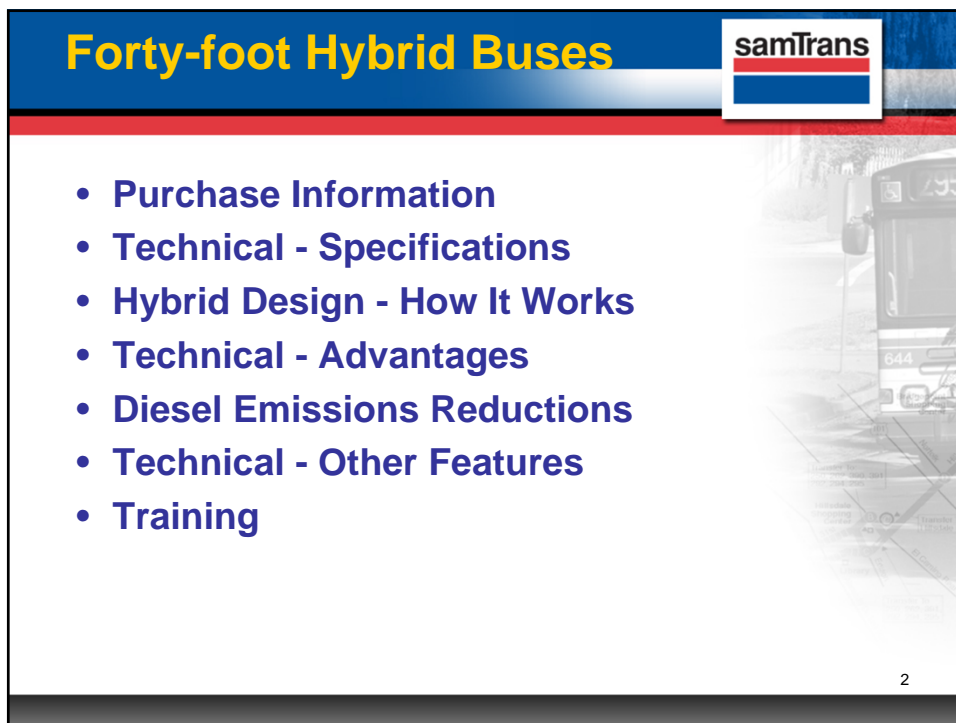



# Performance Report Hybrid Buses

October 2, 2013  
Board of Directors

San Mateo

## Forty-foot Hybrid Buses



- Purchase Information
- Technical - Specifications
- Hybrid Design - How It Works
- Technical - Advantages
- Diesel Emissions Reductions
- Technical - Other Features
- Training

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## Purchase Information

<u>Buses purchased</u>	<u>Total cost</u>	<u>Cost/bus</u>
25 Forty-foot hybrids	\$16,783,850	\$671,354
21 Forty-foot diesel	\$9,377,105	\$446,529
16 Twenty-nine-foot diesel	\$6,657,493	\$416,093

**Hybrid incremental cost funded by FTA  
State of Good Repair grant**

**Delivery – Hybrids & four 29-foot Diesels**


- 4 or 5 buses per week starting mid-October
- Approximately 3 weeks preparation
- Remainder of order mid-2014 delivery

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## Technical: Specifications


**Hybrid Buses:**

- **Body length** 40 feet
- **Body width** 102 inches
- **Body height** 11 feet 6 inches
- **Capacity** 39 seats, 2 wheelchairs



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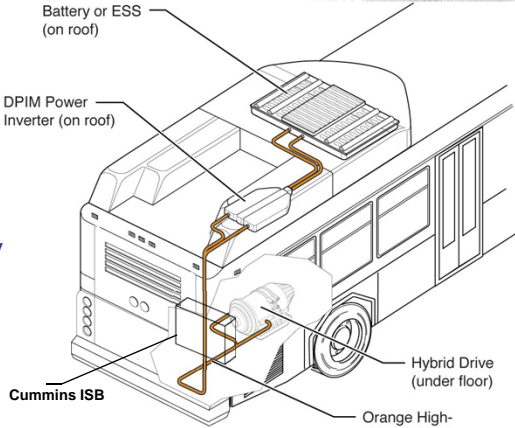
## Hybrid Design – How It Works



### Parallel Hybrid Design


**Major Components:**


- Cummins ISB Engine
- Allison EV40 Drive Unit
- Allison Duel Power Invertor Module Controller
- NiMH Battery Pack - Energy Storage System



