

# CLIMATE CHANGE

Californians are now experiencing first-hand the damaging effects of climate change. In the past year, extreme weather events affected every part of the state. These events devastated communities in Northern and Southern California, presenting new challenges and strengthening the state's resolve to combat climate change and design resilient communities.

In 2017, California emerged from an historic five-year drought with the wettest winter season in history. The summer months saw the highest average temperatures in California's recorded history, and the 2017 fire season stretched into January 2018, with communities in Northern and Southern California experiencing significant loss of life and property damage from catastrophic wildfires. Mudslides followed, creating an unexpected new hardship for already stressed communities. There is no question that climate change is here. The need for action is clear.

The Administration and the Legislature have many accomplishments that chart the course to a low-carbon future for California. Last July, Governor Brown signed landmark legislation extending and improving the state's Cap and Trade program and establishing a groundbreaking program to measure and combat air pollution at the neighborhood level. In recent years, the Governor has signed legislation establishing ambitious and enforceable greenhouse gas (GHG) emission reduction targets; setting the nation's toughest restrictions on short-lived climate pollutants; directing Cap and Trade funds to GHG-reducing programs that benefit disadvantaged communities, support clean transportation and protect natural ecosystems; and requiring the state to generate half of its electricity from renewable sources by 2030 and double the rate of energy efficiency savings in buildings.

The state's climate programs span all sectors—industrial, electricity, transportation, and natural and working lands. The Renewables Portfolio Standard, Low Carbon Fuel Standard, Cap and Trade Program, Advanced Clean Cars program, Short Lived Climate Pollutant Reduction Strategy, Sustainable Freight Action Plan, and the developing Natural and Working Lands Implementation Plan all serve as models for partners throughout the United States and the world. Throughout the implementation of these programs, the state's population and economy have continued to grow, yet GHG emissions have decreased and per capita electricity consumption remains flat.

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## CLIMATE CHANGE INITIATIVES

In its last year, the Administration is proposing four initiatives to solidify the path to deeper GHG emission reductions and a \$1.25 billion Cap and Trade Expenditure Plan.

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### ZERO-EMISSION VEHICLE INVESTMENT INITIATIVE

The transportation sector is responsible for 50 percent of the state's greenhouse gases and 80 percent of smog-forming oxides of nitrogen that contribute to the state's air quality challenges. To meet climate goals and clean air standards, California must dramatically reduce transportation sector pollution.

The Administration has a multi-pronged effort to reduce emissions from the transportation sector, including investing \$2.4 billion over the next five years to expand transit around the state. The state is also making major investments in bike and pedestrian transportation and is building the nation's first high-speed rail system. However, more needs to be done to reduce emissions from the over 25 million passenger vehicles on California roads.

In 2012, the Governor issued Executive Order B-16-12 directing state agencies to accelerate the market for ZEVs in California. The Executive Order calls for 1.5 million ZEVs in California by 2025. In 2016, the Air Resources Board released its Mobile Source Strategy, which lays out a roadmap for complying with GHG targets and federal air quality standards that includes 4.2 million ZEVs by 2030 combined with significant, continued improvements in conventional vehicle efficiency.

The Air Board administers the Clean Vehicle Rebate Project, a program that provides \$5,000 for hydrogen electric, \$2,500 for battery electric, and \$1,500 for plug-in hybrid electric vehicles, and an additional \$2,000 for low income drivers. With these rebates, California's ZEV market has grown significantly. The number of zero-emission passenger vehicles on the road in California expanded from approximately 25,000 in 2012 to over 350,000 now, more than any other state and about half of all the ZEVs nationwide. Over 40 ZEV models are on the market for California

consumers, compared to 5 at the start of 2012, with models now including mini-vans and SUVs. In 2017, ZEVs accounted for about 5 percent of all new car sales in California.

