



# 2030 Target Scoping Plan

*October 1, 2015*



# Workshop Outline

- ▣ Introduction and Welcome
- ▣ 2030 Target Scoping Plan Overview
- ▣ Greenhouse Gas Emissions Reduction Focus Areas
  - ▣ Short-Lived Climate Pollutants
  - ▣ Energy Efficiency
  - ▣ Natural and Working Lands
  - ▣ Electricity
  - ▣ Transportation and Land Use
- ▣ Economic Analysis
- ▣ Next Steps

# CALIFORNIA CLIMATE STRATEGY

*An Integrated Plan for Addressing Climate Change*



## VISION

**Reducing Greenhouse Gas Emissions  
to 40% Below 1990 Levels by 2030**

## GOALS

**50%  
reduction  
in petroleum  
use in vehicles**



**50%  
renewable  
electricity**



**Double energy  
efficiency savings  
at existing buildings**

**Carbon  
sequestration  
in the land base**



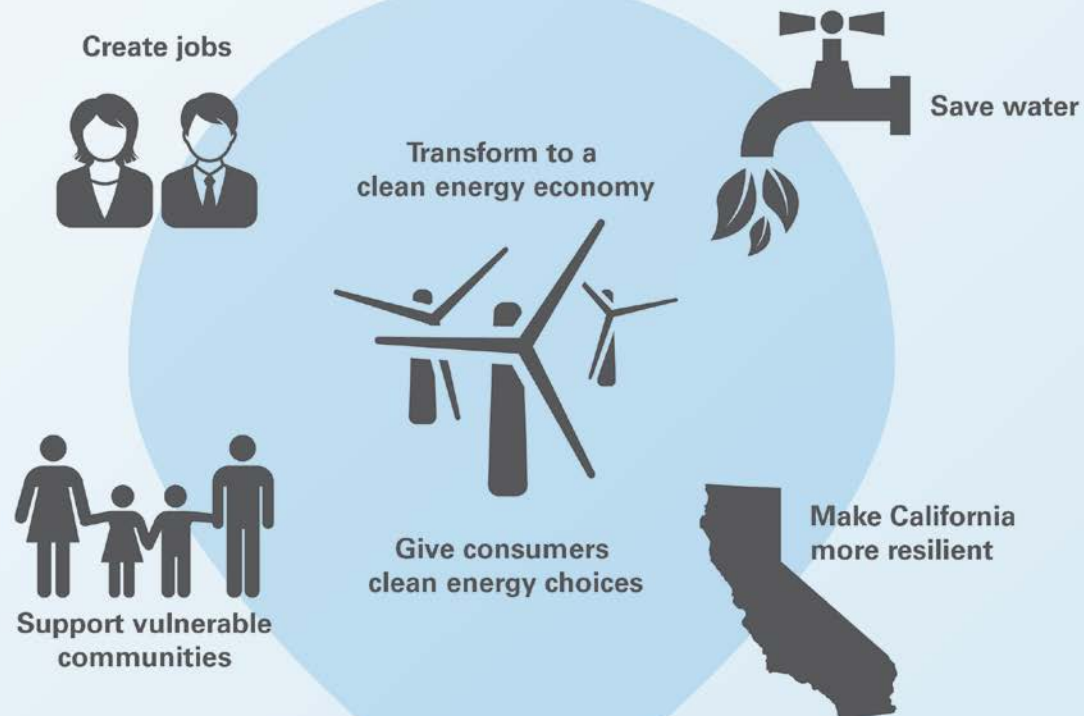
**Reduce  
short-lived  
climate pollutants**

**Safeguard  
California**



# CALIFORNIA CLIMATE STRATEGY

## PRINCIPLES



# CALIFORNIA CLIMATE STRATEGY

## IMPLEMENTATION

### SCOPING PLAN

Climate  
Action Plans

SLCP Plan

Forest  
Carbon Plan

Cap and Trade  
Regulation

2040 CA  
Transportation Plan

### LEGISLATION

AB758 Energy  
Efficiency Plan

GGRF  
Investment Plan

Healthy Soils  
Action Plan

Other plans/regulations for renewables, efficiency, transportation, fuels

## BUILDING BLOCKS

Partnerships



Incentives



Voluntary Action



Local Action



Research

Grants

Regulations

# 2030 Target Scoping Plan Overview

CALIFORNIA AIR RESOURCES BOARD

# AB 32 Objectives

- ▣ Develop a balanced approach to address climate change
- ▣ Improve air quality and public health
- ▣ Provide a consistent policy approach to drive investment in clean technology
- ▣ Provide a model for future national and international climate change efforts
- ▣ Achieve 1990 emissions by 2020; maintain and continue reductions past 2020 to achieve 2030 and 2050 goals
- ▣ Coordinate efforts across government agencies

# Prior Scoping Plans

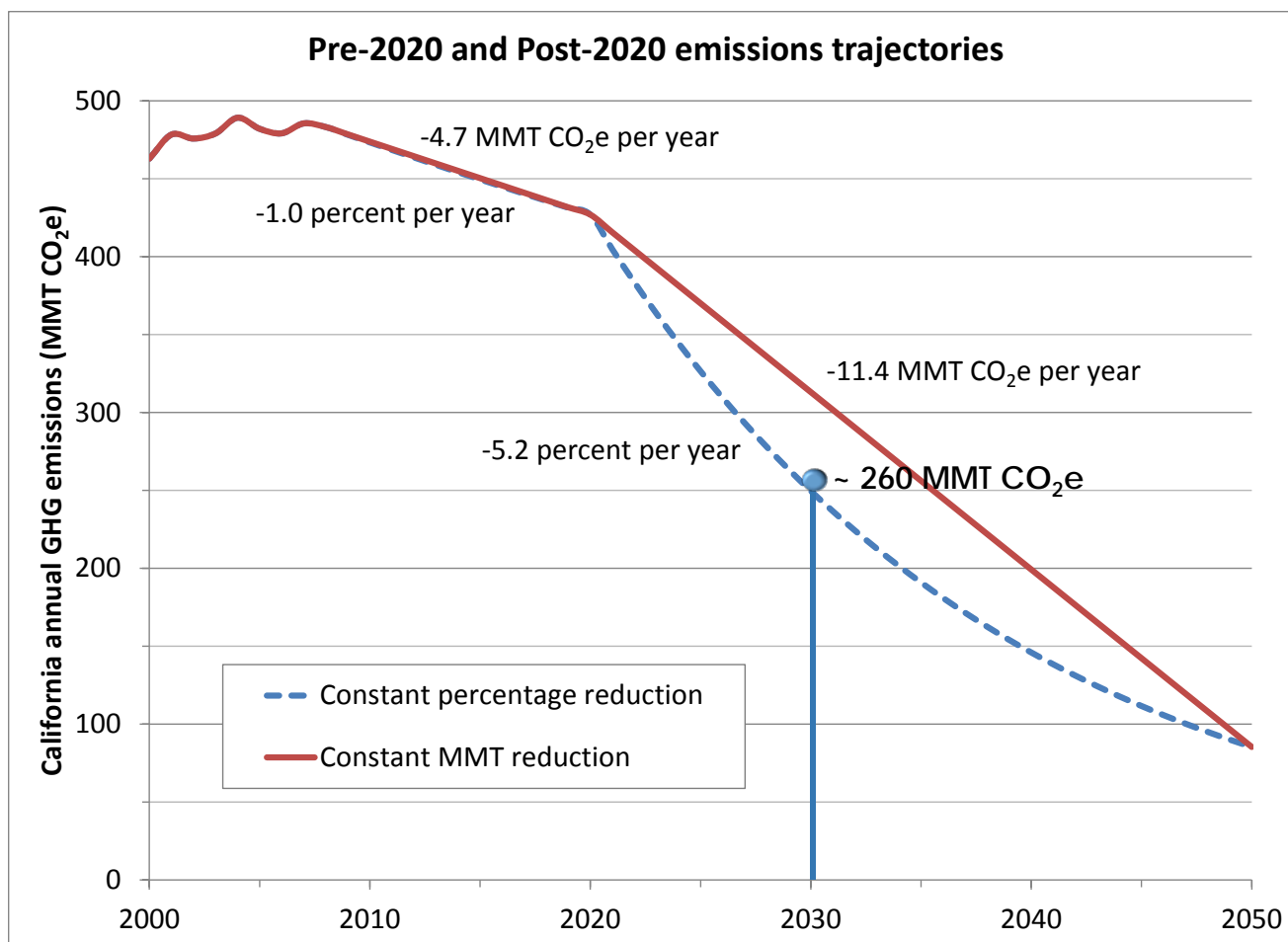
- Established new paradigm for climate mitigation
- First economy-wide climate change plan
- Pioneered the concept of a market-based program supplemented with complementary measures
- Sector-by-sector approach
- Public outreach and education
- Must be updated at least every 5 years



