



2016 State Strategy for the State Implementation Plan

**ARB Public Workshop
September 1, 2016
Sacramento, CA**

Agenda

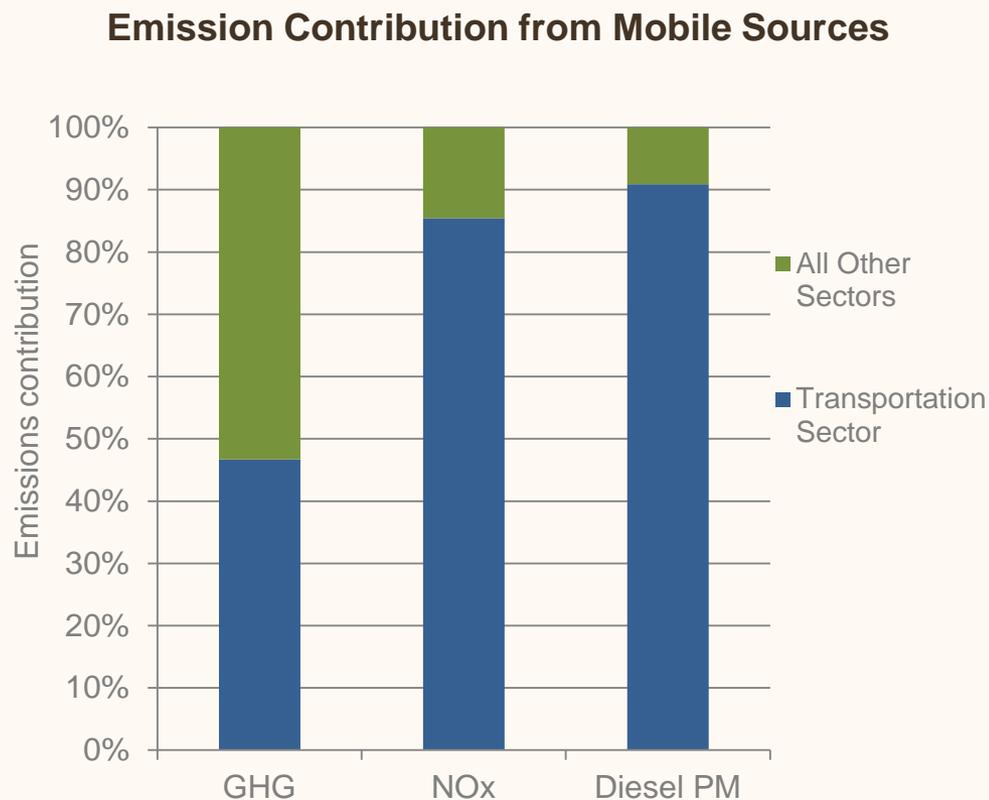
- **Overview of State SIP Strategy**
- Proposed Measures
 - On-Road Light-Duty Vehicles
 - On-Road Heavy-Duty Vehicles
 - Fuels
 - Off-Road Federal and International Sources
 - Off-Road Equipment
 - Consumer Products
- Next Steps

