

A Framework for Evaluating State-Level Green Stimulus Proposals



LAO 

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Executive Summary

Green Stimulus Intended to Achieve Both Economic and Policy Goals. During economic downturns such as the one California and the United States are currently experiencing, governments often seek to help the economy recover through various initiatives referred to as economic stimulus, such as spending on public infrastructure projects and grants for programs. When such economic initiatives also have an environmental benefit, they are sometimes labeled as “green stimulus.” Examples of activities that have been proposed as green stimulus include electricity grid modernization, renewable energy innovation, and climate adaptation activities such as forest management and coastal habitat restoration.

Likely to Be Increased Interest in Green Stimulus Proposals. Given the state’s economic condition and its numerous climate and environmental goals, the Legislature is likely to consider green stimulus proposals in the coming months and years. When reviewing such proposals, the Legislature faces two basic questions to evaluate whether they are worth pursuing: (1) what effects is the proposal likely to have on short-term economic conditions, such as employment and economic output, and (2) what short- and long-term environmental benefits could the proposal achieve?

Key Considerations for Evaluating Green Stimulus Proposals

State’s Ability to Adopt Large-Scale Stimulus Is Constrained. While federally funded green stimulus projects could have notable positive economic effects for the state, we find that the potential for *state-funded* efforts to have meaningful stimulative impacts is likely limited by budget constraints. This is primarily because the State Constitution requires that the state budget be balanced annually, meaning an increase in funding in one area of the budget generally means that money is not available for other state programs. It is difficult to be confident that any boost in economic activity from increasing funding for one program would not be more than offset by a corresponding decrease in economic activity from less funding for another program. Additional funding through new taxes or fees is also unlikely to provide significant net benefits, because the higher tax or fee likely would reduce private sector spending in the short term. While there could be stimulative benefits from new bond funds—which allow the state to spend more in the near term than it otherwise would—the magnitude of the effects on statewide economic conditions likely would be relatively minor since state bonds typically are small compared to the overall size of the California economy. Given these constraints, we find it unlikely that state-funded green stimulus would have large effects on overall short-term economic conditions.

Potential Stimulus Effects of Different Programs Are Difficult to Compare. A major challenge to designing effective state stimulus is the significant uncertainty that exists regarding the degree to which different programs and projects might vary in their stimulative effects. Estimated effects produced by economic models are uncertain because of limited information about both the reliability of the models and the accuracy of assumptions used to prepare those estimates. Additionally, because the pandemic and public health conditions continue to evolve, it continues to be difficult to predict how they ultimately will affect various industries and households. These uncertainties create challenges in identifying which types of proposals would provide the most effective economic stimulus. For example, the overall stimulative effects of different environmental projects are difficult to compare to other types of spending—such

as spending on education, broadband infrastructure, or financial relief for households and businesses. Furthermore, when trying to compare different types of environmental projects, it is challenging to estimate which ones might provide the largest stimulus effect.

Environmental Programs Have Potential to Yield Other Important Benefits. Green stimulus proposals have the potential to provide significant environmental benefits by assisting the state in (1) addressing current and future impacts of climate change, (2) reducing greenhouse gas emissions, and (3) supporting other initiatives to improve natural resources and reduce pollution. Moreover, some of these projects—particularly climate adaptation projects—could help to avoid future damages and costs, which might bring significant longer-term economic benefits for certain regions and the state compared to if they were not undertaken. These could include taking action to mitigate the threat of future wildfires or flooding from sea-level rise. Projects could also be targeted at addressing environmental justice and social equity concerns by remediating conditions that disproportionately affect communities with residents who earn low incomes. Such activities could include cleaning up contaminated lands, improving air and water quality, and building new parks in urban areas.

Recommendations

Focus More on Environmental Merits of Proposals Than Short-Term Economic Stimulus. We recommend the Legislature limit the amount of emphasis it places on potential economic stimulus benefits when evaluating state-funded green stimulus proposals. Instead, we recommend that the Legislature base its funding decisions primarily on the potential environmental merits, including the long-term economic benefits from reducing future damages related to climate change. We identify several key questions the Legislature will want to consider when assessing the potential fiscal and environmental effects of pursuing green stimulus proposals:

- How significant are the climate or environmental benefits, and do they outweigh the costs?
- How much long-term economic benefit will be created for the state?
- What is the most cost-effective way to achieve a specified policy goal?
- How equitable is the distribution of benefits?
- What are the highest priorities for state-level funding?

In order to better inform future efforts, we also recommend the Legislature invest some time and resources in articulating specific climate goals, collecting additional data, and evaluating the effectiveness of existing programs.

INTRODUCTION

During economic downturns such as the one California and the United States are currently experiencing, governments often seek to help the economy recover through various initiatives—such as targeted expenditures—referred to as economic stimulus. When such initiatives also have an environmental benefit, they sometimes are labeled as “green stimulus.” Given the state’s economic condition and its numerous climate and environmental goals, the Legislature likely will be presented with green stimulus proposals to consider in the coming months and years. This report is intended to provide guidance for the Legislature on how to evaluate the merits of state-funded green stimulus proposals.

