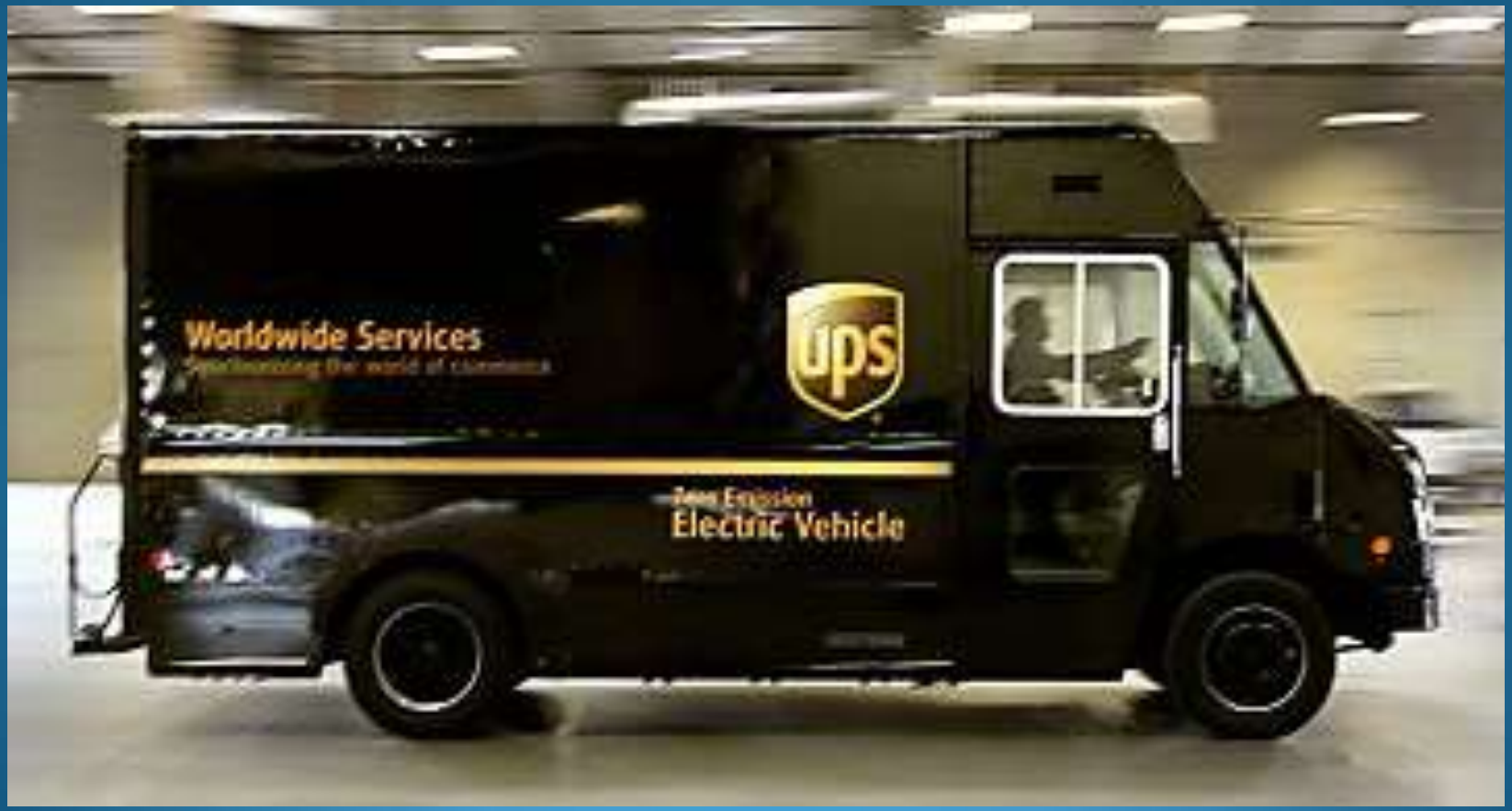
Transpower Heavy Duty Battery Electric Truck Project

