Welcome and Opening Remarks

All workshop materials and webcast link:
www.arb.ca.gov/cc/scopingplan/meetings/meetings.htm

E-mail address for online audience questions:
auditorium@calepa.ca.gov
Workshop Outline

- Overview of Scoping Plan Discussion Draft
- Economic modeling
- Schedule
- Environmental Justice Advisory Committee comments with discussion
- ARB Open Discussion
Discussion Draft
AB 32 Scoping Plan Update

- Sets framework to achieve 2030 target and put State on path to achieve long-term climate goals
- Progress will be through regulations, partnerships, and incentives
- Update is part of Administration’s overall climate strategy
  - Safeguarding California
  - Climate Change Research Plan
New Directives and Legislation

- **Executive Order B-30-15**
  - Reduce GHG emissions 40% below 1990 levels by 2030
  - Update Scoping Plan to incorporate 2030 GHG target

- **Senate Bill 32 (SB 32) codifies 2030 GHG target**

- **AB 197**
  - Consider the social costs of GHG reductions
  - Prioritize measures resulting in direct emission reductions
  - Follow existing AB 32 requirements—including considering cost-effectiveness and minimizing leakage
GHG Reduction Targets

- Emissions to be Reduced by 2020
- Additional Reductions by 2030
- Additional Reductions by 2050

*Executive Order B-30-15 and SB 32
**Executive Orders S-3-05 and B-16-2012

Note: MMT = Million Metric Tons
Scoping Plan Update Process

- Being developed in consultation with many stakeholders
  - Climate Action Team
  - Environmental Justice Advisory Committee
  - Local and regional agencies
  - Industry and interested public stakeholders

- Workshops & Board Hearings
  - Concept Paper (June 2016)
  - Discussion Draft (December 2016)
Advisory Groups

 Economic Advisors
   Five core academic economists and energy modelers
   Providing input on tools and modeling assumptions to evaluate economic impact of Scoping Plan

 Environmental Justice Advisory Committee (EJ AC)
   Over 20 Committee meetings and regional community meetings to date
   Draft initial recommendations by sector
   Next meeting to discuss Discussion Draft and other related reports
   December 21-22, 2016 (Bakersfield)
California Climate Strategy

- Achieve 2030 target
- Provide direct GHG emissions reductions
- Minimize emissions leakage
- Facilitate sub-national and national collaboration
- Support cost-effective and flexible compliance
- Support US EPA Clean Power Plan
- Support climate investment for programs in disadvantaged communities
- Provide air quality co-benefits
- Protect public health
Discussion Draft

Key Sectors
Recommendations to Transition Beyond 2020

- Six key sector focus areas
  - Energy
  - Industry
  - Transportation
  - Natural and Working Lands including Agriculture
  - Waste Management
  - Water

- Structure
  - Outline sector vision / high-level goals
  - Acknowledge cross-sector interactions
  - Identify measures to help achieve 2030 target
"Looking to the Future" section intended to identify high-level goals for sector

Intended to capture broad actions that put the sector on the path to achieve the mid-term and long-term GHG reduction goals
Cross Sector Interactions

- Movement away from silo-based approaches
- Intended to acknowledge interactions and encourage policy development that takes advantage of sector synergies
- Multi-sector analysis also acknowledges trade-offs and identifies potential impacts
Sector Measures

- Known Commitments already required or committed to in plans or statute
  - SB 350 - increase renewable energy and energy efficiency
  - SB 1383 - Short-Lived Climate Pollutant Plan
  - SB 375 – support sustainable community development
  - Mobile Source Strategy - help State achieve its federal and state air quality standards

- Known Commitments provide the foundation for the majority of measures identified in each sector to meet the 2030 target

- Potential new measures may need additional evaluation and may have barriers affecting successful deployment

- Some sectors have started to map out supporting actions needed to help move forward with goals and measures
Discussion Draft

Strategy to 2030 – Scenario Analysis
Reference Scenario

- 2030 GHG emissions estimated to be ~301 MMTCO₂e for known commitments and do not achieve target.