We begin by describing past economic stimulus initiatives, as well as providing examples of such efforts that have been focused on environmental benefits. Next, we identify key considerations for evaluating state-funded green stimulus proposals, including the degree to which they are likely to

provide significant (1) economic stimulus and (2) environmental benefits. We conclude with recommendations for the Legislature on how to evaluate the merits of green stimulus proposals, along with steps that might be taken to collect additional information that could aid such assessments.

This report is submitted pursuant to Chapter 135 of 2017 (AB 398, E. Garcia), which requires our office to report annually on the economic impacts and benefits of the state’s greenhouse gas (GHG) emissions targets. Consistent with the statutory direction, this report assesses the potential economic impacts and benefits of GHG reduction strategies that could be included in green stimulus proposals. However, the scope of the report is broader than GHG reduction strategies because it also assesses the potential effects of other environmental-related projects, such as climate adaptation activities.

GREEN STIMULUS PROPOSALS INTENDED TO ACHIEVE BOTH ECONOMIC AND POLICY GOALS

The coronavirus disease 2019 (COVID-19) pandemic has severely disrupted the economy at the global, national, state, and local levels. To reduce spread of the disease, governments, businesses, and households have taken measures to limit in-person interactions. As a result, businesses reduced their capacities, workers and consumers stayed at home, and schools and colleges transitioned to remote learning. These measures have led to an economic downturn, resulting in higher unemployment and decreased economic activity, particularly for workers earning lower wages and with lower levels of educational attainment. We anticipate the Legislature will be asked to consider economic stimulus proposals in response, to provide relief to those affected by the recession and to help rebuild the economy. Of these proposals, some will purport to be “green,”

consisting of policies and programs designed to stimulate the economy through measures that also provide environmental benefits. This section provides a definition of economic stimulus and what characteristics make certain stimulus proposals garner the green label.

What Is Economic Stimulus? Economic stimulus refers to government actions intended to encourage short-term economic activity. In this report, we primarily discuss *fiscal* stimulus, which is designed to support the overall demand for goods and services through increases in government spending or decreases in taxes. Such government interventions are intended to provide economic relief, get people employed, increase consumer spending, and spur businesses to invest. Historically, the federal government has utilized economic stimulus during recessions to

diminish the severity of the economic downturn and to help support a more rapid economic recovery. Some examples of fiscal stimulus that the federal government has undertaken in the past include spending on public infrastructure projects, unemployment benefits, direct payments to businesses, tax credits for households and businesses, and grants for programs.

Stimulus could also refer to other government actions that do not involve increases in spending or decreases in taxes. Regulatory changes could be a type of stimulus, increasing the overall demand for goods and services by incentivizing private sector spending through regulations. For example, streamlining the permitting and inspection processes for solar panel installations could decrease the costs of solar energy projects and may incentivize private sector spending. While the Legislature also could consider such non-fiscal measures to support the economic recovery, because they are less common they are not the focus of this report.

What Is Green Stimulus? A subset of economic stimulus proposals might be presented as being green stimulus. In this report, we use this term to describe proposals aimed at providing economic stimulus while also achieving other environmental policy goals, such as climate mitigation, climate adaptation, or other natural resources and environmental protection objectives like reducing pollution and preserving ecosystems. Generally, most green stimulus proposals are designed to support economic recovery through increased government spending on infrastructure projects to improve environmental resiliency and reduce pollution, management of natural resources, and grants for environmental programs. **Figure 1** describes examples of activities that have been proposed as being green stimulus.

Federal Examples of Green Stimulus. Historically, most economic stimulus initiatives have come from the federal government, not state and local governments. This is due to the

federal government's ability to run a budget deficit. Whereas state and local governments are required to pass balanced budgets—meaning they cannot spend more than they collect in revenue—the federal government can spend more by borrowing funds, providing it greater capacity to undertake large spending initiatives even during a recession. Therefore, the most notable example of green stimulus was included in the federal American Recovery and Reinvestment Act of 2009 (ARRA). Among its green stimulus allocations, ARRA included over \$90 billion nationwide for clean energy projects and tax incentives aimed at both supporting the economic recovery and meeting environmental goals, such as reducing GHG emissions. The clean energy spending in ARRA included energy efficiency improvements, such as weatherization and retrofits; grid modernization; mass transit, high-speed rail, and zero-emission vehicles; carbon capture and storage technologies; and clean energy innovation, manufacturing, and job training. Although this package included some tax incentives, such as tax decreases for households' investments in energy efficiency improvements, most of the measures involved increased government spending.