- Project is funded by CEC and AQMD for total project cost of $2.6M – AQMD funded $500K
- Two Class 8 trucks will be demonstrated at the POLA and POLB moving containers to the ICTF
- Goal for range – 100 miles/charge

Transpower Heavy Duty Battery Electric Truck Project

- First of two prototype electric trucks is functional and beginning to produce valuable test results
  - Basic validation of major drive system components
  - Areas where upgrades are required to optimize and perfect the product
- Preparations for second prototype truck are focused on two key tasks:
  - Working out specifications for the base vehicle to be built by Navistar in early 2012
  - Completing development of the new Inverter-Charger Unit (ICU), the main new component to be introduced in the second truck

EVI/UPS Zero Emission Goods Movement Medium Duty Truck Project

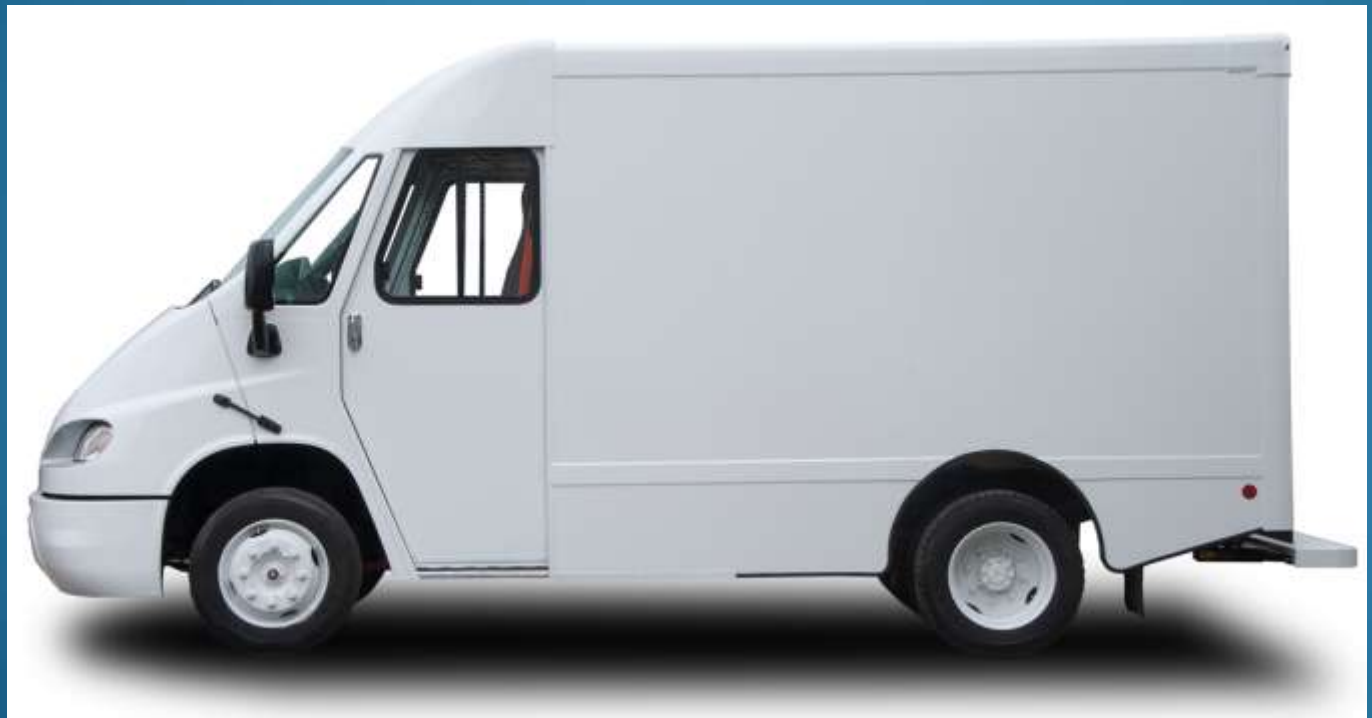


EVI/UPS Zero Emission Goods Movement Medium Duty Truck Project

- 40 Class 6 medium duty diesel trucks will be replaced with 40 battery electric trucks at a UPS San Bernardino Facility, total project cost of $6.9M – AQMD/EPA funded $1.4M
- Vehicle Range – 100 Miles
- Project includes updating UPS electrical system and installing EV infrastructure to accommodate overnight charging of all vehicles

