



APRIL 27, 2018
BOARD HEARING
SACRAMENTO, CA

2018 Proposed Amendments
to the

Low Carbon Fuel Standard Regulation

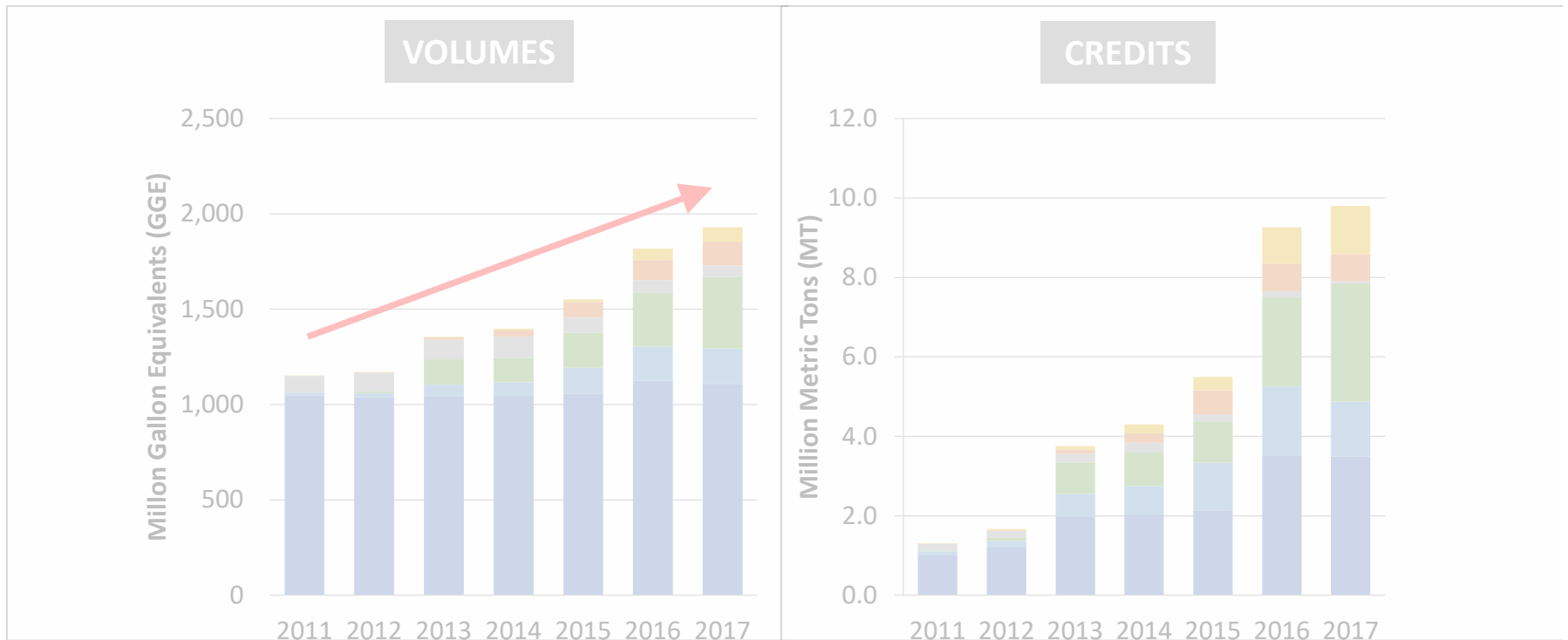
and to the

Regulation on Commercialization of Alternative Diesel Fuels