# 2030 Target Scoping Plan Requirements

- ▣ Engagement with State Agencies
  - ▣ Engagement with Legislature
  - ▣ Coordination with other plans (i.e. 111(d), Cap & Trade, SIP, Freight Strategy, etc.)
  - ▣ Economic and Technology Advancement Advisory Committee Engagement
  - ▣ Environmental Justice Advisory Committee Engagement
- Public Health Analysis
  - Environmental Analysis (CEQA)
  - Public Process: Workshops (Sacramento and regional)
  - Draft Report / Final Report (targeted measures and estimated emission reductions)

# Path to 2050 Greenhouse Gas Target



# Guiding Principles

- Reduce Greenhouse Gas Emissions to 40% Below 1990 Levels by 2030 (Executive Order B-30-15)
- Create jobs and support a robust workforce
- Save water
- Support Disadvantaged Communities
- Make California more resilient
- Transform to a clean energy economy
- Give consumers clean energy choices

# Achieving the 2030 Target

- Continuation of programs established to reach the 2020 GHG emissions reduction target
  - Cap-and-Trade Program
  - Low Carbon Fuel Standard
  - Renewable Portfolio Standard
  - Advanced Clean Cars Program
  - ZEV Program
  - Sustainable Freight Strategy
  - Short-Lived Climate Pollutant Strategy
  - SB 375 Sustainable Communities Strategy

# Measure Development Plan

- Governor's Office pillars framework
  - Reduce petroleum use
  - Increase renewable electricity
  - Increase building energy efficiency
  - Reduce short-lived climate pollutants
  - Ensure natural/working lands are carbon sink
- Sector oriented measures
- Maximize GHG reductions across all areas
  - Realize cobenefits at large industrial sources
- Multi-agency collaborative process
- Stakeholder input
  - Public workshops with formal and informal comment periods

# Elements of 2030 Strategy

- Focus areas within pillars framework
  - Energy
  - Green buildings
  - Transportation
  - Water
  - Natural and working lands
  - Agriculture
  - Waste management
  - Short-lived climate pollutants
- Maximize synergies among sectors

# Advisory Groups

- Economic and Technology Advancement Advisory Committee
  - Provide input on tools and modeling assumptions to evaluate economic impact of Scoping Plan
- Environmental Justice Advisory Committee
  - September 25, 2015: Board re-convened EJAC for 2030 Target Scoping Plan and approved new members

# Environmental Justice Advisory Committee

- AB 32 calls for an Environmental Justice Advisory Committee (EJAC) to advise the Board in developing the Scoping Plan and any other pertinent matter in implementing the Act
  - From communities in State with the most significant exposure to air pollution (i.e., communities with minority populations or low-income populations or both)
- Nine existing members appointed by Board in 2013, four new members appointed September 2015
- Committee meetings are open to the public and include a public comment period

<http://www.arb.ca.gov/cc/ejac/ejac.htm>

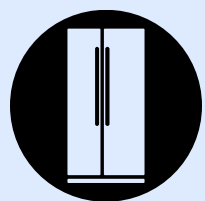


# Agency Perspectives

## GHG Reduction Focus Areas

- ▣ Short-Lived Climate Pollutants
- ▣ Energy Efficiency
- ▣ Natural and Working Lands
- ▣ Electricity
- ▣ Transportation and Land Use

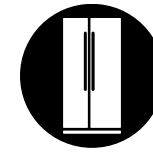
# GHG Reduction Focus Areas



## Short-Lived Climate Pollutants

California Environmental Protection Agency  
**Air Resources Board**

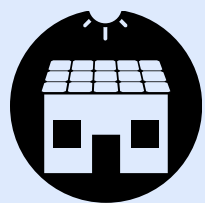




# Short-Lived Climate Pollutants

- ARB developing Short-Lived Climate Pollutant Reduction Strategy
- Recommended action in the 2014 Scoping Plan Update
- Required by Senate Bill 605
- One of Governor's five pillars to meet 2030 GHG goal
- Concept Paper released for public comment in May 2015
- Draft Strategy just released for public comment and to be discussed at workshops on October 13 (Sacramento), October 14 (South Coast), and October 19 (San Joaquin Valley)

# GHG Reduction Focus Areas



## Energy Efficiency



**CALIFORNIA**  
ENERGY COMMISSION



**California**  
Public Utilities  
Commission



California Environmental Protection Agency  
**Air Resources Board**



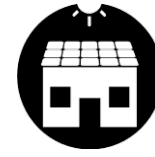
# Scope

- Very large, cross sector potential GHG reductions
  - Energy used by buildings ~25% of GHG emissions
  - Buildings use ~68% of electricity & ~55% of natural gas
- EE almost always the most cost effective approach
  - Less costly to avoid consumption compared to generation
- Improving existing buildings is critical to 2030 goals
  - Current homes will be ~87% of housing in 2030
  - Current businesses will be ~80% of commercial sq ft in 2030
- 2030 goal requires full offset of demographic and economic driven load growth plus begin to reduce total energy consumption



# 2020 Status Update

- ▣ Appliance standards – state & federal
  - ▣ TVs, battery chargers, water, LEDs, computer/displays, HVAC
- ▣ Utility energy efficiency programs
  - ▣ CPUC approves budget and oversees IOU EE programs
  - ▣ POUs report progress to CEC
- ▣ Building standards
  - ▣ Update effective 7/1/2014; next update expected 1/1/2017
- ▣ Energy Services Assistance Program & Weatherization Assistance Program ensure services for disadvantaged communities
- ▣ Clean Energy Jobs Act (Prop. 39) for K-14 public schools



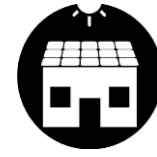
# Legislative Update

## ■ SB 350

- Establish annual targets for statewide EE savings and demand reduction to achieve doubling of savings by 2030
- “Measure” EE savings using normalized metered consumption where feasible and cost-effective

## ■ AB 802

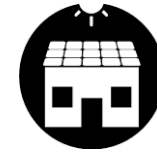
- Incentives for existing buildings coming up to current code
- Energy performance benchmarking for large buildings
- Increased energy usage data access for CEC to improve forecasting capabilities



# Vision

- ▣ Broad market based demand for energy efficiency services
- ▣ Innovative business solutions deliver savings
- ▣ Efficiency valued as a real estate attribute
- ▣ Affordable financing available for all Californians
- ▣ Efficiency procured as a clean distributed energy resource, analogous to generation