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## Hybrid Design



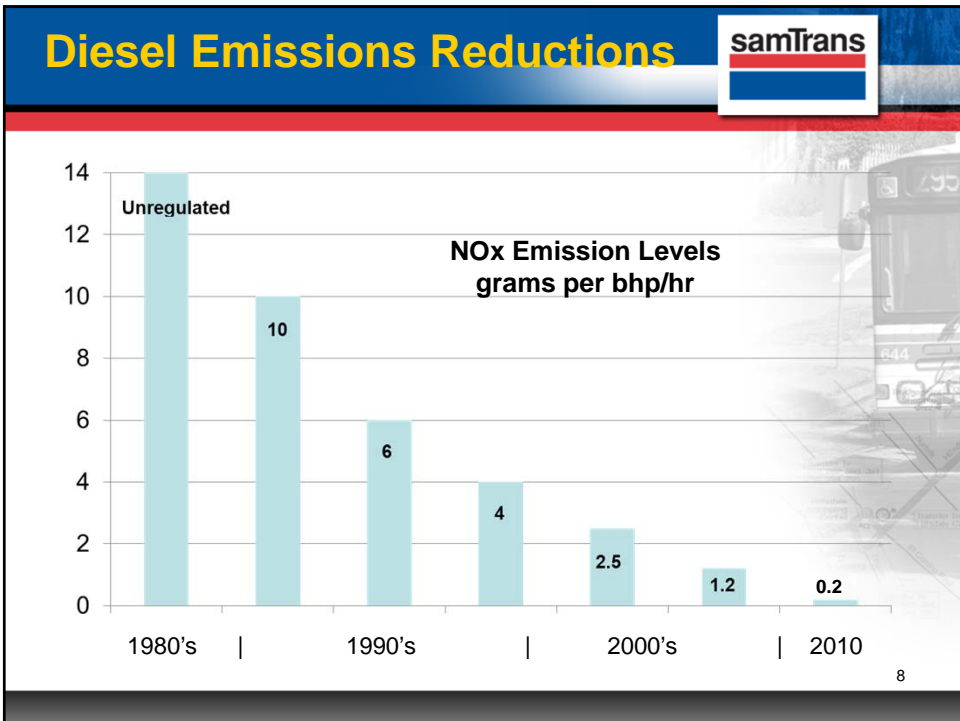


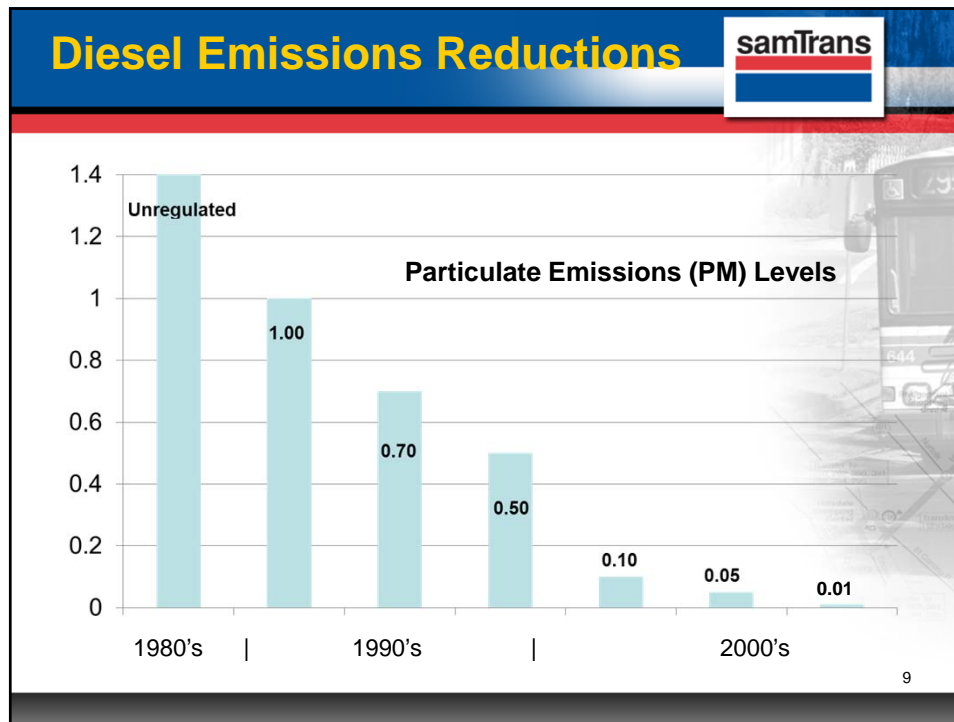
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## Technical - Advantages

- 6.7L - vs - 9.0L Clean Diesel
- Smaller diesel engine – lower emissions
- Emission certification levels same as compressed natural gas (CNG) engines
- Less fuel/lower operating cost
- Significantly quieter operation
- Extended brake life

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## Technical: Other Features

- **EMP Cooling System**
  - Improved cooling
  - Reduces power drain of the engine (less fuel)
  - Greater access to engine and other components
  - Eliminates the possibility of fire from a hydraulic line leak
- **Vanner Beltless Alternator (DC-DC Converter)**
- **UTC Camera System 7 cameras (2 exterior)**
- **Amerex V-25 Automatic Fire Detection & Suppression System**
- **BRT front cap styling**

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## Technical: Other Features



- **LED headlamps**
  - Improved visibility
- **Hanover destination signs**
  - 10-year warranty
  - Integrated login with AVL/farebox system
- **C.L.A.S.S. (Contact Less Acoustic Sensing System) Rear Doors**
- **Driver Console – Enhanced Visual Stop Request**
- **Sure-Lok Dual Auto-Loc™ Wheelchair Restraints**
- **Lift-U Wheelchair ramp (6:1)**
- **Added – 2 vertical stanchions (wheel-well)**
- **Recaro Ergo Metro with LiquiCell padding (Driver Seat)**

## Training



### **Mechanics** (more than 3,700 training hours)

- **Allison Transmission Hybrid Drive Service**
- **Allison Transmission Electric Drive Energy Storage System**
- **Dynex I/O Controls Multiplex Electrical System**
- **Gillig Maintenance Training**
- **Cummins ISB Engine Training**

### **Bus Operators** (approximately 500 training hours)

- **Hybrid Bus Orientation for Bus Operators**



**Let's go see our 1<sup>st</sup>  
Hybrid bus!**