![Graph showing emissions from 1990 to 2050 with 2030 goal marked at 260 MMTCO₂e and 671 MMTCO₂e cumulative reductions required to achieve 2030 limit.]
Closing the Gap

- Evaluated three preliminary draft scenarios
  - Scoping Plan Scenario
  - No Cap-and-Trade (Alternative 1)
  - Carbon Tax (Alternative 2)

- Considered legislative direction and Scoping Plan objectives in mapping out options

- Scenarios rely on mix of measures
  - Enhance and extend existing programs
  - New policies and regulations

- Measure implementation details determined in individual agency regulatory and program development processes; assumptions made for purposes of modeling potential emission reductions, cost, and environmental impacts
Draft Scoping Plan / Carbon Tax Scenarios

- Draft Scoping Plan Scenario
  - 2030 Known Commitments
  - New Refinery Efficiency Measure (20% reduction by 2030)
  - Post-2020 Cap-and-Trade Program

- Carbon Tax Scenario (Alternative 2)
  - Same as Draft Scoping Plan but substitute carbon tax for Cap-and-Trade Program
No Cap-and-Trade Scenario

- Enhanced Known Commitments
- New measures
  - Refinery Efficiency Measure (30% reduction by 2030)
  - Industrial sector efficiency (25% reduction by 2030)
  - Increased RNG utilization
  - Electric heat pumps in buildings
- New incentive programs
  - Early retirement/replacement of older gasoline light-duty vehicles and gas furnaces
Policy Analysis
Draft Scoping Plan Scenario

Benefits
- Majority of reductions due to baseline policies and measures
- New measure delivers refinery facility GHG emission reductions
- Declining cap delivers additional GHG reductions beyond other measures to achieve the 2030 limit
- Cap-and-Trade Program constrains emissions through a declining emissions limit and scales to provide additional reductions if other measures do not perform as expected
- Free allocation to minimize emissions leakage, where identified
- Provides compliance flexibility and allows for continuation and expansion international and subnational collaboration through linkages
- Provides auction proceeds for Greenhouse Gas Reduction Fund Investments
- Can be adapted for Clean Power Plan (CPP) compliance mechanism

Drawbacks
- Different legal interpretations about authority
Policy Analysis
No Cap-and-Trade (Alternative 1)

Benefits
- Under ideal conditions, delivers more cumulative emission reductions than needed to achieve 2030 target, but emissions start to increase in later years
- Majority of reductions due to enhanced known commitments
- New measures deliver refinery and industrial facility GHG emission reductions

Drawbacks
- New statutory authority needed for some policies and measures
- Fewer options for minimizing emissions leakage
- Limited opportunities for international or subnational collaboration through linkages
- No auction proceeds to fund Greenhouse Gas Reduction Fund Investments
- Need to identify other measures for compliance with CPP
- Need additional funding for new incentive programs
- Uncertainty may result in lower reductions and that target is not achieved
Policy Analysis
Carbon Tax Scenario (Alternative 2)

**Benefits**
- Majority of reductions due to known commitments
- New measure delivers refinery facility GHG emission reductions
- Provides compliance flexibility
- Could provide revenue for potential Greenhouse Gas Reduction Fund Investments, or other uses

**Drawbacks**
- Carbon tax does **not include** an explicit emissions limit (does not guarantee reductions-uncertainty)
- If reductions aren’t realized, additional measures need to be implemented quickly to make up unrealized reductions
Drawbacks, cont.

- New statutory authority is needed
  - Structure of carbon tax is unclear absent of legislative direction—difficult to evaluate
  - Options to minimize emissions leakage are unclear (include exemptions for trade exposed sectors, putting burden on other sectors for GHG reductions)
- May not achieve reductions beyond the known measures
- No clear path for international and subnational collaboration through linkages
- Uncertain potential for additional GHG reductions at covered entities
- Does not include an enforceable mandate as required by US EPA to reduce emissions at the stack - would need to identify other measures for compliance with CPP
Planned Modeling Updates

Cap-and-Trade and Carbon Tax Scenarios

- Energy efficiency alignment with SB 350
  - Reduce EE assumptions to reflect 2x additional achievable energy efficiency (AAEE) in 2015 IEPR demand forecast

- Behind-the-meter (BTM) rooftop PV
  - Reduce to 18 GW in 2030 so Reference and Draft Scoping Plan Scenarios are the same

- Delay measure implementation to 2020 for:
  - Landfill gas and agricultural methane mitigation
  - Industrial measures
  - Off-road vehicle measures
Planned Modeling Updates