Presentation Overview

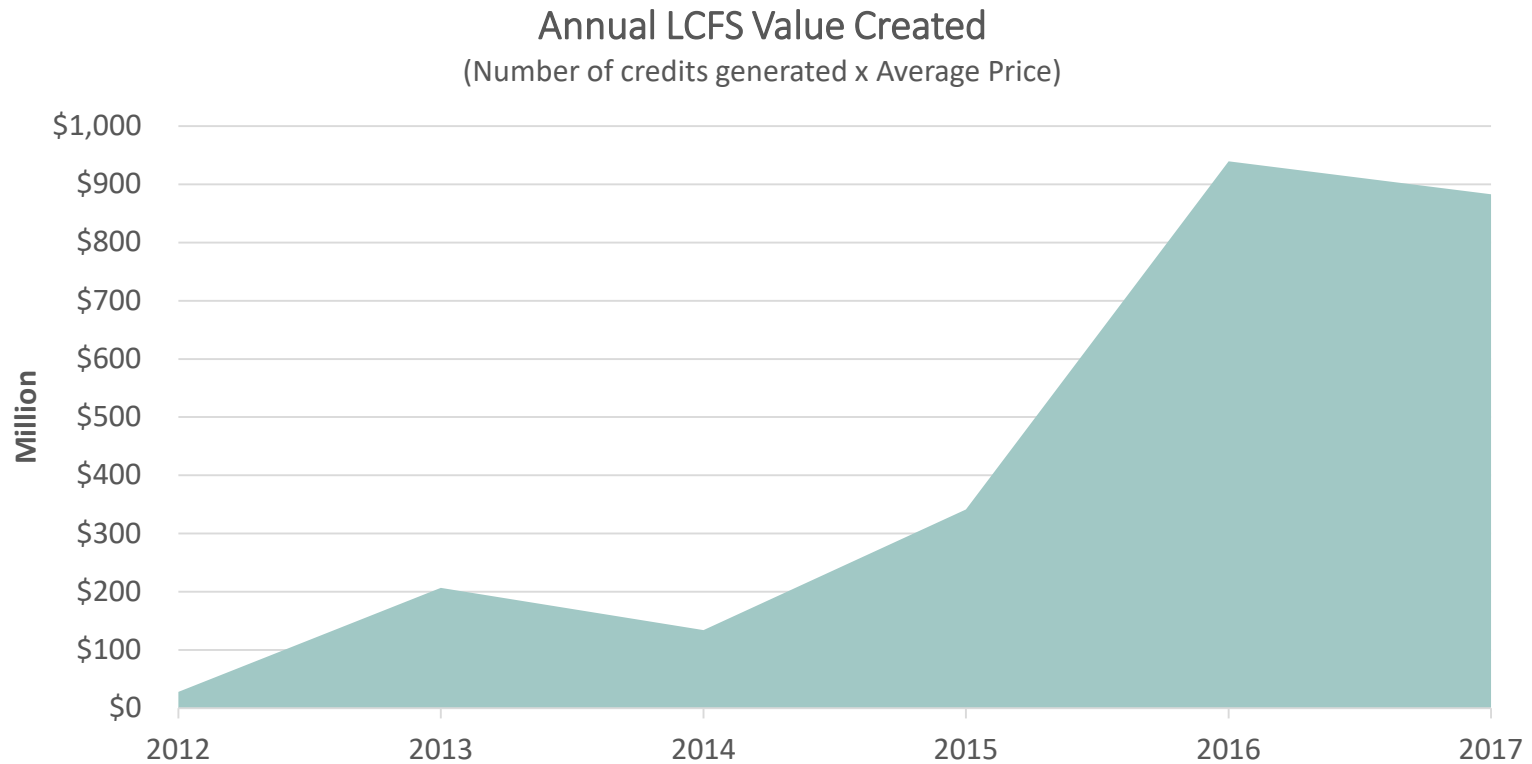
- Background and Current Status of the LCFS
- Proposed Amendments
- Environmental and Economic Impacts
- Rulemaking & Implementation Timeline