Charging infrastructure for ZEVs continues to be one of the greatest barriers to adopting the technology among consumers and the automotive industry. California currently has approximately 14,000 public chargers and 31 hydrogen refueling stations. California's existing ZEV infrastructure growth has been supported by the California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program, which provides grants totaling \$40 million per year. California's ZEV charging infrastructure is also supported by the Public Utilities Commission's proceeding to direct investments of investor-owned utilities, as well as investment by Volkswagen required by a 2016 settlement agreement. Additionally, innovative private investors are developing emerging charging and hydrogen re-fueling infrastructure technologies and the private market is growing.

But these existing funds are not enough to promote the adoption of ZEV vehicles needed to meet the state's goals.

The Administration is proposing a new eight-year initiative to accelerate sales of zero-emission vehicles through vehicle rebates and infrastructure investments, and the Governor is issuing Executive Order B-48-18, setting a new ZEV target of 5 million ZEVs in California by 2030. The new ZEV initiative will provide a total of \$2.5 billion over eight years and, when combined with private investment, will meet and exceed the goal of 1.5 million ZEVs on California's roadways by 2025, and provide a solid foundation for getting to the Governor's goal of 5 million ZEVs by 2030.

- Expanding Alternative Fuel Infrastructure—\$235 million for the Energy Commission to accelerate investments in the statewide network of hydrogen and electric charging stations. This proposal represents a five-fold increase in state infrastructure investments for the budget year, and at least tripling the current level for the next seven years. This proposal will be supported by existing funds available from the Alternative and Renewable Fuel and Vehicle Technology Program and one-time funds from the expiring New Solar Homes Partnership Program (set to sunset on June 1, 2018), and provides a multi-year funding plan to invest \$900 million for ZEV infrastructure through 2025.
- Continuing Clean Vehicle Rebates—\$200 million of Cap and Trade funding for the Air Board to provide rebates to California residents for the purchase or lease of new light-duty zero-emission vehicles and plug-in hybrids, including \$25 million for incentives for low-income consumers. This proposal will provide \$200 million annually through 2025, reflecting the state's commitment to achieve its ZEV target. As the number of ZEVs purchased increases over time, the Air Board will revise the program's income eligibility

requirements to target moderate and low-income consumers that are most influenced by the availability of the rebates.

California is an important market in the world for proving and scaling ZEVs, and is well positioned to benefit from the expected transition to these vehicles. These state infrastructure funds will attract and leverage private investment, including innovative planning and development of e-mobility options to ensure low income and disadvantaged communities are included in the ZEV transition. It will also encourage emerging market opportunities and support cutting-edge technologies that will continue to expand future investments in hydrogen and battery electric charging stations. California's transition will lower fuel costs for drivers, improve public health, and take the state closer to its clean energy goals by reducing reliance on fossil fuels.

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### **SEQUESTRATION AND RESILIENCE INITIATIVE**

The Administration is proposing a series of actions to increase carbon sequestration and storage and improve resilience.

As climate change impacts become more common, climate science indicates that reducing the probability of the most severe climate change consequences will require a limitation of global temperature rise to at least 2 degrees Celsius, and efforts to limit the increase even further to 1.5 degrees Celsius. Climate science further indicates that, in addition to reduction of GHG emissions, management and storage of the gases that have already been emitted is necessary to achieve this limitation. Afforestation (including urban forestry), climate smart agriculture (including carbon capture in soil), biochar, direct capture for use in products such as cement, and underground sequestration are among the techniques already in use to capture and manage carbon emissions.

To define the state's efforts to manage our natural and working lands, the Administration proposes the adoption of targets for reduction of GHG emissions from these lands. By September 2018, the Air Board, working with the Natural Resources Agency and the California Department of Food and Agriculture, will evaluate and present initial targets. Actions to meet the targets will include land conservation and other management strategies that account for a changing climate. The Administration has also convened an expert group to identify how to protect, restore, and maintain California's native plants and biodiversity to protect habitat and contribute to the state's climate goals. These strategies will provide natural infrastructure solutions for resilient carbon storage, and ultimately put California on the path to achieve net zero carbon emissions.

