



Low Carbon Fuel Standards: Ensuring Biofuels Meet Greenhouse Gas Reduction Goals



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- **Climate Solutions mission is to accelerate practical and profitable solutions to global warming by galvanizing leadership, growing investment and bridging divides.**

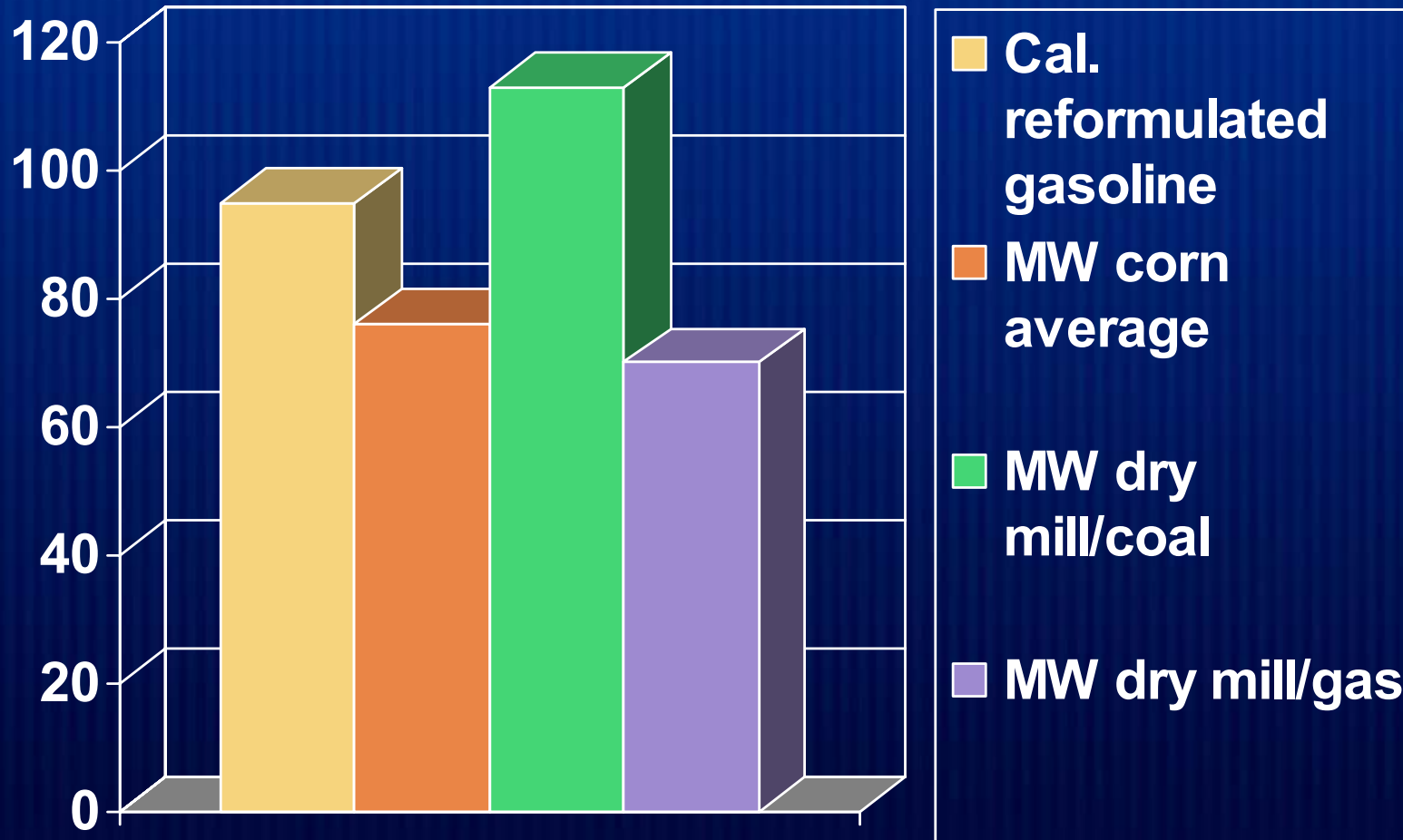
Today's Talk

- **Greenhouse emissions from biofuels**
- **Varying GHG performance of biofuels**
- **Renewable Fuel Standards**
- **Low Carbon Fuel Standards**
- **Basics**
- **California implementation**
- **Similar moves elsewhere**
- **Implementation issues**

