

Sustainability and the Low Carbon Fuel Standard

**California Biomass Collaborative
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California Air Resources Board

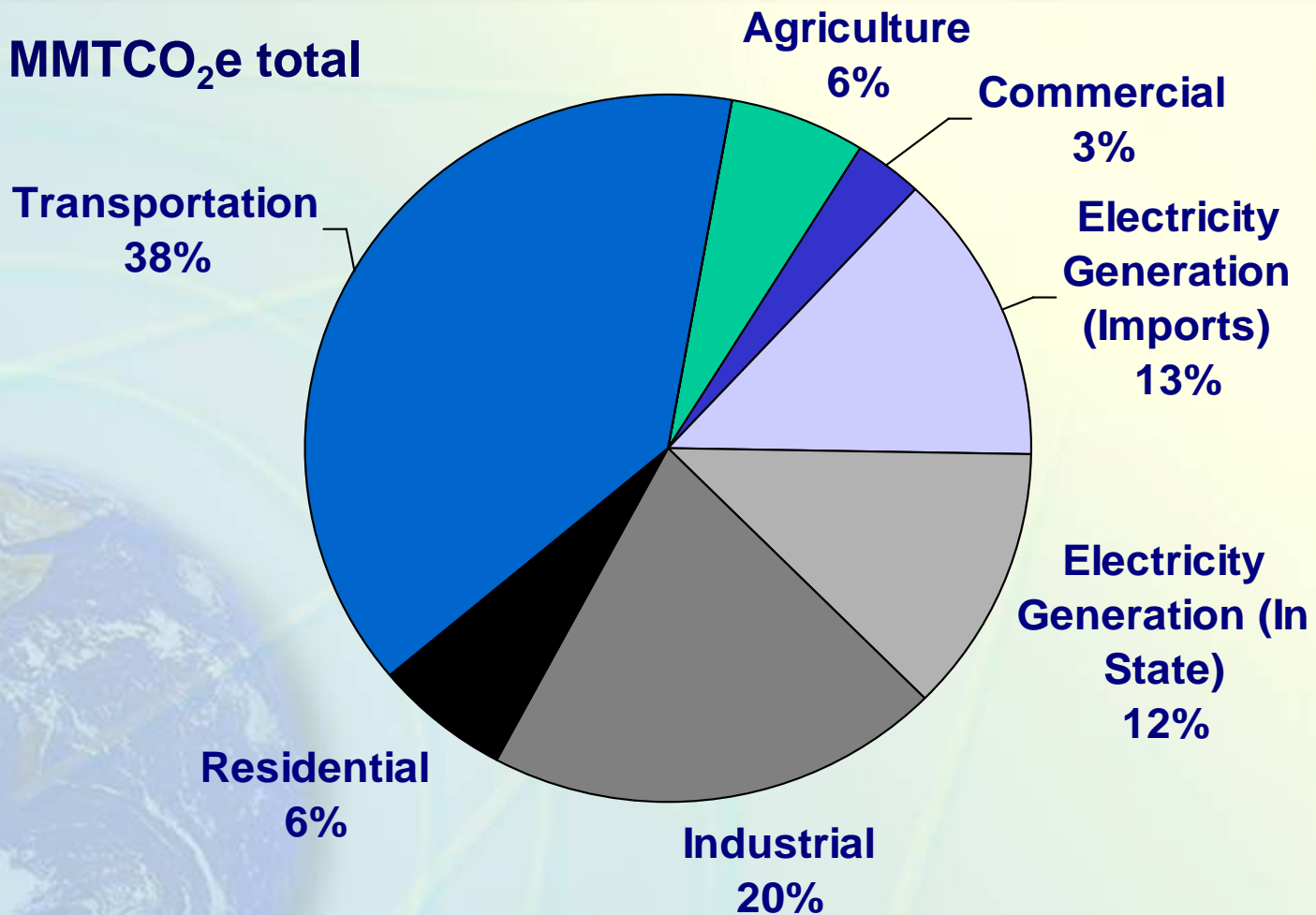
California Environmental Protection Agency

Presentation Outline

- Low Carbon Fuel Standard (LCFS)
- Federal Energy Act
- National and international efforts on sustainability
- ARB's sustainability plans
- Conclusions