As the current economic downturn continues, the President recently signed into law legislation providing an additional \$900 billion for COVID-19 relief, as well as \$1.4 billion for federal government spending. This legislation included increased support for clean energy and environmental programs, including for research

Figure 1

Examples of Activities That Have Been Proposed as Green Stimulus

- Carbon capture and storage technologies.
- Climate adaptation activities.
- Coastal habitat restoration.
- Electricity grid modernization.
- Energy efficiency improvements.
- Forestry management and wildfire prevention.
- Mass transit, rail, and active transportation infrastructure.
- Recycling infrastructure.
- Renewable energy innovation, manufacturing, and job training.
- Water supply and treatment infrastructure.
- Zero-emission vehicle rebates and infrastructure.

and development of clean energy, such as solar, wind, geothermal, hydropower, and nuclear energy; energy storage technology; as well as carbon capture and storage. In addition, the legislation provided funding for water resources projects, environmental cleanup, and public lands management. Similar to ARRA, this legislation also includes some tax incentives, such as extending the tax credits for renewable energy production.

State Examples of Green Stimulus. Because stimulus typically comes from the federal government, California historically has not enacted many stimulus initiatives, including green stimulus. However, several state-level green stimulus

proposals have recently been discussed, both by the Legislature and advocacy groups. For example, several state legislators put forward economic stimulus ideas that included a number of green stimulus elements during the last legislative session, such as increased spending on wildfire prevention, climate adaptation, water and recycling infrastructure, clean transportation, and energy efficiency. The proposals would have funded these activities through bond acceleration, securitization of revenue streams (including cap-and-trade auction revenues), and issuance of tax vouchers. If our economy remains in a downturn, we anticipate there will be increased interest in additional green stimulus proposals in the next legislative session.

KEY CONSIDERATIONS FOR EVALUATING GREEN STIMULUS PROPOSALS

When presented with potential green stimulus proposals, the Legislature faces two basic questions to evaluate whether they are worth pursuing:

- **What Are the Short-Term Economic Stimulus Benefits?** This evaluation focuses on the effects a proposal is likely to have on certain short-term economic conditions, such as employment and economic output.

- **What Are the Environmental Benefits?** This evaluation focuses on the effects a proposal is likely to have on a wide variety of different environmental and economic outcomes, including both short-term and long-term benefits.

In this section, we discuss key information and considerations related to both questions. **Figure 2** summarizes our main findings.

Figure 2

Major Findings Related to State-Funded Green Stimulus

- ✓ **State's Ability to Adopt Large-Scale Stimulus Is Constrained**
 - Federal funding has potential for largest positive effect.
 - Shifting state budget expenditures unlikely to have significant benefits.
 - Additional funding through new taxes or fees also unlikely to provide significant benefits.
 - New state bonds could have some benefits, but effects likely would be small.
- ✓ **Potential Stimulus Effects of Different Programs Are Difficult to Compare**
 - Information about the reliability of economic outcome models is limited.
 - Status of pandemic and economic conditions in flux.
- ✓ **Environmental Programs Have Potential to Yield Other Important Benefits**
 - Lessen future damages and costs resulting from climate change.
 - Reduce greenhouse gas emissions to help mitigate climate impacts.
 - Improve environmental conditions, such as enhancing ecosystems and reducing pollution.

State's Ability to Adopt Large-Scale Stimulus Is Constrained

Among the most important factors in determining the potential stimulative effects of a proposal is the source of funding—federal funds, state bond funds, or state budget allocations from the General Fund or special funds. At a high level, the net stimulus effects of each fund source are determined by two offsetting factors: (1) the positive short-term economic benefits from the additional spending and (2) potential negative effects of any budget-balancing actions the state would need to take, such as spending reductions in other areas and/or increased taxes.

Federal Funding Has Potential for Largest Positive Effect. Proposals that are funded with additional federal funds—such as through another federal stimulus package—likely would have the largest positive economic effects for the state. This is because California receives the short-term economic benefits associated with the additional spending without any immediate offsetting state trade-offs—such as higher state debt service payments, reduced spending in other areas of the state budget, or higher state taxes. The magnitude of the stimulative effect depends on how much federal money is provided, and a large amount of federal funding could have a significant positive stimulative effect. For example, we estimate that, as of November 1, 2020, more than \$250 billion in federal funding has been allocated to California's state and local governments, households, businesses, and other entities in response to COVID-19 and the ensuing economic impacts. This funding has likely provided substantial short-term economic benefits for the state. For context, the overall state General Fund budget for 2020-21 is \$134 billion.

The recent federal stimulus package included funding for some environmental activities. However, very little of this funding is provided directly to states and, as a result, the state has limited influence over how the money will be spent. If the federal government provides additional stimulus funds that can be used for environmental projects and provides states with some discretion over specific spending decisions, then the Legislature

might want to prioritize spending based, in part, on how effectively programs provide economic stimulus. Proposals are more likely to be effective stimulus if they target (1) projects that can be implemented relatively quickly, (2) economic activities that would not have otherwise occurred, (3) projects that mainly use in-state labor and supplies, and (4) industries or workers most affected by the recession. (See the box on page 8 for more details on these criteria.) In general, the degree to which environmental proposals meet these criteria will likely vary from project to project. As we discuss in more detail below, although these criteria can serve as helpful guidance, significant uncertainty remains about which projects might provide the greatest stimulative benefits.

