



Cap-and-Trade Auction Proceeds Second Investment Plan

DRAFT CONCEPTS FOR PUBLIC DISCUSSION

This Concept Paper for the Cap-and-Trade Auction Proceeds Second Investment Plan (Fiscal Years 2016-17 through 2018-19) (Concept Paper) presents preliminary, high level ideas for public discussion and comment. It does not propose any specific funding levels or percentage allocations – those decisions are made by the Legislature in the annual State Budget process to appropriate moneys from the Greenhouse Gas Reduction Fund (GGRF).

State law requires the Department of Finance (Finance), in consultation with the Air Resources Board (ARB or Board) and other State agencies, to develop and submit to the Legislature a three-year investment plan for auction proceeds. Statute also directs ARB to hold public workshops in different regions of the State and a public hearing on the investment plan prior to submittal to the Legislature. The Second Investment Plan is due to the Legislature in January 2016 to serve as a resource for investment decisions as part of the 2016-17 and later State Budgets. It does not affect the Legislature’s consideration of 2015-16 GGRF appropriations.

This Concept Paper and the seven workshops scheduled in August 2015 provide an opportunity for early public input to help shape the draft Second Investment Plan. That draft will be released for public review and comment, followed by another round of workshops. This robust public process concludes with a formal public hearing and testimony to the Board in late 2015. Table 1 provides a timeline for the public process on development of the Second Investment Plan. For more information or to submit written comments, please visit: <http://www.arb.ca.gov/investmentplan>.

Table 1. Public Process Milestones for the Second Investment Plan

Timeframe	Milestone
July-August 2015	Release Concept Paper for the Second Investment Plan and hold public workshops
Fall 2015	Release Preliminary Draft Second Investment Plan and hold public workshops
Late Fall 2015	Release Revised Draft Second Investment Plan and hold public Board hearing
January 2016	Submit Final Second Investment Plan to the Legislature

I. INTRODUCTION

California's efforts to address climate change have made the State an international climate leader as we drive down greenhouse gas emissions with a mix of strategies that make sense for California and its economy. However, much more must be done to build on our success and further decarbonize California's economy. In Governor Edmond G. Brown Jr.'s January 2015 Inaugural Address, he outlined 2030 climate and energy goals for the State. By 2030, California aims to:

- Reduce today's petroleum use in cars and trucks by up to 50 percent;
- Increase the portion of electricity generated using renewable resources to 50 percent;
- Double the energy efficiency savings achieved at existing buildings, and make heating fuels cleaner;
- Reduce emissions of methane, black carbon, and other potent short-lived climate pollutants across industries; and
- Manage farm and rangelands, forests, and wetlands so they can store carbon.

In April 2015, the Governor issued Executive Order B-30-15, calling for a reduction in greenhouse gas emissions 40 percent below 1990 levels by 2030 (mid-term target) and emphasizing the need for State agencies to take into account climate change in their planning and investment decisions. Achieving the Governor's goals will require accelerating current strategies and pursuing innovative strategies across sectors—all while providing the opportunity for California to adapt to the impacts of climate change and bringing a multitude of other tangible benefits to all Californians. In addition, aligning investments with this Executive Order will safeguard California in the face of current and future climate risk.

The GGRF is an important part of the State's overall climate investment efforts to reduce greenhouse gas emissions and advance the goals of Assembly Bill 32. Ultimately, these investments and other transformative drivers, such as regulatory efforts lay the foundation for the systemwide changes the State will need to achieve the long-term goals of Assembly Bill 32, as reflected in the Governor's Executive Order B-30-15 target of reducing greenhouse gas emissions 80 percent below 1990 levels by 2050 (long-term target)—a level scientists agree is needed to avoid catastrophic changes to the climate.

The investments made to date are delivering progress towards the goals and actions outlined in the Climate Change Scoping Plan (December 2008), the First Update to the Climate Change Scoping Plan (May 2014), and other State climate and energy plans. At the same time, these investments are delivering jobs, public health benefits, and providing Californians with more lifestyle choices—from expanded transportation mobility options, to more sustainable goods and services, to enhanced natural resources. Additional information on investments can be found in the March 2015 Annual Report to the Legislature on Investments of Cap-and-Trade Auction Proceeds, which is available at: <http://www.arb.ca.gov/auctionproceeds>.

II. BACKGROUND

In 2006, the Legislature passed and the Governor signed the California Global Warming Solutions Act of 2006 (Assembly Bill 32; Núñez, Chapter 488, Statutes of 2006), which created a comprehensive, multi-year program to reduce greenhouse gases to 1990 levels by 2020, and to maintain and continue reductions beyond 2020.

Part of the State's comprehensive approach includes the Cap-and-Trade Program (title 17, California Code of Regulations, section 95800 et seq.), which is a market-based regulation that sets a limit on the emissions from sources responsible for 85 percent of California's greenhouse gas emissions. As part of this program, ARB conducts quarterly auctions where State-owned allowances, as well as allowances consigned by electrical distribution utilities, can be purchased. The funds received for the sale of California State-owned allowances are deposited into the GGRF, and are available for appropriation.

The Legislature has passed a suite of bills that define requirements for the use of the GGRF. All GGRF investments must reduce greenhouse gas emissions. Additionally, the Legislature has identified several goals for the investment of auction proceeds. The draft priority investments identified in this Concept Paper reflect the need to address and balance these goals.

- Maximize economic, environmental, and public health benefits to the State;
- Foster job creation by promoting in-State greenhouse gas emission reduction projects carried out by California workers and businesses;
- Complement efforts to improve air quality;
- Direct investment toward the most disadvantaged communities and households in the State, including allocation of at least 10 percent of the investments to projects located within disadvantaged communities, and 25 percent to projects benefitting those communities;
- Provide opportunities for businesses, public agencies, nonprofits, and other community institutions to participate in and benefit from statewide efforts to reduce greenhouse gas emissions; and
- Lessen the impacts and effects of climate change on the State's communities, economy, and environment.

Finance submitted the First Investment Plan to the Legislature in May 2013, encompassing auction proceeds for Fiscal Years 2013-14, 2014-15, and 2015-16. The First Investment Plan prioritized projects in three categories: Sustainable Communities and Clean Transportation; Energy Efficiency and Clean Energy; and Natural Resources and Waste Diversion. This Concept Paper relies on the same categories.

Through 2014-15, \$902 million has been appropriated to 12 State agencies to support programs that reduce greenhouse gas emissions and bring additional co-benefits to the State, including to the most disadvantaged communities. Maps identifying disadvantaged communities are in Appendix A and these prior GGRF appropriations

are summarized in Appendix B. From low-income home weatherization to wetlands restoration to putting cleaner cars on California's roads, the GGRF appropriations are funding a diverse set of climate investments that are delivering near- and long-term greenhouse gas emission reductions, as well as community co-benefits through improved air quality, job creation, and enhanced sustainability.

The Legislature established continuing appropriations totaling 60 percent of the GGRF moneys (beginning in 2015-16) to benefit High Speed Rail, affordable housing and sustainable communities, transit capital, and transit operations. This Concept Paper recognizes the important role of those programs, but the discussion and analysis focus on investment of the remaining 40 percent of GGRF monies in 2016-17 and later years.

III. OVERARCHING THEMES

This Concept Paper builds on the First Investment Plan and presents preliminary objectives and draft areas for GGRF investment beginning in 2016-17. Here we discuss several overarching themes that are guiding the preliminary recommendations in this document.

A. Beyond 2020

While the First Investment Plan encouraged prioritizing investments to enhance existing programs that could bring about more immediate benefits, this Second Investment Plan will support investments in programs and projects needed to support the ongoing transition toward a low-carbon economy. Projects supported in 2016-17 through 2018-19 will realize benefits beyond 2020 and should be focused on helping deliver successes in meeting the State's mid- and long-term climate targets and goals. Therefore, this Second Investment Plan suggests investing in programs and projects that lay the groundwork for the approaches to resource management and zero and near-zero emission systems that are needed to meet the State's long-term reduction targets.

B. Benefits for All Californians

Senate Bill 535 requires that the three-year investment plan allocate a minimum of 25 percent of the annual GGRF proceeds to projects that benefit disadvantaged communities and a minimum of 10 percent to projects located within disadvantaged communities.

To continue meeting or exceeding these investment targets as the level of funding rises, funding targets for projects located within disadvantaged communities may need to be established for each program. In addition, while many low-income communities have interest in applying for GGRF monies, many lack the capacity to competitively engage in the GGRF program application processes. There is a need to assist disadvantaged

communities to raise awareness, as well as understand the range of GGRF program opportunities and the program application requirements.

C. Innovative Technologies

Achieving the State’s mid- and long-term targets and goals will require accelerating the uptake of known technologies and strategies that reduce greenhouse gas emissions, but it will also require pursuing innovative approaches that are either in the early stages of implementation, or have yet to begin. Public and privately-partnered demonstrations and deployments can help identify which clean technologies or strategies deliver economic returns—creating climate benefits and jobs long after the funds have been spent.