Forests also are a particular concern in California. California's forests are overgrown as a result of decades of fire suppression to protect resources and property, as well as land management policies that have not supported active forest management. These overcrowded forests, now critically dry from drought, increasing temperature and changing precipitation patterns, are experiencing devastating wildfires and epidemic levels of insect and disease infestation that have killed over 129 million trees and altered millions of acres of the forest landscape. Such conditions are making the state's forests carbon emitters, not the carbon sinks they should be.

To reverse these adverse trends, the Administration is developing a Forest Carbon Plan, which will serve as a road map to firmly establish California's forests as a more resilient and reliable long-term carbon sink.

Over the past two years, the Administration's Tree Mortality Task Force has been coordinating the response and mitigating the impacts of the state's unprecedented tree loss. This group has resulted in broad stakeholder dialogue on the need for enhanced forest management. The Governor will convene a task force composed of scientists and knowledgeable forest practitioners to thoroughly review the way the state's forests are managed and suggest ways to further reduce the threat of devastating fires. In addition, the Administration is holding stakeholder meetings with state and local governments and private industry to address critical land use and infrastructure issues associated with the devastating 2017 fires.

Additionally, to better respond to the challenges of climate change and extreme weather, the Administration is working with the federal government and state technology leaders to harness satellite data that will allow response in real time to new forest fires and other climate pollutants of concern.

In recent years, the Administration has invested in landscape-scale healthy forest management projects. The forest health grant program promotes reforestation, fuel reduction, pest management, conservation, and biomass utilization to increase forest health, increase carbon storage in forests, reduce wildfire emissions and protect upper watersheds, where much of the state's water supply originates. The following additional investments are proposed for the budget year:

- **Healthy and Resilient Forests**—\$160 million of Cap and Trade funding for the Department of Forestry and Fire Protection (CAL FIRE) to support forest improvement, fire prevention, and fuel reduction projects. In recognition of tree mortality impacting the state's forestland and climate change continuing to lengthen the wildfire season, this proposal will fund projects that reduce fuel loads, decreasing the intensity of wildfires and potential impacts to watersheds and communities.

- Local Fire Response—\$25 million of Cap and Trade funding for the Office of Emergency Services to fund additional fire engines for the statewide mutual aid system. In response to the unprecedented fire conditions and a longer wildland fire season, this proposal will enhance the state's ability to deploy resources to emergency response agencies during a wildfire incident.

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### **CALIFORNIA INTEGRATED CLIMATE INVESTMENT PROGRAM**

Investors, philanthropists and climate leaders throughout the world are recommending the acceleration and expansion of investments in climate smart infrastructure because existing financing models are unable to provide capital at the necessary speed and scale to meet the climate challenge. To address this need, the Administration is proposing additional funding:

- California Integrated Climate Investment Program—\$20 million of Cap and Trade funding for the California Infrastructure and Economic Development Bank (IBank) to provide seed funding to accelerate private sector investments in California infrastructure projects that reduce GHG emissions and improve climate resilience. With the establishment of the Program, the Administration will also convene an advisory group of leading experts to develop advanced funding pathways and a better pipeline of investable projects, creating new markets for California businesses. The Program will initially provide financing for innovative infrastructure projects that reduce GHG emissions and improve climate resilience through IBank's California Lending for Energy and Environmental Needs Center.

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### **CALIFORNIA CLIMATE CHANGE TECHNOLOGY AND SOLUTIONS INITIATIVE**

The California Climate Change Technology and Solutions Initiative will help to bridge the gap to new technologies, modeling and analysis, leading to deeper GHG emission reductions and greater resilience statewide. Specifically, the Administration is proposing additional investments in climate and clean energy research:

- California Climate Change Technology and Solutions Initiative—\$35 million of Cap and Trade funding for the Strategic Growth Council for research and development of innovative technologies and other solutions to maximize GHG emission reductions and prepare the state for a changing climate. This proposal will support these priorities by funding activities to (1) advance the deployment of transformative technologies to reduce GHG emissions, (2) prepare for a changing climate, (3) integrate the social and equity dimensions of climate policies, and (4) support the development of advanced climate data partnerships and

initiatives. Additionally, this funding also will support a new research initiative focused on climate policy impacts on California's economy. The initiative will include labor market analysis, economic modeling, case studies on just transition, and a toolkit on community re-investment. These investments will assist in easing the transition of workers and communities impacted by economic disruption.