Shifting State Budget Expenditures Unlikely to Have Significant Benefits. In general, the state's ability to use its own budgetary resources to provide economic stimulus is very limited because the state Constitution requires that the state budget be balanced annually. An increase in funding in one area of the budget generally means that money is not available for other state programs. (This applies to shifts in annual budget expenditures, as well as decisions about the allocation of increased revenues from existing fees and taxes.) For example, spending a greater share of the General Fund budget on environmental projects means less money is available for other state priorities, such as education, health care, or adding to reserves. This is also true for the use of state special funds. For example, spending more cap-and-trade auction revenue on certain environmental activities leaves less funding available to support other types of projects and programs. It is difficult to be confident that any increase in economic activity from increased funding to one program would not be more than offset by the corresponding decrease in economic activity from less funding to another program. In most cases, such shifts in how funding is allocated in the annual budget likely will not result in meaningful economic stimulus. (There might be some short-term stimulative benefits associated with spending additional money from one of the state's budget reserve accounts, but constitutional requirements likely limit the Legislature's ability to spend those funds on most environmental projects.)

Additional Funding Through New Taxes or Fees Also Unlikely to Provide Significant Benefits. Some stimulus proposals might include increased taxes or fees to support higher government spending. The overall stimulative effects of such proposals are likely to be small and could be negative depending on how they are structured. This is because the higher tax would reduce private sector spending in the short term. This negative economic effect could be offset—partially or fully—by the benefits associated with an increase in government spending. However, there is often a lag between when the tax is collected and when the money is spent. As a result, the economic effects from collecting the tax might be negative in the short term, even if the net economic effects over the longer term are more uncertain. It is worth noting that although such proposals are likely not an effective way to provide near-term economic stimulus, there could be other fiscal or policy rationales for such proposals that make them worth considering.

New State Bonds Could Have Some Benefits, but Effects Likely Would Be Small. The state funding source most likely to have a positive stimulative effect is bonds—either general obligation bonds, revenue bonds, or some other similar financing arrangement (such as securitizing future revenue streams to achieve one-time funding in the near term). Issuing bonds to raise money for new projects would have a positive stimulative effect in the short term by increasing spending in the economy more than would otherwise have occurred. From a budget perspective, bonds are similar to taking out a loan that is paid back in future years with interest. If interest rates remain low—as is currently the case—these borrowing costs could be relatively low. However, the long-term costs associated with debt payments would reduce the amount of funding available to spend on other programs in future years.

While there could be stimulative benefits from new bond funds, the magnitude of the effects on statewide economic conditions likely would be relatively minor. This is because the size of state bonds is typically small compared to the overall size of the California economy. For context, federal stimulus actions taken in 2020 totaled about

\$3.1 trillion—equivalent to about 15 percent of national Gross Domestic Product. To match the overall scale of this effort, a state bond raising a similar amount—in terms of Gross State Product—would have to be nearly \$500 billion. Most state bonds approved by voters have not exceeded several billion dollars, and the largest bond approved in the last few decades was a \$20 billion transportation bond (Proposition 1B of 2006).

Potential Stimulus Effects of Different Programs Are Difficult to Compare

A major challenge to designing effective state stimulus is the significant uncertainty that exists regarding the degree to which different programs and projects might vary in their stimulative effects. In other words, it is often unclear whether funding certain activities is likely to produce more jobs and economic activity in the state than alternative spending options in the current economic climate. Some of the key reasons for this uncertainty are:

- ***Challenges Estimating Statewide Economic Outcomes.*** Various economic models can be used to estimate the effects of different stimulus proposals on economic outcomes, such as employment and Gross State Product. The economic estimates produced by these models are uncertain because of limited information about the reliability of the models and the accuracy of assumptions used to prepare those estimates. For example, the actual economic benefits and costs of stimulus programs depend in part on factors that are uncertain, such as future labor market conditions and behavioral responses by affected businesses. As a result, the benefits and costs of new stimulus programs may be less than or greater than expected if the initial assumptions turn out to have been inaccurate.
- ***Evolving Pandemic and Economic Conditions.*** The pandemic and the state's public health response continues to evolve. For example, it is still unclear how the overall number of infection cases will change in the coming months, how different entities and individuals will respond to future public health

Key Criteria for Identifying Effective Uses of Potential Federal Green Stimulus Funds

If the federal government allocates additional green stimulus funding and provides states with some discretion over specific spending decisions, the Legislature might want to target the funds in a way that maximizes the stimulative effects. Below, we discuss key criteria that might help the Legislature identify the most effective efforts, as well as how they might apply to different green projects. It is worth noting that these criteria apply broadly to stimulus proposals, including non-environmental proposals.

Can Be Implemented Quickly. In general, projects that can be implemented more quickly will be more effective at promoting near-term economic recovery. While projects ideally should be implemented during the “recession window”—when the recession is still ongoing—many economists believe stimulus could be effective after the recession technically ends, but before economic conditions (such as employment) have fully recovered. The unique nature of the current pandemic-driven recession makes it especially difficult to predict how long the current recession will last and how long it will take to reach full economic recovery. If it takes a relatively long time to reach economic recovery, projects with somewhat longer time lines to begin implementation—such as a couple of years—still could have stimulative effects.