2004 California GHG Emissions

480 MMTCO₂e total



ARB, "California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit" (2007), www.arb.ca.gov/cc/ccei/inventory/1990_level.htm

Objectives of the LCFS

- Lower GHG emissions from fuels
- Help meet California's GHG reduction goals
- Reduce petroleum dependency
- Diversify CA's transportation fuels
- Achieve at least a 10% reduction in average fuel carbon intensity by 2020
- Much greater reductions in longer term

LCFS Promotes Very Low Carbon Fuels

- Hydrogen
- CNG, LNG, LPG
- Advanced biofuels
- Ethanol
- Biodiesel
- Renewable Diesel
- Electricity

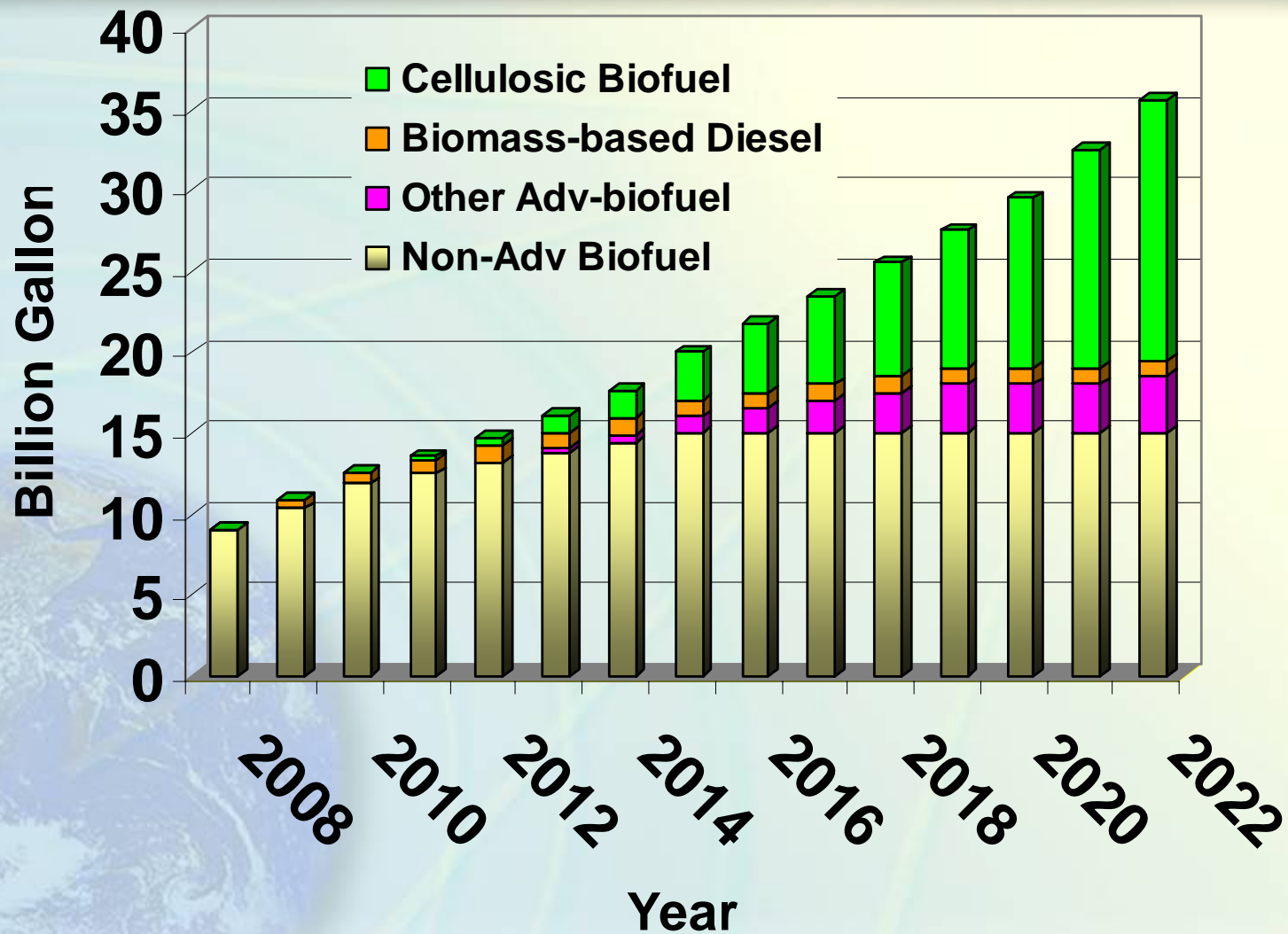
LCFS Dependent on Market Mechanisms & Technology Innovations

