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**OVERVIEW OF DOE ALTERNATIVE FUELS  
UTILIZATION PROGRAM (AFUP)**

Presented by

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October 28, 1986

at the  
DOE Automotive Technology Development  
Contractors Coordination Meeting

**MASTER**

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## AFUP Comprises Two Principal Activities

### Alternative Fuels Utilization R&D

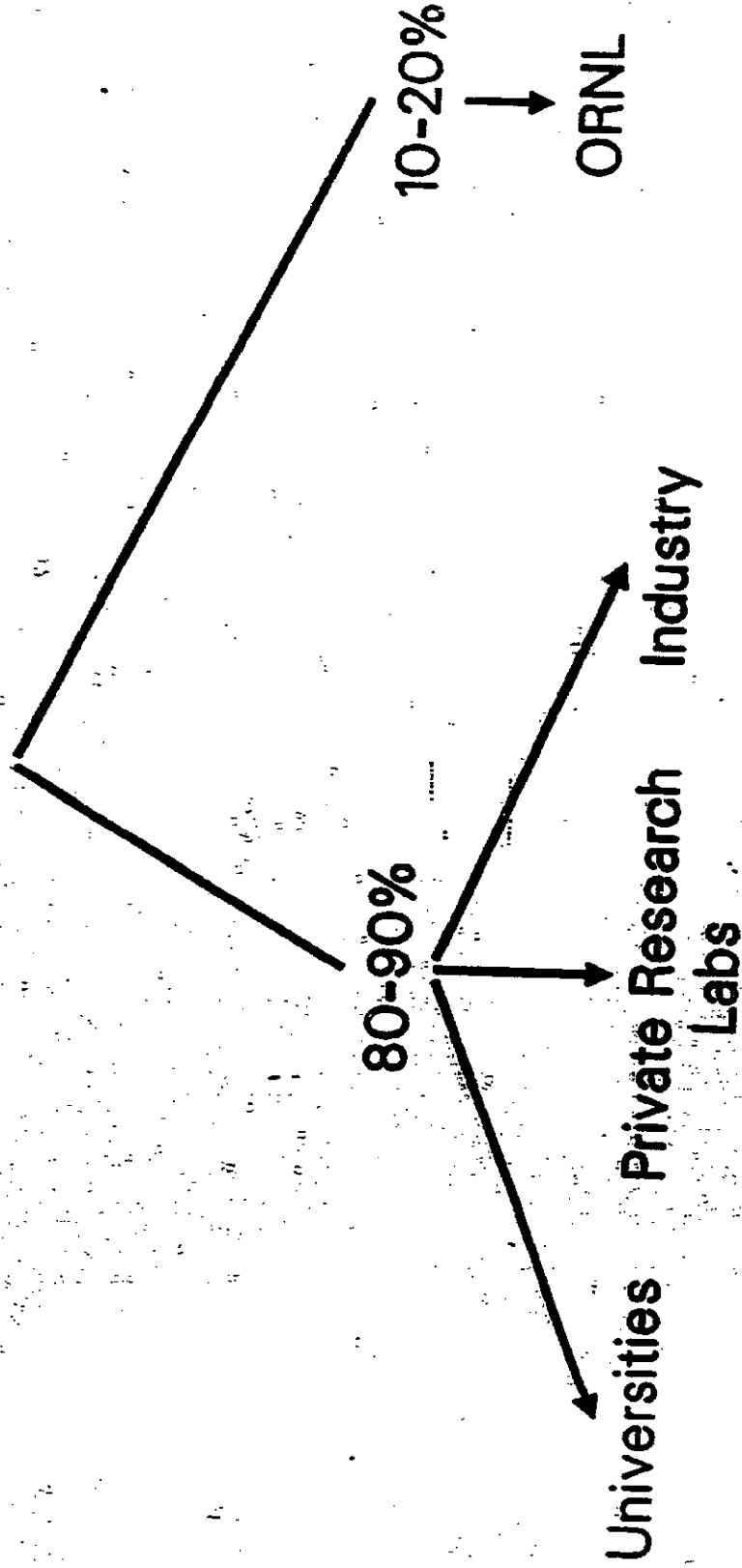
- Applied R&D
- Long range
- History traceable  
back through ERDA  
& EPA