The ability to implement environmental projects quickly can vary. Some environmental programs could be implemented within months, particularly when additional funding is provided for existing grant programs. For example, the state probably could quickly disperse additional federal funding for programs that provide financial incentives to adopt cleaner heavy-duty vehicles where there is currently a waiting list. In other cases, large-scale infrastructure projects—such as building new water recycling plants or relocating coastal highways at risk of flooding from sea-level rise—could take several years to plan and implement.

Encourage New Economic Activity. Proposals are more stimulative if they encourage new economic activities, rather than funding activities that would have been undertaken anyway or using workers that would otherwise already be employed elsewhere. The degree to which green stimulus spending would encourage new activities depends on the specific details of each program. For example, electric vehicles are still a small portion of the overall vehicle market and, as a result, many private property owners—such as apartment building owners—do not have a strong financial incentive to install vehicle chargers. Government funding that supports new charging stations could encourage these property owners to install chargers that would not have otherwise been funded.

In contrast, some programs might simply pay for activities that would have occurred anyway. For example, [studies](#) evaluating a past federal program that paid households to retire their older high-polluting vehicles and purchase new cleaner vehicles—also known as “Cash for Clunkers”—found that the program had limited stimulative effects. This is because most households receiving the subsidies either (1) would have purchased a new vehicle anyway or (2) simply shifted their vehicle purchase forward by a few months to access the temporary incentive. As a result, the net effect on overall economic activity during the recovery period was relatively minor.

Use In-State Labor and Supplies. Stimulus proposals are more effective if most of the money goes to workers and businesses in the region that it is intended to benefit. Therefore, projects that use a lot of in-state labor and products manufactured in California likely are more stimulative for the state than those that result in the purchase of goods manufactured out-of-state. The

degree to which environmental projects spend money on in-state labor and materials varies. Most projects result in a mix of in-state and out-of-state spending. For example, a proposal to subsidize solar energy likely would result in spending on in-state labor for installation but the purchase of solar panels manufactured out-of-state.

Benefit Groups Most Affected by Recession. Since the current economic downturn began, employment in many parts of the economy has largely recovered, including environment-related industries, such as energy efficiency and renewable energy. However, the most affected industries—such as leisure and hospitality—might not directly benefit from environmental projects. Leisure and hospitality employment in October 2020 was 25 percent lower than February 2020, while construction and utility jobs were only down by a few percent. While focusing stimulus efforts on environmental projects could have some positive effects, in many cases, these efforts could be less effective than targeting stimulus towards other industries that employ workers who have been more greatly affected and therefore would not address the uneven economic effects of the recession.

conditions, and when a vaccine will be widely available. This uncertainty makes it more difficult to predict the effects of the pandemic on various industries and households.

The uncertainty caused by these two factors creates challenges in identifying which types of proposals would provide the most effective economic stimulus. For example, the overall stimulative effects of different environmental projects are difficult to compare to other types of spending—such as spending on education, broadband infrastructure, or financial relief for households and businesses. Furthermore, when trying to compare different types of environmental projects, it is challenging to estimate which ones might provide the largest stimulus effect.

Environmental Programs Have Potential to Yield Other Important Benefits

While the state's ability to increase spending to dramatically increase economic activity is limited and the relative stimulative effects of different programs are uncertain, green stimulus proposals have the potential to provide significant environmental benefits. Specifically, green stimulus proposals could assist the state in (1) addressing current and future impacts of climate change, (2) reducing GHG emissions, and (3) supporting

other initiatives to improve natural resources and reduce pollution.

Climate Adaptation Benefits. Researchers predict that climate change will have myriad consequential effects throughout California. Changing conditions will include higher sea levels, increased risk of inland flooding, more severe heat days, more frequent and prolonged droughts, and more widespread and intense wildfires. These climate change effects have the potential to adversely affect human health, damage property and infrastructure, disrupt regional economies, and impair natural habitats. For example, our August 2020 report, [What Threat Does Sea-Level Rise Pose to California](#), describes numerous negative impacts that encroaching seas and waves could cause along California's coast due not only from increased flooding, but also through erosion of beaches and cliffs and raised coastal groundwater levels. Moreover, climate adaptation projects that help to avoid future damages and costs could bring significant longer-term economic benefits for certain regions and the state compared to if they were not undertaken. Therefore, projects that are focused on improving California's ability to moderate these impacts could have widespread benefits.

For example, the 2020 wildfire season took lives, leveled homes, destroyed habitats, and worsened air quality throughout the state. Moreover, current [estimates](#) suggest the state's wildfire protection costs will reach at least \$3.1 billion in 2020-21.