- Creates market for low carbon fuels
- Establishes stable investment environment
- Expands alternative fuels market in CA three to five times by 2020
- Encourages technology innovation, rewards transportation fuels with lower carbon footprint
- Promotes alternative fuel and hybrid vehicles

Key Principles in the Design of LCFS

- Governs intensity
- Measured on lifecycle basis
- Market-based
- Performance-based
- Direct & indirect land use change
- Sustainability
- Fuel-neutral

Federal Energy Act Biofuel Volumes



Sustainable Development

Definition:

Sustainable development is a pattern of resource use that meets human needs while preserving the natural environment so that needs can be met in the present as well as the indefinite future.

List of LCFS Sustainability Issues

Environmental Components	Social and Economic Components
Greenhouse gas emissions	Environmental justice
Air quality	Income distribution
Water use	Working conditions/worker rights
Water quality	Child labor
Land use protections (like those in federal Energy Act)	Land rights (displacement of indigenous people)
Soil erosion	Labor rights
Genetically modified organisms	Food prices and food security
Biodiversity	

Developing Sustainable Policy

- To develop sustainable policy, ARB will coordinate with:
 - Other state agencies
 - Federal government
 - International governments
 - Stakeholders
- Provide status reports and opportunity for input all along the way
- Continue improvements beyond current rulemaking efforts

International Sustainability Efforts

- United Kingdom, Netherlands, and Germany developing sustainability criteria
- More qualitative than quantitative at this stage



US EPA and Federal Energy Act Sustainability Requirements

- Include direct and indirect land use change GHG emissions
- Renewable biomass does not include:
 - Biomass from land cleared after 2007 Energy Act
 - Biomass from forest or forestlands that are rare or critically imperiled
- Only fuel from renewable biomass is renewable

What Has ARB Learned from National and International Efforts?

- Sustainability is complex
- Core environmental and socio-economic issues
- No quantitative national or international standards
- National and international cooperation required
- More research useful

ARB Work Plan for Sustainability

- Quantify direct and indirect land use GHG emissions
- Evaluate ongoing work on other sustainability issues
- Develop recommendations on how best to address sustainability

Direct and Indirect Land Use Change

- Use GTAP model to assess both direct and indirect land use change
- Evaluate sensitivities and uncertainties
- Incorporate into lifecycle analysis
- Compare to other available information and model outputs
- Develop recommendations for Board consideration as part of the regulatory proposal

Partners on Land Use Impacts and Sustainability

- University of California, Berkeley
 - Dan Kammen, Michael O'Hare, Sabrina Spatari, Andy Jones, Rich Plevin, others
- University of California, Davis
 - Sonia Yeh, Bryan Jenkins, Nathan Parker, others
- Purdue University
 - Tom Hertel, Wallace Tyner, others
- California Energy Commission

Economical & Environmental Impact Assessment of LCFS

- Economic and environmental impacts assessed as part of regulatory development process
- New California biomass facilities undergo CEQA and new source review, but must address potential environmental justice implications of LCFS
- New fuels must undergo multimedia evaluation

Issues Requiring National and International Cooperation

- Consistent verification process for establishing GHG potential of fuels
- Develop robust lifecycle analysis
 - Land use change impacts
 - Sustainability
 - Co-products
- Develop compliance models
- Establish tracking mechanisms

Summary

LCFS Sustainability Features:

- Include Direct and Indirect Land Use
- Consider Federal Land Use Protections
- Evaluate Potential for Inclusion of Other Sustainability Criteria
- Conduct Environmental and Economic Assessment
- Coordinate with National and International Organizations and Stakeholders
- Complete by December 2008