Overview of the State SIP Strategy

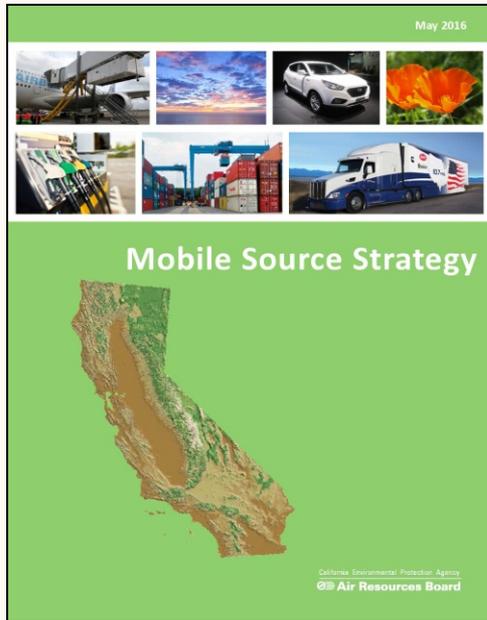


Mobile Source Reductions are Key

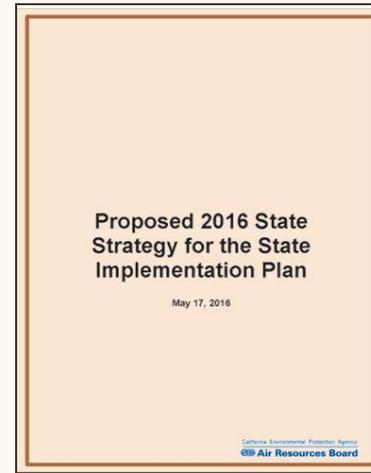
- Largest contributor to smog-forming and diesel PM emissions
 - 80 percent of ozone-forming NOx
 - 50 percent of greenhouse gases
 - 90 percent of toxic diesel PM
- Requires integrated planning process to develop strategies to meet multiple goals



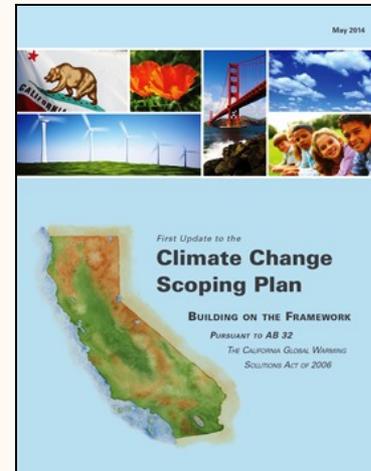
Mobile Source Strategy Framework



Criteria
measures



GHG
measures

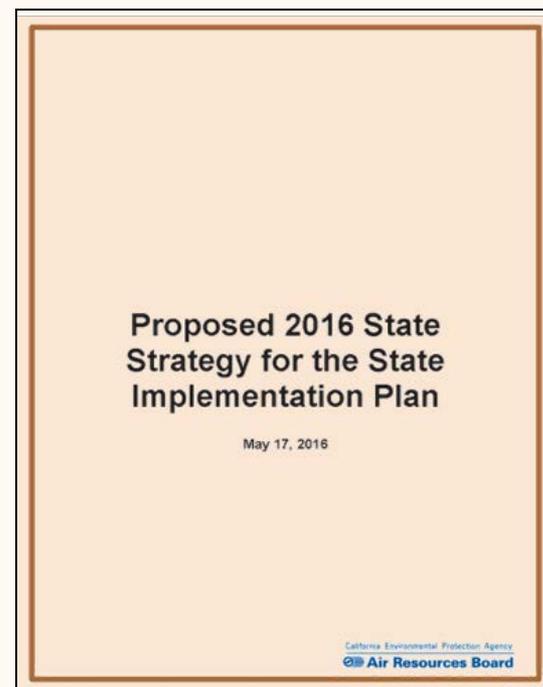


State SIP Strategy Public Process

- State SIP Strategy and Draft Environmental Analysis (EA) released: May 17, 2016
- Public comment period for State SIP Strategy and Draft EA: May 17, 2016 - July 18, 2016
- Public Workshop: September 1, 2016
- First Board hearing: September 22 – 23, 2016
- Second Board hearing: December 8 – 9, 2016

Proposed 2016 State SIP Strategy

- Represents elements of the Mobile Source Strategy needed to meet Clean Air Act requirements
- Outlines specific legal commitments to provide emission reductions necessary for attainment:
 - 80 ppb 8-hour ozone standard
 - 75 ppb 8-hour ozone standard
 - 12 $\mu\text{g}/\text{m}^3$ annual PM2.5 standard
- Work ongoing to define attainment strategy for PM2.5 in the San Joaquin Valley



SIP Development

- Responsibility shared between ARB and local air districts
- ARB develops measures for mobile sources, fuels, and consumer products
- Districts develop measures for stationary sources
- ARB is lead air quality agency for SIP
 - Assess conformance with State law and Clean Air Act requirements
 - Submit to U.S. EPA upon Board approval

Technical Foundation - 1

- Research and field studies
- Emissions inventory
 - Comprehensive updates to stationary and mobile sources, including EMFAC14
 - Updates to spatial and temporal profiles
 - Updates to speciation profiles
- Air quality modeling
 - Updates to modeling platform reflecting latest science
 - Use of global models to determine boundary conditions
 - Incorporates new EPA modeling guidance

Technical Foundation - 2

- Technology and Fuels Assessments
 - Identify the next generation of technologies and fuels
 - Comprehensive evaluation of technology performance, necessary fuels, cost, market readiness, and current deployment challenges
 - Available at:
<http://www.arb.ca.gov/msprog/tech/report.htm>