No Cap-and-Trade Scenario

- Increase RPS ~62%
- Increase VMT reductions ~2%
- Increase high efficiency heat pumps
- Increase rail electrification
- Reduce demand of in-state aviation
Discussion Draft

Collaboration
Advocacy & Collaboration

- Regional and local initiatives
  - Locally-driven efforts critical for AB 32 success
  - Emissions being reduced across sectors (codes, standards, general plan improvements; SCSs; improve municipal operations)
  - Proposing regional plan level per capita targets to promote sustainable growth (other metrics or different per capita or service population based targets may be appropriate)
  - Beyond plan level, projects can support State’s goals – new development implement CEQA mitigation using all feasible measures, no net GHG increase

- International efforts
  - State committed to working at national and subnational level to reduce GHGs
Scoping Plan Evaluations

- CEQA environmental analysis
- Economic
- AB 197 Ranges Per Measure
  - GHG S
  - Criteria and Toxics
  - Social cost of carbon
Economic Modeling Outline

- Modeling updates
- Uncertainty
- Next steps
Scoping Plan Economic Analysis

Reference Scenario
Economy; technology; population; practices

Existing Analyses
IEPR, SIP, SLCP, AEO, others

Vision Model

Scoping Plan
Measures
Changes in Technologies & Practices

PATHWAYS ANALYSIS

GHG Emissions

Costs/Savings

Carbon Prices

Other Monetized Costs/Savings

Updated PATHWAYS ANALYSIS

Updated GHG Emissions

Updated Economy

Updated PATHWAYS ANALYSIS

REMI

Macroeconomic Impacts
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**Pathways Analysis**

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Updated GHG Emissions
Scoping Plan Measure Updates

- Scenario and measure updates impact costs and savings from PATHWAYS
- Costs have been added for measures
  - Update since November 7 Scoping Plan workshop
  - Capital and incentive costs have been added for 7 measures
<table>
<thead>
<tr>
<th>Sector</th>
<th>Measure</th>
<th>Scenario</th>
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<tbody>
<tr>
<td>Industrial</td>
<td>25% reduction in energy demand by 2030</td>
<td>Alt. 1</td>
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<tr>
<td>Oil &amp; Gas</td>
<td>25% reduction in energy demand by 2030</td>
<td>Alt. 1</td>
</tr>
<tr>
<td>Refining</td>
<td>20% reduction in GHG s by 2030</td>
<td>All</td>
</tr>
<tr>
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<td>SB 375 VMT reductions</td>
<td>All</td>
</tr>
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<td>Early retirement of R&amp;C space heating &amp; air conditioning</td>
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<td>Flexible loads and workplace charging</td>
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Zero Cost Measures

- **Zero cost emission reductions**
  - Result from conservation, behavior change, or reduced output
  - Associated with responses to dynamic price signals

- **Emissions reductions with a cost**
  - Driven by investments in efficiency or capital expenditures
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**Scoping Plan Economic Analysis**

- Reference Scenario
  - Economy; technology; population; practices
- Existing Analyses
  - IEPR, SIP, SLCP, AEO, others
- Vision Model
- Scoping Plan Measures
  - Changes in Technologies & Practices

**PATHWAYS ANALYSIS**

- GHG Emissions
- Costs/Savings
- Carbon Prices
- Other Monetized Costs/Savings

**REMI**

- Updated Economy
- Macroeconomic Impacts

**Updated PATHWAYS ANALYSIS**

- Updated GHG Emissions
Other Monetized Costs/Savings

- Impact on natural and working lands
  - NWL sector modeling workshop Dec 14, 2016
  - LBNL landscape carbon accounting tool
  - Working to incorporate impact on NWL into modeling

- Human and ecosystem health
  - AB 197 ranges of criteria and toxic emissions are not monetized for inclusion
  - Social costs are not included in the economic modeling
  - These impacts may be included in future Scoping Plans
Scoping Plan Economic Analysis

Reference Scenario
Economy; technology; population; practices

Existing Analyses
IEPR, SIP, SLCP, AEO, others

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Macroeconomic Impacts
Carbon Pricing

- Cap-and-Trade allowance price
  - Range from auction price floor to Allowance Price Containment Reserve (APCR)

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<th></th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
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<tbody>
<tr>
<td>Floor</td>
<td>$15.40</td>
<td>$19.70</td>
<td>$25.20</td>
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<tr>
<td>Reserve</td>
<td>$72.10</td>
<td>$79.70</td>
<td>$85.20</td>
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</table>