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## **CAP AND TRADE EXPENDITURE PLAN**

The state's ability to drive innovation, bring emerging technologies forward, scale existing technologies and protect and enhance natural and working lands is due in large part to funds available from the Cap and Trade program. To date, the state has appropriated approximately \$6 billion in Cap and Trade auction proceeds. These funds have been spent on programs that reduce or sequester greenhouse gases by providing more transit options, modern housing near jobs and services, additional tree cover, forest and watershed improvements, healthy soils, recycling opportunities, and housing upgrades to cut energy use.

For example, in 2017, the Natural Resources Agency's Urban Greening Program awarded \$76 million to 39 green infrastructure projects. These projects convert built environments into green spaces that reduce GHGs, improve air and water quality and provide opportunities for walking, biking and recreation, with 92 percent of the funding awarded to projects in disadvantaged communities. From a new greenway and trail segment in Oakland to a new park in El Centro with walking paths, trees, understory plantings and water capture systems, this program is helping to create urban greenspaces throughout the state.

Cap and Trade funds support the Air Board's car scrap and replace program in the South Coast Air Quality Management District and San Joaquin Valley Air Pollution Control District. Since 2015, low-income residents have replaced almost 2,500 older, dirtier vehicles with cleaner vehicles. The vast majority of residents participating in this program live in or near a disadvantaged community and have household incomes equal to or less than 225 percent of the federal poverty level.

Cap and Trade funds also support affordable, transit-oriented development projects that reduce GHG emissions. These projects increase the accessibility of housing, employment centers, and key destinations with low-carbon transportation options (walking, biking, and transit) resulting in fewer vehicle miles traveled. These projects include the Rolland Curtis West Project, which connects infill affordable housing to a new active transportation corridor in South Los Angeles, and the Redding Downtown Loop and Affordable Housing Project, which integrates affordable housing with sustainable transportation infrastructure to transform downtown Redding into a

more walkable and bike-friendly community.

In addition to supporting several of the Administration’s climate initiatives, the Cap and Trade Expenditure Plan will provide additional investments in other programs, consistent with both the expenditure priorities specified in Chapter 135, Statutes of 2017 (AB 398) and the statutory requirements regarding allocation of at least 35 percent of expenditures to benefit disadvantaged and low-income communities. (See Figure CLI-01)

Figure CLI-01  
**2018-19 Cap and Trade Expenditure Plan**  
 (Dollars in Millions)

<i>Investment Category</i>	<i>Department</i>	<i>Program</i>	<i>Amount</i>
Air Toxic and Criteria Air Pollutants	Air Resources Board	AB 617 - Community Air Protection	\$250
		Technical Assistance to Community Groups	\$5
Low Carbon Transportation	Air Resources Board	Clean Vehicle Rebate Project	\$175
		Clean Trucks, Buses, & Off-Road Freight Equipment	\$160
		Enhanced Fleet Modernization Program, School Buses & Transportation Equity Projects	\$100
	Energy Commission	Low Carbon Fuel Production	\$25
Climate Smart Agriculture	Air Resources Board	Agricultural Diesel Engine Replacement & Upgrades	\$102
	Energy Commission	Energy Efficiency	\$34
	Department of Food and Agriculture	Healthy Soils	\$5
	Energy Commission	Renewable Energy	\$4
Healthy Forests	CAL FIRE	Healthy & Resilient Forests	\$160
	CalOES	Local Fire Response	\$25
Short-Lived Climate Pollutants	Department of Food and Agriculture	Methane Reduction	\$99
	CalRecycle	Waste Diversion	\$20
Integrated Climate Action: Mitigation & Resilience	Strategic Growth Council	Transformative Climate Communities	\$25
	IBank	California Integrated Climate Investment Program	\$20
	California Conservation Corps	Energy Corps	\$6
Climate and Clean Energy Research	Strategic Growth Council	California Climate Change Technology and Solutions Initiative	\$35
<b>Total</b>			<b>\$1,250</b>



