

## The Future of U. S. Electric Hybrids

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## The Future of U.S. Electric Hybrids



- What is Driving the Publicity?
- What is the Real Objective?
- What are the Opportunities for Hybrids?
- What are the Advantages and Disadvantages of the Technology?
- What are the Alternatives?
- What does the Future Hold?

## What are the Goals of Hybridization?



- Enhanced Vehicle Performance
- Reduced Fuel Consumption

# What are the Environmental Benefits/Constraints



- Reducing consumption and CO<sub>2</sub> emissions
  - Hybrids are one alternative, but must be measured on a mission-specific basis
  - Fuel Consumption is regulated by the Motor
     Vehicle Cost and Information Act of 1972
  - The fleet average allows variation above and below the average

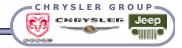
# What are the Environmental Benefits/Constraints



### Reducing criteria pollutants

- Hybrids will not reduce emissions of HC, CO and NOx in the real world
- Criteria pollutants are regulated under the Clean Air Act
- Emissions are averaged over a cycle. If hybridization reduces emissions, e.g. during engine off, emissions may increase during other parts of the cycle, as long as the certification target is met
- All vehicles certified to a certain standard will meet that standard, without regard to engine size

# What are the Environmental Benefits/Constraints



 Fuel Consumption and Criteria Pollutant Emissions are Independently Regulated under different Laws

## Hybrid Advantages and Disadvantages

#### Advantages

- Opportunity to downsize the ICE engine
- Potential to improve performance/AWD capability
- Potential for all-electric low speed operation
- Reduction in consumption & CO2 proportional to ICE downsize and/or all-electric range
- Allows IC engine to operate in a narrower, more optimum speed/load range

#### Disadvantages

- System cost and weight
- Vehicle utility constraints
- Replacement battery pack costs
- Fuel Economy Benefits are Mission-specific

## What is "Mission-Specific" Fuel Economy?

- The fuel economy benefit of hybrids is most pronounced in cyclic driving, such as urban stopand-go driving
- Hybrids do not offer cost effective fuel economy benefits in highway driving, or in conditions requiring high power (trailer towing)
- Diesels offer "Mission-neutral" fuel economy benefits, both in urban and cross country trailertowing cycles.
- An optimum solution to the fuel economy question will likely include a variety of technologies.

#### What are the Alternatives



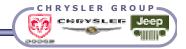
- Depending on stated goals and objectives, several alternatives to Hybrids are available
  - Diesels consume less fuel than hybrids
  - E-85 flexible-fuel vehicles have the potential to displace more inexpensive imported oil than hybrids
  - CNG vehicles produce less ozone-forming emissions than hybrids, and North American supplies of NG are plentiful

#### What does the Future Hold



- Fierce competition in the marketplace
- Continued desire for affordable vehicles that meet customer safety, utility, performance and fuel economy needs
- No single technology is likely to prevail in the near to mid-term
- A portfolio of advanced technologies offering environmental benefits that customers can choose from and are willing to pay for to meet individual needs is the best offense

## DaimlerChrysler HEV's

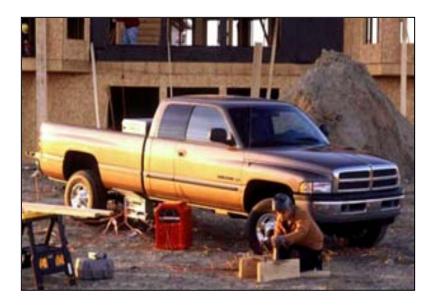


### Dodge Ram Contractor Special

- Integrated starter-generator hybrid powertrain
- Achieves up to 10% better fuel efficiency
- Converts to a clean electric generator when parked

A complete work-site or household can be powered

from the electric outlet box







## DaimlerChrysler HEV's





# Dodge Ram COMBATT HEV (Based on Dodge Ram HEV)



- Specially developed for military and non-military national defense programs
- On-board electric power generation
- State-of-the-art severe off-road suspension system
- 7% fuel economy improvement
- Meets DoD's "Single Battlefield Fuel" strategy

# DaimlerChrysler Advanced Diesel



## Jeep Liberty



## DaimlerChrysler Flexible-Fuel Vehicle

### Chrysler Voyager FFV



# DaimlerChrysler Compressed Natural Gas

## Dodge B2500 CNG Van