### Federal Methanol Fleet

- Initiated by Congress,  
FY 1985 start
- Logistical, operational  
project, few R&D  
aspects

# AFUP R&D Is Conducted Largely Through Subcontracts With In-House Work As Well

R&D Funds  
\$1.0-1.2 million



## Why R&D on Fuel Utilization?

- Synfuels
  - Mismatch between engine requirements and properties of economical fuel
- Alcohols
  - Engine technology inadequate beyond using low-level blends
- Gaseous Fuels
  - Storage & handling
- Vegetable Oils
  - Engine technology, processing requirements uncertain

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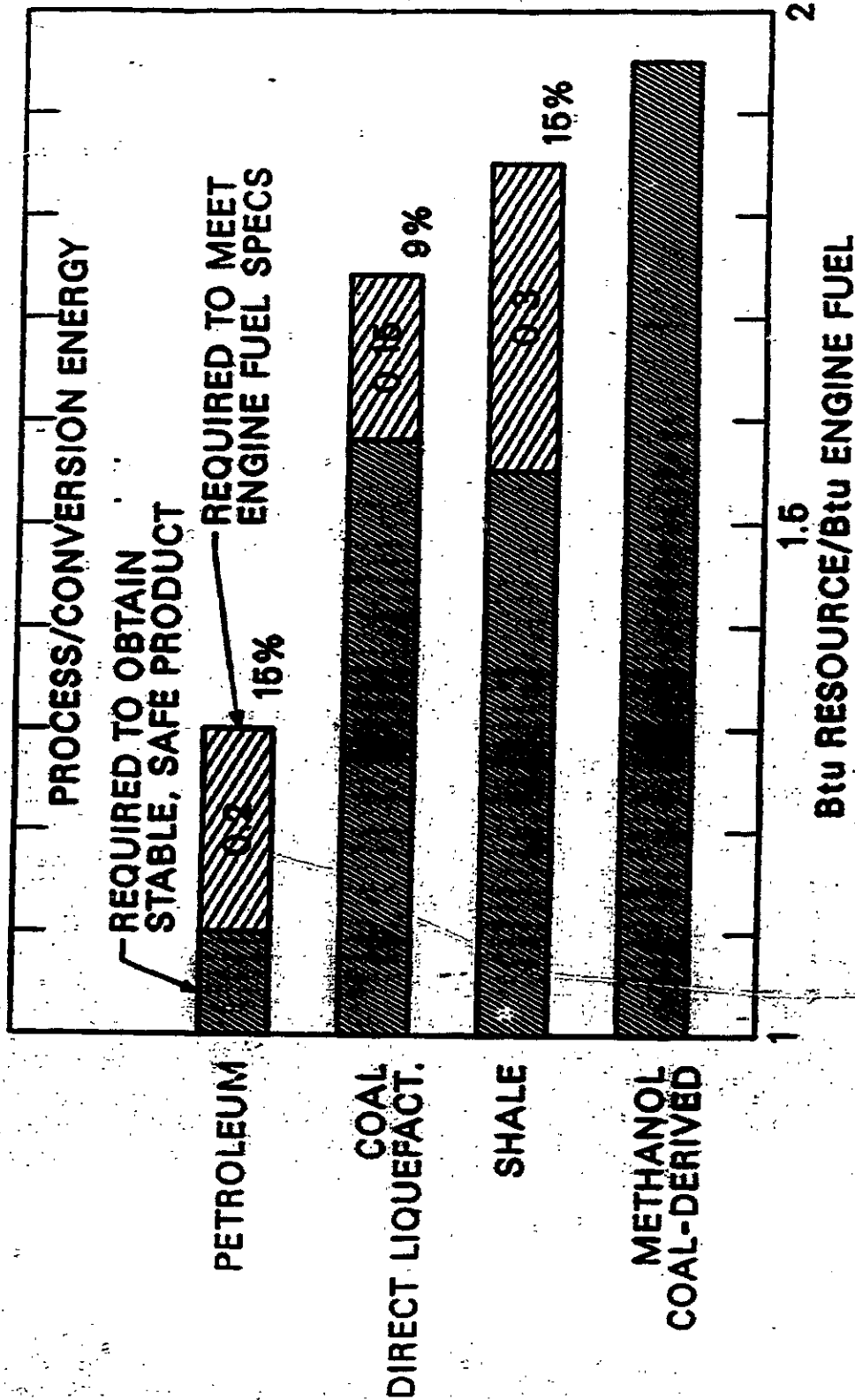


