

# ***Ammonia As A Motor Vehicle Fuel in California***

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**Air Resources Board**

# Potential Benefits of Ammonia

- ✦ An alternative fuel
- ✦ Combustion products are water and nitrogen
- ✦ No greenhouse gases when combusted
- ✦ Possible use as a source of hydrogen in fuel cells

# California Perspective

- ✦ ARB maintains neutral position on motor vehicle fuels
- ✦ All motor vehicle fuels are treated equally
- ✦ All motor vehicle fuels must be consistent with ARB's air quality objectives

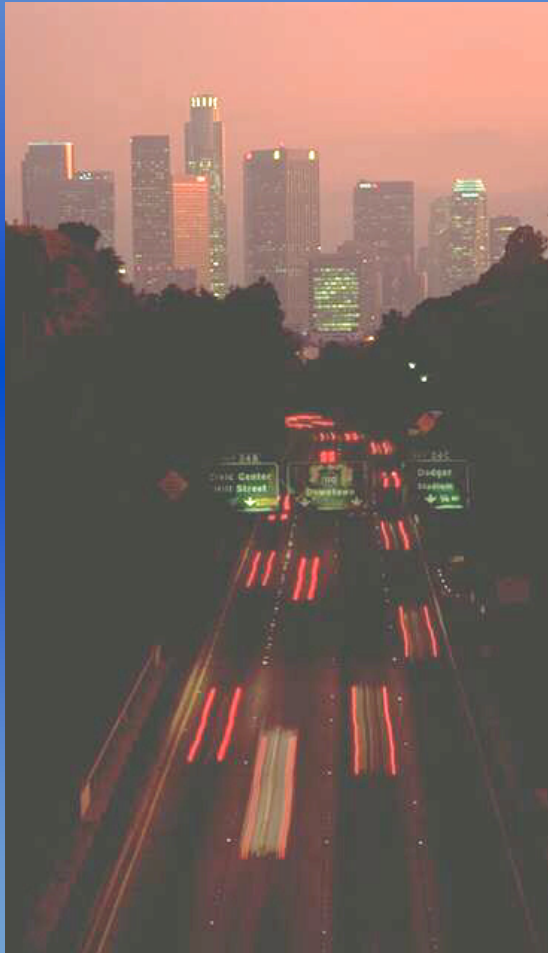
# Regulatory Concerns

- ✦ Full greenhouse gas lifecycle evaluation
- ✦ Full multimedia evaluation to assess impacts
- ✦ Compatibility with fuel system and engine components
- ✦ Engine performance and durability
- ✦ Fuel specifications to ensure quality and emissions benefits
- ✦ Certification of engines using ammonia

# Market Concerns

- ✦ Acceptance by motor vehicle and engine manufacturers
- ✦ Cost competitive with conventional fuels
- ✦ Develop storage and distribution infrastructure
- ✦ Public education

# Greenhouse Gas Fuel Standard



- ✦ A statewide goal to reduce the *carbon intensity* of California's transportation fuels by at least 10 percent by 2020
- ✦ Goal will be accomplished by establishing a **Low Carbon Fuel Standard** ("LCFS") for transportation fuels sold in California.

# Rationale for LCFS

- ✦ Required to meet the GHG reduction goals of AB 32
- ✦ Executive Order S-01-07 directed ARB to determine if a LCFS can be adopted as a discrete early action measure
- ✦ June 21, 2007 hearing, the Board approved the LCFS to be one of the discrete early actions measures

# LCFS Development Process

- ✦ Public workshops
  - Workshop meetings every 4-6 weeks
- ✦ Working groups
  - 4 working groups to concentrate on specific areas of the LCFS
  - Meet between workshops
  - Present information for workshops



# LCFS Workgroups

- ✦ Lifecycle
- ✦ Compliance and Enforcement
- ✦ Policy and Regulatory Development
- ✦ Environmental and Economic

# LCFS Schedule

**2007**

University of California completes LCFS study with CEC & ARB

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**2007-  
2008**

Conduct LCFS workshops

**Early  
2008**

Initiate draft regulatory language

**Fall  
2008**

Regulatory package completed

**End of  
2008**

LCFS regulation submitted to the Board for consideration

**2009**

Regulation submitted to Office of Administrative Law

**2010-  
2020**

Implementation

# LCFS Early Action Strategies

## ✦ Biomass Derived Diesel Fuel

- Biodiesel (ester-based)
- Renewable Diesel (ASTM D-975 Compliant )

## ✦ Ethanol

- E-10
- E-85

## ✦ ARB propose specifications in 2008

# Multimedia Evaluation

- ✦ Health and Safety Code Section 43830.8 requires a multimedia evaluation for any ARB regulation that establishes a specification for a motor vehicle fuel
- ✦ External scientific peer review
- ✦ Must be approved by the California Environmental Policy Council

# Questions