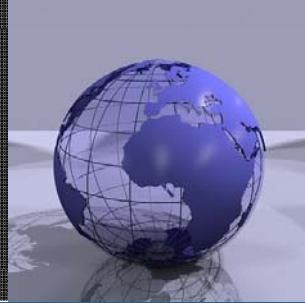


California Environmental Protection Agency



Air Resources Board

***Overview of the California
Low Carbon Fuel Standard***



Oregon DEQ
November 3, 2009

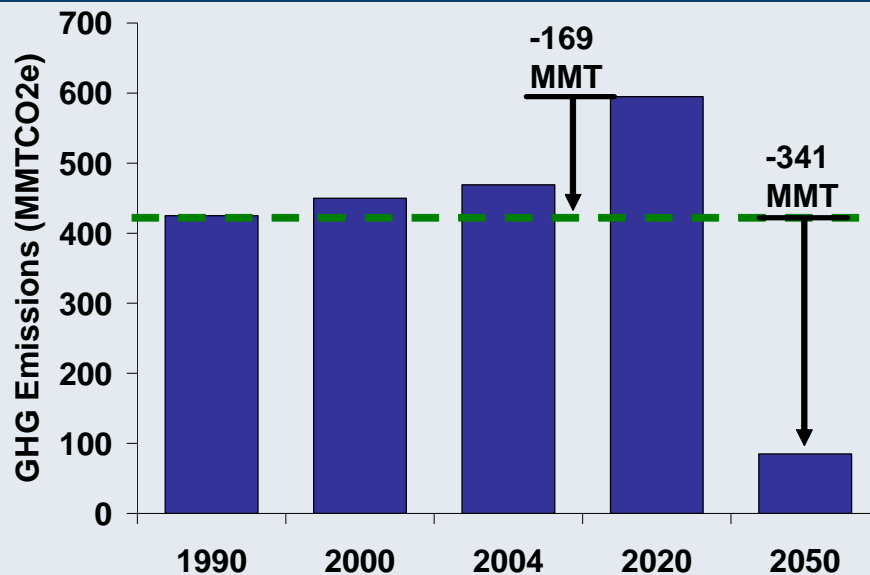
**What the Program
Accomplishes**

Transportation Sector Important

- Significant reductions needed to achieve 2020 target and 2050 goal
- GHG emissions from transportation are large and increasing
- Transportation emissions affected by:
 - Amount and type of transportation fuels
 - Efficiency of motor vehicles
 - Number of vehicle miles traveled

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Large GHG Reductions Required



LCFS Established by the Governor

- **Governor Schwarzenegger established the LCFS in January 2007**
- **UC completed analysis demonstrating feasibility in the spring and summer of 2007**
- **ARB identified LCFS as AB 32 discrete early action measure in June 2007**
- **Board adopted proposal in April 2009**

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Framework for Low Carbon Fuels

- **Creates durable framework for near and long term transition to low carbon fuels**
- **Encourages technology innovation**
- **Establishes a model for regional and national standards**
- **Sets stage for future reductions**

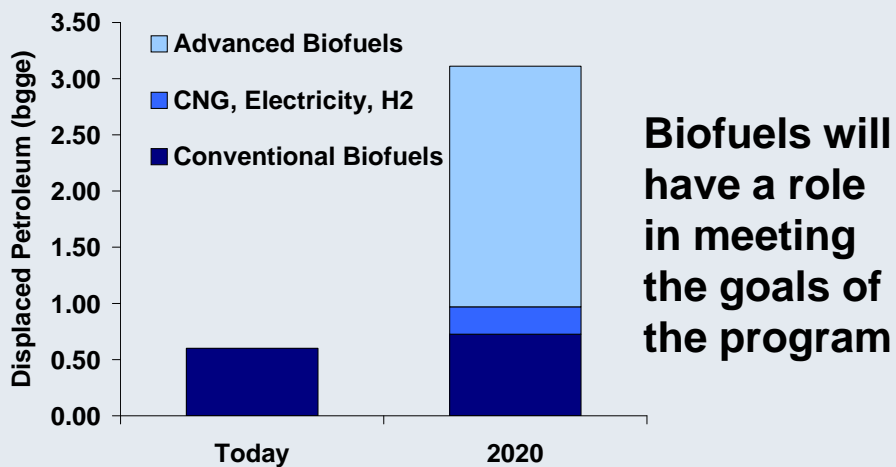
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LCFS Reduces GHG Emissions