Attainment Needs

- South Coast and San Joaquin Valley have most critical challenges
- Significant reductions needed to meet ozone standards in South Coast:
 - ~70 percent reduction in NO_x by 2023
 - ~80 percent reduction in NO_x by 2031
- Current programs achieve two thirds of necessary reductions
- Further deployment measures will utilize incentives to deploy technologies
- Meeting PM_{2.5} standards is greater challenge in San Joaquin Valley

SIP Strategy

- Provides ARB's commitment to achieve all of the reductions needed from mobile sources
- Also includes consumer products
- Identifies regulatory and programmatic mechanisms to deploy cleaner technologies and fuels
- Includes actions at local, state, and federal level
- Approximately 80 percent of reductions come from regulatory actions
- Incentive programs ensure sufficient penetration to meet air quality standards by attainment deadlines

Key Mobile Source Actions

- Establish cleaner engine performance standards
- Increase penetration of zero and near-zero technologies
- Ensure durability of emission control systems
- Expand use of cleaner renewable fuels
- Conduct pilot studies to demonstrate new technologies
- Incentivize deployment of cleanest technologies

Incentivizing Deployment of Cleanest Technologies

- Collaborating with South Coast on comprehensive action plan
 - Identify overall funding needs as well as financing mechanisms
 - Explore opportunities to maximize co-benefits of criteria pollutant and GHG reductions
- Coordinating with U.S. EPA and local districts to develop programmatic structure to credit incentive-based measures in SIP

Nature of the SIP Commitment

- Commitment has two components:
 - Take action on new measures according to an implementation schedule
 - Achieve aggregate emission reductions by specific dates
- Individual measure reductions are goal as we initiate rule making process
- Final measures may provide more or less reductions than the amount shown
- Upon U.S. EPA approval, commitment becomes federally enforceable

Implementation Schedule

| Measures | Agency | Action | Implementation Begins |
|---|----------------------------|-------------|-----------------------|
| On-Road Light-Duty | | | |
| Advanced Clean Cars 2 | ARB | 2020 | 2026 |
| Lower In-Use Performance Assessment | ARB / BAR | n/a | ongoing |
| Further Deployment of Cleaner Technologies | ARB / SCAQMD / U.S. EPA | ongoing | 2016 |
| On-Road Heavy-Duty | | | |
| Lower In-Use Emission Performance Level | ARB | 2016 | 2017 |
| Low-NOx Engine Standard – California Action | ARB | 2017 - 2019 | 2023 |
| Low-NOx Engine Standard – Federal Action | U.S. EPA | 2017 - 2019 | 2024 |
| Medium and Heavy-Duty GHG Phase 2 | ARB / U.S. EPA | 2016 - 2019 | 2018 |
| Advanced Clean Transit | ARB | 2017 | 2018 |
| Last Mile Delivery | ARB | 2018 | 2020 |
| Innovative Technology Certification Flexibility | ARB | 2016 | 2016 |
| Zero-Emission Airport Shuttle Buses | ARB | 2018 | 2023 |
| Incentive Funding to Achieve Further Emission Reductions from On-Road Heavy-Duty Vehicles | ARB / SCAQMD | ongoing | 2016 |
| Further Deployment of Cleaner Technologies | ARB / SCAQMD / U.S. EPA | ongoing | 2016 |
| Off-Road Federal and International Sources | | | |
| More Stringent National Locomotive Emission Standards | U.S. EPA | 2016 | 2023 |
| Tier 4 Vessel Standards | ARB / IMO | 2015 - 2018 | 2025 |
| Incentivize Low-Emission Efficient Ship Visits | ARB | 2017 - 2018 | 2018 |
| At-Berth Regulation Amendments | ARB | 2017 - 2018 | 2022 |
| Further Deployment of Cleaner Technologies | ARB / SCAQMD / U.S. EPA | ongoing | 2016 |
| Off-Road Equipment Sources | | | |
| Zero-Emission Off-Road Forklift Regulation Phase 1 | ARB | 2020 | 2023 |
| Zero-Emission Off-Road Emission Reduction Assessment | ARB | 2025 | -- |
| Zero-Emission Off-Road Worksite Emission Reduction Assessment | ARB | tbd | -- |
| Zero-Emission Airport Ground Support Equipment | ARB | 2018 | 2023 |
| Small Off-Road Engines | ARB | 2018 | 2022 |
| Transport Refrigeration Units Used for Cold Storage | ARB | 2017 - 2018 | 2020 |
| Low-Emission Diesel Requirement | ARB | by 2020 | 2023 |
| Further Deployment of Cleaner Technologies | ARB / SCAQMD / U.S. EPA | ongoing | 2016 |