Low Carbon Fuel Volumes, Credits Continue to Grow and Diversify



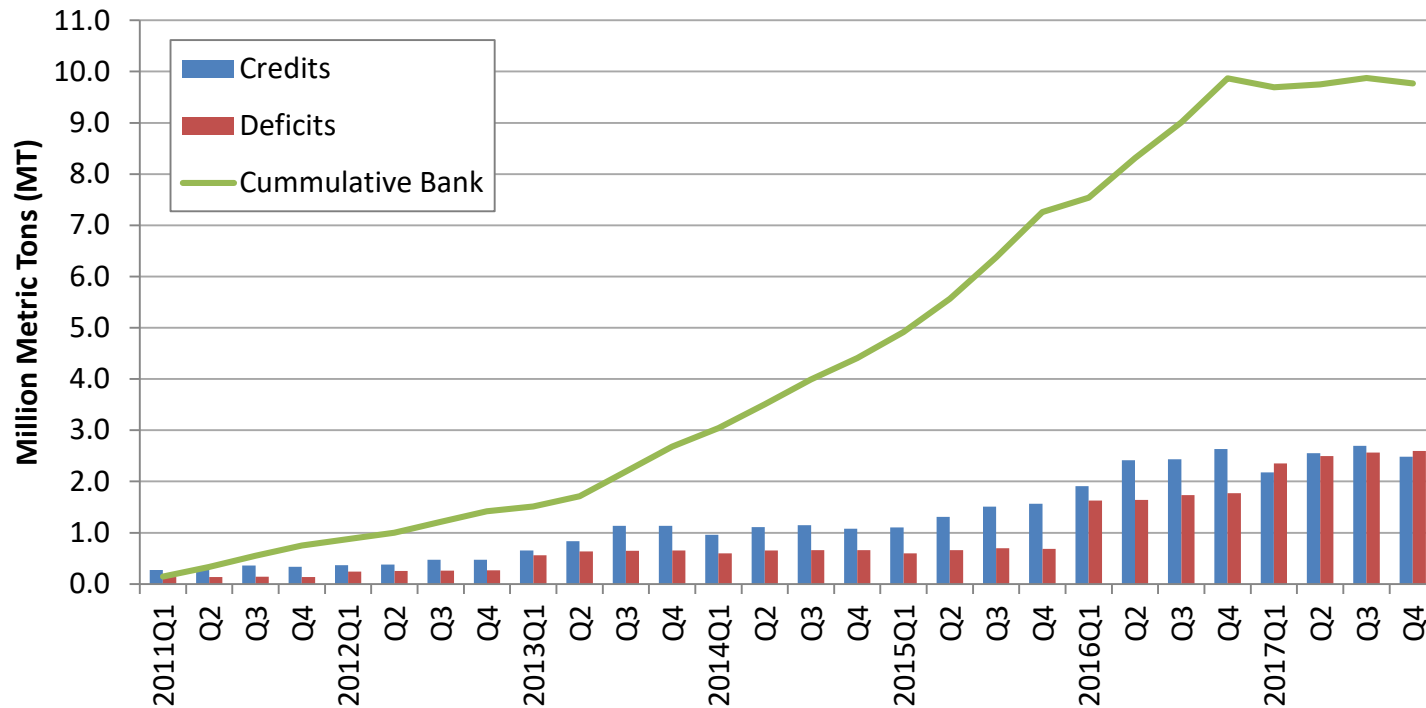
■ Ethanol
 ■ Biodiesel
 ■ Renewable Diesel
 ■ Fossil Natural Gas
 ■ Biomethane
 ■ Electricity