- **Results in a 10 percent reduction in the carbon intensity by 2020**
- **Reduces 16 MMT GHG emissions from the transportation sector by 2020**
- **Achieves about 10 percent of the total emission reductions required to meet the AB 32 target**

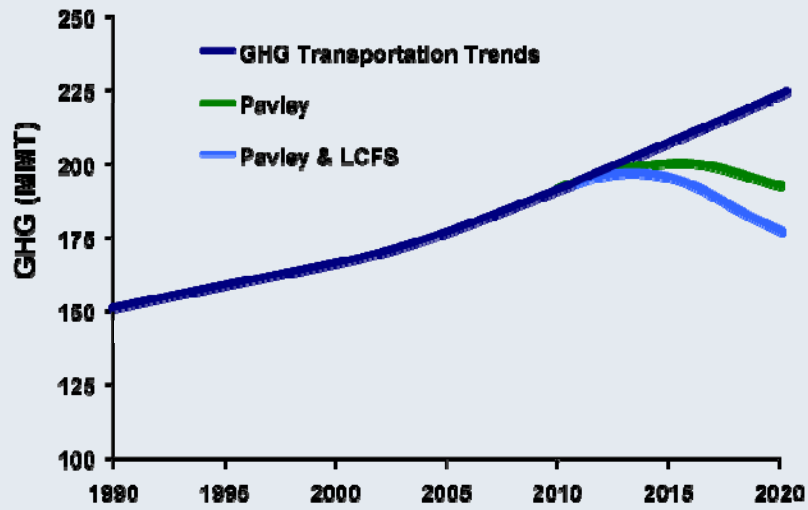
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LCFS Displaces Petroleum



8

Pavley and LCFS Reverse GHG Trend



9

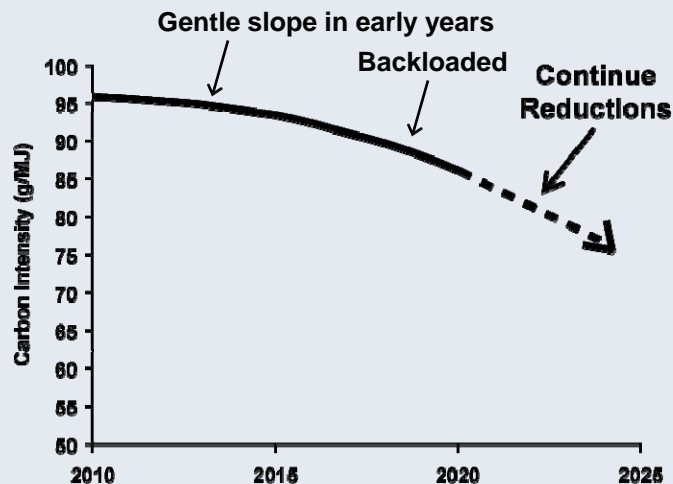
**How the
LCFS Works**

LCFS Mechanics

- Baseline fuel carbon “intensity” is that of 2010 gasoline and diesel fuel
- Carbon intensity represents the GHG emissions per unit of energy
- Fuel producers achieve 10 percent reduction by 2020
- Reduction is gradual and weighted toward later compliance years

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The LCFS Compliance Schedule



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Who is Regulated?

