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Biofuels Mid-Stream Infrastructure Requirements

California Energy Commission

April 14, 2009

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Why Biofuels?

- Supply and technology is available now
  - Large worldwide supply – actively traded throughout the world
  - Establish technology and delivery systems – over 20 years of worldwide experience
  - Practical GHG answer now
- Ability to integrate with existing petroleum infrastructure and vehicles
- In 2008 Biofuels provided CA 37% of all petroleum reductions and 15% of all GHG reductions
- Key to California's LCFS goals: One 30 million gallon biodiesel terminal could fuel 50% of all diesel cars and pickup trucks, yielding 2.3 metric tons GHG reductions equal to 1.1 million electric vehicles.

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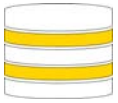

Cost Effectiveness of Alternative Energy Incentives to Reduce GNG

Alternative Energy Source	Proposed Incentive	Cost Per Metric Tonne of GNG Reduction
Biodiesel	25¢ / gallon	$29
E85 Flex Fuel Vehicle	25¢ / gallon	$102
Electric Vehicle	$10,000 / vehicle	$142
Plug-in Electric Vehicle	$10,000 / vehicle	$499
CNG Car	$5,000 / vehicle	$184
CNG Van / Pick-Up	$15,000 / vehicle	$214
Hydrogen Car (Infrastructure Only)	$28,000 / Infrastructure/vehicle	$1,041
CNG Bus / Refuse Truck	$75,000 / vehicle & compressor	$12,551

Source: Emerging Office Staff Analysis, assuming 74% GHG Reduction for Biodiesel, 22% for Ethanol, AB 1007 Wells-to-Wheels

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CA Biofuels Infrastructure Status

- CA is consuming1.2 billion gallons of ethanol that will grow to over 4 billion by 2017 to meet the federal RFS
- CA is consuming 50 million gallons biodiesel that will grow to over 800 million gallons per year by 2017 to meet the goals of LCFS
- California's portion of the federal RFS for biodiesel will be 120 million gallons in 2012 and 200 million gallons by 2017
- Currently, CA does not have the infrastructure to meet the RFS requirements in either 2012 or 2017
- Current components of importation, storing, blending, testing and data management
  - Piecemeal and variable at best
  - No organized mid-stream biofuels infrastructure is being executed or planned
  - These deficiencies will become an impediment to implementing both the LCFS and RFS

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Biofuels Midstream Infrastructure Requirements

- Multiple modes of bulk liquids importation
  - Unit trains
  - Ocean going ships
- Bulk liquid storage
  - Specialized terminal
  - In deep water ports
- Testing and data management
- Blending at the rack(s) – the point of integration
- Distribution into retail

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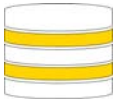
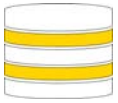


CA Must Import Biofuels

- California does not produce its own biofuels' feedstocks
  - Ethanol's corn/sugar feedstocks and production are mainly in the Midwest & South/Central America
  - Biodiesel feedstocks & production are mainly in the Midwest, Gulf Coast, S.E. Asia, Argentina & eventually other countries along the equator
- In-state biofuel production issues
  - Production is most cost effective near sources of feedstock
  - CA's animal fat, used vegetable oil (used in animal feed) and brown grease <5% of State's feedstock needs for biodiesel by 2017
  - Other sources of feedstock still in research phase
  - Difficult to permit production facilities near population centers
  - Currently, a glut of worldwide production capability for biodiesel, 8-9 billion gallons that are immediately available to help reduce GHG
- International biofuel sources provide CA with a broader supplier base and raise competition for better pricing



Modes of Bulk Fuel Importation

- Trucking: costly, impractical, high GHG
- Rail: more cost effective with unit trains (80 -110)
  - Railroad operators move trains faster, more assuredly and less expensively
  - Requires fast loading and unloading – demurrage costs of rail cars
  - Mountains and deserts make it expensive domestically
- Ocean going ships – require deep water berth(s)
  - Ocean going ships are the most cost effective for large bulk shipments
  - Should be an obvious component of CA's infrastructure – in fact, deep water bulk liquid terminals are disappearing
  - Less carbon generated
  - Kinder method of transportation for bulk biomaterials – especially in the summer
  - Required for international importation

Existing Palm Plantation – 3.9 MT of Oil Per Year

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Next Generation Palm > 8 MT Oil Per Year

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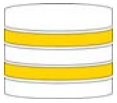
Biofuels Terminal Requirements

- Biofuels cannot go directly into existing petroleum terminals without modifications & changes to operating protocols
- Biofuels require specially adapted tanks, pipelines and fittings
- Ethanol absorbs water that causes oxidation issues for tanks, pipeline and blending concerns
- Biodiesel
  - Not fungible: requires lot tracking & treatment
  - May require heating
  - Decomposes over time, may need treatment
  - Post-production processing may be needed
- Dedicated biofuels terminals are difficult to permit

Biofuels Blending

- Point of integration with refined petroleum products
- Biofuel is a small portion of the blend
  - Blending needs access/proximity to petroleum terminals
  - Already happening for ethanol
- In-line blending necessary to assure proper mixing for biodiesel
  - Splash blending is the source of many problems
  - Requires specialized equipment that compensates for differences in viscosity, especially for biodiesel
  - Heating may be necessary
  - May also include dyes and additives
- Requires testing and QC procedures to assure quality at different blends to meet ASTM specifications at different blends
- May appear daunting but equipment and procedures are well established



Testing and Data Management

- Data management of feedstock and biofuels is critical to successfully establish a permanent infrastructure for the State of California
- Testing
  - To meet ASTM standards
  - On-going by lots of biodiesel both in-tank & after blending
- Tracking by lot
  - Test data
  - Origin for potential sustainability data
  - Point and proof of blending for tax credit
  - RIN data for EPA RFS requirements
  - Multiple data sources
    - Feedstock producers
    - Shippers
    - Biofuel refiners
    - Blenders
    - Laboratories
  - Multiple data destinations
    - Customers
    - Federal government: Customs, IRS & EPA
    - California: Franchise Tax Board, CEC, CARB, etc.

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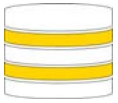

California Needs to Show Leadership

- Put strong mandates behind LCFS and/or provide at least a 25¢/gal incentive for biofuels
- Require all biodiesel blending to be performed in-line to assure quality and maintain confidence
- Grant(s) to develop deep water biofuels terminals
- Define workable, measurable sustainability criteria for biofuels that must include an international outreach to assure a long term impact
- Provide grants to develop an integrated data management system that rationalizes both state and federal certification and data collection requirements

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