D. Systems Approach

Leveraging the opportunities that exist when integrating systems across sectors and geographies could be considered in this Second Investment Plan to obtain the deep reductions needed to achieve the State’s long-term climate goals. For instance, by investing in strategies to convert organic waste (from landfills, dairies, and forests), to energy, we reduce methane—a potent greenhouse gas—while generating feedstocks for renewable energy generation or production of low carbon fuels to power vehicles.

E. Integrated Projects in Disadvantaged Communities to Support Local Climate Action

To help support local transformation through climate action in disadvantaged communities, concentrated investment could be made through “integrated projects”—projects that support energy and transportation solutions, smart growth, urban forestry, and more—all in a single community. Investing in multiple project types to cut greenhouse gases in one geographic area would allow the State to emphasize the synergistic effects that exist between many of the strategies.

This approach could be particularly advantageous in the 2,000 census tracts identified as disadvantaged communities where significant capital and jobs are needed to improve areas that have traditionally lacked investment. Local governments with jurisdiction in these disadvantaged communities are uniquely positioned to select from a menu of greenhouse gas reducing projects to meet local needs and support community-wide transformation. These local governments could be appropriate applicants and project managers for “integrated projects.”

F. Efficient Financing Mechanisms to Maximize Investment

Diversifying how greenhouse gas reduction projects in California are financed could significantly stretch GGRF monies further, strengthen the State's investment portfolio, expand the types and number of projects that can be supported, and ultimately deliver greater climate benefits. Expanding beyond simple grant and rebate financing to offer loans, credit enhancements, and other innovative mechanisms could provide expanded options to induce action.

Many programs and project-types may be appropriate for innovative financing. Options for a cost-effective approach include using the GGRF to support a State revolving loan fund, loan guarantee program, or a clean energy finance center at the California Infrastructure and Economic Development Bank (I-Bank), while other agencies with the relevant expertise retain program design and project selection responsibilities. This approach would expand the financing options for all GGRF programs, with lower overhead costs, while establishing a self-sustaining funding mechanism.

California can look to many other states and federal programs as well to learn from their approaches to strategic investment in innovation. From electric vehicle financing to agricultural clean energy loans, dozens of states across the U.S. have unique programs that stretch public dollars further. In addition, three states—Connecticut, New York, and Hawaii—have each developed their own state green bank to engage private capital, while meeting their unique challenges and needs.

G. Short-Lived Climate Pollutants

Although carbon dioxide is the dominant greenhouse gas, other short-lived climate pollutants may be responsible for as much as 40 percent of global warming experienced to date. Short-lived climate pollutants are gases and particles that have a relatively short lifetime in the atmosphere, but have a strong warming influence on the climate. These pollutants include methane, tropospheric ozone, fluorinated gases (F-gases), and black carbon. They are emitted from activities that span the priority areas, including transportation, energy, natural resources, and waste. Because several short-lived climate pollutants are also harmful air pollutants, efforts to reduce them deliver immediate health benefits as well as climate benefits.

Black carbon, another powerful climate forcer, is a component of diesel particulate matter. California's regulatory and incentive programs have spurred tremendous investments in cleaner diesel and alternative fuel technologies over the last 15 years. With full implementation of existing control programs, plus funding for new freight strategies, the State will continue to reduce black carbon to realize climate and public health benefits.

While California has reduced some of these pollutants, much more remains to be done, especially to reduce methane and F-gases. Methane is the second most potent greenhouse gas and its emissions continue to rise in California and globally. In

addition, F-gases, and in particular hydrofluorocarbons, are the fastest growing source of greenhouse gas emissions and cause much greater warming, at least over short time-scales, than carbon dioxide.

As a result of their importance, this Concept Paper discusses additional programs to reduce California's short-lived climate pollutant emissions. The focus is on considering investments to cut methane and F-gases, which could benefit rural areas and small businesses. Additionally, ARB is currently developing a Short-Lived Climate Pollutant Plan which will be completed by December 2015.

H. Rural Communities and Small Businesses

Providing more opportunities for small businesses and rural communities to help advance the State's climate mitigation efforts could bring economic and health benefits. Representing half of the State's private-sector labor force,¹ California small businesses are critical players in efforts to decarbonize the economy while maintaining economic competitiveness. Rural communities also have a critical role to play, as they are often home to agricultural lands, rangelands, grasslands, and forested lands where greenhouse gas reductions and carbon sequestration activities intersect. Protection and sustainable management of these lands and resources will be pivotal in meeting climate goals.

To expand the opportunities available and increase participation of rural areas and small businesses in climate investments, the State may need to consider additional programs. For example, an emphasis on reducing methane from California's waste, natural and working lands, and the agricultural sector brings with it an opportunity to grow renewable energy and clean jobs in California's rural areas. Applying compost to rangelands can further the State's Healthy Soils Initiative and sequester carbon in these rural areas. Programs to reduce woodsmoke from residential heating and to divert excess woody biomass to bioenergy facilities can bring significant reductions of criteria air pollutants in rural communities. Programs aimed at reducing emissions from F-gases could provide opportunities for California's small businesses to upgrade their refrigeration equipment.

¹ Small Business Administration. Small Business Profile. Advocacy: The voice of small business in government. 2014. <https://www.sba.gov/sites/default/files/files/California13%281%29.pdf>.

IV. DRAFT INVESTMENT CONCEPTS

Figure 1 below summarizes the types of projects being considered for recommendation as investments in the three-year cycle beginning in 2016-17, with a new emphasis across categories on efforts to reduce short-lived climate pollutants. The remainder of the Concept Paper will assess the existing situation and current funding resources, then identify the need for additional investments. This Paper and the process for public input will inform development of the Second Investment Plan; it does not affect the Legislature's consideration of 2015-16 GGRF appropriations.

Figure 1. Summary of Potential Investment Concepts (2016-17 to 2018-19)

Transportation & Sustainable Communities	Clean Energy & Energy Efficiency	Natural Resources & Waste Diversion
<p>Public transit (rail, bus, ferry), affordable housing, active transportation, and sustainable communities (60% continuous appropriation).</p> <p>Zero emission vehicles and equipment, plus charging/fueling infrastructure.</p> <p>Innovative efficiency strategies for freight and passenger transportation (e.g., connected vehicles, information technology solutions for logistics, reduction of non productive moves, etc.).</p>	<p>Energy efficiency and clean energy projects, including energy water conservation.</p> <p>Renewable energy generation.</p> <p>Low Global Warming Potential refrigerant systems.</p> <p>Residential woodsmoke reduction (through woodstove replacement and utilization of biomass).</p> <p>Carbon capture and sequestration.</p>	<p>Conservation and improved management strategies for achieving net climate benefits and long term carbon sequestration on natural and working lands.</p> <p>Urban forestry.</p> <p>Anaerobic digestion, composting, and waste to fuel (from dairy, forest biomass, and landfill organic waste).</p>

A. Transportation and Sustainable Communities

California's transportation sector represents 37 percent of greenhouse gas emissions in California, making it one of the highest priorities for investment in the State. While significant progress has been made improving air quality in California through cleaner engines and fuels, further investments in innovative technologies and pioneering strategies can lay the foundation for aggressively decarbonizing the State's transportation system. Increasing access to alternative mobility options and active transportation must occur concurrently with investments in vehicle emissions systems.

1. Existing Situation

The State is pursuing four general approaches to reducing criteria pollutant, toxic, and greenhouse gas emissions from both the passenger and freight transportation sectors: 1) improving vehicle efficiency, including deployment of zero emission vehicles and equipment; 2) reducing the carbon intensity of transportation fuels; 3) increasing sustainable mobility options through integrated transportation, public transit, active transportation, land use, and housing decisions; and 4) improving the efficiency and throughput of existing transportation systems.

To accelerate these approaches, the State has established several targets and goals, including Governor Brown's Executive Order B-16-2012 for Zero Emission Vehicles (ZEVs), a draft 2015 Zero Emission Vehicle Action Plan,² and regional targets for reducing greenhouse gas emissions associated with regional travel demand.

To propel similar progress with vehicles and equipment that transport cargo, Governor Brown released Executive Order B-32-15, which directs State agencies to develop an integrated strategy to improve freight efficiency, transition to zero-emission technologies, and increase the competitiveness of California's freight system. ARB's April 2015 Sustainable Freight: Pathways to Zero and Near-Zero Emissions document³ describes ARB's vision and levers to achieve a more efficient, cleaner freight system. The California Department of Transportation's December 2014 California Freight Mobility Plan⁴ identifies priority freight routes and transportation facilities that are critical to California's economy and necessary to meet freight efficiency goals.

In addition, California is investing in a sustainable transportation future by expanding its public transit systems and modernizing passenger rail throughout the State. The California High Speed Rail will serve as the backbone of an inter-regional transportation system that is augmented by regional and local connector systems to provide access to sustainable mobility options.

Lastly, Metropolitan Planning Organizations throughout California continue to develop and implement Sustainable Communities Strategies as part of their Regional Transportation Plans, demonstrating how they will reach the State's regional greenhouse gas reduction targets through planning compact and transit-oriented communities, supporting and developing land use policies that accommodate the Regional Housing Needs Assessment, transportation demand management strategies, and transportation networks including highways, transit, local streets and roads, and bicycle and pedestrian infrastructure. The Strategic Growth Council and transportation programs funded by the GGRF are supporting implementation of these strategies.