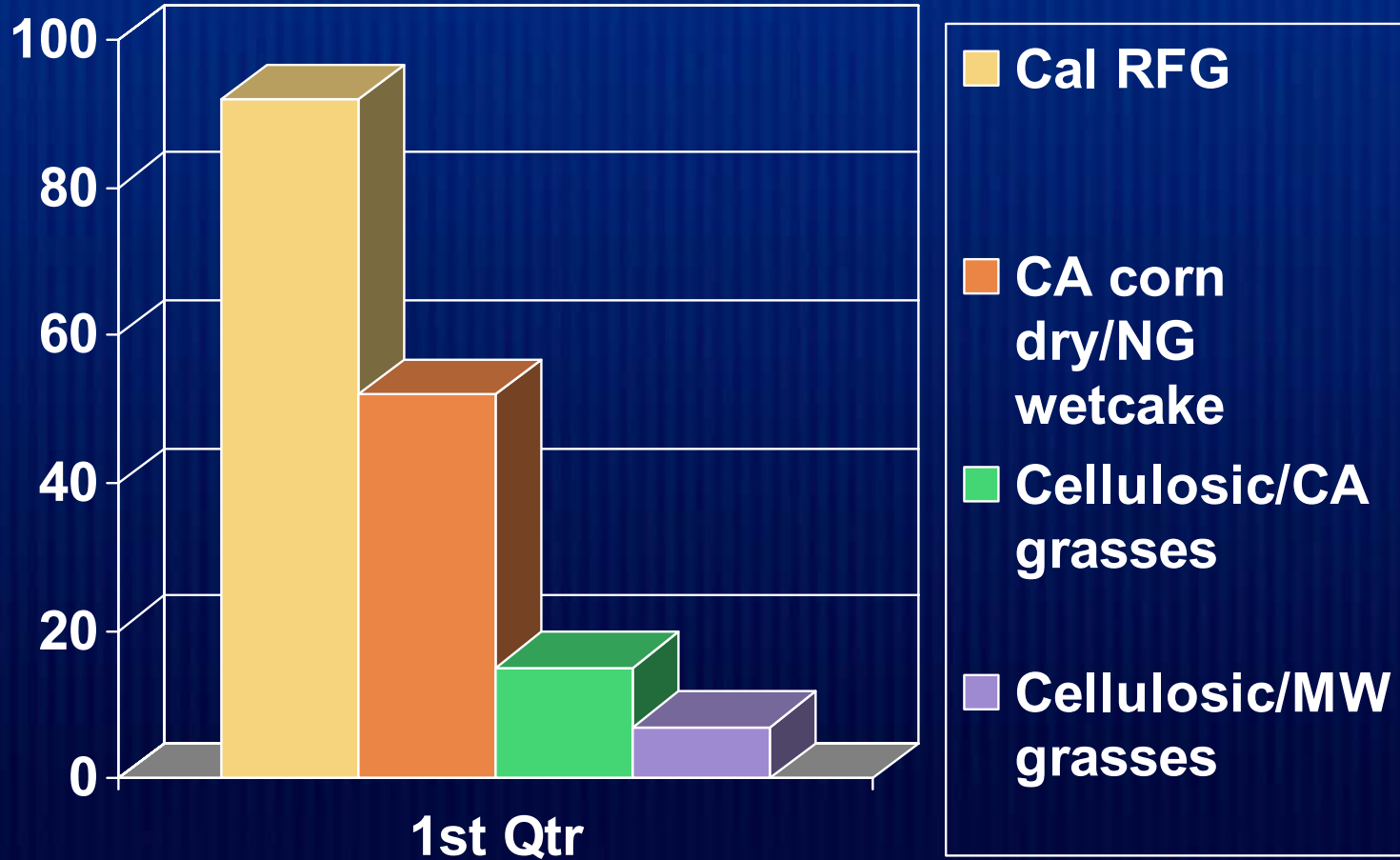
Do biofuels really reduce greenhouse gases?

