



PLUG-IN HYBRID ELECTRIC MEDIUM DUTY COMMERCIAL FLEET DEMONSTRATION AND EVALUATION

Principle Investigator: Matt Miyasato, Ph. D.

Presenter: Jeff Cox

South Coast Air Quality Management District

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ARRAVTo68

Overview

Timeline

- Start – November 2009
- Finish – September 2015
- 20% Complete

Budget

Total project funding

- DOE - \$45,443,325
- Contractor - \$45,612,649

Barriers

- System/vehicle validation
- Wide geographic distribution of demonstration fleet vehicles
- Quick deployment timeline

Partners

- SCAQMD
- EPRI
- VIA Motors
- Odyne Systems
- SCE
- Pathway Technologies

Objectives

- Nationwide demonstration and evaluation of approximately 280 medium-duty PHEV's
- Develop a production-ready, commercializable PHEV system for class 2 to 7 vehicles
- Develop production-ready “smart charging” capability for the vehicle
- Build customer familiarity
- Quantify performance attributes and environmental impact
- Use project results for system development to optimize performance and reduce costs

PHEV Systems Developed



VIA Motors – Pick-up truck



Odyne – Class 6/7 Work Truck



VIA Motors - Van

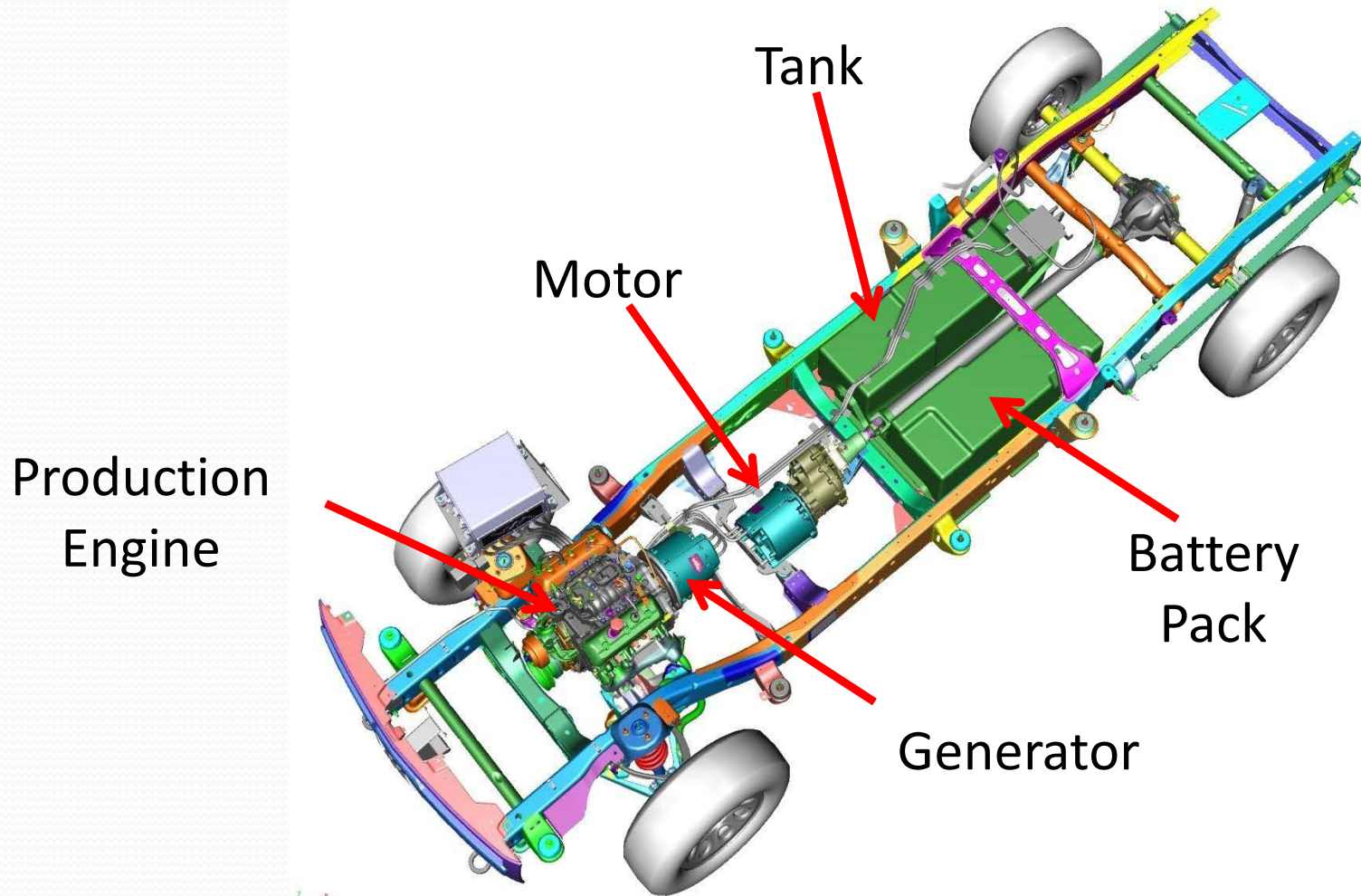
Approach – VIA Motors

Vehicle Design:

