

Biofuels: Permitting Process, Air Quality Aspects, and Policy Issues

Permitting Process

California Environmental Quality Act

- Requires state and local agencies to
 - Identify significant environmental impacts
 - Avoid or mitigate those impacts
- Addresses Potential Impacts from
 - Construction
 - Installation
 - Operation

Key steps for CEQA process

- Public agency evaluates project to determine possibility of significant environmental effect
- Determination of lead agency
- Lead agency prepares Initial Study
- Lead agency prepares Environmental Impact Report or Negative Declaration
- Decision on project

Potential Roles of Air Districts

- Lead agency
 - Notice of Preparation
 - Initial Study
 - Environmental Impact Reports
- Cooperating agency or Responsible Agency
 - Ongoing technical support to lead agency
- Issue Air Permits

California Air Permit Requirements

- New Source Review (NSR)
 - Govern building and expansion of stationary sources
 - Purpose
 - To provide a regulatory mechanism to allow continued industrial growth in nonattainment areas
 - Minimize the amount of emission increase from this growth
 - Keep emission levels from the permitting of sources at a constant level- no increases in emissions

NSR requirements

- Best Available Control Technology (BACT) required if emissions are above the specified levels
- Project's emission levels compared to the district's offset threshold
- Offsets required to mitigate any emission increases remaining after BACT has been applied

Other potential issues

- Odor
- Toxics
 - Hydrogen Sulfide
- Water Permits
 - Discharge
- Cal OSHA
 - e.g. exposure to toxics

Air Quality Aspects of Biofuels

Ethanol Background

- Today virtually all CaRFG3 is blended with 5.7% vol. ethanol
- Source: presently corn; future cellulosic waste
- Mostly imported from Midwest

Emissions Benefits and Issues of Ethanol

- Potential to reduce GHG
- Reduces exhaust Carbon Monoxide (CO) and Hydrocarbons emissions
- Increased permeation emissions
- Oxides of Nitrogen issue

Ethanol GHG Emissions

- Estimated emissions: going from 5.7% to 10% corn-based ethanol gasoline, about 1.2% GHG reduction—
- GHG Reductions per vehicle mile, going from 0% to 10% ethanol is:*
 - Corn-ethanol: 2%
 - Cellulosic ethanol: 6-9% C

*Argonne National Laboratory, 1999

Estimated Permeation Emissions*

- On road-45 tons/day
- Small off road engines-10 tons/day
- Portable fuel containers-5 tons/day

*Estimated emissions for average ozone day

Biodiesel Background

- Definition: Methyl ester of fatty acids from animal fats, plant oils, and recycled grease

Emissions Benefits and Issues of Biodiesel

- GHG reductions
- Generally lower tailpipe emissions
- NO_x increase with biodiesel
- Engine manufacturers concern on blends >B20
- Fuel specifications needed to address
 - B100
 - Oxidative and thermal stability

Biodiesel GHG

- Tailpipe emissions of CO₂ similar to Diesel
- Lifecycle CO₂ emissions lower than diesel.
 - 78% CO₂ reduction based on life-cycle (Well-to-Wheel)*
- Dependent on many factors, energy to make biodiesel, fertilizers, etc

*Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus

Biodiesel Impact on Exhaust Emissions*

- Tailpipe emissions of PM, CO, THC are lower than conventional diesel fuel, NO_x emissions can be higher
 - B20 reduces PM (10%), HC (21%), CO (11%)
 - B20 increases NO_x (2%)
- Toxic Emissions-as a whole toxics are lower than diesel, individual toxics vary

*A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions Draft Technical Report

Biomethane Background

- Produced from anaerobic digestion
- Recoverable Sources: landfills, agriculture (manure management)
- Used for production of electricity and heat
- Can be used as a motor vehicle fuel

Biomethane Background (cont.)

- Raw gas contains: methane, carbon dioxide, hydrogen sulfide, oxygen, water, ammonia, nitrogen, odorous compounds
- Landfill gas also has halogenated hydrocarbons, BTEX
- Clean up to remove impurities, water scrubbing and column
- Motor Vehicle Fuel quality-must meet CNG fuel specifications

Emissions Benefits and Issues of Biomethane

- Reduces GHG emissions
- Emissions benefits same as CNG

Biomethane GHG

- Use of Biomethane reduces GHG emissions by:
 - Directly reducing the amount of methane emitted to the atmosphere
 - Secondary effects- reduces the formation of atmospheric ozone, a GHG

*Source Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999, CEC Staff Report: November, 2002 Publication #600-02-001F

Policy Issues

Ways to Drive More Biomass to Energy Use

- Incentives
 - US incentive for ethanol and providing blenders up to 1cent/percent/ gallon of biodiesel
- CARB In Use Strategies Verification for Diesel
 - Verifies the uses of technologies including fuels that reduce diesel PM

How will CARB Address Future Technologies

- Research
- Coordinate activities between academia, government, industry, and the public
- Promote new technologies
- Develop fuel specifications
- Need new legislation to establish incentive structure and determine a revenue source

Future Direction

- Air quality reductions alone do not justify the cost of using biomass derived fuels
- Additional justifications for using biomass derived fuels
 - Need for energy diversity to enhance self sustainability.
 - Reductions in GHG
 - Offset higher cost or reduce cost of biomass derived fuels