Agenda

• WestStart-CALSTART Background
• Fuel Economy Drivers, Hybrids and the HTUF Process
• California Policy Innovations
• Summary
Mission Statement

WestStart-CALSTART is a unique non-profit, member-supported organization dedicated to the growth of an advanced transportation technologies industry that will:

• Create high-quality jobs;
• Clean the air;
• Reduce dependence on foreign oil; and
• Prevent global warming
CALSTART: A Strategic Broker for Advanced Transportation

2008
155+ Worldwide Participant Network

4 Offices in US

Four focus areas:
- Efficient vehicles
- New fuels
- Mobility/transit
- Industry support

Regional in Name
National and International in Targeted Areas

CALSTART is WestStart’s California Operating Division
CALSTART Has 155+ Member/Participants (partial list)
Fighting Global Warming

IPCC Climate Change Mitigation Report (May 4):

- More fuel efficient vehicles
- Hybrid vehicles
- Cleaner diesel vehicles
- Biofuels
- Modal shifts to rail and public transport
- Non-motorized vehicles
- Land use and transit planning
High Energy Costs Here to Stay

- $100 bbl oil?
- $4 gal gasoline?
- US EIA forecasts heavy demand will keep imported oil prices on rise until 2014; new supplies after then may ease supply crunch, cause decline in crude costs

Source: TFC Commodity Charts, Brent Crude Oil, ADM Investor Services
Why Hybrids Are Gaining Traction with Fleets

- **Rising fuel costs**: Optimizing urban truck drivelines is becoming critical for fuel efficiency, emissions.
- **Major engine changes** – and increased cost/complexity – coming in 2007-2010 to comply with EPA emissions requirements.
- **Idle Management** is a growing issue nationwide.
- **Productivity/performance** complaints from cleaner engines.
- **“Green Footprint”** – pressures from management to reduce carbon and overall environmental impacts.
- **Trend toward integrated engine/drivelines** in trucks.
- **Increasing electrical power needs** in heavy vehicles and equipment.
Recent Heavy Hybrid News
There is Tremendous Momentum Growing

- Eaton sells 30 hybrid electric buses to China
- Freightliner to produce 1,500 M2 hybrid trucks in next 3 years
- Peterbilt/Eaton to enter production hydraulic refuse truck 2008
- Azure plans production of hybrid shuttles in 2008
- Kenworth and Peterbilt announce production plans for medium hybrid trucks in 2008
- International launches first hybrid production: Fall 2007
- Eaton moves into production of hybrid drive system
- Kenworth announces pre-production delivery hybrid truck
- FedEx/Azure announce partnership on gas-electric hybrids
- Peterbilt testing Class 8 hybrid with Eaton system
- ArvinMeritor signs Wal-Mart agreement for Class 8 hybrids
- Oshkosh unveils hybrid refuse truck at HTUF meeting
- Peterbilt introduces Class 7 hybrid truck for customer trials
- International builds first production-line hybrids in Nov 06
- Freightliner unveils Class 7 utility hybrid on M2 chassis
- Azure/StarTrans agreement on producing hybrid shuttles
- UPS testing advanced series hydraulic hybrid prototype
- Bosch-Rexroth buys Dana hydraulic hybrid drive unit
- Misubishi-Fuso Unveil Hybrid work truck (CI 4-5 delivery)
- ISE builds 50 advanced hybrid buses for Las Vegas
- Volvo announces hybrid heavy trucks for 2009 production
Hybrid Truck Users Forum (HTUF)

- Goal: Speed the development and introduction of commercially viable medium- and heavy-duty hybrid trucks in the U.S.
- User driven process involving more than 80 fleets with > 1 million trucks
- Joint WestStart-U.S. Army program
HTUF Working Groups Today

• 6 Core Working Groups of fleet truck users now operating, plus:
  – 1 WG partnership with NTEA (light truck)
  – 1 new Forum forming (construction equip.)
  – 1 Task Force: Plug-in HE Trucks (PHET)

• Main Working Groups:
  – Utility/Specialty trucks – George Survant, Florida Power & Light, user lead
  – Parcel Delivery trucks – Jerry Swart, FedEx Ground; Robert Hall, UPS – user leads
  – Refuse Truck Working Group – Matt Stewart, City of Chicago Sanitation, user lead
  – Bus Working Group – Tony Bryant, Tri-Met, user lead (launched with support of Federal Transit Administration)
  – Class 8 Working Group – active
  – Incentives Working Group – active
HTUF National Meeting 2007
Hybrid Truck Users Forum - 7th Meeting