## AIR TOXIC AND CRITERIA POLLUTANTS

California's approach to climate change works in tandem with efforts to reduce other pollutants to improve the health of all Californians. Recognizing the importance of air quality concerns, AB 398 identifies air toxic and criteria pollutants as a priority for Cap and Trade funding. The Cap and Trade Expenditure Plan proposes \$255 million to fund actions to reduce air toxic and criteria pollutants:

- AB 617 Community Air Protection—\$250 million for the Air Board to provide grants for early incentive actions to reduce both stationary and mobile source emissions in communities heavily impacted by air pollution. Under Chapter 136, Statutes of 2017 (AB 617), the Air Board will identify at-risk communities and key measures to reduce neighborhood pollution. This proposal will provide funding to strategically reduce both criteria and toxic emissions in the identified communities.
- AB 617 Technical Assistance to Community Groups—\$5 million for the Air Board for Community Assistance and Innovative Resources Grants to provide technical assistance grants to community-based organizations to participate in the AB 617 process, including the development of community emission reduction plans.

## LOW CARBON TRANSPORTATION

Through investments across multiple agencies, the state is developing low-carbon transportation options for all Californians. These investments include programs to improve and expand transit systems, support transit-oriented development, improve vehicle efficiency, reduce diesel emissions from trucks and buses and reduce the carbon intensity of transportation fuels. Budget augmentations announced earlier this month from other funding sources also support the state's climate goals, including \$100 million from the Road Maintenance and Accountability Act of 2017 (SB 1) for the Department of Transportation for active transportation to support new pedestrian facilities, bike lanes, and expanded bike share programs. The Cap and Trade Expenditure Plan includes the following programs that will reduce emissions in the transportation sector.

- Clean Trucks, Buses, and Off-Road Freight Equipment—\$160 million for the Air Board to provide incentives for zero-emission trucks, transit buses, school buses, and zero-emission freight equipment in the early stages of commercialization. These funds will also be available for the Carl Moyer Program, which will offset the redirection of tire fee revenue to support the Department of Fish and Wildlife. In addition to these funds, several transit agencies have indicated they intend to use new funds from SB 1, to invest in zero-emission buses. Over the next year, the Air Board will work with the Energy Commission to integrate

the Advanced Freight and Fleet Technology Program with current clean truck and freight equipment programs, consistent with the Sustainable Freight Action Plan.

- Enhanced Fleet Modernization and Other Equity Programs—\$100 million for the Air Board to provide equity-focused investments that increase access to clean transportation for low-income households and disadvantaged communities. Specific projects include voluntary car scrap and replace incentives for low-income consumers, car sharing, van pools, low-income clean vehicle rebate program, and rural school bus replacement.
- Low Carbon Fuel Production—\$25 million for the Energy Commission to provide incentives for in-state biofuels production in support of the Low Carbon Fuel Standard. This proposal will invest funds in the construction and demonstration of commercial scale biofuel production facilities, including the production of gasoline substitutes such as ethanol, diesel substitutes such as biodiesel and renewable diesel, and gaseous fuels such as biomethane. These types of projects produce fuels that result in up to 165 percent lower carbon emissions compared to petroleum diesel and gasoline.