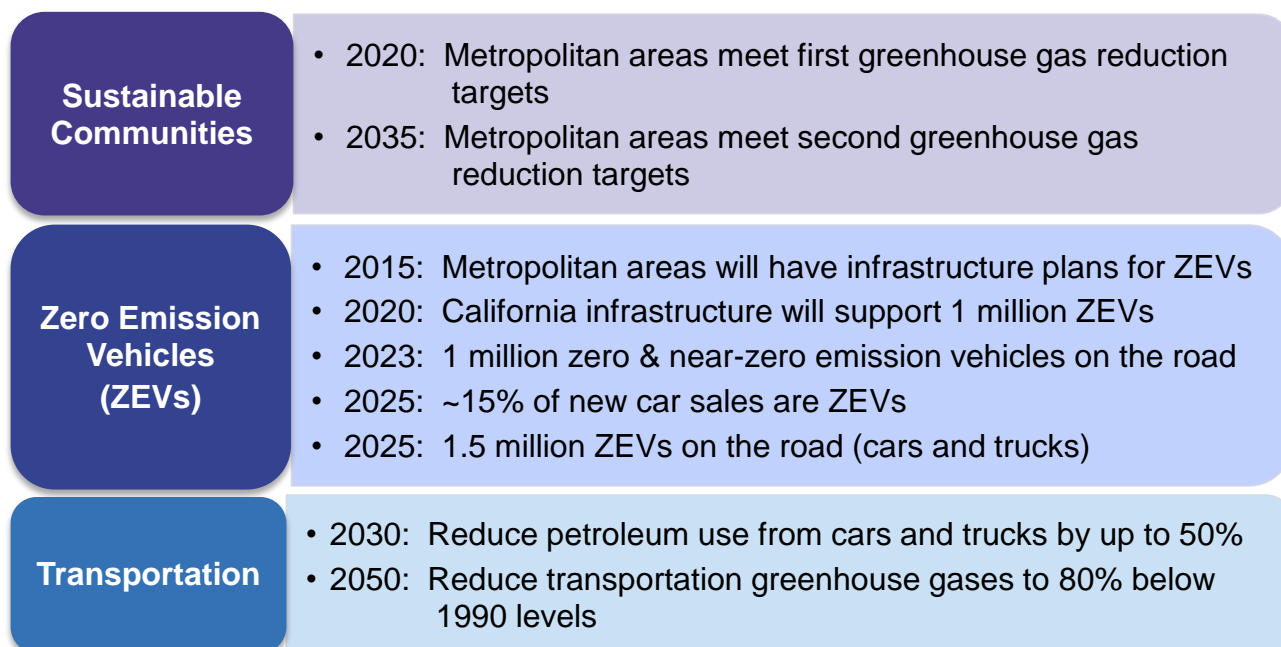
² Governor's Interagency Working Group on Zero-Emission Vehicles. 2015 ZEV ACTION PLAN, An updated Roadmap toward 1.5 Million Zero-Emission Vehicles on California Roadways by 2025. April 2015. http://gov.ca.gov/docs/DRAFT_2015_ZEV_Action_Plan_042415.pdf.

³ Sustainable Freight Pathways to Zero and Near-Zero Emissions, Discussion Document. April 2015. <http://www.arb.ca.gov/gmp/sfti/sustainable-freight-pathways-to-zero-and-near-zero-emissions-discussion-document.pdf>.

⁴ California Freight Mobility Plan. December 2014. http://www.dot.ca.gov/hq/tpp/offices/ogm/california_freight_mobility_plan.html.

Figure 2 below shows the State’s major transportation goals and targets related to reducing greenhouse gas emissions within California.

Figure 2. California’s Major Transportation Goals and Targets



2. Current Funding

Within this category, the largest sources of existing funding are directed to transportation infrastructure for all modes and support for public transit. In addition, when the Legislature and the Governor enacted Senate Bill 862 in 2014, they established continuous appropriations of 60 percent of the available GGRF monies for transportation and sustainable communities programs, including High Speed Rail, local and regional public transit, active transportation, affordable housing, and agricultural land preservation projects. All of these projects help cut petroleum use from passenger transportation by creating a more robust and accessible public transit system and by integrating land use, transportation, and housing strategies to build transportation-efficient communities.

For the vehicle side, most established funding sources focus on advancing cleaner passenger vehicles and freight equipment. Existing programs provide rebates for light-duty clean cars, vouchers for cleaner heavy duty trucks, grants for current technology trucks, locomotives, and harbor craft, as well as funds for demonstrating and deploying new heavy duty technologies with zero or near-zero emissions in all applications. The GGRF Low Carbon Transportation Program supports pilot projects, demonstrations, and deployment of zero and near-zero emission transportation technologies, including those powered by renewable fuels, to provide climate and air quality benefits.

3. Needs Assessment

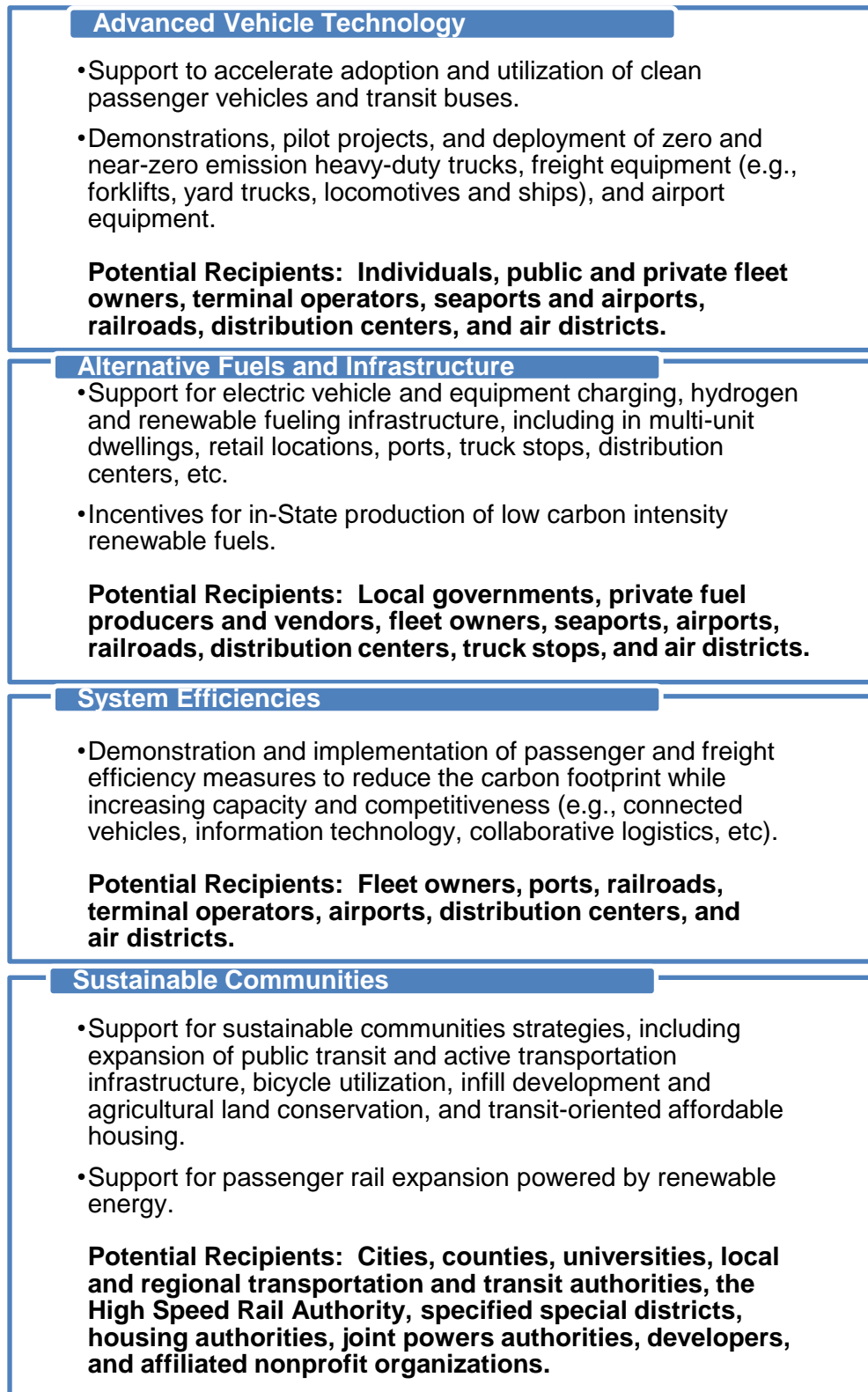
While the dedicated investments described above are clearly benefitting the State, they do not sufficiently decarbonize California's transportation sector—the largest source of greenhouse gas emissions. California must make substantial public investments in modern transportation strategies to develop a transportation system that better meets the State's 2030 and 2050 climate goals. This transformation is also necessary to help meet health based air quality standards in the Los Angeles and San Joaquin Valley.