Emission Reductions

- Aggregate emission reductions in the South Coast:
 - 107 tpd NOx, 48 tpd ROG in 2023
 - 97 tpd NOx, 60 tpd ROG in 2031
- Aggregate emission reductions in the San Joaquin Valley:
 - 9 tpd NOx in 2031

*More information on pages 25 and 27 of ARB's Proposed 2016 State SIP Strategy (May 2016), available at: <http://www.arb.ca.gov/planning/sip/2016sip/2016sip.htm>

Economic Analysis

- Assessed Statewide costs and benefits on affected industries and the overall economy
- Strategy provides broad environmental and health benefits
- Measures likely to change the way vehicles, fuels, and mobile equipment are manufactured, distributed, and consumed
- Employment and production shifts within industries

Environmental Analysis

- Draft Environmental Analysis (EA) completed
 - Potentially significant impacts found for some resource areas
- Released for public comment period
 - May 17, 2016 – July 18, 2016
- Staff will prepare responses to relevant comments received on Draft EA
 - Posted prior to December Board Hearing

Agenda

- Overview of State SIP Strategy
- **Proposed Measures**
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Proposed Measures



On-Road Light-Duty Vehicles



Advanced Clean Cars 2

- **Goals:** Increase stringency of fleet-wide emission standards, and ensure ZEVs continue to expand in the market
 - Regulation may include further reductions below current SULEV criteria emission standards
 - Evaluate appropriate policy mechanism (ZEV mandate and fleet standards) to ensure ZEV market continues to expand
- **Type of Action:** ARB Regulation
- **Timeframe:** Board adoption by 2020
 - Implementation 2026 – 2035 (preliminary)

Lower In-Use Emission Performance Assessment

- **Goal:** Ensure in-use vehicles continue to operate at their cleanest possible level
 - On-going study of inspection and maintenance program performance and on board diagnostic (OBD) system based inspections
 - Evaluate effectiveness of OBD focused inspection procedures; make improvements if necessary
 - Analysis of Smog-Check database; vehicle sampling via BAR's Random Roadside Inspection Program; laboratory investigation as needed
- **Type of Action:** ARB Assessment
- **Timeframe:** N/A, on-going

On-Road Heavy-Duty Vehicles



Lower In-Use Emission Level Performance Level

- **Goal:** Ensure in-use vehicles continue to operate at their cleanest levels
 - Revise Periodic Smoke Inspection Program and Heavy-Duty Vehicle Inspection Program (opacity limit)
 - Revise Warranty and Useful Life Period
 - Comprehensive Heavy-Duty Inspection and Maintenance
 - Revise Certification Requirements (e.g. test cycles)
 - Revise the NTE Protocol
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB Board adoption date: 2017 - 2020
 - Implementation schedule: 2020 +

Low-NOx Engine Standard

- **Goal:** Introduce low emission engine technologies that will substantially lower NOx emissions
 - Develop a heavy-duty low-NOx engine standard, including a low-load certification cycle
 - Work collaboratively with U.S. EPA to establish new national low-NOx engine standard
- **Type of Action:** ARB Regulation/U.S. EPA Regulation
- **Timeframe:**
 - ARB Board Hearing date: 2019
 - U.S. EPA Rulemaking: 2019
 - Implementation schedule: 2023 - 2027

EPA's Commitment to Develop Low-NOx Standards in Phase 2 Preamble

“EPA believes the opportunity exists to develop, in close coordination with CARB and other stakeholders, a new, harmonized national NOx reduction strategy for heavy-duty on-highway engines.”