Projects that improve the health of the state's forests—such as by employing mechanical thinning and prescribed burning techniques to reduce tree density and combustible fuels—could decrease the intensity and spread of future wildfire ignitions and could mitigate the types of negative impacts the state experienced this past year. Specifically, to the degree that forest health activities prevent extreme wildfire conditions from developing, they have the potential to lessen public health impacts (from both smoke and fire), disaster recovery costs (from property damage), disruptions to regional economies (from effects on business activities and tourism), and environmental harm (from impairment to habitats, ecosystems, and natural watershed functions).

Climate Mitigation Benefits. Climate mitigation projects that reduce GHG emissions can help the state achieve its emissions limit of at least 40 percent below 1990 levels by 2030, as required by Chapter 249 of 2016 (SB 32, Pavley). This limit was established, in part, based on a recognition that GHGs contribute to climate change and result in the many different types of economic and environmental damages discussed above. Reducing GHGs in California consistent with the targets established by the Legislature would help reduce future global climate damages. In addition, since California emits only about 1 percent of global GHGs, some of the most significant benefits from state climate mitigation activities might be related to their indirect effects. For instance, policies that promote newer low-GHG technologies—such as heavy-duty electric vehicles—could encourage

technological innovation that might reduce the future cost of these technologies. As a result, these technologies might be adopted more widely in other jurisdictions and result in a more significant reduction in global emissions. Also, many GHG reduction programs can have significant co-benefits, such as by also reducing other pollutants that negatively affect local and regional air quality.

Other Environmental and Natural Resource Benefits. Some projects are not specifically designed to respond to climate change but, instead, could provide other types of environmental benefits. Such activities might focus on preserving or restoring fish and wildlife habitats, enhancing ecosystem functions, or expanding public access to natural resources. These types of activities to benefit “public trust” resources have been funded and conducted by the state for decades, frequently supported by voter-approved general obligation bonds. Some projects may also be specifically targeted at addressing environmental justice and social equity concerns by remediating conditions that disproportionately affect communities with residents who earn low incomes. Such activities could include cleaning up contaminated lands, improving air and water quality, or building new parks in urban areas. The Legislature has also provided funding specifically for “disadvantaged communities” that may not have a comparable amount of local resources to undertake necessary initiatives, such as water supply and treatment projects.

LAO RECOMMENDATIONS

Based on our research and above findings, we recommend that when evaluating state-funded green stimulus proposals, the Legislature focus primarily on expected environmental policy merits—including long-term economic benefits from reducing future damages related to climate change—rather than potential short-term economic effects. In order to better inform future efforts, we also recommend the Legislature invest some time and resources in articulating specific climate

goals, collecting additional data, and evaluating the effectiveness of existing programs.

Place Limited Emphasis on Stimulus When Evaluating Green Stimulus Proposals

We recommend the Legislature limit the amount of emphasis it places on potential economic stimulus benefits when evaluating state-funded

green stimulus proposals. In our view, although there could be some stimulative benefits associated with certain proposals, state budget constraints make it very unlikely that state-funded green stimulus proposals will have large effects on overall economic conditions. Moreover, there is significant uncertainty about which state projects are likely to have the greatest stimulative effects. Consequently, it would be very difficult for the Legislature to select among environmental proposals based on their potential stimulus benefits. Therefore, as we discuss next, a more effective approach would be for the Legislature to make its decisions based primarily on other types of benefits about which it might have more confidence.

Base Allocation Decisions on Fiscal and Policy Merits of Environmental Proposals

We find that the prospective climate and environmental benefits of green stimulus proposals are likely to be easier to identify than potential short-term economic effects. We therefore recommend that if the Legislature considers future state green stimulus proposals, it base its funding decisions primarily on their climate and environmental merits. These benefits might occur in the short or longer terms and could accrue in the areas of climate adaptation, climate mitigation, or other environmental and natural resources goals. When assessing the potential advantages of pursuing green stimulus proposals, the Legislature will want to consider several key questions about the potential fiscal and environmental effects. We highlight some of these questions in **Figure 3** and discuss them below. (In general, these evaluative questions would apply to the review of environmental proposals regardless of the state's fiscal condition.)

How Significant Are the Climate or Environmental Benefits, and Do They Outweigh the Costs? Among the most important questions for the

Legislature to evaluate is the degree to which a proposal will help the state meet its climate or other environmental goals, weighed against its associated costs. This environmental cost-benefit analysis should include assessment of both direct benefits, as well as potential co-benefits. For instance, many programs that reduce GHG emissions—such as incentives to replace older diesel engines with newer technologies—have other benefits, such as reducing criteria pollutants (such as nitrous oxides) and toxic air pollutants (such as diesel particulate matter). Reducing these co-pollutants yields public health benefits by improving local and regional air quality.

The Legislature should also consider how those costs and benefits compare to those of alternative ways of spending state funds to achieve other policy goals and priorities. That is, the Legislature would want to consider the benefits of the environmental proposals against what might be achieved by spending a like amount of money elsewhere. For example, alternative uses of stimulus funds might include spending on various priorities related to the COVID-19 pandemic or construction of other types of infrastructure, each of which would provide different potential benefits in the near and longer terms.