# Implementation Tools

- ▣ Continued delivery of validated savings from cost-effective utility EE programs and codes & standards
  - ▣ Appliance standards to address rapidly growing plug loads
  - ▣ Zero net energy new construction policy
  - ▣ Complementary utility programs and codes and standards to steadily improve existing buildings
    - ▣ Existing Buildings Energy Efficiency Action Plan
- ▣ Emerging technologies and R & D
  - ▣ LEDs
  - ▣ Highly efficient heat pumps
- ▣ Market based approaches that attract private capital and enable innovative business models and financing

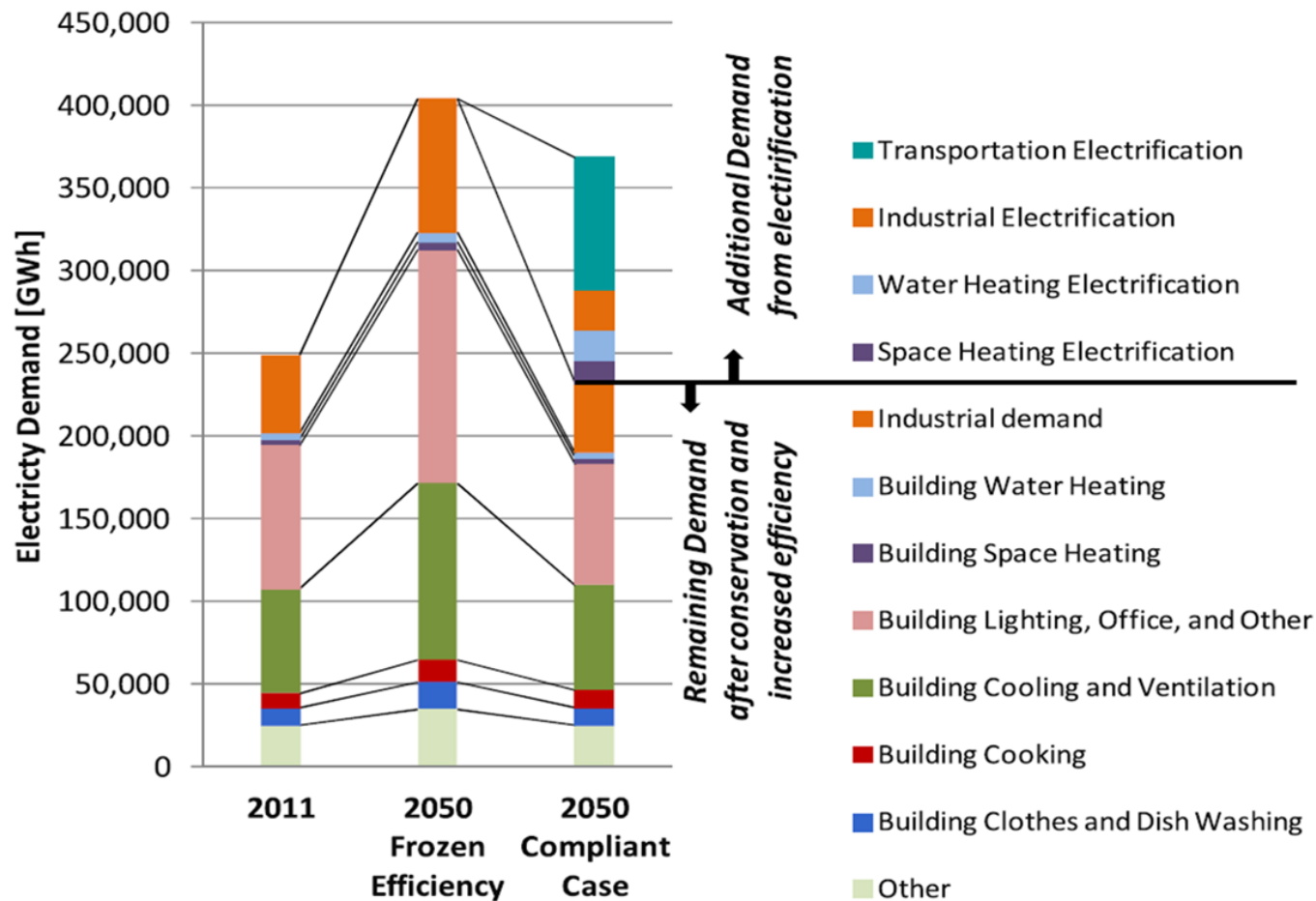


# Overlap with Other Sectors

- Electricity sector is primary overlap
  - Increasing EE reduces electricity infrastructure needs
  - Increasing EE lowers renewable energy procurement requirements
  - Potential for electrification of end uses that are primarily natural gas today (water heating, space heating)
- Transportation sector is secondary overlap
  - Increasing EE creates headroom lessening infrastructure build out for electrified transportation



# Overlap with Other Sectors



Source:  
Wei et al.,  
2013



# Green Buildings – Scope

- Energy Efficient AND
  - Conserve Water
  - Recycle and Prevent Waste
  - Reduce Transportation Impacts
  - Contribute to Cool Communities
- Comprehensive approach to support climate goals
- Strategy focused on new and existing buildings





# 2020 Status Update

Measure	Update
State Leading by Example	On track to meet or exceed goals
Green Building Standards Code	Mandatory requirements and voluntary “reach” standards
Beyond Code	Local governments advancing innovative programs
Existing Building Retrofits	Roadmap to action





# Implementation Tools



- Strengthen the CALGreen Code
- Expand voluntary efforts
- Advance green building rating systems
- Expand emphasis of existing buildings
- Augment existing incentive programs
- Continue research activities



# Overlap with Other Sectors

## Energy

- GHG reductions counted under energy efficiency measure

## Water & Waste

- Perform much better in certified green buildings

## Transportation

- Dominates carbon footprint of buildings

## Certified Green Buildings

- Achieve significant GHG savings





# Mid- and Long-Term Vision

- ▣ Vision for 2030
  - ▣ Build upon ZNE and green building programs
  - ▣ Establish goals and a path towards zero carbon buildings
  
- ▣ Vision for 2050
  - ▣ Buildings generate zero or near-zero GHG emissions over the course of the year