EVI/UPS Zero Emission Goods Movement Medium Duty Truck Project

- Delivery Delay due to problems with body design and manufacture
- Morgan Olson completing final body design



EVI/UPS Zero Emission Goods Movement Medium Duty Truck Project

- EVI has received the first prototype vehicle and has started verifying powertrain integration
- EVI is on schedule to meet the August delivery dates
  - 27 P70's – August 1
  - 13 P10's – August 30

Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

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- In June, 2009 the Ports released Request for Concepts and Solutions to provide zero-emission movement of containers between the ports and near-dock rail facilities
- Must have capability to provide zero-emission transportation of containers between near-dock rail yards and the ports
- The system will be required to interface with existing terminal operations
- 90% of containers currently entering Southern California through the ports travel to locations other than near-dock rail yards

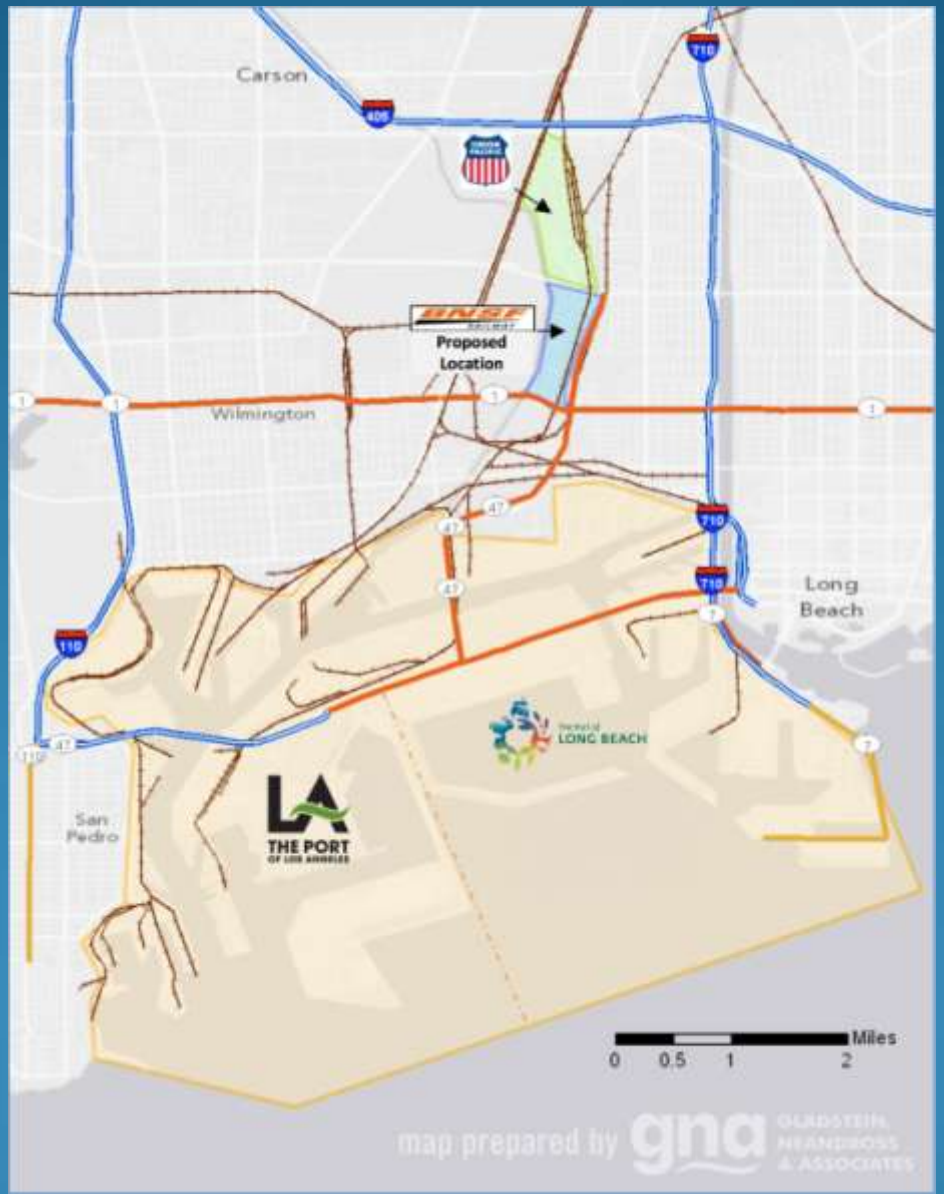
Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