LCFS Credits Prices are Supporting Low Carbon Fuel Acquisition

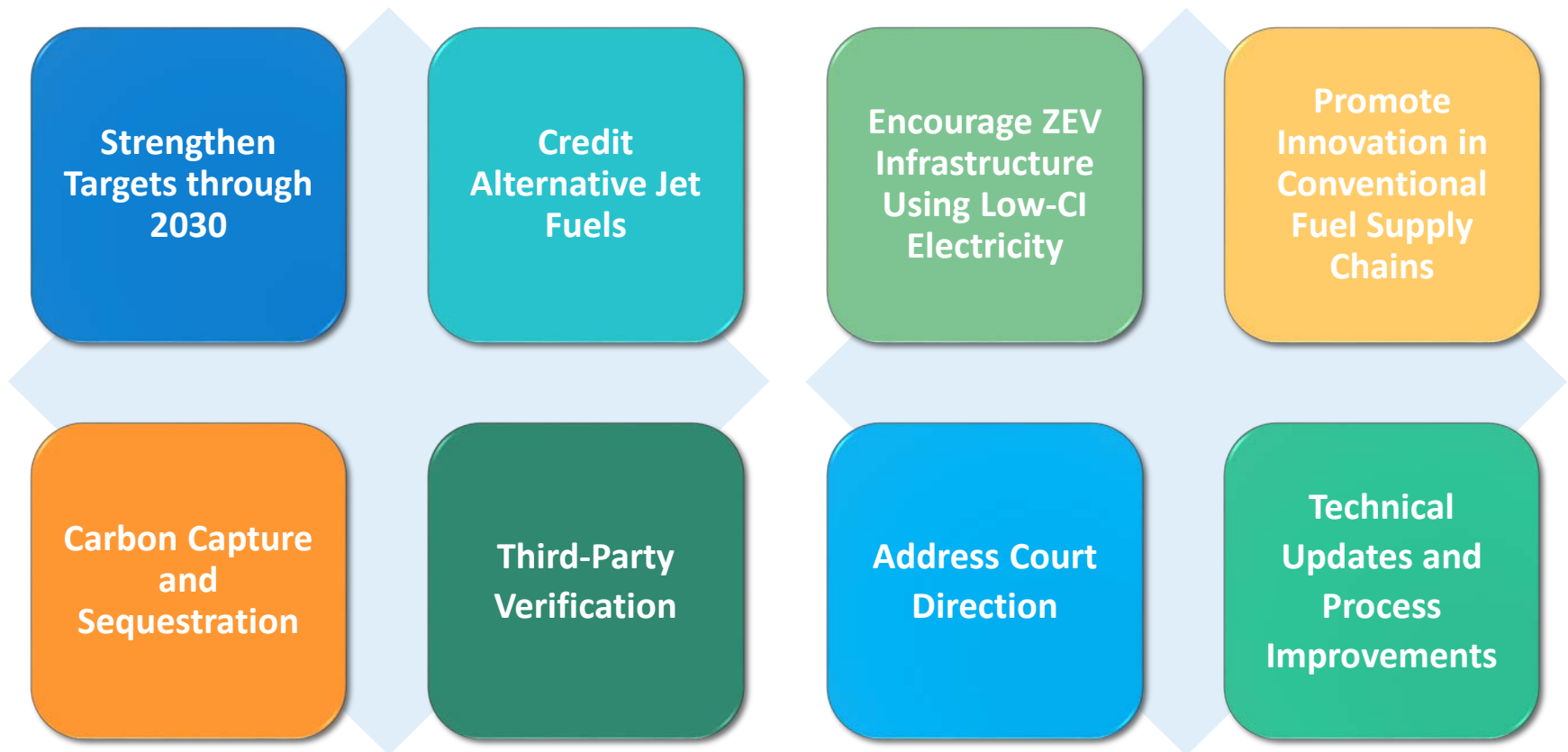


Credit Bank Available to Help Meet More Ambitious Targets

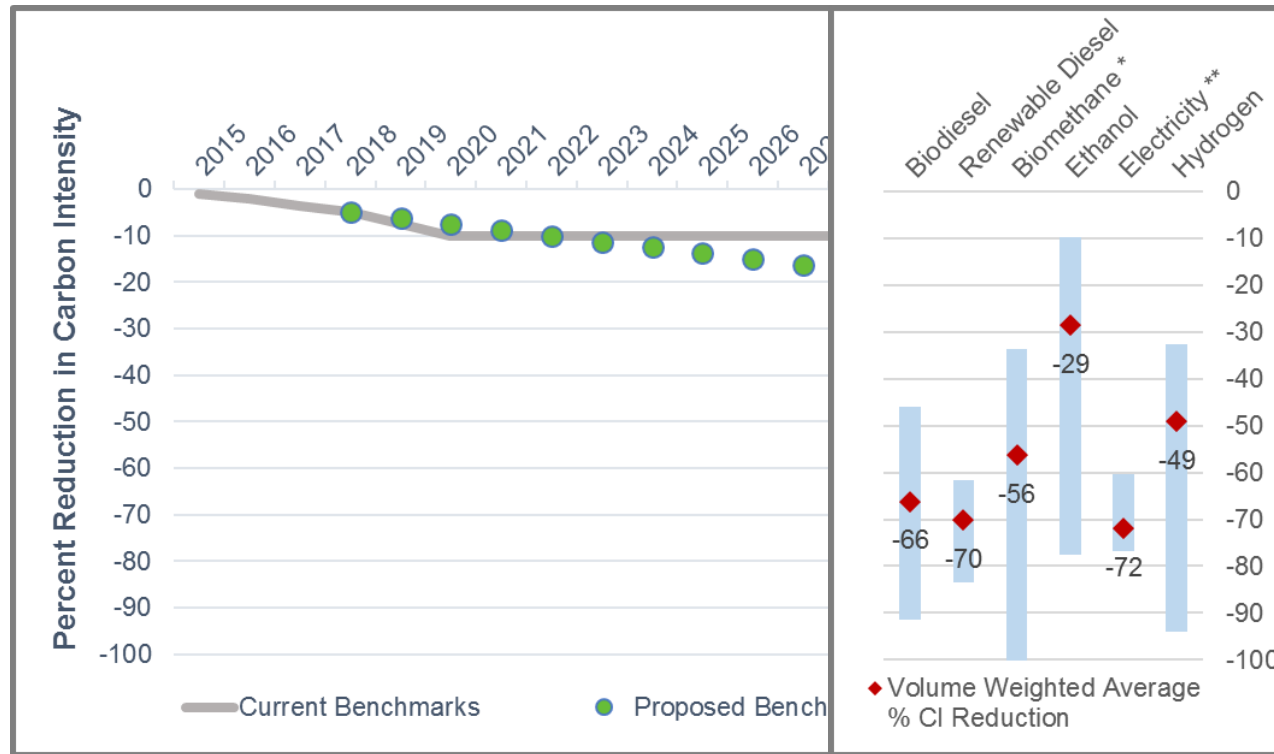
Total Credits and Deficits for All Fuels Reported and Cumulative Credit Bank
Q1 2011 – Q4 2017