# Questions & Comments

ENERGY EFFICIENCY

# GHG Reduction Focus Areas



## Natural & Working Lands

California Environmental Protection Agency  
 **Air Resources Board**





# Scope

Forests



Wetlands



Rangeland



Farmland

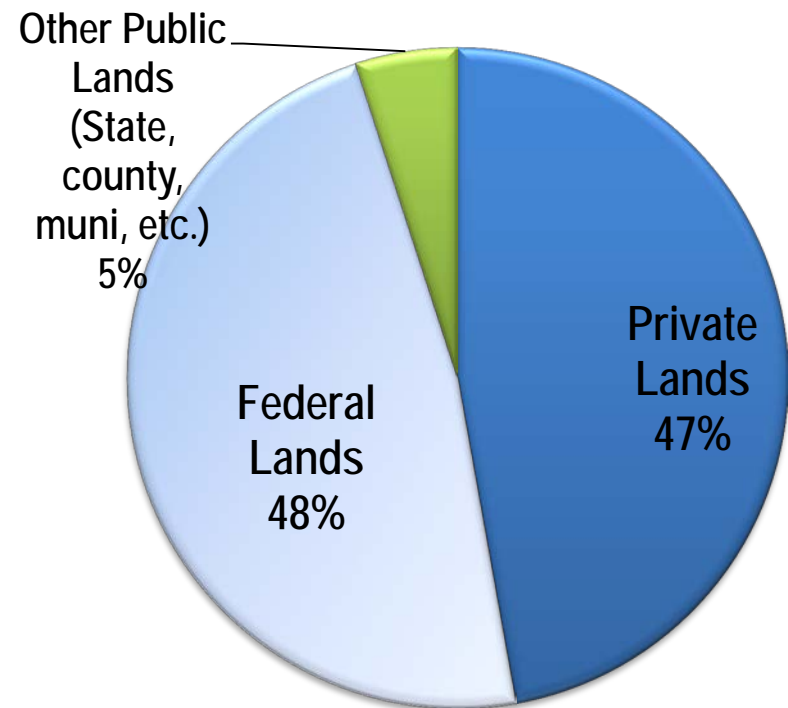




## Scope



## Land by Major Ownership



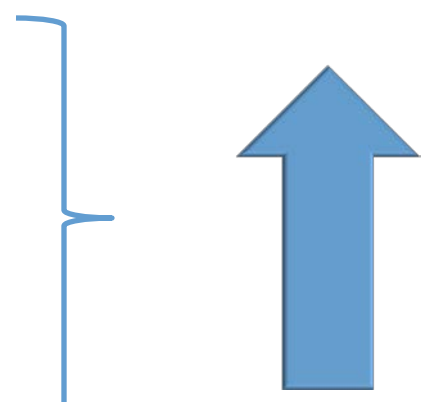


# The Value

- ▣ **California's land base stores carbon** below ground, in soil and root systems, and above ground, in trees, shrubs, grasses and other plant biomass
- ▣ **Healthy and resilient natural and working lands provide sustainable public benefits in addition to carbon sequestration**, such as water filtration, improved air quality, wildlife habitat, temperature moderation through shading, and soil fertility that supports food production
- ▣ **Conservation of natural and working lands supports sustainable communities**
- ▣ **Natural and working lands provide jobs, support regional economies and improve quality of life for all California residents.**



# These Values are Threatened

- ▣ Land Conversion for Development
  - ▣ Degradation
  - ▣ Drought
  - ▣ Sustained Heat
  - ▣ Fire
- 



# 2020 Status Update

## ▣ Investments

- ▣ Land Conservation
- ▣ Habitat Restoration
- ▣ Enhanced Land Management
- ▣ New Technology
- ▣ Agricultural Water Use Efficiency
- ▣ Dairy Digesters



# 2020 Status Update

## ▣ Planning

- ▣ Forest Carbon Plan
- ▣ Bioenergy Action Plan
- ▣ Water Action Plan
- ▣ State Wildlife Action Plan
- ▣ General Plan Guidelines
- ▣ Safeguarding California





# 2020 Status Update

- ▣ Collaboration
  - ▣ Forest Fire Risk Reduction
  - ▣ Watershed Improvement Program
  - ▣ Natural Disaster Resiliency Competition
  - ▣ Healthy Soils Initiative



## Vision 2030 and 2050

- ▣ **Protect** Minimize Conversion
- ▣ **Enhance** Carbon Sequestration Potential
- ▣ **Innovate** Across Sectors
- ▣ **Develop** Sequestration Targets
- ▣ **Align** Climate Targets with Co-Benefits



# Implementation Tools: Protect

- ▣ Sustainable Agricultural Lands Conservation Program
- ▣ Forest Legacy Program
- ▣ Land Use Planning



# Implementation Tools: Enhance

- ▣ Management for Forest Health:
  - ▣ Reforestation, Insect and Disease Infestations, High Fire Risk Areas
- ▣ Wetland Restoration
- ▣ Healthy Soils Initiative
  - ▣ Building soil organic matter to sequester carbon, increase water retention, improve air and water quality, reduce sediment erosion and dust, improve biological diversity and improve plant health and yields.
- ▣ CDFA Fertilizer Research and Education Program



# Implementation Tools: Innovate

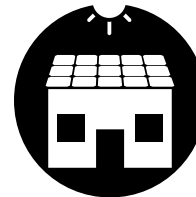
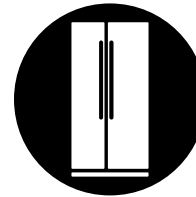
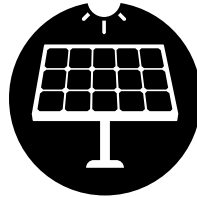
- ▣ Biomass Waste Diversion
  - ▣ Bioenergy
  - ▣ Biofuels
  - ▣ Compost
- ▣ Urban Greening
  - ▣ Energy Efficiency
  - ▣ Active Transportation

## Biomass Diversion & SLCP Reductions

Forest  
Management  
& Bioenergy

Land Protection  
& Avoided VMT;  
Urban Greening

Ag & Forest Waste  
Diversion to Biofuels

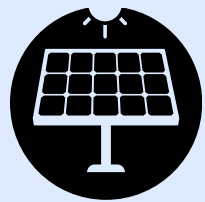




# Questions & Comments

Natural and Working Lands

# GHG Reduction Focus Areas



## Electricity



**CALIFORNIA**  
ENERGY COMMISSION

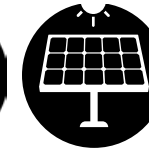


**California**  
Public Utilities  
Commission



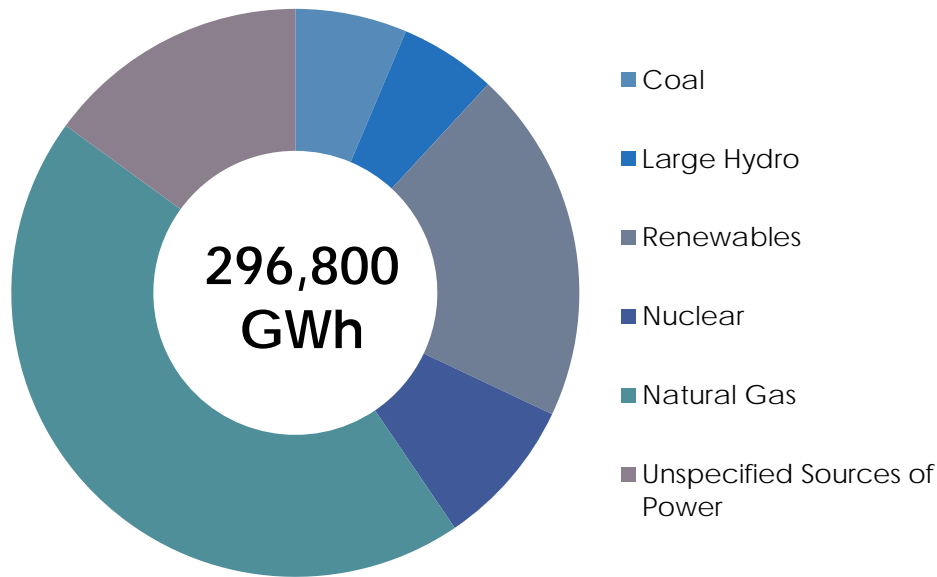
California Environmental Protection Agency  
 **Air Resources Board**





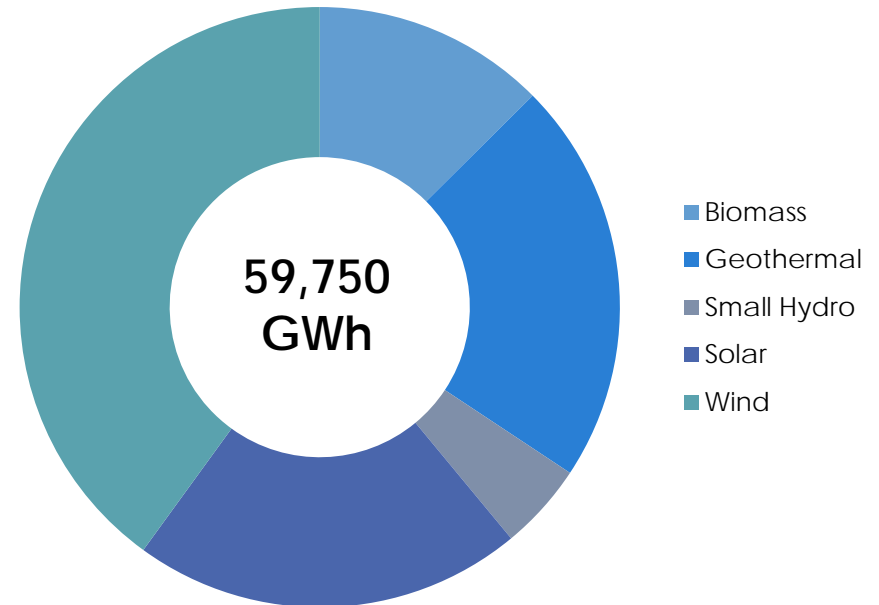
# Electricity Sector in California

Total California Generation  
(GWh)