Because rebate programs for zero emission and plug-in hybrid vehicles are consistently oversubscribed, these programs may need additional financial support and consideration of structural changes to target incentives where they are most necessary to meet the State's zero emission vehicle targets and to ensure long-term sustainability. Further, continued financial support is critical to transition to a zero emission freight system. This approach includes significant investment in pre-commercial development and demonstrations of innovative freight technologies, followed by greater funding to support widespread deployment. Also required is funding for the alternative renewable fuels and fueling infrastructure to support these advanced technologies. In addition, as the State moves beyond 2020, creating a more efficient and competitive freight system in California will require more than advanced vehicle and equipment technologies—it will necessitate an integrated approach to overall system efficiency to move more cargo with less climate impact.

California must also improve mobility options to allow all residents to drive less and reduce household costs while reducing greenhouse gas emissions and realizing better air quality. This change necessitates expanded public transit service to increase ridership; more transit-oriented residential development that includes affordable housing and other trip reduction strategies; expanded networks, facilities and programs that promote safe additional access via transit and active transportation to jobs, schools, colleges, shopping and other destinations; expanded vanpool, car share, and carpool programs; incentives that reduce vehicle travel; and protection of agricultural lands that are at risk of conversion to more carbon-intensive uses. The 60 percent continuous GGRF appropriation to these project types supports implementation of sustainable community strategies and a more sustainable passenger transportation system.

Figure 3 below shows the draft investment concepts for transportation and sustainable communities.

Figure 3. Draft Investment Concepts for Transportation and Sustainable Communities



Supported by continuous appropriations of 60% of the GGRF

4. Disadvantaged Communities

Greenhouse gas reduction strategies for transportation that uniquely address the needs of disadvantaged communities across the State include efforts to provide more affordable, expanded transportation mobility options. This includes investments to increase public transit service, reliability, and affordability; expand farmworker vanpools; enhance safety and access to active transportation options; encourage location-efficient development accessible to transit; and provide financial support to help low-income residents of these communities access and benefit from zero emission vehicles. In addition, greenhouse gas reduction strategies that address serious local air pollution issues in disadvantaged communities, including the modernization of port and freight activities, can directly improve the health of disadvantaged communities. Fully half of the Low Carbon Transportation and the Affordable Housing and Sustainable Communities investments are targeted to benefit disadvantaged communities.

5. Co-Benefits

While California already has efforts in place that will significantly cut diesel particulate matter, other air toxics, and black carbon emissions, these investments will support further reductions in air toxics and short-lived climate pollutants from the transportation sector. These reductions will deliver additional health and economic benefits for communities along busy roadways, and near ports and rail yards where concentrations of diesel particulate matter and other vehicle exhaust toxics are high.

Sustainable communities' projects provide more transportation mobility options and opportunities to realize the health advantages of active transportation, but additional efforts will be needed to prevent potential displacement pressures to ensure all Californians benefit from this kind of development.

B. Clean Energy and Energy Efficiency

California's energy sector—including use of electricity and natural gas—accounts for about half of the State's near-term greenhouse gas emissions. Reducing energy-sector emissions to near-zero by 2050 will require wholesale changes to the State's current electricity and natural gas systems. It will require better integrating renewables, including distributed generation renewables, aligning demand with supply, expanding storage capacity, and increasing energy efficiency.

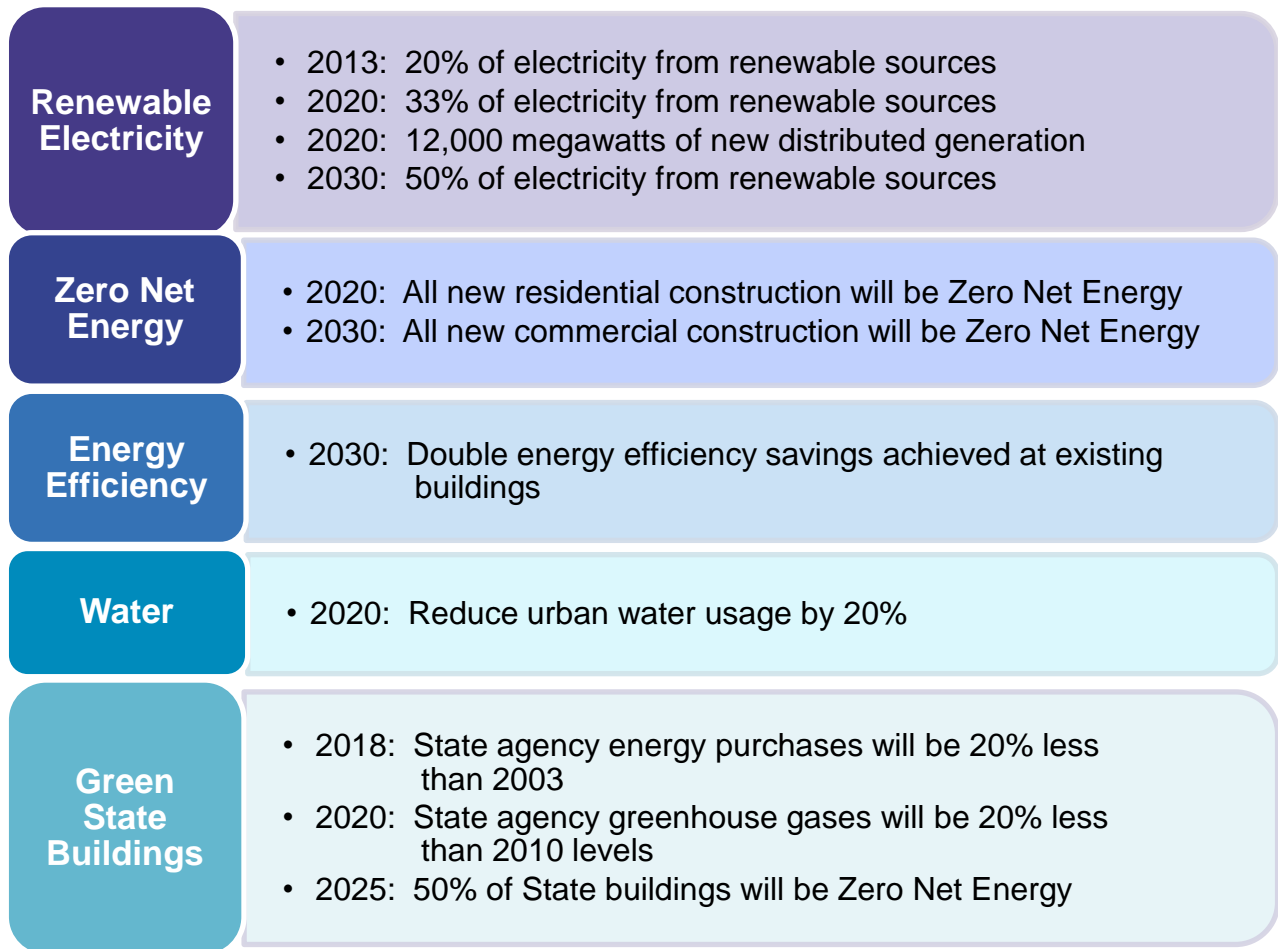
Transforming the energy sector will also require reducing the carbon footprint of one of the largest electricity users in the State—the water system. Targeted investments to power water systems with more renewable energy sources, improve energy efficiencies, and strategically reduce demand for energy-intensive water can contribute to the systemic transformation of California's water system that is already underway. Providing a foundation for an approach for more sustainable water management in

California, the State Water Plan⁵ as well as the Update to the Scoping Plan,⁶ provide high-level recommendations and priorities to address both climate change and the drought, and can inform priority investments.

1. Existing Situation

Figure 4 below highlights key goals California has set to direct how the State generates and uses energy.

Figure 4. California’s Renewable Energy and Energy Efficiency Goals and Targets



⁵ California Department of Water Resources. California Water Plan webpage. <http://www.waterplan.water.ca.gov>.

⁶ California Air Resources Board. First Update to the Climate Change Scoping Plan - Building on the Framework, Pursuant to AB 32, The California Global Warming Solutions Act of 2006. http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

2. Current Funding

To assist with achieving these ambitious goals, California has made important public investments to help secure the State's energy future. The State continues to provide incentives for energy efficiency and clean energy projects, including grants, tax breaks, and loans. In addition to State incentives, the publicly-owned and investor-owned utilities also have programs to support clean energy and energy efficiency. Some local municipalities also offer help in a variety of forms, including rebates, building permit fee waivers, and Property Assessed Clean Energy (PACE) financing. Incentives focused on increasing energy-water efficiency include funding from the GGRF for appliances that are more energy efficient and use less water, as well as agricultural practices and equipment to cut both energy and water use.

3. Needs Assessment

Clean energy and energy efficiency have traditionally received substantial public support. While there are many programs directed at providing renewable generation capabilities and improved energy efficiency to residential, commercial, industrial, and public entities, there are still a few important areas that require additional investment.

Providing financial assistance for water agencies to pursue renewable energy fills an important niche that can help decarbonize the State's water supply. While there are many renewable energy incentives in California, bio-energy systems in California lag and need additional financial support to advance the market. This, as well as co-generation opportunities, are covered in the discussion on methane emission reductions as part of the Natural Resources and Waste Diversion investment section.