Key Objectives of the 2018 Rulemaking

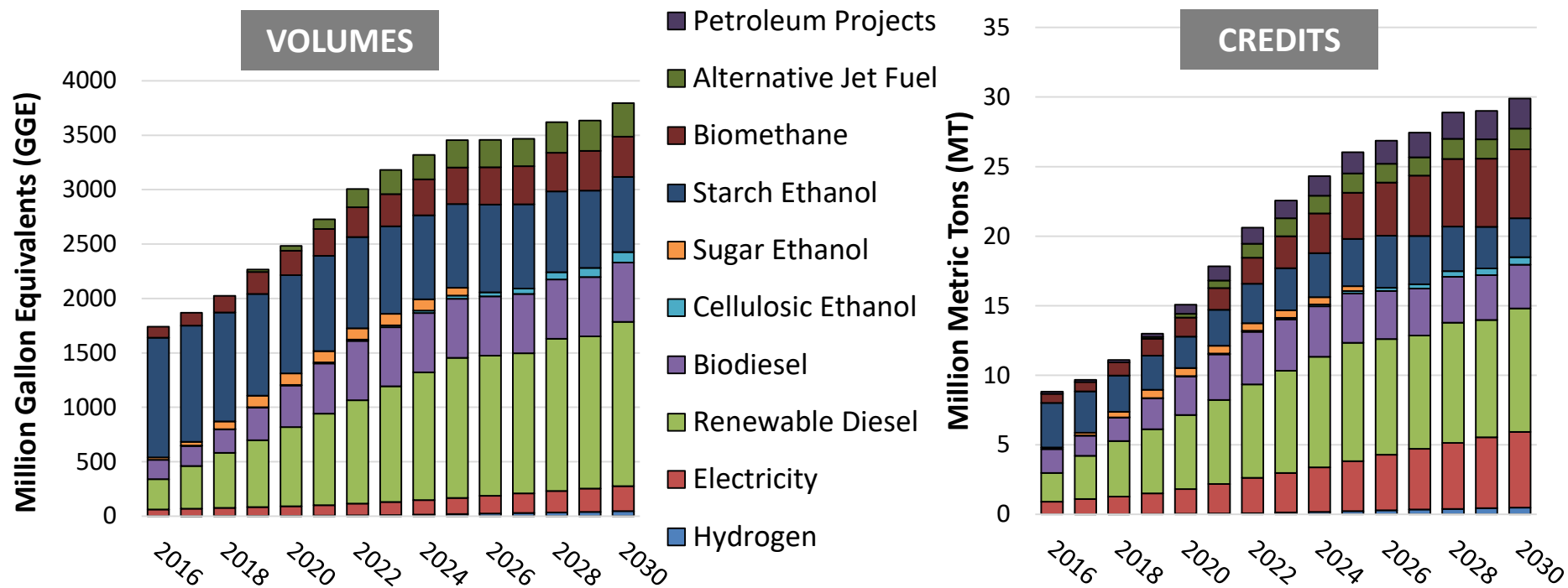


Targeting a 20% Carbon Intensity (CI) Reduction by 2030



| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|----------------------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|
| Percent CI Reduction | 6.25 | 7.5 | 8.75 | 10 | 11.25 | 12.5 | 13.75 | 15 | 16.25 | 17.5 | 18.75 | 20 |