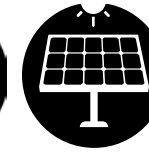
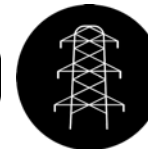


Instate: 198,900 GWh Imports: 97,900 GWh

Total Renewable Generation  
(GWh)



Instate 44,850 GWh Imports: 14,900 GWh

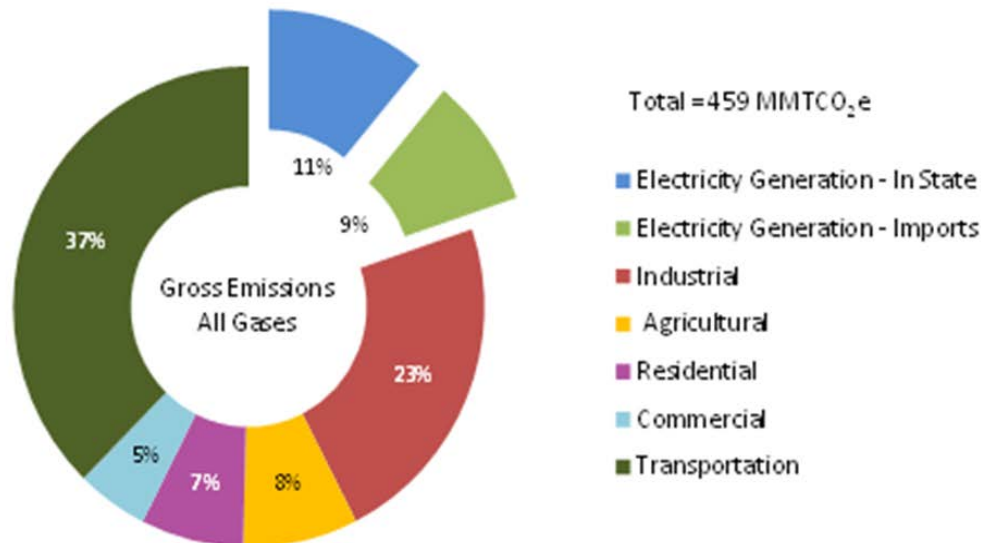


Electricity

# Focus Area Description & Scope

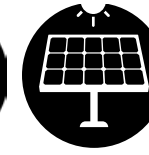
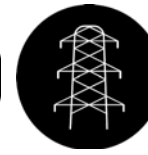
Executive Order B-30-15 sets statewide goal to reduce GHG emissions 40% below 1990 levels by 2030

**2013 GHG Emissions by Sector**  
Million Metric Tonnes of CO<sub>2</sub> Equivalent (MMTCo<sub>2</sub>e)



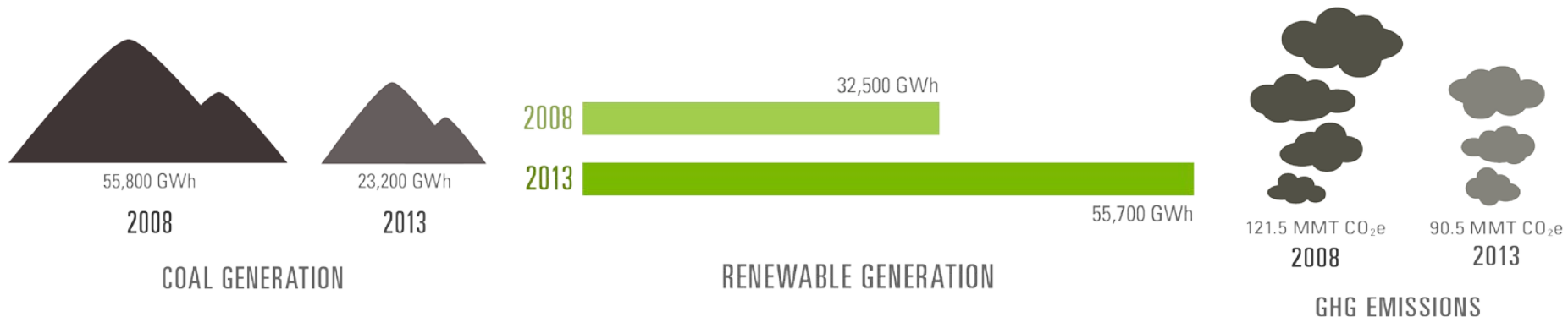
## GHG Emissions Statewide

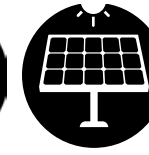
- 20% from electricity sector
- About ½ from out-of-state electricity
- 37% from transportation