- Series hybrid system
- 4.3L gasoline V6 engine
- 4x4 or RWD
- High energy lithium-ion battery – 24 kWh
- Blended regenerative braking
- Charging-Level 1 and Level 2
- Reduces payload by about 600 lbs
- Crew Cab, Extended Cab, or Regular Cab
- Optional: 15 kW Export power



VIA Motors System Design



Approach – Odyne Class 6/7

- Odyne Hybrid System with Allison automatic transmission
- Diesel Engine
- High Energy Lithium-Ion Battery- JCS 28.4 kWh
- Blended Regenerative Braking
- Launch Assist
- On-board Charger (>3.3 kW)
- Charging-Level 1 (120 Vac) and Level 2 (240 Vac)
- Export Power (>5 kW)
- Redundant system that can be returned to conventional driving



Work Truck Applications



Hybrid Bucket Truck



Hybrid Digger Derrick

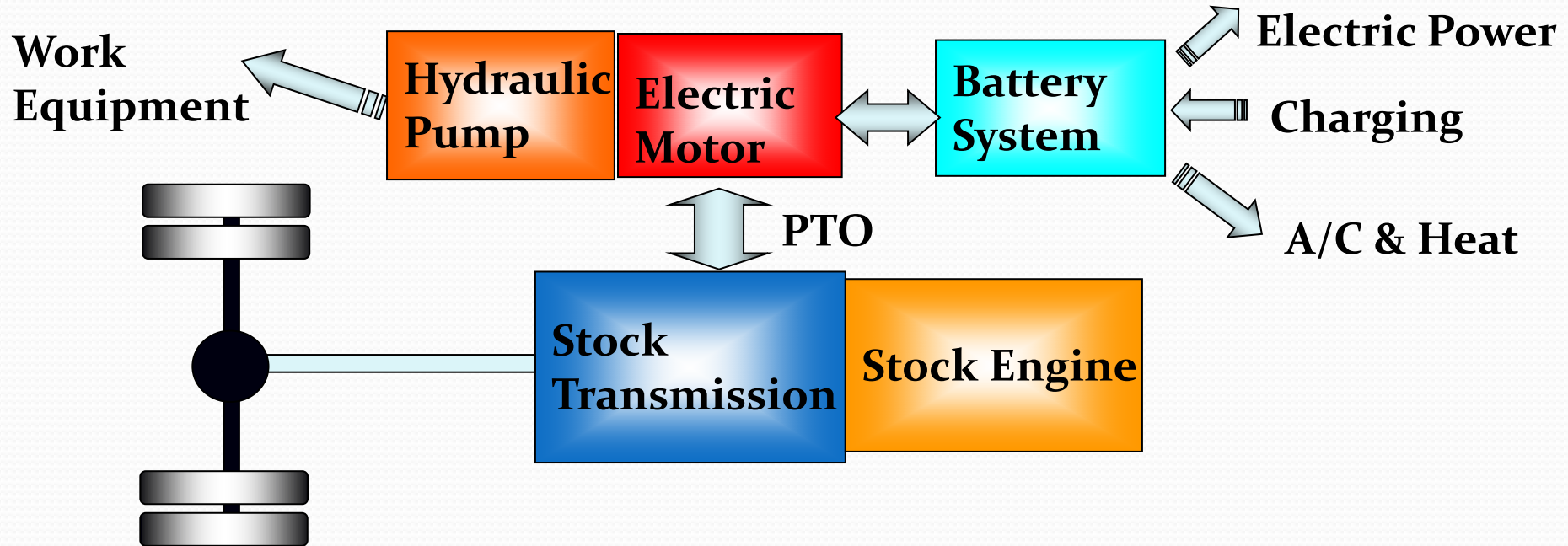


Hybrid Compressor Truck



Hybrid Crane Truck

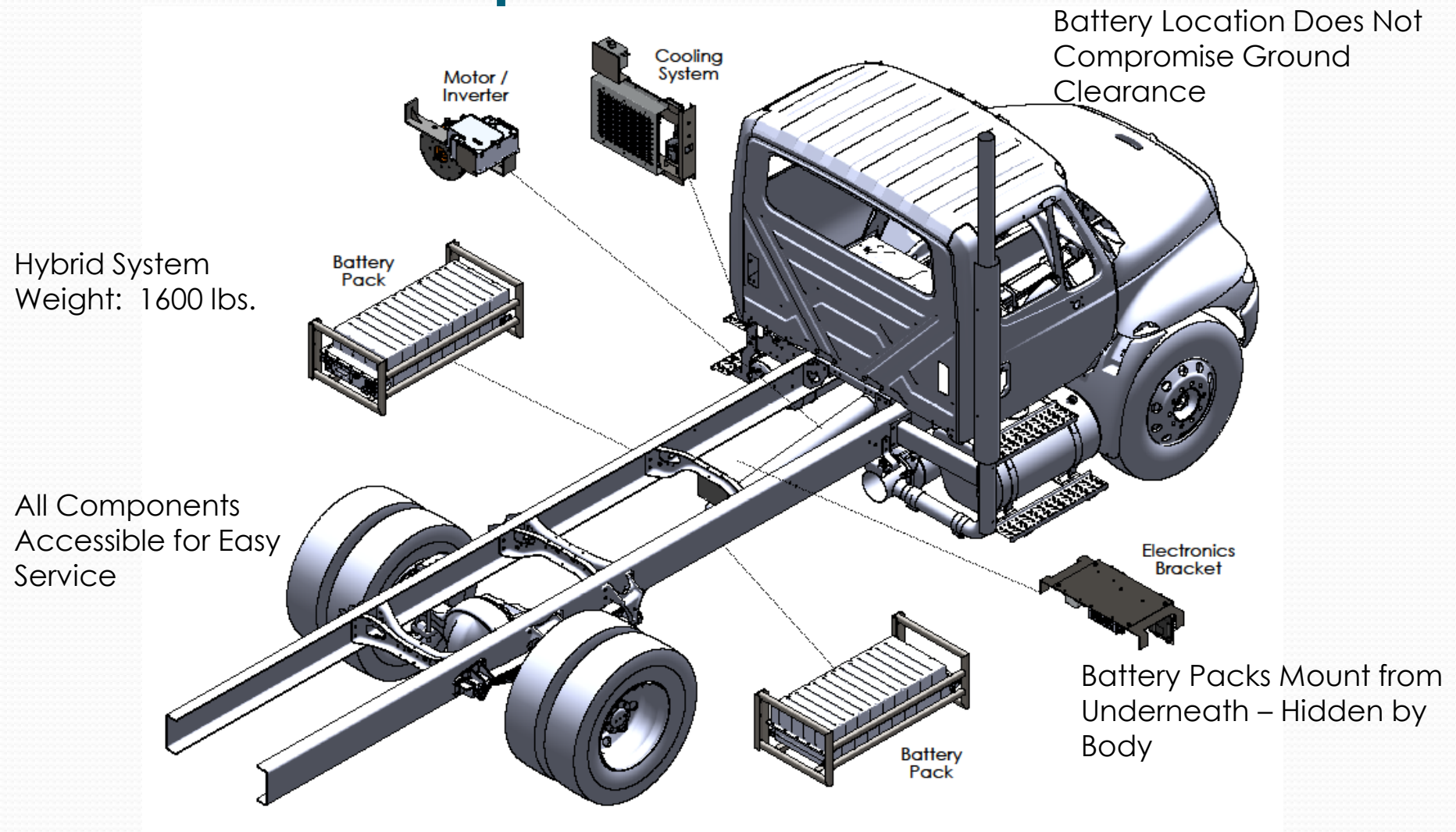
Hybrid Architecture



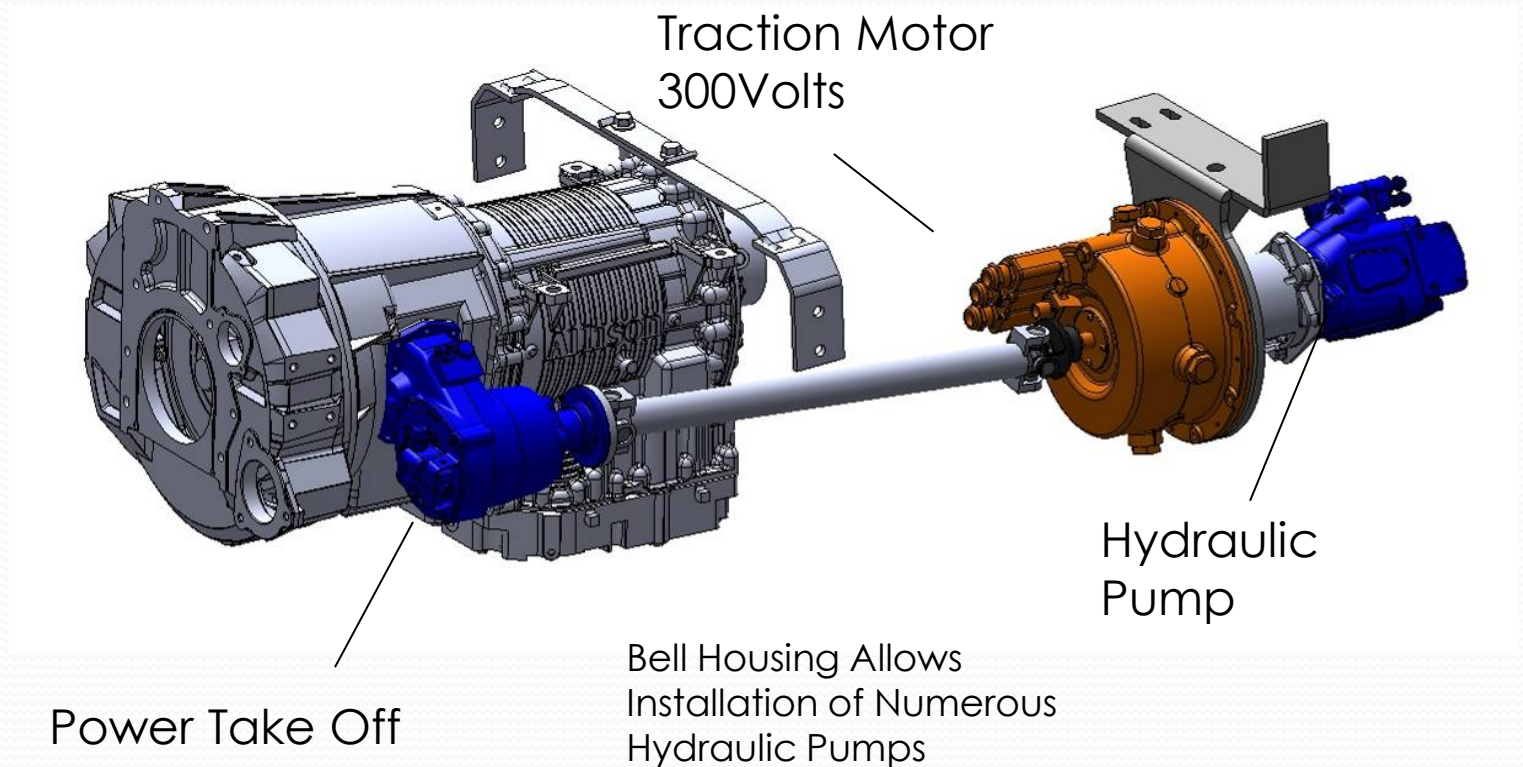
Parallel Hybrid Solution

- ▶ Provides redundant system to operator to minimize downtime.
- ▶ Low validation and capital equipment costs,