- Carbon tax
  - Social cost of carbon (currently around $36 in $2007)

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
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<tr>
<td>3% discount</td>
<td>$48.01</td>
<td></td>
<td>$52.58</td>
<td>$57.16</td>
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</tbody>
</table>
Carbon Price Modeling

- Estimate annual emissions obligation of covered sectors
- Adjust firm production costs to incorporate carbon price to cover annual emissions
  - Under Cap-and-Trade (SP scenario)
    - Allowance allocation for competitiveness and consumer protection
    - Return of value through GGRF
    - Cost containment provisions
    - Uncertainty in allowance price - high certainty in reductions
  - Under carbon tax (Alternative 2)
    - High certainty in price – uncertainty in reductions
Carbon Tax

- Tax structure unknowns
  - Achieving the SB 32 GHG target
    - Adjustable tax if reductions are higher/lower than anticipated
    - Additional direct measures if reductions are not realized
  - Assistance to minimize leakage and ensure California competitiveness
- Distribution of tax revenue
- Linkage with existing and potential partners
Uncertainty

- Reference case or ‘business as usual’ GHG baseline
  Revision of 2020 emissions baseline
  - 2008 Scoping Plan 596 MMTCO2e baseline in 2020 was revised to 545 MMTCO2e
  - 8% reduction due to unanticipated economic downturn

- Measure (and scenario) emission reductions
  - Range of uncertainty across measures

- Measure (and scenario) cost
  - Range of uncertainty across measures
Reference Case Uncertainty

Expected BAU

258 MMT CO2e target

2020  2025  2030

Uncertainty Range
2030 Uncertainty Example: Alt. 1

Expected 2030 BAU

Alt. 1

Alt. 1

Alt. 1

258 MMT CO2e target

2030 Uncertainty Range
2030 Uncertainty Example: Alt. 1

Expected 2030 BAU

GHG range

Alt. 1

258 MMT CO2e target

2030 Uncertainty Range

48
2030 Uncertainty Example: Alt. 1

- Expected 2030 BAU
- 258 MMTCO2e target
- Alt. 1
- Alt. 1

2030 Uncertainty Range
2030 Uncertainty Example: Draft Scoping Plan Scenario

- Expected 2030 BAU
- Direct measures
- Cap and Trade

258 MMT CO2e target

Direct measures
Cap and Trade

2030 Uncertainty Range
2030 Uncertainty Example: Alt. 2

Expected 2030 BAU

Direct measures

Carbon tax

Direct measures

Carbon tax

258 MMT CO2e target

2030 Uncertainty Range
Next Steps

- Finalizing modeling results for the January draft of the 2030 Target Scoping Plan
  - Carbon pricing
  - Monetized impact on natural and working lands

- Evaluating the economic impact of scenarios
  - Direct cost and savings
  - Macroeconomic impact
  - Impact on disadvantaged communities

- Policy assessment of scenarios
  - Context of uncertainty
  - Ability to meet policy criteria outlined by California agencies
Context of Economic Impact

- Under the reference case, the California economy is anticipated to grow from 2020 through 2030
  - Employment
    - Average growth of 0.2% per year
    - Estimated 23.5 million jobs in CA in 2030
  - State GDP
    - Average growth of 2.3% per year
    - Estimated $3.4 trillion CA economy in 2030

- Economic impact of the scenarios is evaluated against the reference case
  - Draft results show the California economy and employment continue to grow under all scenarios
  - Any impact will be measured as a slowing or an acceleration of growth
  - No scenario is anticipated to result in zero or negative growth of the CA economy
Policy Assessment

- Ability to reduce GHGs to meet SB 32 target
- Estimated range of reductions in criteria pollutants and toxics
- Evaluation of avoided social cost
- Impact on disadvantaged communities
- Impact on natural and working lands
- Estimated economic impact
Policy Assessment

- Ability to meet SB 32 target
- Reduction in criteria pollutants and toxics
- Avoided Social Costs
- Impact on Natural & Working Lands
- Impact on Disadvantaged Communities
- Economic Impact
Schedule

- Mid-January 2017: Release full Draft Scoping Plan with all appendices, economic and environmental analyses
- January Board Hearing on full Draft Scoping Plan
- First quarter 2017: Release final Scoping Plan
- Spring 2017: Final Board consideration