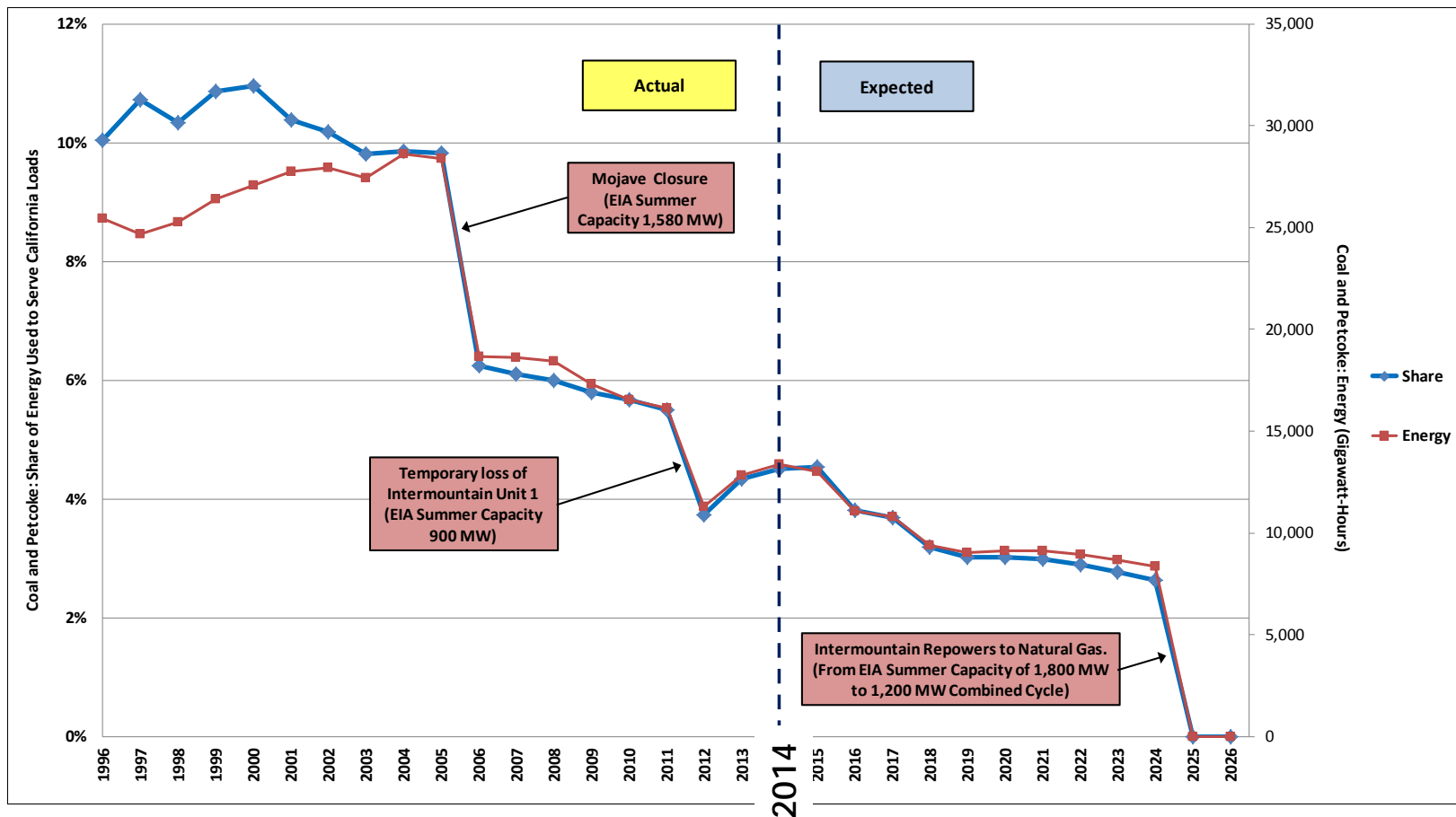
## Vision to 2020

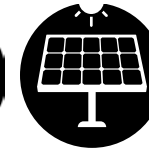
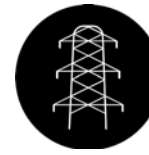
- Electricity sector is about 20% below 1990 GHG emission levels
- From 2008 to 2013:
  - Renewable generation almost doubled
  - Coal generation reduced by more than half
  - GHG emissions reduced by a quarter





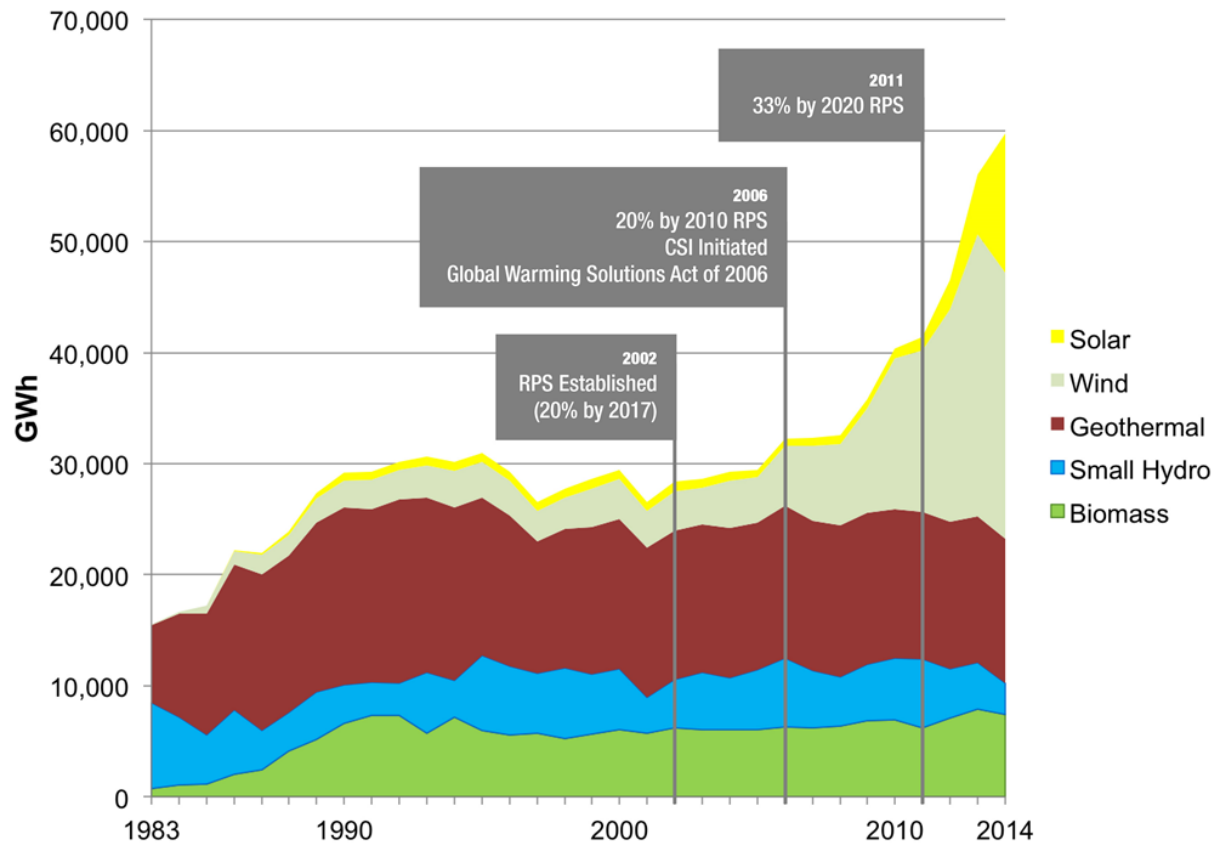
# Annual and Expected Energy from Coal Used to Serve California, 1996 – 2026 (Includes Imports)



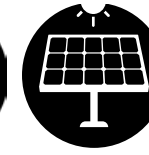
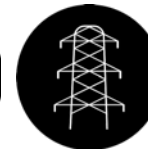


Electricity

## California Renewable Energy Generation by Resource Type (In-state And Out-of-state)

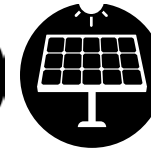
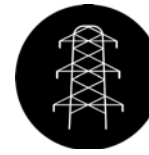


Source: CEC Tracking Progress Web Page



# Achieving 2020 Goals

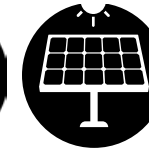
- ▣ Electricity sector is about 20% below 1990 GHG emission levels
- ▣ Energy/Water Nexus
- ▣ GHG reduction/climate programs
  - ▣ Renewables Portfolio Standard
  - ▣ Customer-side distributed generation programs
  - ▣ Cap-and-Trade
  - ▣ Combined Heat and Power Programs
  - ▣ Energy Efficiency
  - ▣ Electric Vehicle Programs
  - ▣ Integrating variable resources



Electricity

## SB 350, De León

- Increases the 33% RPS to 50% RPS
- Paves the way for transformation of the California ISO into a regional organization
- Requires integrated resource plans
- Requires studies on low-income customers' access and barriers to clean technologies
- Ensure low-income residents benefit from clean energy policies

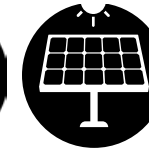


# 50% Renewables and Reliability

- Increasing renewables beyond 33% creates integration challenges
- Overgeneration expected at some times-of-day
- Flexible supply and demand needed
- Regional marketplace supports renewable integration