### CLIMATE SMART AGRICULTURE

Climate Smart Agriculture is an integrated approach to achieving GHG reductions while also ensuring food security in the face of climate change. This strategy is defined by three main pillars: (1) sustainably increasing farm productivity and incomes, (2) adapting and building resilience to climate change, and (3) reducing and removing GHG emissions, where possible. The Cap and Trade Expenditure Plan supports these efforts through the following proposals:

- Agricultural Diesel Engine Replacement and Upgrades—\$102 million for the Air Board to provide incentives for farmers and agricultural businesses to replace existing diesel, agricultural vehicles and equipment with the cleanest available diesel or advanced technologies. Emissions from agricultural equipment are a significant source of air pollution, especially in the San Joaquin Valley, and reducing these emissions is critical for meeting federal ozone and particulate matter air quality standards.
- Agricultural Energy Efficiency Program—\$34 million for the Energy Commission to reduce energy costs, increase efficiency, and reduce greenhouse gas emissions in the food processing sector. Funded technologies will be reliable, have potential for broad sector adoption and help contribute to meeting the state's energy efficiency and greenhouse gas reduction goals.
- Healthy Soils Program—\$5 million for the Department of Food and Agriculture to provide financial incentives to farmers to implement conservation agriculture management practices that sequester carbon, reduce atmospheric GHGs, and improve soil health. The program is

the first in the world to directly relate agricultural management practices to quantitative GHG reductions and promote the development of healthy soils on California's farmlands and ranchlands. The Budget also includes an additional \$9 million from the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoors Access for All Fund (SB 5), for a total of \$14 million for this program.

- Renewable Energy Program—\$4 million for the Energy Commission to provide grants for the installation of cost-effective on-site renewable energy for agricultural operations located in disadvantaged communities.

### **SHORT-LIVED CLIMATE POLLUTANTS**

The warming effect of short-lived climate pollutants, such as methane, fluorinated gases and black carbon, can be significantly greater than that of carbon dioxide. Reducing these emissions can have an immediate beneficial impact on both climate change and public health. Chapter 523, Statutes of 2014, included a number of requirements for addressing dairy and livestock sector methane emissions and landfill methane emissions via diversion of organic material from the waste stream. The Cap and Trade Expenditure Plan includes the following proposals in support of these efforts:

- Methane Reduction—\$99 million for the Department of Food and Agriculture's Dairy Digester Research and Development Program and Alternative Manure Management Program to reduce methane emissions. Methane is 25 times more potent as a greenhouse gas compared to carbon dioxide. The Dairy Digester Research and Development Program offers grants to dairies to capture methane to be used for transportation fuels and clean energy production. The Alternative Manure Management Program provides financial incentives to dairy farms to implement non-digester manure management programs to reduce methane emissions.
- Waste Diversion—\$20 million for the Department of Resources, Recycling and Recovery to provide financial incentives for infrastructure facilities that divert waste from landfills, which will reduce methane emissions. Projects include composting, anaerobic digestion, and fiber, plastic, and glass recycling facilities.

### **INTEGRATED CLIMATE ACTION: MITIGATION AND RESILIENCE**

The Budget proposes \$110 million from SB 5 for multiple departments and conservancies to implement various climate resiliency projects, including \$18.6 million for the Natural Resources Agency to provide grants to local agencies to enhance and expand urban parks, mitigate urban heat islands, and develop non-motorized urban trails, and \$14.6 million for CAL FIRE to provide

grants for the planting of trees in urban areas. In addition to these programs, the Cap and Trade Expenditure Plan includes the following programs that integrate mitigation actions with resilience benefits:

- Transformative Climate Communities—\$25 million for the Strategic Growth Council to support neighborhood-level transformative projects that reduce GHG emissions, increase resilience, and provide local economic and health benefits to disadvantaged communities. This program provides funding for a combination of community-driven climate projects, such as transit-oriented development, water-energy efficiency installations, and urban greening, in a single neighborhood.
- Energy Corps—\$6 million for the California Conservation Corps to continue the Energy Corps Program, which provides job training and work experience to young adult corps members through the completion of energy and water conservation audits and projects in public buildings. Beginning in 2013-14, the Energy Corps has been supported by funding from the Clean Energy Jobs Act (Proposition 39), which expires in 2018-19.