Extensive Scenario Analysis Demonstrating Technological Feasibility



See: Staff Report. Appendix E. Standardized Regulatory Impact Assessment

Expand Fuel Types and Vehicle Applications

- Add Alternative Jet Fuel (AJF) as a credit generating fuel
- Remove exemption for propane
- Expand electric equipment types eligible to generate credit
- Other changes to requirements for CNG, hydrogen, fuels used in military applications and school buses



Zero Emission Vehicle Infrastructure and Renewable Electricity to ZEVs

- Promote the expansion of zero-emission vehicle infrastructure as directed by Executive Order B-48-18
- Add flexibility for pathways using low-CI electricity in ZEV applications



Project-based Crediting

Updates to Innovative Crude, Refinery Investment Credit and Renewable Hydrogen Provisions

- Focus on innovative actions
 - Use of renewable electricity
 - Replace fossil fuels (e.g. renewable natural gas)
 - Solar steam
 - Carbon capture and sequestration
- Simplify eligibility threshold and credit calculation method



Carbon Capture and Sequestration

CCS is an important strategy for long term GHG reductions

California Council on Science and Technology found almost all solutions to 2050 goal require CCS

- Consistent with IPCC studies for other regions
- International Energy Agency emphasizes CCS not optional in meeting Paris climate agreement

CCS offers significant emission reduction opportunities to biofuels

Average Corn
Ethanol
70 gCO₂e/MJ

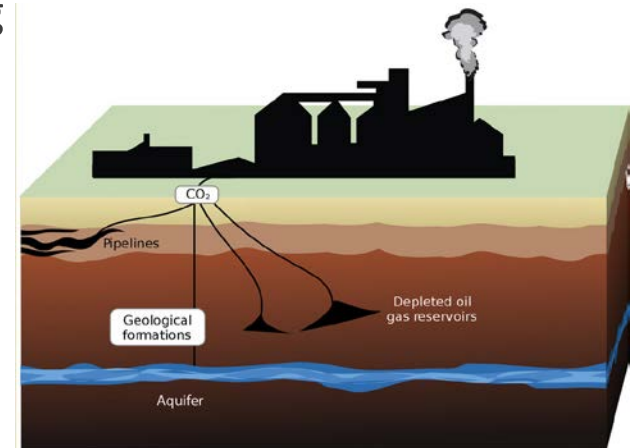


Corn Ethanol
with CCS
40 gCO₂e/MJ



Carbon Capture and Sequestration Protocol

- Protocol would allow CCS credit generation for:
 - Low carbon fuel pathways (e.g. ethanol)
 - Direct air capture projects
 - Refinery investment or innovative crude projects
- Rigorous accounting & permanence requirements
 - Includes 100-year post-injection monitoring
- Storage facility must be co-applicant
- CO₂-EOR allowed
 - Requirements above and beyond traditional EOR practices
 - Only most protective EOR projects will qualify



Third-Party Verification

- Ensures data reported to, and used by, CARB to calculate LCFS credits and deficits is accurate and conforms to regulatory requirements
- Proposed verification program is consistent with the verification programs implemented under CARB's Cap-and-Trade Program
 - CARB is accreditation body and all verifiers must be accredited
 - CARB can modify, suspend, or revoke accreditation, if needed
 - Includes provisions for annual site visits and rigorous conflict of interest requirements
 - CARB would conduct audits of specific verifications and verification body management systems



Court Order Response and Proposed ADF Amendment

- CARB was directed by court order to
 - Re-analyze potential NOx impacts of biomass-based diesel use related to the LCFS
 - Pending completion of corrective action, maintain LCFS diesel standard at 2017 level
- Supplemental analysis indicated overall statewide net health benefits from increased use of biodiesel: PM decreases annually; potential NOx increases may have occurred in certain years.
- In response to court, staff conservatively proposes
 - Funding measures to remediate potential historical NOx
 - Revising the Alternative Diesel Fuels (ADF) regulation's biodiesel in-use sunset to avoid off-road impacts