- System that can work on a regional level is of significant interest
- In the proposed system a natural gas hybrid truck is envisioned that can operate solely on electrical power from catenary lines
- Onboard battery will allow truck to operate in electric mode for a limited distance after disconnecting from catenary
- Battery range of less than ten miles is sufficient to allow for zero-emission operation at the ports and near-dock rail yards

Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

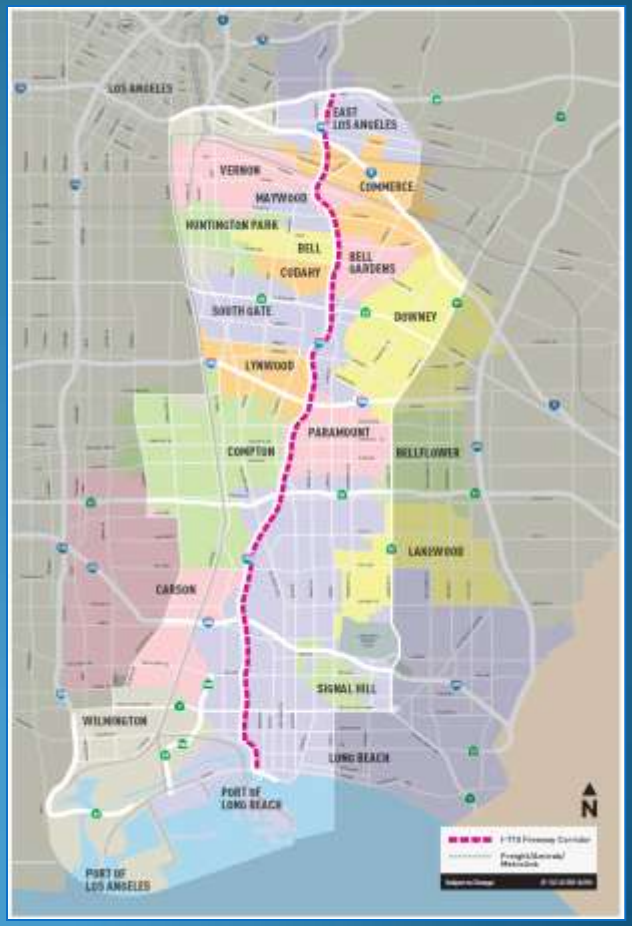
- When travelling longer distances, the trucks would revert to a low-emission hybrid-electric mode
- The trucks can be built and deployed while the catenary infrastructure is being developed
- The near-term proposal would be to deploy catenary systems along CA-47/103 to address the needs of the communities around the near-dock rail yards

Proposed Location for Demonstration



Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

- The long-term goal is for a zero-emission truck corridor along the I-710 and CA-60 freeways as proposed by the Southern California Association of Governments (SCAG)
- AQMD has commissioned a Zero-Emission Catenary Hybrid Truck Market Study to determine feasibility



Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

- Catenary systems that support heavy duty trucks have been demonstrated in Europe

Potential Project: Heavy Duty Hybrid Electric Truck with Catenary System

- Challenges:
  - Consensus by government, industry and community stakeholders for technology and deployment is needed
  - Aesthetics, right of way, cost of infrastructure and cost of vehicles
- Benefits:
  - Flexible truck platform that will allow for zero-emission operations in key regions
  - Extended off-catenary operation, completely eliminating diesel emissions

Proposed Project: Catenary System With Heavy Duty Hybrid Electric Truck

QUESTIONS?

RECOMMENDATIONS?