- ▶ Ability to retrofit to existing vehicles

Core Components



Minimally Intrusive Design



Ancillary Program Activities

- Charging infrastructure is purchased and installed for each vehicle
- A Smart Charging Module is provided with each vehicle and allows communication with the grid
- A data acquisition system is provided with each vehicle and data is recorded and analyzed for the duration of the demo period
- Emissions testing based on measured use-profiles from the field study

Collaborations/Partnerships

- SCAQMD – Prime Recipient
- California Energy Commission – Funding Partner
- EPRI – Program Management and Fleet Coordinator
- VIA Motors – Hybrid System Developer
- Odyne Systems – Hybrid System Developer
- So Cal Edison – Battery and Vehicle Testing
- JCS – Battery Supplier
- Pathway Technologies – Smart Charging Router
- Electric Utility Industry



Future Work

- Fiscal Year 2013
 - Complete system and calibration validation testing for the VIA Motors and Class 6/7 applications
 - Initiate deployment of VIA Vans and Class 6/7 PHEV's
 - Install cellular based data acquisition systems and set-up download servers to acquire in-use performance data
 - Install Level 2 vehicle charging infrastructure
- After 2013
 - Complete the deployment of VIA trucks, vans and Class 6/7 PHEV's
 - Evaluate and analyze the vehicle operation in the field
 - Conduct laboratory emissions and fuel economy tests
 - Conduct user surveys
 - Identify opportunities for performance optimization
 - Identify opportunities for cost reductions

Project Summary

- The project will:
 - Develop and deploy 3 different work truck PHEV platforms
 - Quantify the attributes of performance attributes for each platform in terms of:
 - Criteria pollutant emissions
 - Greenhouse gas reductions
 - Fossil fuel displacement
 - Operating cost reduction
 - Provide opportunity to further optimize the efficiency of the system based on field data
- The design specifications are complete to enable an EV capable medium-duty PHEV that can operate electrically at a job site and/or drive electrically.
- Fleet participants have been engaged to enable a nationwide demonstration program of ~280 vehicles