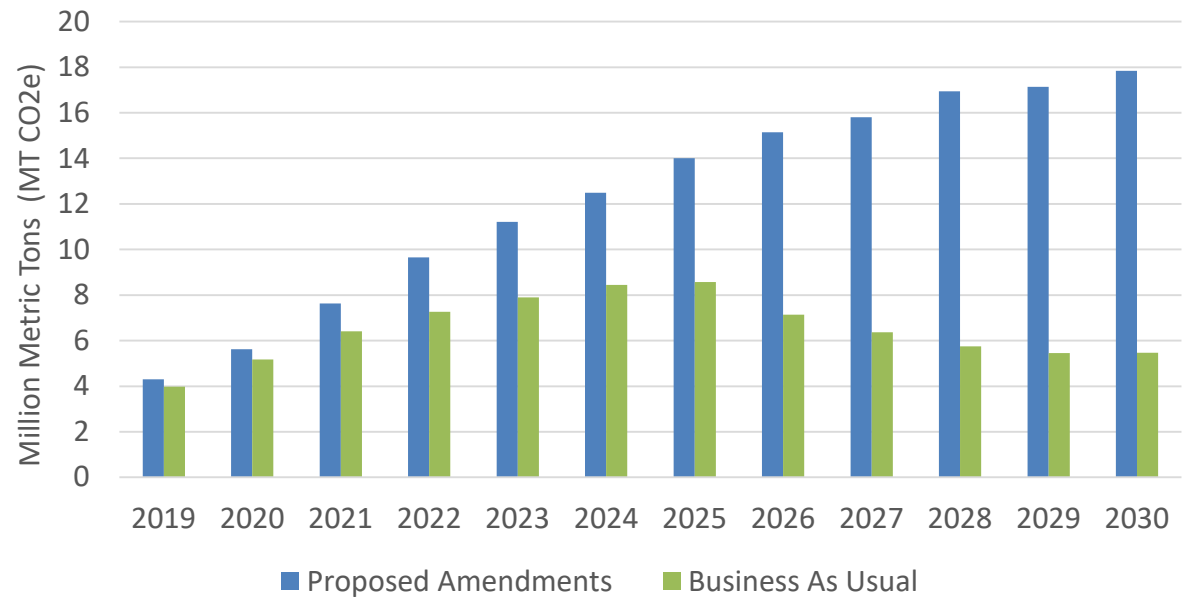
Other Improvements

- ✓ Improve and simplify the pathway application process
- ✓ Create a buffer account as a safeguard mechanism to ensure environmental integrity
- ✓ Reporting requirements
- ✓ Facilitate investment in new credit-generating projects and alternative fuels production
- ✓ Technical updates to models and data
- ✓ Clarify responsibilities and calculation methodologies

Projected GHG Emissions Benefits

Cumulatively,
70 million MT
 additional GHG
 reductions
 beyond a
 business-as-usual
 scenario

GHG Emission Reductions Attributable to LCFS



Environmental Analysis – Impacts

The Draft Environmental Analysis (EA) released for 45-day public comment period (March 9 – April 23, 2018)

Final EA and written responses to comments on the Draft EA will be presented to the Board (Fall 2018)