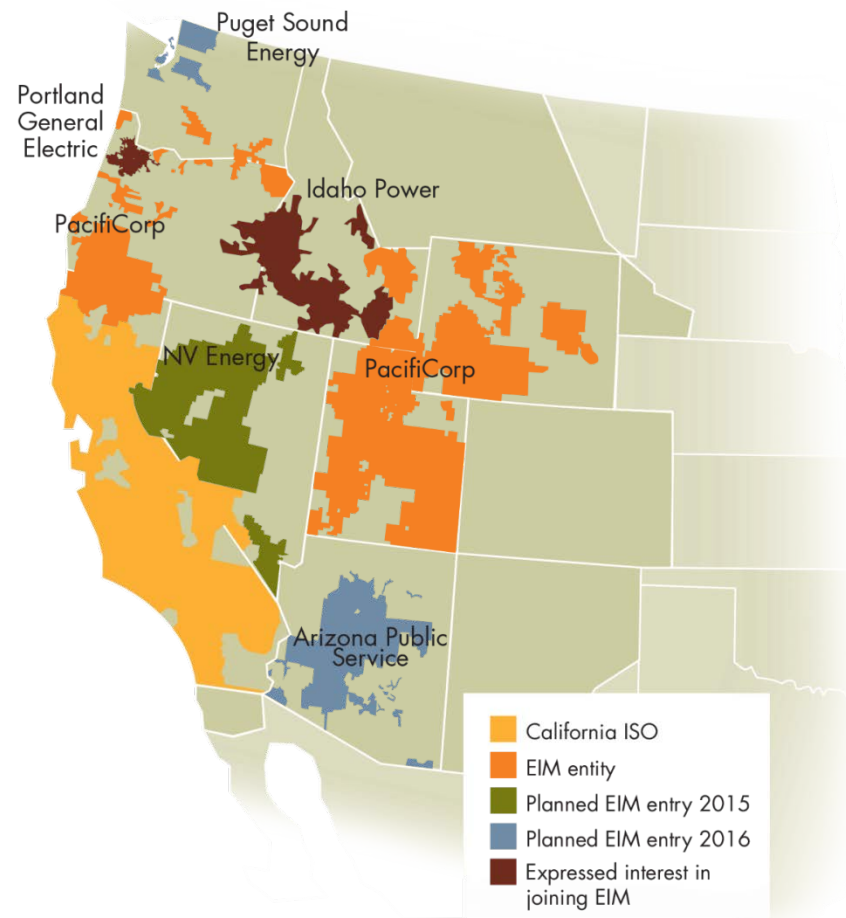
Solutions
Target energy efficiency
Increase storage and demand response
Enable economic dispatch of renewables
Decarbonize transportation fuels
Retrofit existing power plants
Align time-of-use rates with system conditions
Diversify resource portfolio
Deepen regional coordination

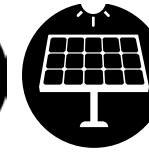
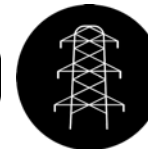




Electricity

# Energy Imbalance Market





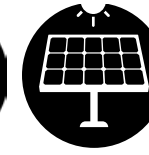
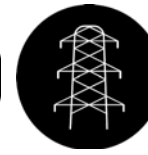
# Implementation Tools

## Market-Based Mechanisms

- ▣ Cap-and-Trade

## Planning Initiatives

- ▣ Comprehensive clean energy procurement
- ▣ RETI 2.0
- ▣ Regional grid



# Implementation Tools

## Research and Development

- ▣ Synchrophasors
- ▣ Improved forecasting and grid modeling
- ▣ Microgrids
- ▣ Energy storage
- ▣ Demand response

# Questions & Comments

ELECTRICITY

# GHG Reduction Focus Areas

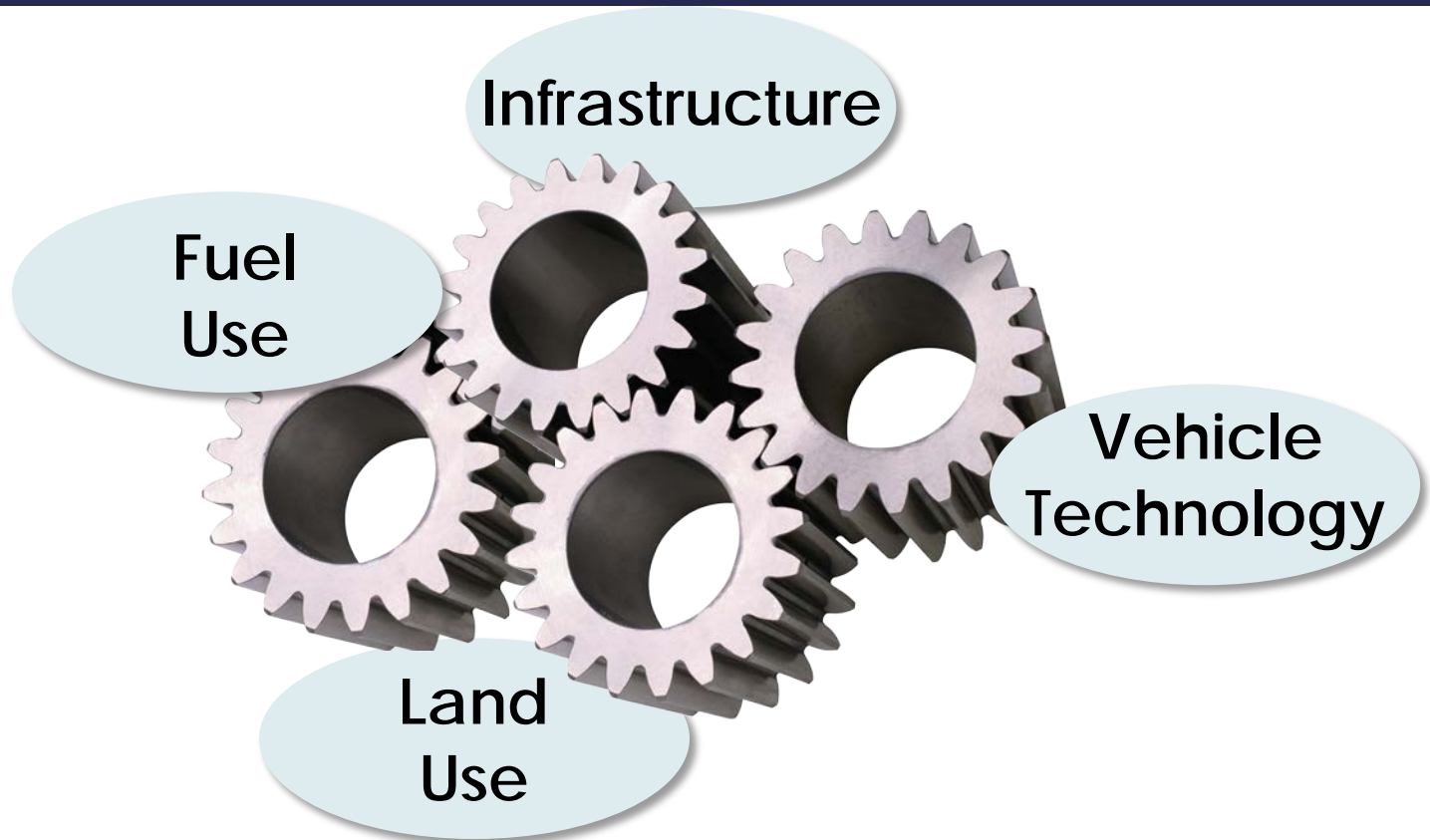


## Transportation and Land Use





# The Transportation Sector



*An Interwoven Transportation “System”*



# Focus Area Description & Scope

## Vehicle Tech

- ▣ Aerodynamics, Weight, tires
- ▣ Conventional powertrain improvements
- ▣ Hybrids
- ▣ Battery EVs
- ▣ Fuel Cell EVs

## Fuel Use

- ▣ Liquid fuels (fossil and renewable sources)
- ▣ Electricity
- ▣ Gaseous fuels (hydrogen, natural gas)

## Land Use

- ▣ Infill, mixed use
- ▣ Transit oriented development

## Infrastructure

- ▣ High-Speed Rail
- ▣ Integrated mass transit systems
- ▣ Bike and pedestrian facilities
- ▣ Freight facilities



# Achieving 2020 Goals

## Vehicle Technology:

- ▣ LDV: Advanced Clean Cars (LEV GHG, ZEV)
- ▣ HDV: Phase 1 vehicle GHG standards
- ▣ HDV: Advanced Clean Transit rule
- ▣ HDV: Zero emission airport shuttles, last mile delivery
- ▣ LDV & HDV Incentive programs, demonstrations, etc
- ▣ Marine: Electric shore power at dock
- ▣ Rail: Commuter rail enhancements (e.g. electric Caltrain)