There is an opportunity to improve the energy efficiency of California's businesses while addressing a major short-lived climate pollutant source. For example, as the 2020 deadline for the Montreal protocol-driven phase out of Ozone Depleting Substances approaches, refrigeration systems throughout California relying on Ozone Depleting Substances are increasingly being transitioned to systems that use high Global Warming Potential (GWP) refrigerants. While low-GWP refrigerant systems are available, financial barriers inhibit widespread adoption. Currently, there are no incentives to support low-GWP refrigerants. Offering support to California businesses to install or upgrade to a low-GWP refrigerant system can provide significant reductions of F-gas emissions at a very low cost. These systems may be more efficient than older systems that use high-GWP refrigerants, also reducing energy use and electricity bills.

Reducing residential woodsmoke from home heating and home greenwaste burning is another target for new investment. In rural areas of California where residents rely on wood as a primary heating source, there are climate and air quality benefits to be gained by aiding the replacement of inefficient fireplaces and woodstoves with natural gas heating (if available) or the most efficient, lowest polluting woodstoves. In some of these communities, residents also dispose of their greenwaste through open burning

when there are lower-carbon, but more expensive, options. Providing support to expand existing local programs to reduce residential woodsmoke should be considered.

Carbon capture and sequestration (CCS) is a potential means to reduce greenhouse gas emissions and mitigate climate change, whereby large amounts of carbon dioxide are captured, transported, injected, and stored underground in geological formations such as depleted oil and gas reservoirs and saline formations. CCS may be able to divert millions of metric tons of carbon dioxide from emission into the atmosphere and store them underground, potentially for millennia. Support for CCS could be used to fund a demonstration project in California to capture a partial stream of carbon dioxide from an industrial facility, like a power plant, and inject the stream into an underground geologic formation that can contain the emissions permanently.

Figure 5 on the next page shows the draft investment concepts for clean energy and energy efficiency.

4. Disadvantaged Communities

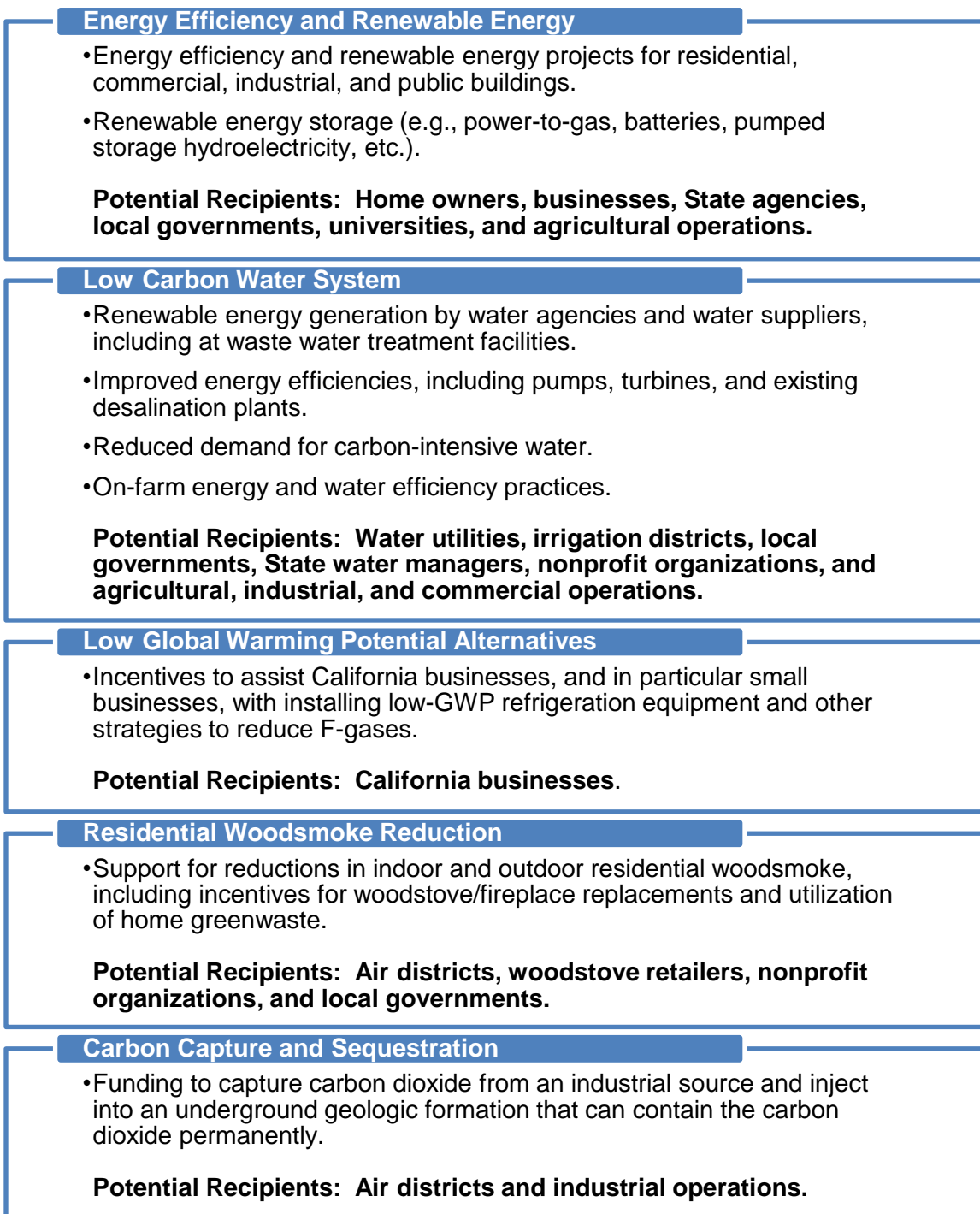
For clean energy and energy efficiency, specifically addressing the socioeconomic vulnerability of disadvantaged communities requires strategies that reduce household energy costs. Household clean energy generation (like solar and more efficient woodstoves), as well as household improvements (like weatherization) that reduce energy use, not only save residents on their energy bills, they result in healthier, more comfortable indoor living environments and cleaner outdoor air.

5. Co-Benefits

Investing in clean energy and energy efficiency in California can save consumers and businesses money on their utility bills, create healthier homes and workplaces, and generate clean energy manufacturing and service jobs. Reduced utility bills are particularly beneficial for disadvantaged community residents who can use the savings for other quality-of-life expenditures. Many of the strategies that reduce the carbon footprint of the State's water system also help with drought resiliency for both farmers and urban water consumers. Replacing woodstoves and fireplaces with the most efficient wood-burning technologies or alternatives can cut climate pollutants, improve indoor air quality for households reliant on wood for home heating, and improve outdoor air quality in valley and foothill areas where the topography traps the smoke.

An incentive program to upgrade refrigerant systems would benefit small businesses, such as neighborhood grocery stores, as they face the high cost of replacing older refrigeration equipment using ozone-depleting refrigerants with new systems using refrigerants that are non-ozone depleting and have lower global warming potential. New systems typically offer the added benefits of improving energy efficiency, reducing operating and maintenance costs, and improving reliability, thus reducing downtime and the risk of product loss.

Figure 5. Draft Investment Concepts for Clean Energy and Energy Efficiency



C. Natural Resources and Waste Diversion

California's natural resources are key assets in efforts to address climate change. Given the decadal time frame of most natural systems, achieving the State's mid- and long-term climate targets and goals will not be possible without investing now in California's natural resources, particularly through protection and improved land management. These investments can provide near-term greenhouse gas emission reductions and put natural resources systems on track to serve as needed long-term carbon sinks.

Achieving California's climate goals will require an integrated, landscape-scale approach to managing the State's natural and working lands—including forests, wetlands, rangelands, and agricultural lands—so that these lands can contribute to renewable energy generation, provide essential ecosystem benefits, and enhance the capacity of these landscapes to store carbon in a manner that can be sustained well into the future.

In addition, transforming how the State manages organic waste is one of the most potent tools in reducing short-lived climate pollutants—and simultaneously provides important opportunities to improve agricultural soil health and to generate renewable bioenergy.