- **Providers of most petroleum and biofuels are 'regulated parties'**
- **Providers of fuels that meet 2020 levels must 'opt in' to earn credits:**
 - **Electricity**
 - **Hydrogen**
 - **Natural Gas**

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Flexible/Market-Driven Compliance

- **Supply a mix of fuels with carbon intensity equal to the standard**
- **Provide fuels that have lower carbon intensity than the standard**
- **Use purchased or banked credits to meet the standard**

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Impact on Fuels

- **Increase use of:**
 - Low carbon corn or sugarcane ethanol
 - Cellulosic ethanol
 - Renewable diesel and biodiesel
 - Electricity, hydrogen, natural gas
- **And decrease the use of:**
 - Petroleum
 - High carbon biofuels

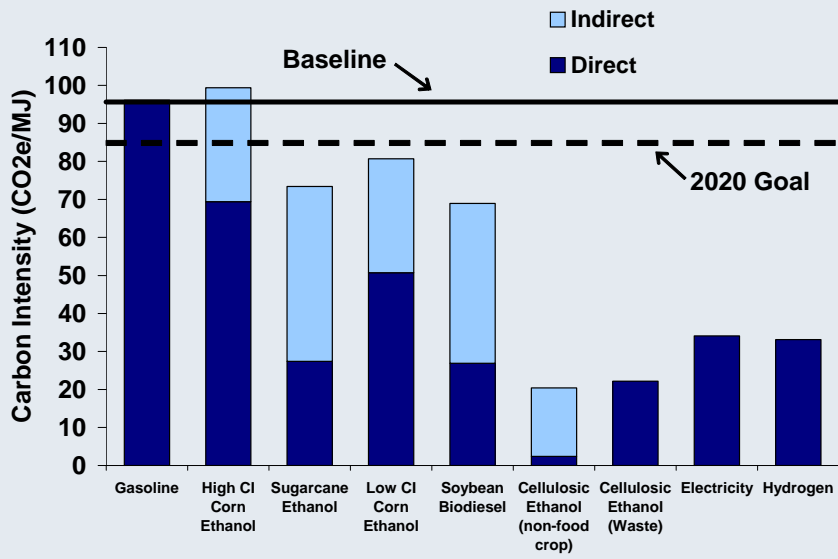
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Compliance and Enforcement

- **ARB to provide software tools for fuel carbon reporting and credit tracking**
- **Regulated parties report quarterly and annually**
- **Enforcement includes records review, field inspections, and audits and penalties**

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Carbon Intensity of Tomorrow's Fuels



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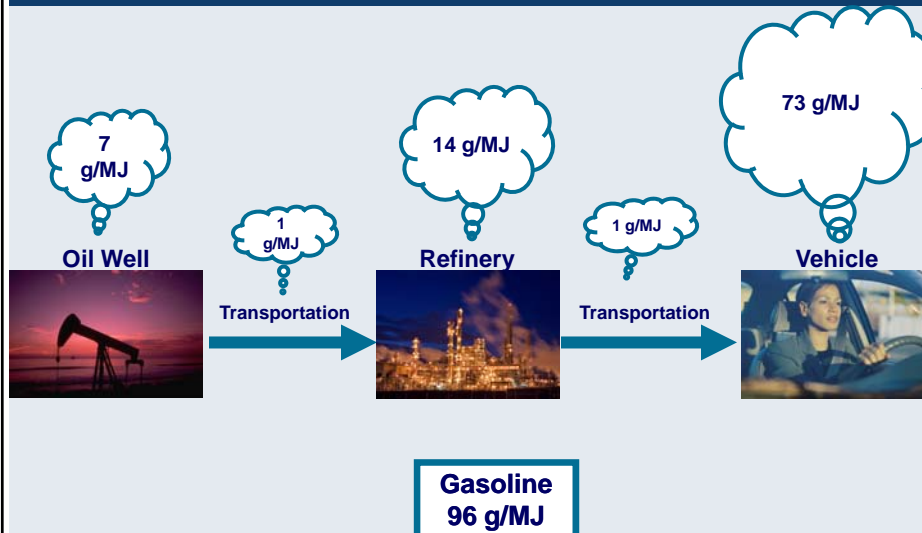
Based on
Lifecycle Analysis