How Much Long-Term Economic Benefit Will Be Created for the State? While state funding for environmental projects is unlikely to yield significant short-term economic impacts, certain

Figure 3

Key Questions to Assess Environmental Merits of Green Stimulus Proposals

- ✓ **How Significant Are the Climate or Environmental Benefits, and Do They Outweigh the Costs?**
- ✓ **How Much Long-Term Economic Benefit Will Be Created for the State?**
- ✓ **What Is the Most Cost-Effective Way to Achieve a Specified Policy Goal?**
- ✓ **How Equitable Is the Distribution of Benefits?**
- ✓ **What Are the Highest Priorities for State-Level Funding?**

green stimulus projects might provide a substantial economic benefit for California over the longer term, such as spending on infrastructure projects. In particular, climate adaptation projects that help the state to lessen future damage and disruption could ultimately result in avoided costs, thereby yielding savings for both private property owners and the state and local governments compared to if the project was not undertaken. For example, restoring coastal wetlands in certain areas could help buffer the impacts of rising seas and protect nearby communities from flooding—at least for the coming decades. This, in turn, could prevent damage to property and infrastructure—and associated costs—as well as economic disruption to businesses and tourism.

In evaluating green stimulus proposals, the Legislature will want to assess whether the long-term benefits—including avoided future costs—exceed the near-term costs. Research suggests that investing in up-front mitigation can yield substantial savings from subsequent natural disasters. Specifically, a national [study](#) found that for every \$1 the federal government invested in natural hazard mitigation grants from 1993 to 2016, society saved an average of \$6 from avoided costs associated with property damage, sheltering displaced households, business disruption, and loss of life and injuries (including mental health impacts).

What Is the Most Cost-Effective Way to Achieve a Specified Policy Goal? Even if the Legislature has evidence that a green stimulus proposal will yield benefits, it also will be important to consider whether the proposal does so in a more cost-effective manner than alternative approaches to achieving the same goal. If not, this would suggest that there is a less expensive way to achieve the same benefit, or that a greater level of benefit could be achieved for the same expenditure level. For example, the state’s cap-and-trade auction revenues are typically allocated to dozens of different programs intended to reduce GHG emissions, including transit-related projects, subsidies for electric vehicles and equipment, forest management projects, and dairy digester projects that reduce methane. Based on estimates from the administration, these different projects

reduce emissions at very different costs, ranging from \$9 per ton to nearly \$5,000 per ton. If the Legislature’s primary goal is to reduce GHGs in the near term, it might want to target limited funds to activities that do so at the lowest cost per ton.

Another example relates to initiatives the Legislature might want to pursue to prepare jurisdictions for future droughts and the risk of water shortages. Different strategies for increasing water supplies—either through capturing more water for use or conserving the amount already available—vary greatly in costs. For instance, a recent [report](#) by the Pacific Institute found that building a new seawater desalination plant has a median cost of over \$2,000 per acre-foot of water, compared to \$590 per acre-foot for a new stormwater capture system. Investments in water conservation activities—such as grants or rebates for water efficient appliances, turf removal, and water efficient outdoor landscaping, or to implement more efficient agricultural practices—typically are comparatively less costly, and can even result in net *savings* based on reduced energy, wastewater, or maintenance costs. For example, the Pacific Institute researchers estimated that replacing showerheads with more water-efficient models could have a “negative cost”—that is, net savings over the appliances’ lifetime after accounting for implementation costs—of up to \$3,000 per acre-foot. Water conservation activities typically yield less overall water than large water supply projects. However, if funds are limited, the Legislature may want to prioritize funding for more cost-effective drought preparation projects.

How Equitable Is the Distribution of Benefits? As it considers the potential merits of specific proposals, the Legislature will also want to weigh whether associated benefits meet its goals for equity and fairness. Certain communities across the state are burdened by higher levels of pollution and other negative environmental impacts than others, and many of these communities are disproportionately home to large populations of people of color and Californians earning lower incomes. For example, some [research](#) has found that African Americans, Hispanics, and people earning lower incomes are disproportionately burdened by particulate matter pollution. Similarly,

despite federal and state water quality standards, over one million Californians [currently lack access to safe drinking water](#), and many of these problems are centered in Latino, rural, and lower-income communities. Given these disparities, pollution reduction efforts would be more equitable if designed to benefit households from the most affected communities.

[Evidence](#) also shows that certain groups are also more vulnerable to the effects of climate change. These include communities of color, communities with lower incomes, and people with limited English proficiency. For example, [research](#) suggests that African Americans in Los Angeles are nearly twice as likely to die from a heat wave than other Los Angeles residents, and families living below the poverty line are unlikely to have access to air conditioning or cars that allow them to escape extreme heat. Therefore, the Legislature may want to focus climate adaptation spending on assisting populations and communities who face higher vulnerability and likely would have less capacity to prepare without state assistance.