Medium and Heavy-Duty GHG Phase 2

- **Goal:** Establish next generation of Heavy-Duty Truck GHG standards building upon Phase 1 standards
 - 34% reduction in CO₂ (tractor-trailers) compared to Phase 1
 - Federal Phase 2 finalized August 2016
 - California Phase 2 scheduled for adoption in Summer 2017
- **Type of Action:** U.S. EPA Regulation/ARB Regulation
- **Timeframe:**
 - U.S. EPA adoption date (Federal Phase 2): August 2016
 - ARB Board Hearing date (CA Phase 2): 2017
 - Implementation schedule: 2018-2027

Advanced Clean Transit (ACT)

- **Goal:** Increase penetration of clean engine technologies and zero emission buses into transit bus fleets by developing ACT rule amendments
 - Phase-in advanced technology buses
 - Require renewable fuel/cleanest engines for conventional buses
 - Develop flexibility provisions
 - Promote innovative methods of transportation
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB Board Hearing date: 2017
 - Implementation schedule: 2018 - 2040

Last Mile Delivery

- **Goal:** Increase the penetration of zero-emission class 3-7 trucks used for last mile delivery
 - Phase in zero-emission last mile delivery trucks from 2020 through 2030
 - Work with stakeholders to explore mechanisms
 - Update Board next spring
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB Board Hearing date: 2018
 - Implementation schedule: 2020 - 2050

Innovative Technology Certification Flexibility

- **Goal:** Provide certification flexibility for advanced truck and bus technologies needed to meet AQ and climate goals
 - Targets new heavy-duty low-NO_x, low-CO₂, and hybrid engines, plus medium- and heavy-duty hybrid conversions
 - Mostly provides OBD compliance flexibility
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB Board Hearing date: 2016
 - Implementation schedule: 2017-2027

Zero-Emission Airport Shuttle Buses

- **Goal:** Promote deployment of zero emission airport shuttle buses
 - Encourage early introduction of zero emission buses
 - Establish future phase-in requirements
- **Type of Action:** ARB Regulation/Incentives/MOU
- **Timeframe:**
 - ARB Board Hearing date: 2018
 - Implementation schedule: 2023

Incentive Funding to Achieve Further Emission Reductions from On-Road Heavy-Duty Vehicles

- **Goal:** Provide incentive funding to accelerate the penetration of zero and near-zero equipment beyond the rate of turnover achieved through implementation of other measures
 - ARB's Low Carbon Transportation funds and AQIP (~\$7 million per year for low-NOx trucks using renewable fuels (2015- 2020))
 - District's AB 923 and Carl Moyer (~\$28 million per year for cleaner trucks (2015-2020))
 - ARB's Proposition 1B: Goods Movement Emission Reduction Program funds (~\$165 million for cleaner trucks (2016-2018))
- **Type of Action:** Funding programs
- **Timeframe:**
 - ARB Board adoption date: 2016 and annually thereafter
 - Implementation schedule: 2016 - 2023

Fuels



Low-Emissions Diesel Standard

- **Goal:** Replace 50 percent of diesel demand with Low Emissions Diesel by 2031, reduce NOx and PM from fuels
- Specifications:
 - <1 percent aromatics hydrocarbon content
 - Virtually sulfur free
 - Carbon Intensity Maximum: 30-60 gCO₂e/MJ
 - Anticipated to be satisfied mainly by renewable diesel
- South Coast regional targets implementation before Statewide, target off-road, legacy
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - Board Hearing by 2020

Questions & Answers



Got Questions?

Off-Road Federal and International Sources



More Stringent National Locomotive Standards

- **Goal:** U.S. EPA rulemaking for new Tier 5 and remanufactured national locomotive emission standards
- **Type of Action:** ARB Advocacy
- **Proposed Timeframe:**
 - U.S. EPA rulemaking: 2020
 - Implementation:
 - 2023 for remanufactured locomotives
 - 2025 for newly manufactured locomotives

Tier 4 International Vessel Standards

- **Goal:** Advocate with international partners to the International Maritime Organization (IMO) for stricter marine vessel standards
- **Type of Action:** ARB Advocacy
- **Proposed timeframe:**
 - ARB action: 2015-2018
 - IMO action, ratification, implementation: 2020-2025

Incentivize Low Emission Efficient Ship Visits

- **Goal:** Develop programs in cooperation with ports and other stakeholders to incentivize cleaner vessels to visit California ports
- **Type of Action:** Incentives
- **Proposed timeframe:**
 - ARB action: 2017-2018
 - Implementation: 2018+