*Numerous other policy actions enacted to address regional ozone and local pollutants*





# Achieving 2020 Goals

## Fuel Use (Supply/Distribution):

- ▣ Low Carbon Fuel Standard (LCFS)
- ▣ Cap-and-Trade
- ▣ Renewable electricity and hydrogen supply requirements
- ▣ Hydrogen fueling infrastructure (planning, state \$)
- ▣ Electric utility EV rate setting
- ▣ Electric utility EV infrastructure investments



# Achieving 2020 Goals

## Land Use:

- SB375 Sustainable Communities Strategies (SCS)
- GHG reduction targets for 2020 and 2035
- SCSs deploy strategies reducing trips and trip length
- Results in more compact urban form, transit oriented development, transportation choices
- CEQA streamlining encourages more infill and TOD
- SB 743, Shift to VMT metric



# Achieving 2020 Goals

## Infrastructure:

- Expansion and integration of rail and transit systems across the state
- Development and implementation of a sustainable freight plan pursuant to EO 32-15
- Active Transportation Program



# Vision for 2030 and 2050

## Vehicle Technology:

- ▣ Continued efficiency gains
- ▣ Electric drivetrains (LDVs, HDVs)
- ▣ Rail efficiency and electrification, expansion at ports
- ▣ High-Speed Rail with electrified locomotives
- ▣ Aviation aircraft efficiency and smart routing
- ▣ Vehicle automation (LDVs, HDVs)



## Vision for 2030 and 2050

### Fuel Use (Supply/Distribution):

- ▣ Large expansion of renewable fuels in-state
- ▣ Continued growth in natural gas (especially renewable natural gas)
- ▣ Expanded use of electricity and hydrogen



# Vision for 2030 and 2050

## Land Use:

- ▣ Continue to support planning to reduce vehicle activity by 2035 and beyond
- ▣ Incentivize and catalyze compact development
- ▣ Encourage local government implementation of regional SCSs
- ▣ Provide guidance for sustainable development practices – General Plan Guidelines update



# Vision for 2030 and 2050

## Infrastructure:

- High-Speed Rail phase I in service by 2030, with mode shift from cars and aircraft
- Infrastructure supportive of freight efficiency
- Integrated and robust local/regional transit networks – transit linked with an integrated schedule and a single ticket
- Improved bike and pedestrian facilities for safety and increased mode share
- Road surface innovations to reduce fuel consumption and improve ecosystem resilience



# Vision for 2030 and 2050







# Vision for 2030 and 2050



Image Credits- Urban Advantage, Roma Design Group, City of Dana Point





# Vision for 2030 and 2050



Image Credits- Urban Advantage, Romo Design Group, City of San Diego



# Implementation Tools

## Vehicle Technology:

- ▣ LDV: Advanced Clean Cars 2 (post 2025)
- ▣ HDV: Phase 2 GHG vehicle standards, possibly Phase 3
- ▣ LDV & HDV: Expanded incentives & demonstrations
- ▣ Zero emission rail and transit vehicles, state and Federal \$



# Implementation Tools

## Fuel Use (Supply/Distribution):

- ▣ Market-Based Mechanisms
  - ▣ Low Carbon Fuel Standard
  - ▣ Cap-and-Trade
- ▣ ISO and PUC policies to foster “vehicle to grid” services



# Implementation Tools

## Land Use: SB375

- ▣ Financing tools for infill development
- ▣ Improve technical modeling tools
- ▣ Provide tools and resources for local SCS implementation
- ▣ Update targets in 2016



# Implementation Tools

## Infrastructure

- ▣ Financing tools for transportation infrastructure that reduces emissions
- ▣ Operating support for transit to get better use of existing infrastructure
- ▣ Active Transportation Program
- ▣ Freight infrastructure capital improvement in line with the sustainable freight strategy



# Interaction with Other Sectors

- Trans fuel production is from industrial sector
  - Refineries, Oil/Gas wells, biofuel production, electricity
- “VGI” – Vehicle Grid Interaction (electricity)
  - Vehicle load demand response
  - Vehicle to grid storage and grid services
- Biofuel feedstock from Agriculture & Waste sectors
  - Farmed crops, WWTP gas, landfill gas, forest thinings
- Energy – Water Nexus
  - Water requirements to produce fuels



# Interaction with Other Sectors

## Multiple Benefits of Sustainable Development

- ▣ Water and Resource Conservation
- ▣ Economic Health
- ▣ Public Health
- ▣ Equity
- ▣ Energy Use in Buildings
- ▣ Municipal Fiscal Sustainability
- ▣ Household and Transportation Costs
- ▣ Availability of Workforce Housing for Economic Growth



# Questions & Comments

TRANSPORTATION AND LAND USE

ALL FOCUS AREAS

# Economic Analysis

CALIFORNIA AIR RESOURCES BOARD

# Goal

- Evaluate the economic impact of options for achieving the 2030 GHG target
  - Estimate the economic impact of various technology pathways and carbon pricing
  - Inform measure development
  - Assess the economic impact of options for achieving the 2030 GHG emission target on the California economy, California businesses, and individuals

# Technology Pathways

- ▣ Potential pathways
  - ▣ Combinations of candidate measures
  - ▣ Evaluate:
    - ▣ Adoption rates: stock rollover
    - ▣ Emissions
    - ▣ Costs and savings
    - ▣ Cross-sector interactions
- ▣ Key Drivers:
  - ▣ Reference scenario conditions
  - ▣ Technology attributes: availability; cost; performance

# Carbon Pricing

- ▣ Define carbon pricing in the macroeconomic analysis
  - ▣ Changes relative prices in the economy
  - ▣ Moves money in the economy
- ▣ Evaluate:
  - ▣ Structural responses
  - ▣ Macroeconomic indicators
  - ▣ Emissions feedback

# Models

- Energy and Environmental Economics Pathways Model
  - Economy-wide stock rollover model
    - Define technology pathways for achieving emission targets
    - Estimate the costs and savings of the pathways
- Regional Economic Models, Inc. (REMI)
  - Input-Output based dynamic general equilibrium model
  - Estimate macroeconomic impact of technology costs and savings
  - Estimate the macroeconomic impact and macroeconomic adjustments due to carbon pricing

# Economic and Technology Advisors

- ▣ Experts in economics and modeling
- ▣ Serve in an advisory capacity in the assessment of the economic impacts of the 2030 Scoping Plan
- ▣ Coordinate with California agencies and external researchers
- ▣ Conduct their activities in public meetings

# Economic Advisor Scope of Work

- Provide feedback on the proposed analytical methods
- Review the economic and technical assumptions and methods in the technology pathways analyses
- Review the assumptions and methods in the macroeconomic analyses
- Review and comment on the overall analyses



# Questions & Comments

ECONOMIC ANALYSIS

# Next Steps

CALIFORNIA AIR RESOURCES BOARD

# Tentative Schedule

- ▣ First Board update – November 19, 2015
- ▣ Draft 2030 Target Scoping Plan – Spring 2016
- ▣ Regional workshops – Fall 2015
  - ▣ Bay Area, Los Angeles, Central Valley
- ▣ Technical Workshops – Fall 2015 to Mid 2016
  - ▣ Economic/environmental analyses
- ▣ Final 2030 Target Scoping Plan presented to Board – Fall 2016

# Public Comments

- To facilitate consideration by state agencies ahead of measure specific workshops\*, please provide comments by October 16, 2015
- Links to submit both written comments and view all comments received can be found at:  
<http://www.arb.ca.gov/cc/cc.htm>

\*There will be additional opportunities to comment at these workshops

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