Lifecycle Analysis Basis for LCFS

- Lifecycle analysis considers the GHG emissions from all facets of fuel production, distribution, and use
- Governor's EO directed that ARB consider lifecycle analysis
- UC reports confirmed that LCFS needs to be based on lifecycle analysis

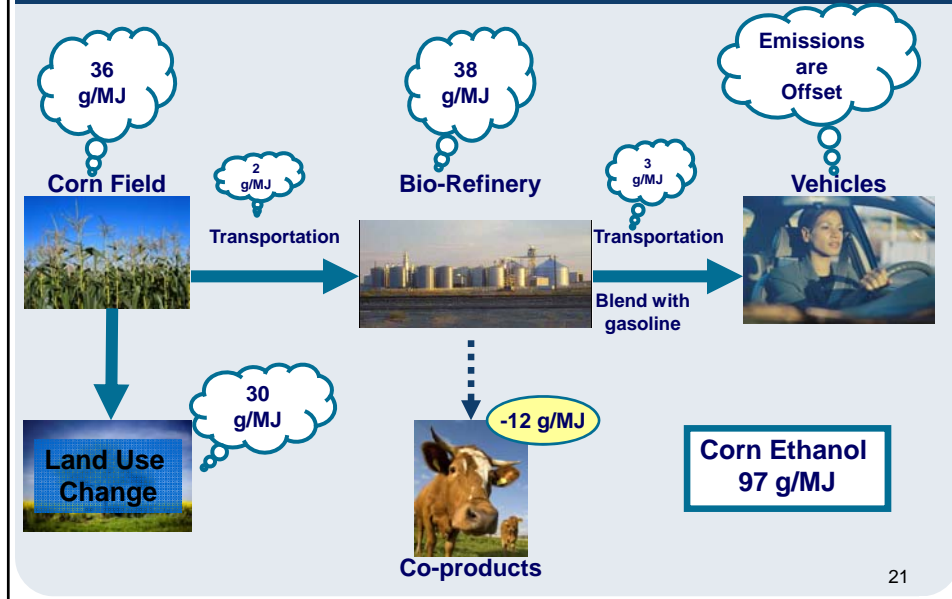
19

Fuel Lifecycle – Gasoline



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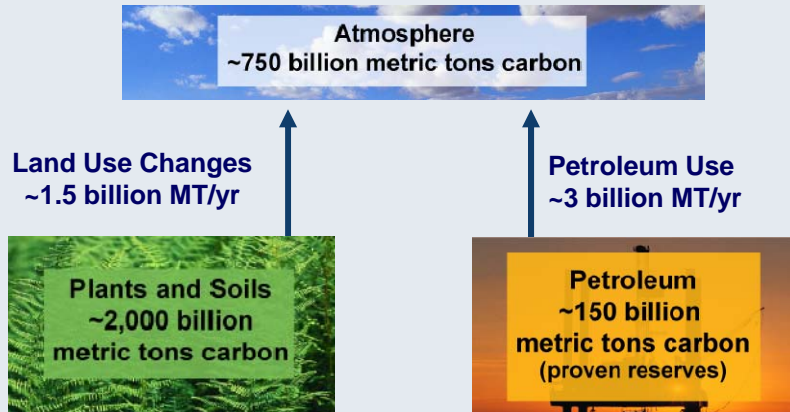
Fuel Lifecycle – Corn Ethanol



Land Conversions Release Carbon

Plants and soil store large amounts of carbon which is released during land conversion