## **A Major Objective For New Hydrocarbons And Synthetic Fuels**

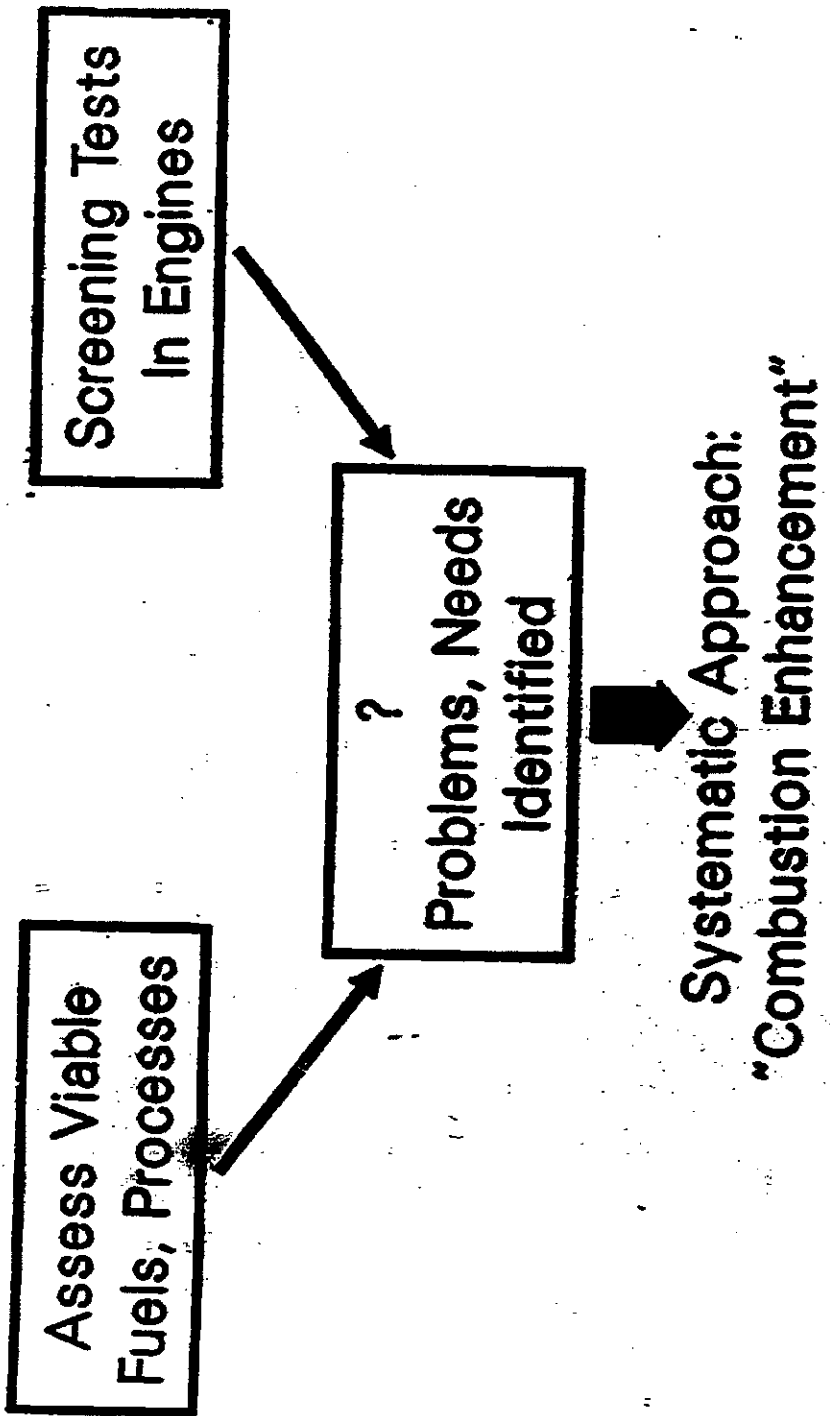
Resolve combustion and emissions problems with utilization of minimally processed (less expensive) synthetic fuels