- Two and a half day forum at Qwest Field, Seattle
- More than 430 attendees, one quarter fleet users – a new record
- 19 med. and heavy-duty hybrids in ride and drive – a new industry record
- All major trucks makers and suppliers involved in process
Key Findings at HTUF 2007

- HTUF process has taken 1-2 years off the development cycle of med and heavy-duty hybrids – *Paul Skalny, Director, Army’s National Automotive Center*

- Hybrid trucks now at cusp of first production
  - International launching first production of medium duty hybrids Fall 2007
  - Peterbilt and Kenworth start production of medium duty hybrids in 2008
  - Peterbilt begins production of refuse truck hybrid in 2008, and Class 8 big-rig hybrid in 2009
  - Mack/Volvo to start hybrid truck production in 2009

- Class 8 hybrids are a key new capability emerging in more-efficient trucks – could impact biggest fuel users on road

- Better purchase incentives are needed to help fleets adopt technology sooner

- Need to speed pre-production trucks and equipment in additional applications (including small bus and Class 8)

- New technology needed: energy storage; more efficient components; light-weight materials; power generation; optimized engines
Timeline to Commercialization:
Hybrid Tech Now Starting in Trucks

Development
Test prototypes and systems

Pre-Production
Field pilot assessments (10-50 vehicles)

Production Intent
Assembly line builds up to 100+

Early Production
Initial commercial volumes – still high incremental cost

TOOLS:
- R&D Support
- Pre-Production Deployment Support (HTUF)
- Purchase Incentives

Trucks are not Priuses!
Tech introduction 10 years behind cars
BUT: big fuel impact per truck
Class 6/7 Deployment Data to Date

- All 24 trucks delivered – 12 months of service on first trucks
- 391 total truck months of service through Aug 07; 409,352 miles
- Availability of trucks high: 99+% overall daily availability of hybrid systems
- Strong user acceptance and trucks meeting mission needs

Fuel economy varies by fleet and use
- 54% fuel economy gain for highest fleet
- 14% fuel economy gain for lowest fleet
- Biggest variables: mileage driven versus work site “boom” time (more work site time equals better mpg)
Overall Fuel Consumption Improvements

- Overall savings as high as 54%
- Total Gallons over Total Operation hours, capturing engine ON and OFF operation
- Dependant on duty cycle!

Decrease 2.1 to 1.4 gal/h totals fuel saving from 14.7 - 9.8 gallons, or 34%
Lab Testing savings from 12.5 – 7.5 gallons, or 40%
Class 8 Hybrids – New Possibility

• Peterbilt is now testing this hybrid prototype of its heavy-duty Model 386 tractor
• Example of the new capabilities and markets emerging for hybrid technology
• Port yard hostler hybrids to be developed in WestStart project with Ports of Long Beach and LA
• Vehicles common at port, rail and distribution centers
HTUF: “Expanding the Funnel”
From Hybrids to More Efficient Trucks

- Deployment, Testing & Production Ramp-up
- Early Production: 500+ Truck Deploy Launches Commercial Phase
- Testing Evaluation Validation

First Commercial Volumes
Technology Enhancement

Outcomes:
- 4+ hybrid system suppliers each at min. 2500 system/year volumes
- 6 truck/ chassis OEMs active Industry volume 20k hybrids/year
- 40-50% fuel use reductions per vehicle
- Increased capabilities of silent watch, power gen

- Power generation
- Energy storage
- Light-weight materials
- Optimized engines
- More-efficient components
- Plug in modes

- Biofuel hybrids
- GTL/BTL Synthetics
- Increased Truck Volume Refuse Hybrid Segment
- Increased Truck Volume Shuttle Hybrid Segment
- Increased Truck Volume Delivery Hybrid Segments
- Class 8 OTR and Drayage Hybrid
- Increased Truck Volume Utility 5-7 Hybrid Segment
- Increased Truck Volume Industrial Hybrid Segment

Capabilities Enhancement
The New “Strike Zone” in Transportation

Balances all three competing needs

Air Quality

Integrated Solutions Needed

Energy Security

Climate Change
Moyer Program

• Moyer program has proven to be highly successful way to reduce smog forming emissions
• However, Moyer only focuses on reduction of smog forming emissions from heavy-duty vehicle sector
  – NOx and Particulate Matter reductions only considerations
  – No credit for greenhouse gas reduction or reducing dependence on oil
  – Most $ used to replace old diesel engines with new ones
  – $140 million/year indefinitely
  – Funded from vehicle registration fees
• Funds administered by regional air quality agencies in state
Governor’s Greenhouse Gas (GHG) Reductions Put into Law in 2006