Carbon Storage and Emissions



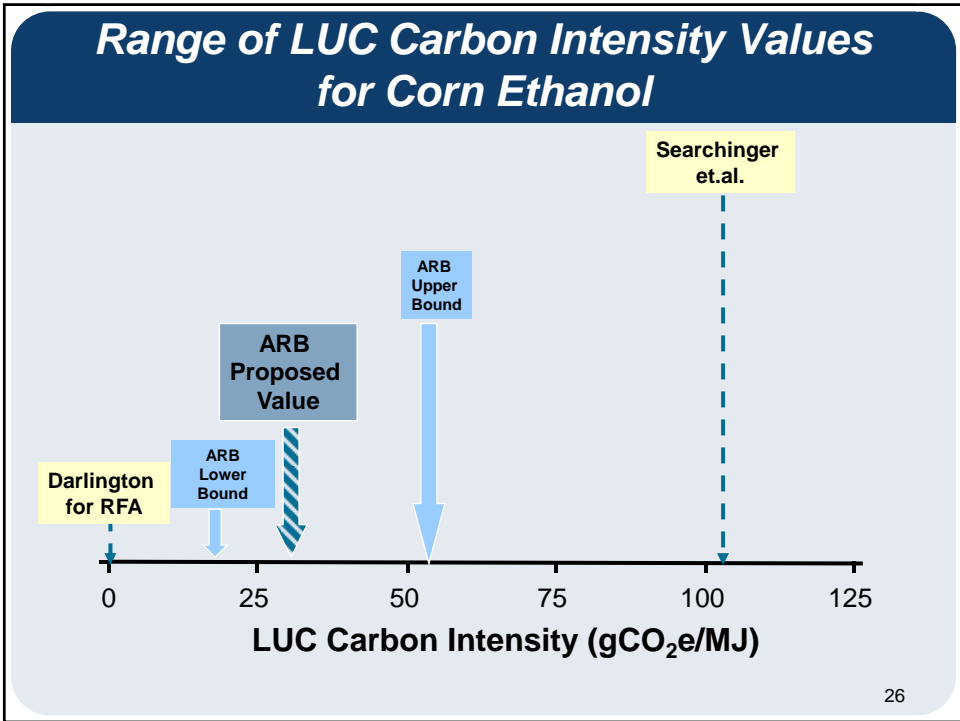
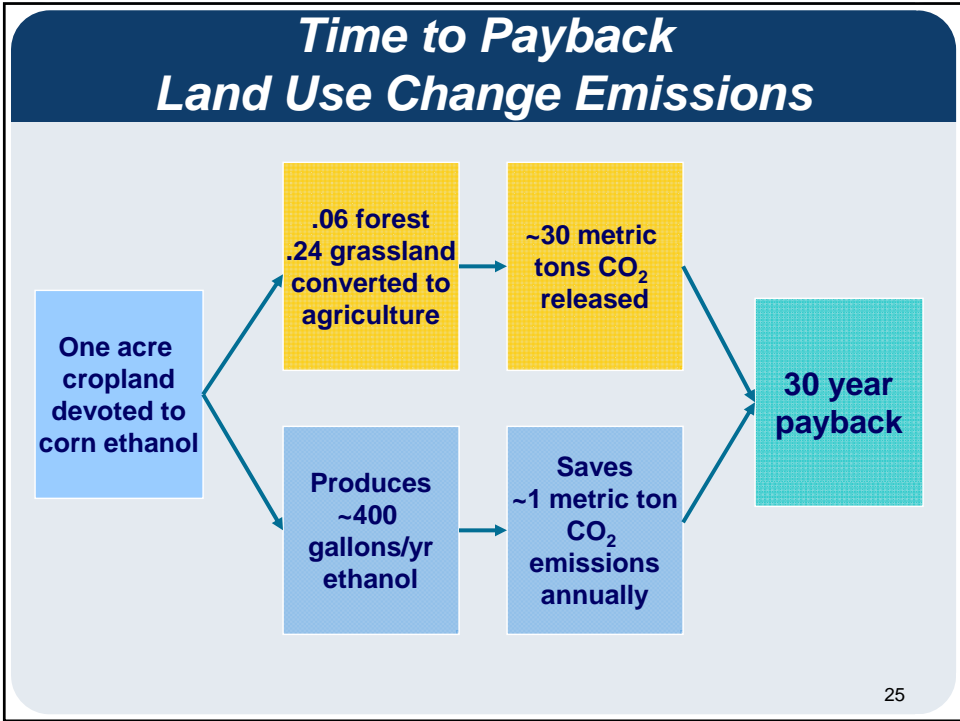
Plants and soils contain approximately 15 times the carbon in proven oil reserves.