- **Maintain end-use efficiency for better resource utilization**
- **Maintain acceptable emissions**
- **Maintain Durability**

# SIGNIFICANT RESOURCE CONSERVATION POTENTIAL WITH ENGINES COMPATIBLE WITH RELAXED FUEL SPECS

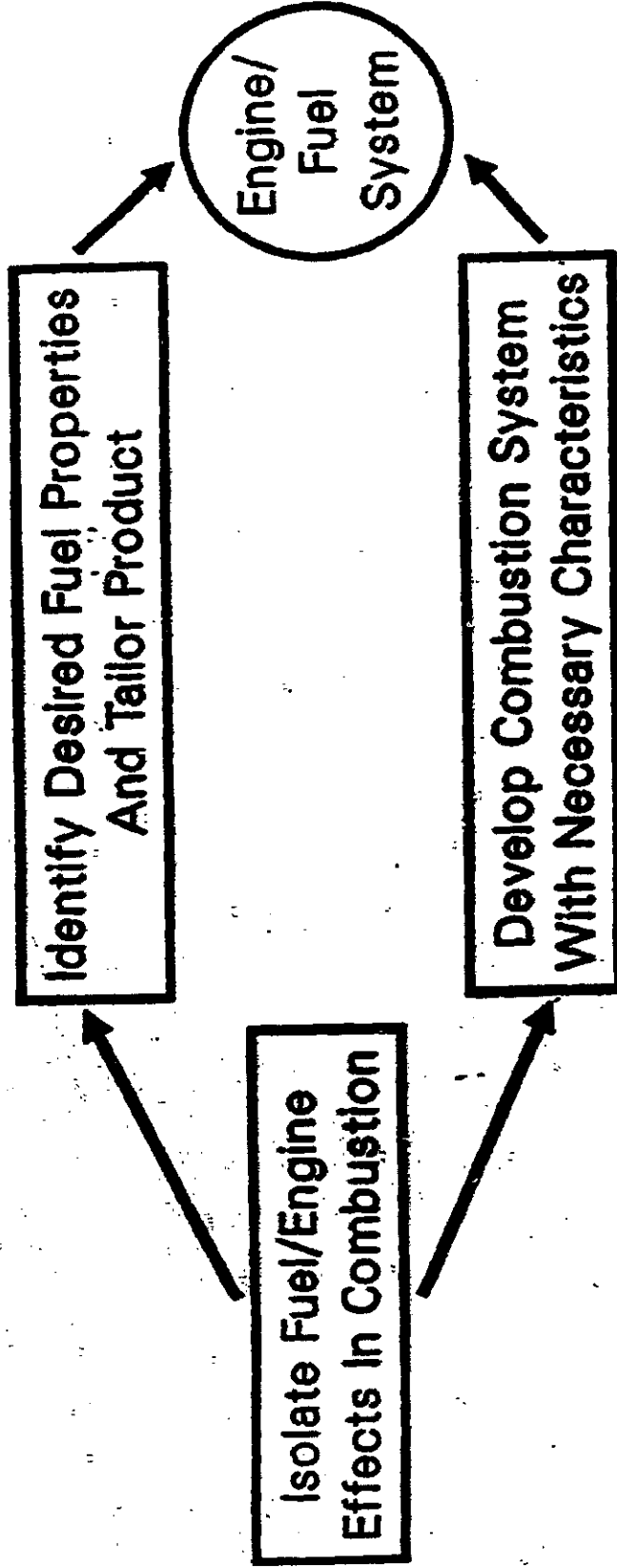


# Identify Optimal System Of Fuel And Engine Technologies - Systematic Approach Needed





# Most Pressing Needs in New Hydrocarbons/Synfuels Grouped Under "Combustion Enhancement"



Petroleum Fuel  
Applications

## Efforts In Progress In This Approach

### Screening

- Synthetic gasoline tests - Southern Illinois University
- Synthetic gasoline tests - University of Miami
- Effect of practical engine modifications for low cetane fuel tolerance - SwRI
- Synthetic diesel fuel tests - Penn State