What Are the Highest Priorities for State-Level Funding? While myriad actions could be implemented to address climate and other environmental concerns, not all of them are the state's primary responsibility. For example, the Legislature likely will want to focus state climate adaptation funding on projects that protect state-owned infrastructure, public trust natural resources, and public health and safety. In contrast, projects that primarily protect private property might be more appropriately funded by the residents and businesses that own those assets. For example, in response to sea-level rise the Legislature might prioritize funding a dune restoration project that will mitigate erosion at a public beach, rather than supporting a similar project in a location that might instead primarily protect private coastal homes.

Moreover, if the Legislature uses green stimulus funding for climate mitigation programs, it will want to consider how these programs fit within the suite of existing GHG regulations. For example, there might be a strong rationale for additional state programs that support new low-carbon technologies that are still in the research and

development stages. This is because, even with the carbon price established by the state's cap-and-trade program, private firms will generally underinvest in research and development activities for low carbon technologies. On the other hand, the Legislature might want to limit its financial support for projects that already receive substantial support from other regulatory programs. For example, the state's [Low Carbon Fuel Standard](#) already provides subsidies to low carbon transportation fuel producers, such as ethanol, biodiesel, and renewable diesel. (These subsidies are provided through the sale of regulatory credits earned by low carbon fuel suppliers.) As such, the Legislature might want to target its limited financial resources on priority activities that do not already receive substantial state support.

Consider Additional Goal-Setting and Program Evaluation

Answering the questions posed in Figure 3 will help the Legislature weigh the potential environmental merits of any green stimulus proposals it is considering in the coming year. However, the state still lacks some key information that would help to further guide its spending decisions and overall climate change response strategy in future years. Specifically, articulating specific climate goals and collecting additional data could clarify the trade-offs associated with different proposals and help the state target funding more effectively.

Establishing More Explicit Policy Goals Could Help Inform Spending Priorities. Investing some time and resources in articulating specific climate goals and collecting additional data would help the Legislature clarify the trade-offs associated with different proposals and target state funding more effectively in the future. The state has established clear goals for some categories of environmental and climate policy. For example, SB 32—and its predecessor legislation, the Global Warming Solutions Act of 2006 or Chapter 488 (AB 32, Núñez)—set explicit goals and time lines for reducing statewide GHG emissions. Similarly, in the [California Forest Carbon Plan](#), the state established a goal of conducting forest restoration and fuels treatment activities on 35,000 acres of forest lands

per year by 2020, increasing to 60,000 acres per year by 2030. State law also has set explicit goals for [water conservation](#), as well as [waste reduction and recycling](#). In contrast, the state has established very few long-term goals for climate adaptation. For example, while Governor Newsom's administration has developed high-level "[principles](#)" for making California's coast resilient to sea-level rise, it has not defined what specifically "resilience" looks like, such as exactly how much public access to beaches it wants to ensure is preserved from erosion.

Being more specific about intended climate adaptation outcomes would include establishing explicit objectives to be accomplished by established deadlines—such as acres of coastal wetlands to be restored to mitigate flooding or percent of asphalt streets to be converted to "cool" pavements to reduce heat. Not only would this provide the state with a strategic direction for its response to various climate challenges, articulating explicit goals also would help the Legislature to perform oversight and evaluate the degree to which the state is making progress on preparing for the impacts of climate change via accomplishment of those goals.

Additional Evaluation of Programs Could Help Inform Spending Decisions. In many cases, the state lacks robust data on the costs and benefits

of different programs. Accordingly, additional research of program costs and benefits would assist the Legislature in identifying which programs achieve its various environmental policy goals most cost-effectively and, therefore, how to target future funds. For example, a recent [report](#) from the California Council on Science and Technology found that the state lacks information about the cost-effectiveness of many of its catastrophic wildfire risk reduction strategies. Similarly, in [prior reports](#), we have found that the state lacks reliable information about the cost-effectiveness of many of its GHG mitigation programs. While expecting that all uncertainty can be eliminated is not reasonable, additional work evaluating the most cost-effective strategies to achieve various state goals would be helpful to inform future decisions. For instance, the Legislature could require agencies to use an independent expert review panel to comment on the estimated costs and benefits of programs before they are adopted. It could also require departments to conduct retrospective evaluations of major programs after they are implemented. As part of this process, the Legislature might also want to require state agencies to establish plans for such retrospective evaluations before programs are implemented. These additional evaluation activities would likely result in additional state costs, but could improve the available information on the effects of these programs.

CONCLUSION

The Legislature is likely to consider proposals to fund green stimulus initiatives that attempt to both help the state's economy recover and make progress towards its climate and environmental policy goals. As we discuss, the potential for such efforts to have meaningful stimulative impacts is likely limited by state budget constraints, and there is a lack of clarity around which types of projects might most effectively boost the economy. These shortcomings, however, do not mean the

Legislature should reject all of the green stimulus proposals that it might consider. Environmental programs could provide significant benefits to the state over both the short and long terms, including the potential to avoid future economic harm by reducing negative impacts associated with climate change. Therefore, their potential policy benefits might merit legislative consideration of future green stimulus proposals.

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