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Biofuels Affect the Carbon Cycle

Current biofuels take decades before there is a net GHG benefit

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Lifecycle Analysis Summary

- **Key to identifying & transitioning to low carbon fuels**
- **Must include all significant effects, including land use changes**
- **ARB used best available science to estimate land use changes**
- **Refine analysis through expert workgroup**

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Economic and Environmental Impacts

Economic Analysis

- **Cost-of-compliance basis**
- **Overall savings estimated for 2010-2020**
- **Impact dependent on crude prices and production costs of alternative fuels**
- **Recognized uncertainties could result in slight costs**

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Environmental Analysis

- **Reduces GHG by 16 MMT in 2020**
- **Achieves 10 percent of scoping plan target**
- **No significant adverse impacts**
- **Potential reductions in criteria pollutants with advance vehicles**

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Comparison LCFS to Federal Requirements

Builds Upon and Improves the RFS

- **All fuels treated the same; no exemptions for existing corn ethanol**
- **Performance-based vs. volume mandates**
- **More market incentives**
- **Includes non-liquid fuels**
- **Provides 3 times the GHG reduction benefits**

Next Steps

Documents to Prepare for December

- **Guidelines for developing fuel pathways**
- **Workplan for sustainability**
- **“Best Practices” guidance document for siting of new facilities**
- **List of biofuels with no inherent land use change**
- **Prioritized list of additional fuel pathways**

Working with Stakeholders

- **Expert workgroup regarding land use change**
- **Informal carbon intensity screening process for new or modified fuel pathways**
- **Specs and multimedia evaluation of biodiesel and renewable diesel**
- **Definitions of and safeguards for “biomass” and “renewable biomass”**

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Review with Stakeholders

- **Regulated parties for electricity**
- **Electricity credits for non-road vehicles**
- **Electricity metering**
- **LCFS as part of AB32 Cap-and-Trade**
- **Develop fee schedule**
- **Re-evaluate EER values for HHD NG**

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On-Going Commitments

- **Participate in environmental review of specific projects**
- **Continue collaborations with other agencies, states, and nations**

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Work to be Completed for Adoption

- **Public comment period for Board-approved changes**
 - Revised regulation language
 - Additional lifecycle pathways
- **Complete administrative record by Nov 09**
 - Respond to public comments

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Summary

Summary

- **Reduces emissions from transportation fuels by 10% by 2020**
- **Emissions from land use changes are real, large, and positive**
- **Complements goals set forth by federal mandates**
- **Structured so program can extend beyond 2020**

Contact Information

Dean Simeroth

Chief, Criteria Pollutants Branch

Phone: 916-322-6020

Email: dsimerot@arb.ca.gov

John Courtis

Manager, Alternative Fuels Section

Phone: 916-323-2661

Email: jcourtis@arb.ca.gov

Mike Waugh

Manager, Alternative Fuels Section

Phone: 916-445-6018

Email: mwaugh@arb.ca.gov

Renee Littaua

Manager, Fuels Section

Phone: (916) 322-6019

Email: rlittaua@arb.ca.gov

Floyd Vergara

Manager, Fuels Section

Phone: 916-327-5986

Email: fvergara@arb.ca.gov