At-Berth Regulation Amendments

- **Goal:** Investigate the feasibility and cost effectiveness of expanding ARB's At-Berth Regulation
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB action: 2017-2018
 - Implementation: 2022-2032

Off-Road Equipment



Zero-Emission Off-Road Forklift Regulation

Phase 1

- **Goal:** Accelerate deployment of zero-emission forklifts with a lift capacity $\leq 8,000$ lbs
 - Forklifts primed for increased zero-emission technology deployment
 - Provide pathway for technology transfer to heavier equipment and other applications
 - Encourage growth of zero-emission infrastructure at worksites
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - ARB Hearing Date: 2020
 - Implementation: 2023-2035

Zero-Emission Off-Road Emission Reduction Assessment

- **Goal:** Evaluate the state of zero and near-zero emission off-road technologies
 - Identify opportunities to expand use of zero and near-zero emission technologies to larger, higher power-demand applications
 - Inform future measures
 - Follows *Zero Emission Forklift and Airport Ground Support* regulations
- **Type of Action:** Technology Review
- **Timeframe:** 2025+

Zero-Emission Off-Road Worksite Emission Reduction Assessment

- **Goal:** Evaluate state of worksite efficiency technologies:
 - Autonomous equipment and connected worksite technologies
 - Potential metrics for quantifying benefits
 - Estimate emission reductions and cost effectiveness
 - Recommend ways to encourage deployment (e.g., through financial incentives or regulatory credit)
- **Type of Action:** Technology Review
- **Timeframe:** TBD

Zero-Emission Airport Ground Support Equipment

- **Goal:** Accelerate deployment of ZE technology in Ground Support Equipment
- GSE already moving towards electric
- Possible Strategies
 - Incentives for Demonstrations
 - Conservative Approach: Natural turnover + incentives
 - Aggressive Approach: MOU or regulatory program
- Pathway to transition ZE to heavier applications
- **Type of Action:** Incentives and/or Regulation
- **Timeframe:**
 - ARB Board Hearing Date: 2018
 - Implementation: 2023

Small Off-Road Engines (SORE)

- **Goals:**
 - Reduce emissions from small off-road engines
 - Enhance enforcement of current emission standards
 - Tighten exhaust and evaporative emission standards
 - Increase penetration of zero emission technology
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - Board Date: 2018
 - Implementation schedule: 2022 - 2030

Transport Refrigeration Units for Cold Storage

- **Goal:**
Advance zero and near-zero emission technology and support the needed infrastructure developments.
- **Type of Action:** ARB Regulation
- **Timeframe:**
 - Board Date: 2017-2018
 - Implementation: 2020 +

Consumer Products



Consumer Products Program

- **Goal:** Consider approaches to maintain reductions from consumer products
 - Evaluate categories with higher reactivity
 - Investigating emission 'bubble'
 - Reviewing existing exemptions
- **Types of Actions:** ARB Regulation
- **Timeframe:**
 - Board Hearing: 2019 - 2021
 - Implementation: 2020 - 2023

Questions & Answers



Got Questions?

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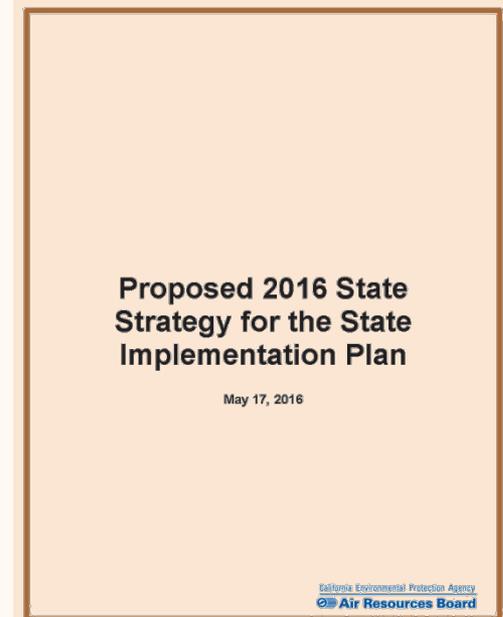
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Next Steps



Next Steps

- **September 22 – 23, 2016**
ARB Board Informational Hearing
on State SIP Strategy
- **December 2016**
ARB Board consideration of State
SIP Strategy
 - Region-specific commitments
 - Prior to Board Hearing: Revised
Draft and Final EA with
Response to Comments



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