### Combustion Enhancement

- Effect of gasoline chemistry on NO<sub>x</sub> emissions - University of Tennessee
- Diesel fuel chemistry, volatility effects - University of Wisconsin
- Fuel droplet size, chemistry effects - Purdue University

## **For Alcohol Fuels A Few Technical Issues Remain**

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- **Cold-starting (Ford)**
- **Materials compatibility and wear  
(Southwest Research)**
- **Aldehyde emissions (U. Wisconsin)**
- **Optimized engine (ORNL, other)**

## **Issues And Barriers With Gaseous Fuels Pertain Mostly To Storage, Special Applications**

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- Investigation of potential for corrosion of compressed gas containers
- Investigation of liquefied natural gas as rail diesel fuel (storage not a dominant problem)

## **Future Activities - Research And Development**

### **New Hydrocarbon and Synthetic Fuels**

- Continue providing test fuels from synthetic fuel center
- Continue fuel property/engine compatibility experiments
- Consider new synthetic fuels processes as they appear

### **Oxygenates (Alcohols)**

- Complete cold-start work
- Investigate methanol in advanced engine

### **Other - Combustion Enhancement**

- A recurring topic needing attention that cuts across all fuel disciplines
- Applied combustion data base from decades of petroleum experience is not adequate for synfuels and of some doubt with conventional fuels

***federal***

***methanol***

***fleet***

**Objective Of The Project:**

Introduce methanol-fueled vehicles into the federal fleet in a manner common to, and consistent with, the present use of gasoline-fueled vehicles

## **Congressional Guidelines:**

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- **Demonstrate methanol vehicle performance**
- **Evaluate cold-weather operation**
- **Assess fuel economy, safety, and emissions**
- **Compare operation and maintenance costs with gasoline cars**

**Project Approach:  
A Two-Phase Approach Designed to  
Learn Before Implementing On A Large Scale**

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- **First Phase**
  - Limited quantities of "State-of-the-Art" preproduction. methanol vehicles using proven conversion technology
  - Operate with analogous gasoline (control) vehicles in parallel assignments
  - Gain familiarity, establish logistics, and provide data for Phase II
- **Second Phase**
  - Using knowledge and experience gained from Phase I, acquire and integrate 1000 production (OEM) vehicles into the federal fleet



## **Status Of Phase I:**

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- **Two fleets are running including the required cold-weather fleet**
- **A third fleet will be operational soon**

## **Fleet At Lawrence Berkeley Laboratory Has Been Operating Since November, 1985**

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- Ten 1984 Citations; five methanol and five gasoline
- Conversion to methanol made by Bank of America
- Fuel can be obtained from Bank of America, California Energy Commission, or from fueling station at LBL

# Lawrence Berkeley Laboratory Fleet Operating Data Summary

November 1, 1985 To September 15, 1986

	<u>TOTAL NUMBER OF TRIPS</u>	<u>TOTAL KILOMETERS</u>	<u>AVERAGE km/TRIP</u>	<u>AVERAGE FUEL CONSUMPTION (L/100 km)</u>
Five Methanol Vehicles	864	49,150	56.9	20.7
Five Gasoline Vehicles	1,171	101,440	86.6	9.8

## **Cold-Weather Fleet Began Operation At Argonne National Laboratory In August:**

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- Fleet consists of:
- Ten Chevrolet S-10 pickups (five methanol and five gasoline)
- Nine Ford Crown Victorias for security forces (five methanol and four gasoline)
- Vehicles have been specially prepared for cold-weather starting

**Arrangements Have Been Finalized  
For A Fleet At Oak Ridge National Laboratory:**

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- Fleet will consist of ten 1987 Buick Regals  
(five methanol and five gasoline)
- Not a cold-weather fleet

## **Plans For Future:**

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- **Operate each of the three fleets, collect, and analyze data for a period of at least two years**
- **Operate a flexible-fuel vehicle in the Washington, DC area for project exposure and evaluation**
- **Await further guidance and/or funding from Congress**

## **Overview Summary:**

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- **Intent of project is federal stimulation of market**
- **Focus is to gain broad acceptance of methanol as a petroleum substitute to the point where purchase/use activities are routine**
- **Project is an operational, not technical or research, exercise**
- **Data will clarify perceptions**