- Growing biofuels feedstocks involves emissions of nitrous oxide from fertilizers, methane and carbon dioxide from soils and carbon dioxide from running farm equipment.
- Making biofuels involves carbon dioxide emissions from natural gas or coal for process heat and electricity.

Emissions vary greatly



Emerging options dramatically cut emissions



Relevant factors

- **Agricultural impacts – perennial grasses require far less fertilizer, and eliminate annual tillage, significant source of soil emissions**
- **Process energy at plant – The major source of GHGs in biofuels lifecycle, so efficiency and use of renewable energy yield major reductions**

Renewable Fuel Standards do not capture differences

- RFS sets goals for percentage of fuels in overall mix – ethanol and biodiesel – does not distinguish by feedstocks or production process
- U.S. RFS does provide additional credit for cellulosic to recognize superior environmental performance –
 - 1 gallon cellulosic = 2.5 gallons corn for compliance with standard

Low Carbon Fuel Standards credit the differences

- LCFS takes full lifecycle into account from farm field to fuel tank.
- Sets goals for reduction in carbon and carbon equivalent (N₂O) intensity in overall fuel supply.
- Fuel companies must comply individually or buy credits
- Lets all options compete on level playing field, including emerging biofuels such as Fisher-Tropsch diesel, natural gas and electricity – doesn't pick winners.

Prospective LCFS benefits

- Drive improved sustainability in agriculture overall by providing premium market for feedstocks grown with low GHGs
- Drive fuels innovation and technology by opening market space for most efficient low GHG options

California LCFS

- **First of a kind**
- **Jan. 2007 - Gov. Schwarzenegger orders 10 percent reduction in carbon intensity of Calif. Fuels by 2020 – A.B. 32 authority**
- **Sept. 2007 - California Air Resources Board begins regulatory proceedings**
- **Jan. 2009 – CARB to adopt plan to achieve goals, complete regulations**
- **Jan. 2010 – LCFS goes into effect**

Carbon standards in new federal RFS

- 36 bgy by 2022 – up from 7.5 bgy by 2012
- Conventional (corn) capped at 15 bgy by 2015
- New conventional ethanol must reduce carbon 20% on full lifecycle basis
- Advanced biofuels 50%, including cellulosic biofuels 60%
- EPA can adjust any of these downwards 10% if goal not feasible

Other federal LCFS moves

- **Warner-Lieberman climate bill – LCFS 5% by 2015 and 10% by 2020**
- **S. 1324: National Low-Carbon Fuel Standard Act of 2007 – Obama introduced in May 2007**
- **UK Renewable Transportation Fuel Obligation – like RFS but with GHG monitoring**
- **EU – GHG monitoring in 2009 with reductions beginning in 2011**

EU LCFS Moves

- **EU climate strategy 10% RFS by 2020**
- **Integration with Draft EU Fuel Quality Directive? proposes an 10% by 2020 carbon reduction.**
- **UK, Netherlands, Germany moving toward sustainability standards**
- **UK Renewable Fuel Transport Option will account for full lifecycle before regulating.**

Will LCFS work? Tricky

issues:

- Rationalization – An LCFS in individual states will cause fuel marketers to shift existing products to serve market, but no real change in world.
- Capital risk – If companies invest under one set of assumptions about biofuels benefits and they change, risk of stranded assets
- Interaction with carbon cap and trade – LCFS must be separate from hard cap

Lifecycle Analysis: Central challenge

- Most LCAs use GREET model, California will use modified GREET model, but concerns exist about lack of capture of agricultural impacts – N₂O, CH₄ – work underway to update model
- Much scientific uncertainty about land use impacts, emissions can vary field to field.

How to resolve LCA?

California responses:

- Existing data sufficient for implementation with estimate of land use impacts included and used in early years.
- Participate in developing standard methodology for land use change and include emerging data to enhance standards.

LCFS for Washington State?

- **Need for legislative authority as in A.B. 32**
- **Possible introduction in 2009 Legislature**

Further questions

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