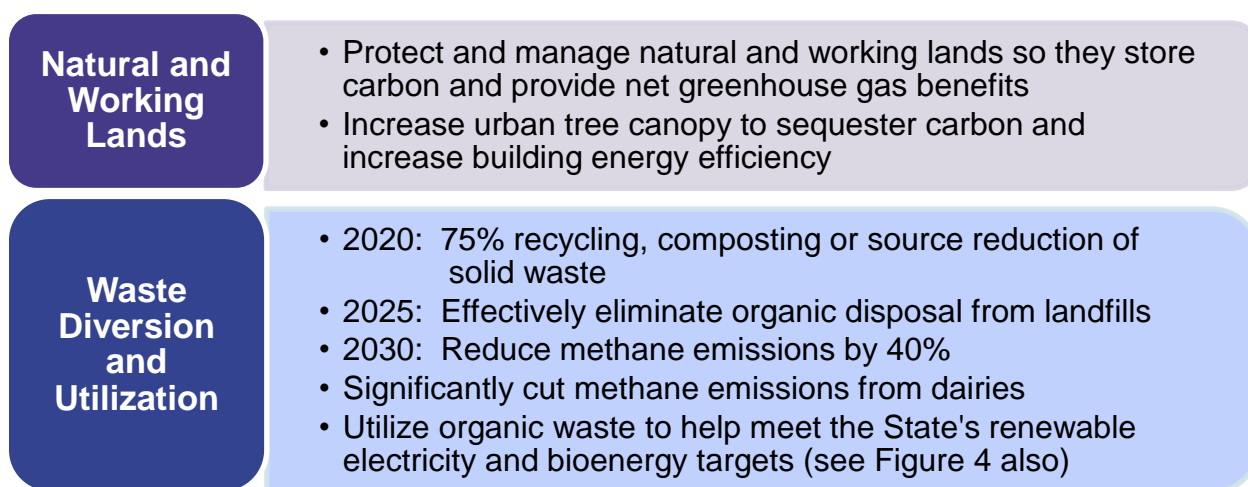
1. Existing Situation

Natural and working lands, and in particular forests, which constitute over one-third of the land base in California and supply clean water to nearly two-thirds of the State's residents, play a critical role in California's climate efforts. For forests, the Natural Resources Agency, California Environmental Protection Agency, California Department of Forestry and Fire Protection (CAL FIRE), ARB, and federal partners are collaborating on a Forest Carbon Plan to describe and meet climate goals. The State expects to set targets for net forest carbon storage, identify implementation plans to achieve these targets, and develop funding recommendations to support net long-term carbon storage in forests. Current investments in forests, mountain meadows, wetlands, and water conservation also address natural resource health. In addition, forest and agricultural land investments can prevent conversion of land types to ensure maximum carbon sequestration.

The California Department of Resources Recycling and Recovery (CalRecycle) implements waste diversion strategies to cut greenhouse gases (especially methane), and criteria and toxic pollutants, by reducing the amount of municipal solid waste that is disposed of in landfills and repurposing that waste as new value-added products. Increasing waste diversion alternatives, expanding their markets, and building the necessary infrastructure, will be needed to reach the State's waste diversion goals.

Figure 6 below summarizes key State goals for natural resources and waste diversion.

Figure 6. California’s Natural Resources and Waste Diversion Targets and Goals



2. Current Funding

State funding to support conservation and restoration of natural and working lands includes several programs housed at departments throughout the California Natural Resources Agency and the California Department of Food and Agriculture, such as CAL FIRE, the Department of Fish and Wildlife, and the Department of Conservation. State funding to CalRecycle to support waste diversion in California has largely focused on expanding California’s recycling capacity.

3. Needs Assessment

Prioritizing investment in carbon storage in all land types is of particular importance to consider for this Second Investment Plan. These investments could initiate changes that often occur on a decadal scale, making immediate action critical to reaching long-term goals. To guide investments to increase carbon storage and achieve a net climate benefit in the near- and longer-term, investments should be considered within the following areas: protecting existing lands threatened by conversion to more carbon-intensive uses, and strategically managing lands to increase their capacity to store carbon and reduce greenhouse gas emissions.

There is a strong history of land conservation in California to protect wildlife, preserve agricultural viability, improve water supply and quality, and provide parks and open space for residents and visitors from around the world. California’s lands should be protected and managed holistically and in a way to systemically utilize natural and working systems to reverse carbon loss and to preserve and grow carbon stocks.

In addition, a comprehensive approach reflects the reality that natural systems traverse property boundaries, requiring strategies that take a landscape-level approach and

enlist all landowners (both public and private) in stewarding that landscape. This includes: managing natural and working lands to achieve sustainable net carbon sequestration and greenhouse gas reductions, targeting investments toward private landowners with easements on forest and agricultural lands that are at risk of conversion, and cost-share programs to promote restoration of forested lands, wetlands, and other natural areas.

Additionally, the potential benefits of forests located in urban areas—including carbon sequestration, air filtration, community cooling, improved active transportation and recreation conditions, improved storm-water runoff, and water retention—are under-realized. This is largely due to insufficient local funds for tree planting and on-going maintenance costs. Building resilient urban forests will also require a focus on drought-tolerant tree species that do not place additional pressure on local water supply.

Managing the State's waste plays an important role in reducing potent short-lived climate pollutants. Organic waste—including organic matter sent to landfills, agricultural and forest biomass, and livestock manure—is responsible for more than half of the State's methane emissions. Addressing this need will require redirecting organic matter sent to municipal waste facilities, including landfills and water treatment plants, to composting and anaerobic digestion—creating renewable energy and other useful products, including amendments that improve agricultural soil health. The generation of this on-site renewable energy can fuel local transportation needs, including powering landfill and dairy trucks, or can be injected into gas pipelines for use in other locations.

Traditional methods of managing livestock manure should be transitioned to scrape manure management systems and dairy digesters should be utilized for turning waste into energy, where feasible and appropriate. Intermediate technologies, such as solid separation, may have a role in contributing to emission reductions.

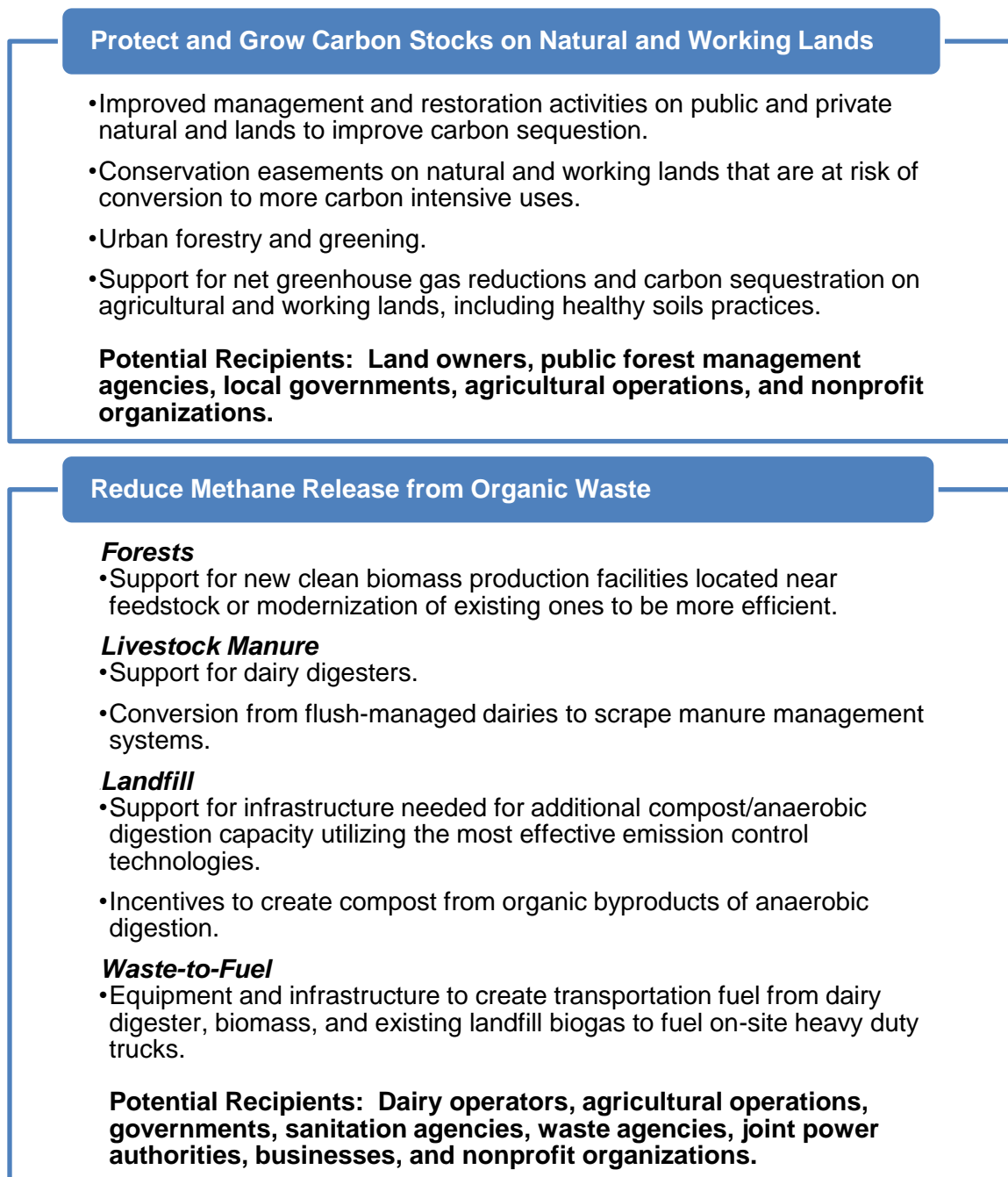
All systems should take into account agronomic and other benefits of various manure management pathways. Forest biomass waste can also be turned into energy—creating fuel for electricity and transportation, and reducing air pollution, including black carbon emissions, associated with open burning.

Waste-related funding in California has largely focused on expanding recycling capacity. While this investment is a start, transforming how the State handles organic matter—essential to reversing growth in methane emissions—will require a significantly larger investment in infrastructure to support resource recovery from organic waste, including production of various forms of energy, compost, and other soil amendments.