AB 32: Global Warming Solutions Act

- By 2010 reduce GHG emissions to 2000 levels
- By 2020 reduce GHG emissions to 1990 levels
- By 2050 reduce GHG emissions 80% below 2000 levels

- Transportation is responsible for >60% of CA’s CO2 emissions
- CA is the 12th largest emitter of GHG emissions in the world
Defining The Target:
CalSTEP Goals = AB 2076 Goals

- In 2003 California used 18.1 billion GGE of on-road gasoline and diesel
- Target is a 15% reduction from 2003 demand to 15.4 billion GGE per year by 2020
- Projected business-as-usual demand in 2025 is 23.8 billion GGE
- Required reduction from business-as-usual case to meet target would be 8.4 billion GGE

AB 2076 Report Goals:
15% less oil consumed and 20% alternative fuels in 2020
• CALSTART publishes major independent plan for transportation energy security: CalSTEP Action Report
• 10-point action plan for reducing oil use, increasing fuel diversity, cutting GHG emissions
• 18-months of review, analysis and consensus from auto, transit, tech and policy leaders
• Outlined steps to improve vehicle efficiency, increase fuel choice and lower vehicle miles traveled (VMT)
Two CalSTEP Policies Sponsored by CALSTART Become Law 2007

- **AB 118 (Núñez)** Would create new annual $120 million transportation program in California
- Funding targeted at measures that would improve air quality, reduce greenhouse gases, and oil dependence
- Support both research, development, and demonstration of new technologies advanced vehicle incentives, and deployment (incentives) for low carbon fuels and advanced vehicles
- Additional $80 million for measures to solely improve air quality from transportation
- **AB 236 (Lieu)** Establishes petroleum reduction goals for State of California’s own fleet
AB118 Language

Alternative and Renewable Fuel and Vehicle Technology Program

• Appropriates $120M/year for seven and a half years
• Authorizes CEC to use this appropriation to provide “grants, loans, loan guarantees, revolving loans or other appropriate measures to public agencies, businesses and projects, public-private partnerships, vehicle and technology consortia, workforce collaboratives, fleets owners, consumer, recreational boaters, and academic institutions to develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies."
• “The emphasis of the program shall be to develop and deploy technology and alternative and renewable fuels in the marketplace, without adopting any one preferred fuel or technology.”
Feedback from Legislature & Governor’s Office on AB 118

Clear preference for deployment over research, development, and demonstration

But not all or nothing

No fixed percentages

Designed to give California Energy Commission flexibility to recognize changing needs of market from year-to-year
Potential Deployment Funding Categories

Key Need & Opportunity Areas

- Low carbon fuel infrastructure
- Medium- and Heavy-Duty Vehicles
- Non-Road Vehicles (i.e. construction equipment)
- Significantly more efficient passenger cars (beyond today’s best hybrids)
- Low carbon fuel passenger cars
- Near-shore marine vessels (i.e. tugboats and ferries)
- New vehicles and retrofit systems & technologies
Venture investments in Clean tech $3B in 2006
4% of this in transportation
4% of $3B = $120 million (same level as AB 118)
Summary

• Build Market “Pull” as well as Push
  – HTUF model shows value of users sending market signals to manufacturers of what they want

• Focus on Larger Policies Drivers That can Address Multiple Issues
  – Climate change, emissions reduction, fuel economy

• Reduce Risks with “Carrots” to go with Regulatory “Sticks”
  – Builds partnerships with industry
  – Sends investment signal to go with policy signal
Clean Transportation Solutions™

Advanced Transportation Technologies™

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Primary Actions

**FUEL DIVERSITY:**
Alternative Fuels Portfolio Standard
- 10 percent by 2012 and at least 20 percent by 2020
- Codifies Governor’s stated goal; Parallel AB 32 strategy

**EFFICIENT VEHICLES:**
‘Energy Security Tax Relief and Realignment’
- A ‘Foreign Oil Security’ price floor coupled w/tax relief for all Californians of driving age

**REDUCE NEED TO DRIVE:**
‘Smart Communities’ Program
- Upgrade transportation models
- New state transportation funding to local governments who reduce driving by 10% over ~25 years
Supporting Actions

CalSTEP Recommendations

FUEL DIVERSITY:
• California Alternative Fuels Infrastructure Partnership
• California Renewable Fuel Production Initiative

EFFICIENT VEHICLES:
• State Fleet Leadership Challenge
• “New Transportation Future” Investment and Revolving Loan Programs
• ‘Energy Independent Vehicle’ Labeling Program

REDUCE NEED TO DRIVE:
• Revolving Loan Program for Neighborhood-scale Planning
• Facilitate Usage-based “Pay-as-you-drive” Insurance