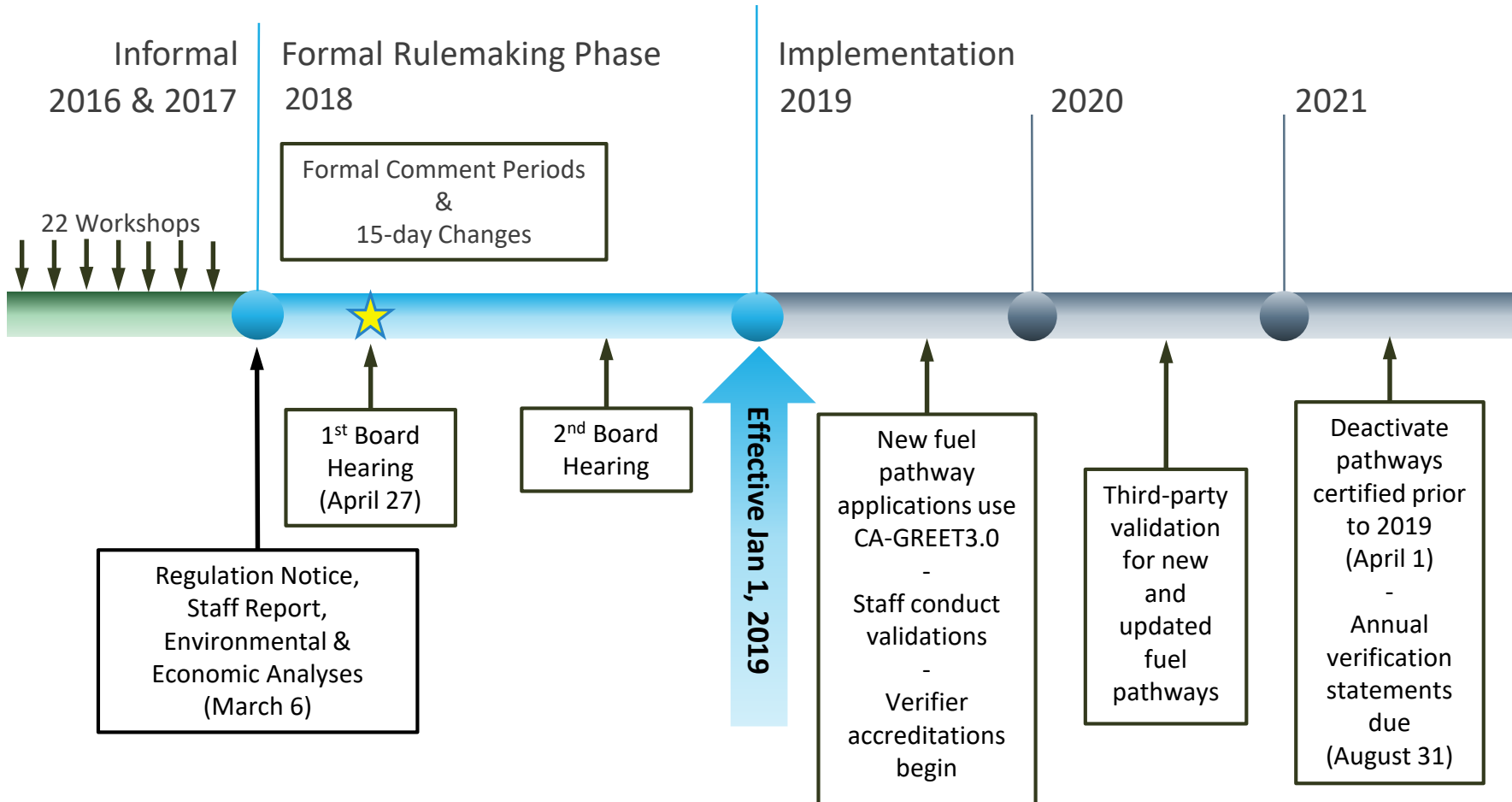
Reasonably foreseeable compliance responses could result in potentially significant and unavoidable adverse impacts in certain resource areas

- Impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval

Economic Analysis

- From 2019 to 2030:
 - California GSP grows from \$2.6 trillion to \$3.4 trillion
 - Employment grows from 23,500,000 to 25,700,000
 - Personal Income grows from \$2.3 to \$2.9 trillion
- Proposed amendments will have minimal impact on the State's economy: average growth rate of State's GSP, employment, and personal income are almost unchanged relative to the Baseline scenario
 - State's economy in 2030 will take less than one month longer to grow to the GSP estimated in the absence of the proposed amendments.
- Cost to obtain third-party verification services represents less than 0.5% of the total direct cost to obligated parties

Rulemaking and Implementation Timeline





Voluntary NO_x Remediation Measure Funding

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Background

- Biodiesel provides net health benefits:
 - Substantial PM 2.5 reductions
 - Slight NOx increase only in older HD engines (pre-2010)
- 790 tons cumulative past NOx in years analyzed (likely overestimated)
 - Not counting 518 tons cumulative past NOx decrease
- Infeasible to mitigate past emissions (already dispersed)
- Proposed funding for accelerated NOx reductions consistent with CARB mission and complementary efforts
- Initial funding: \$4.5 million
 - Additional funding likely needed to remediate 790 tons

Voluntary Accelerated NOx Reductions Funding

- Staff considered options based on:
 - Link to emission source (fuel or vehicle)
 - Geographic distribution (NOx reductions coincide with past NOx increase)
 - Timeliness of reductions
- Propose funding accelerated reductions with Carl Moyer-type approach
 - Only for NOx reductions from on-road/off-road trucks, equipment and engines
 - Utilize CM guidelines and tracking/reporting with modifications
- Allocate to districts based on estimated emissions impact



THANK YOU!