There are also additional opportunities for achieving greenhouse gas reductions from utilizing the resources from the organic waste, whether it is generated from natural and working lands, or diverted from landfills or water treatment. For example, the use of compost in land applications can result in healthy soils and greenhouse gas benefits due to increased carbon storage on the land, soil stabilization which reduces erosion, water conservation, and increased soil health. Additional actions could take advantage of the synergies between these two waste sources.

Figure 7 below shows the draft investment concepts for natural resources and waste diversion.

Figure 7. Draft Investment Concepts for Natural Resources and Waste Diversion



4. Disadvantaged Communities

Strategies in this category that address the needs of disadvantaged communities are those that ultimately result in healthier places to live, work, and play. Restoring and improving how the State manages the forests, wetlands, and other natural lands located in disadvantaged communities helps direct the benefits of these ecosystem services to these communities. For instance, wetland restoration in the Delta provides flood resiliency to the disadvantaged communities there. Urban forestry helps mitigate some of the environmental health burdens in disadvantaged communities. Trees in both urban areas and the California's 33 million acres of forests can provide air and water filtration, resiliency against heat and heat-related illness, recreational opportunities for residents, and create more vibrant streetscapes and landscapes.

Studies suggest that creating a robust recycling, composting, and digestion system in California has the potential for substantial local job creation.⁷ However, efforts to expand composting, anaerobic digestion, and recycling should be pursued strategically to avoid creation of environmental health issues for nearby communities. For example, anaerobic digestion facilities should be sited appropriately to minimize truck traffic, thereby reducing vehicle miles travelled, as well as the associated criteria and toxic air pollutants. In addition, proven emission control technologies should be installed on digester and composting facilities located near residents to minimize exposure to volatile organic compounds and other air pollutants. State and local agencies are working together to encourage growth of these types of operations, while protecting the environment and public health through existing statutory mechanisms, such as the California Environmental Quality Act and environmental permitting programs.

5. Co-Benefits

The State's forests, soil, grasslands and waterways are, as Governor Brown stated in his 2015 inaugural address, "...the very systems of nature on which human beings and other life forms depend." Natural and working lands are essential assets in ensuring California remains one of the most ecologically, economically, and culturally rich places in the nation. California's natural and working lands provide ecosystem services on which we all depend, including water capture supply and filtration, including groundwater recharge, improved air quality, and provision of food, fiber, and wildlife habitat.

Sustainably managed natural and working lands can also buffer both humans and nature from the expected impacts of climate change—by increasing water availability and quality; providing shade and shelter; reducing incidence of pests, disease and

⁷ Natural Resources Defense Council. From Waste to Jobs: What Achieving 75 Percent Recycling Means for California. March 2014. <http://www.nrdc.org/recycling/files/green-jobs-ca-recycling-report.pdf>; Natural Resources Defense Council. Smarter Business: Green Business Guides - More Jobs, Less Pollution - Growing the Recycling Economy in the U.S. November 2011. <http://www.nrdc.org/business/guides/recyclingreport.asp>; and Institute for Local Self-Reliance. Composting Makes \$en\$: Jobs through Composting & Compost Use. May 2013. <http://ilsr.org/composting-sense-tables>.

wildfires; and protecting against erosion. These co-benefits should be sought at every opportunity and pursued through innovative integration of natural resources into other GGRF investment priorities, such as energy and sustainable communities. The public benefits of investing in natural resources now are numerous and are felt through time.

Restoring the State's forests to more natural carbon stock levels is an effective mitigation strategy, but it brings myriad other benefits, including improved wildlife habitat and healthier watersheds. California's remaining wetlands not only sequester carbon, they are the first line of defense against sea-level rise and storm surge, particularly in the fragile Delta region. Investments in mountain meadows and rangelands can ensure water supply and quality to downstream communities. Improving the health of agricultural soils with compost, other amendments, and improved farming practices increases carbon sequestration of soils, while reducing water and pesticide use. The diversion of manure to digesters can reduce air and water impacts related to open manure lagoons and help better manage nitrogen associated with animal wastes. Urban forests cool communities, reduce energy used to cool homes, and create comfortable conditions that encourage active transportation. A more robust, healthier agricultural sector has economic benefits for many of the State's rural communities.

Waste diversion projects have the potential to yield economic, environmental, and public health co-benefits. Operating the next generation of composting and anaerobic digestion plants will require new skills, and where applicable, job training for community residents. Reducing the amount of municipal solid waste landfilled will improve air quality by reducing criteria and toxic pollutants directly from landfills. In addition, waste diversion projects will reduce the distance waste is hauled to landfills, thereby reducing vehicle miles travelled, as well as the associated criteria and toxic air pollutants. Compost and anaerobic digestion projects produce valuable soil amendments which have a number of environmental co-benefits such as reducing soil erosion, displacing synthetic fertilizers, and increasing soil water holding capacity.

V. PUBLIC PROCESS

Public feedback on these concepts will inform the preparation of the Second Investment Plan, which is due to the Legislature in January 2016. Table 1 provides a timeline for the public process on the Second Investment Plan. For more information or to submit written comments, please visit: <http://www.arb.ca.gov/investmentplan>.

Appendix A. Disadvantaged Community Map

This Appendix contains a map of the census tracts currently identified as “disadvantaged communities” for the purposes of GGRF investments. As defined by the Secretary for Environmental Protection, these represent the top 25 percent of census tracts as determined by use of CalEnviroScreen 2.0. Detailed maps for all regions of California and an interactive mapping tool are available at: <http://www.arb.ca.gov/auctionproceeds>.

The Office of Environmental Health Hazard Assessment developed the CalEnviroScreen tool under the California Environmental Protection Agency’s guidance to assess areas that are disproportionately affected by multiple types of pollution and areas with vulnerable populations. Additional information on CalEnviroScreen and the identification of disadvantaged communities is available at: <http://www.calepa.ca.gov/EnvJustice/GHGInvest>.

The Air Resources Board has established guidance for administering agencies to maximize benefits to disadvantaged communities and a specific process to be used in determining whether projects funded by GGRF meet the criteria for being located within or benefiting disadvantaged communities (<http://www.arb.ca.gov/auctionproceeds>).

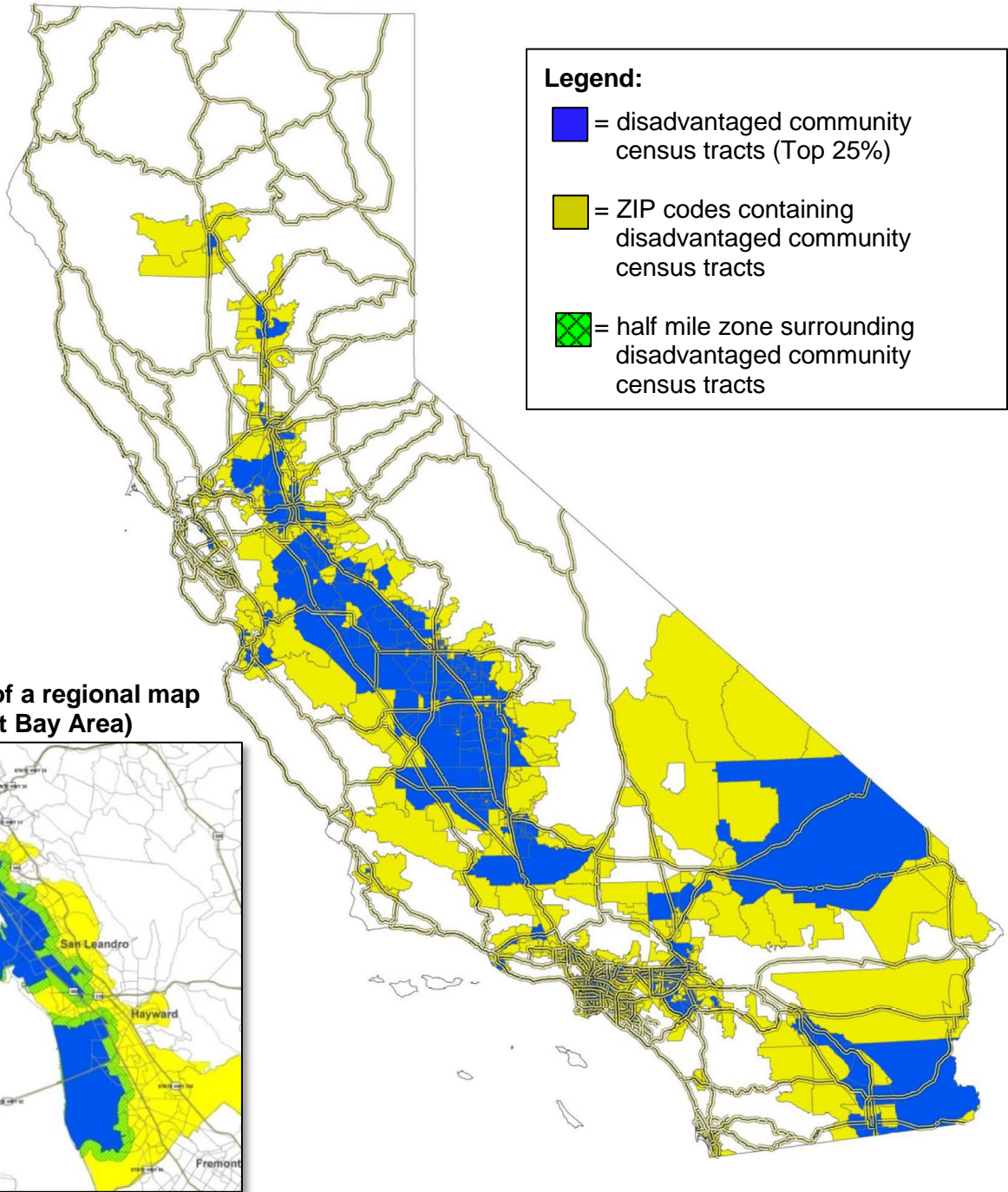
Some projects physically located outside the boundaries of a disadvantaged community census tract, but in close proximity and offering meaningful benefits to one or more disadvantaged communities, may satisfy the criteria. Close proximity means within a half mile or within the same ZIP Code as a disadvantaged community census tract, depending on the project type. The website also contains an interactive mapping tool that allows users to zoom in on a specific location. Figure A-1 is a statewide map that illustrates the information available on the website, including the following:

- Census tracts that have been identified as disadvantaged communities;
- Half-mile zones around disadvantaged community census tracts; and
- ZIP codes containing disadvantaged community census tracts.

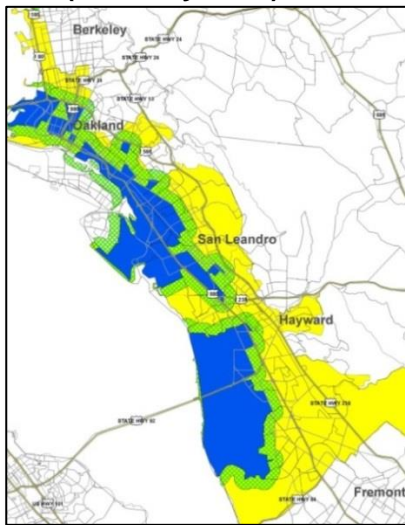
Figure A-1

Statewide Map of Disadvantaged Communities
(overlaid on highway system)

CalEnviroScreen Version 2.0 (October 31, 2014)
Top 25% Highest Scoring Census Tracts



**Example of a regional map
(East Bay Area)**



For more detailed regional maps that allow users to zoom in, refer to:
<http://www.arb.ca.gov/auctionproceeds>.

Appendix B. Greenhouse Gas Reduction Fund Appropriations

Table B-1. Greenhouse Gas Reduction Fund Appropriations for Investment

Agency	Program	Appropriations		Project Categories	Agency Allocation by Project Type (\$M)	Type of Award Process
		2013-14 (\$M)	2014-15 (\$M)			
High Speed Rail Authority	High Speed Rail Construction of the initial operating segment in the Central Valley and further environmental and design work on the statewide system.	\$0	\$59	Planning/design	\$59	State Implemented
			\$191	Right-of-way acquisition and construction of Initial Operating Segment	\$191	
California State Transportation Agency	Transit and Intercity Rail Capital Program Competitive grant program for rail and bus transit operators for capital improvements to integrate State and local rail and other transit systems, and provide connectivity to the high-speed rail system.	\$0	\$25	Connectivity to existing/future rail and transit systems; increased service and reliability of rail and transit, and integration of transit and rail systems	\$25	Competitive
Department of Transportation	Low Carbon Transit Operations Program Support new or expanded bus and rail services to increase transit ridership and decrease greenhouse gas emissions.	\$0	\$25	New/expanded bus or rail services or expanded intermodal transit facilities; service or facility improvements	\$25	Distribution to local transit agencies based on statutory formula
Strategic Growth Council	Affordable Housing and Sustainable Communities Program Implementation of SB 375 sustainable communities strategies and similar strategies in other areas with greenhouse gas reduction policies. Projects will reduce greenhouse gas emissions by increasing transit ridership, active transportation (walking/biking), affordable housing near transit stations, preservation of agricultural lands, and local planning that promotes infill development.	\$0	\$130	Affordable Housing and Sustainable Communities Program	\$125	Competitive
				Sustainable Agricultural Lands Conservation Program	\$5	

Table B-1. Greenhouse Gas Reduction Fund Appropriations for Investment (Continued)

Agency	Program	Appropriations		Project Categories	Agency Allocation by Project Type (\$M)	Type of Award Process
		2013-14 (\$M)	2014-15 (\$M)			
Air Resources Board	Low Carbon Transportation Accelerate the transition to low carbon freight and passenger transportation. Support the Administration’s goal to deploy 1.5 million zero-emission vehicles in California by 2025. Respond to increasing demand for rebates for zero-emission cars and vouchers for hybrid and zero-emission trucks and buses, as well as provide incentives for the pre-commercial demonstration of advanced freight technology to move cargo in California.	\$30	\$200	Clean Vehicle Rebate Project	\$20 (2013-14) \$111 (2014-15)	First-Come First-Served
				Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project	\$10 (2013-14) \$5 (2014-15)	
		\$0		Advanced Technology Freight Demonstration Projects in Disadvantaged Communities	\$50	Competitive
				Light Duty Pilot Projects in Disadvantaged Communities	\$9	
				Zero-Emission Truck and Bus Pilot Projects in Disadvantaged Communities	\$25	
		Department of Community Services and Development		Low-Income Weatherization Program/Renewable Energy Installation of energy efficiency and renewable energy projects in single and multifamily low-income housing units within disadvantaged communities. Weatherization measures typically include weather-stripping, insulation, caulking, water heater blankets, windows, refrigerators, energy efficient light bulbs, electric water heaters and heating and cooling systems. Renewable energy measures include installation of solar water heater systems and photovoltaic systems.	\$0	\$75
Multi-Family Weatherization	Existing Service Providers / Competitive					
Solar Photovoltaic	Competitive					

Table B-1. Greenhouse Gas Reduction Fund Appropriations for Investment (Continued)

Agency	Program	Appropriations		Project Categories	Agency Allocation by Project Type (\$M)	Type of Award Process
		2013-14 (\$M)	2014-15 (\$M)			
California Energy Commission <i>(proposed shift to the Department of General Services)</i>	Energy Efficiency in Public Buildings Energy efficiency and energy generation projects in public buildings owned and operated by a State agency or entity, including, without limitation, the University of California and California State University. Examples of fundable projects include, but not limited to, lighting systems, heating, ventilation and air conditioning equipment, interior and exterior lights, energy management systems and equipment controls, pumps and motors, building insulation, renewable energy (e.g., PV) and combined heat and power projects using renewable fuel, and load shifting projects, such as thermal energy storage.	\$0	\$20	Building retrofits for energy efficiency	\$20	First-Come First-Served
				Energy generation		
Department of Food and Agriculture	Agricultural Energy and Operational Efficiency Projects that reduce greenhouse gas emissions from the agriculture sector by capturing greenhouse gases, harnessing greenhouse gases as a renewable bioenergy source, improving agricultural practices and promoting low carbon fuels, agricultural energy, and operational efficiency.	\$10	\$15	State Water Efficiency and Enhancement Program	\$10	Competitive
				Dairy Digesters and Research Development Program	\$12	
				Alternative and Renewable Fuels Program	\$3	State Implemented
Department of Water Resources	Water Action Plan - Water-Energy Efficiency Funding for grants that support water use efficiency and conservation projects, and leak detection and repair projects, that reduce the need for energy to move water. Support State Water Project facilities.	\$30	\$0	Water-Energy Efficiency Projects: Hyatt Power Plant Unit 1 and Thermalito Power Plant Unit 1 Turbine Replacement	\$10	State Implemented
				Water-Energy Grant Program	\$20	Competitive

Table B-1. Greenhouse Gas Reduction Fund Appropriations for Investment (Continued)

Agency	Program	Appropriations		Project Categories	Agency Allocation by Project Type (\$M)	Type of Award Process
		2013-14 (\$M)	2014-15 (\$M)			
Department of Fish and Wildlife	Water Action Plan - Wetlands and Watershed Restoration Implement projects that provide carbon sequestration benefits, through restoration of wetlands (including those in the Delta), coastal watersheds and mountain meadows.	\$0	\$25	Delta and Coastal Wetlands	\$25	Competitive
				Mountain Meadows Habitat		
				Wetlands and Water Efficiency on Department of Fish and Wildlife Lands		
Department of Forestry and Fire Protection	Sustainable Forests Urban forests in disadvantaged communities and forest health restoration and reforestation projects that increase carbon sequestration and reduce wildfire risk. Enhance forest health and reduce fuel loads in light of climate change increasing wildfire intensity and damage.	\$0	\$24	Forest Legacy Program	\$24	Competitive
				Healthy Forests		
			\$18	Urban and Community Forestry	\$18	Competitive
Department of Resources Recycling and Recovery	Waste Diversion Financial incentives for capital investments in composting/anaerobic digestion infrastructure and recycling manufacturing facilities to divert waste from landfills.	\$0	\$25	Organics Grant Program	\$15	Competitive
				Recycled Fiber, Plastic, and Glass Grant Program	\$5	
				Organics and Recycled Fiber, Plastic, and Glass Loan Program	\$5	
Total Appropriations for Programs¹		\$70	\$832			

¹ Appropriation is for State agencies to administer programs and fund projects.