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PAYING FOR CLIMATE ADAPTATION IN CALIFORNIA

A PRIMER FOR PRACTITIONERS

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EXECUTIVE SUMMARY

Rising average temperatures, destructive fires, higher sea levels, and more severe drought and flood put Californians at risk. These climate change effects—already manifest—demand big investments to update and safeguard California’s water, gas, electric, and transportation systems and natural ecosystems over the next several decades of uncertain weather extremes. Coastal roads must be realigned. The electrical grid must be upgraded to handle an increasing number of extreme heat days. Rural communities dependent on shallow groundwater wells need drought-proof supplies. Millions of flammable trees killed by drought-related disease must be managed across California forests. Investments in social systems—public health, emergency response, job training—are just as important to help communities cope with changing conditions.

How to pay for these investments? This report synthesizes information local, regional, and state leaders need to begin securing the money to pay for climate change adaptation and resilience projects in California. It is a primer for practitioners that defines key terms, catalogs important laws and existing sources of funding, describes challenges, and sets forth equity principles that should underpin all adaptation and resilience investments.

This report, based on interviews with experts and extensive research, also gives policymakers clear recommendations for overcoming the challenges that discourage cities, counties, water districts, utilities, state agencies, private companies, and other entities from making the investments California needs to thrive despite climate change.

These recommendations:

- Integrate resilience requirements and design principles into all infrastructure-related policies, programs, and investment decisions.
- Adopt disclosure requirements that will steer investors toward projects and institutions exposed to less climate (and thus financial) risk.
- Increase market incentives (such as insurance discounts) for projects that increase resilience.
- Develop more and better data about climate risk and share data and adaptation lessons learned in accessible formats.
- Invest in cost-benefit analyses to demonstrate what we already know: The cost of doing nothing is more expensive than paying for adaptation.
- Make sure the funding and financing for resilience projects includes all phases, from predevelopment to maintenance and renewal.
- Coordinate adaptation across jurisdictions to achieve efficiency of scale.
- Pursue multi-function projects that qualify for a wide range of funding sources.
- Engage communities early, often, and always to deliver projects that communities need and support.
- Encourage private sector participation in projects but include requirements and metrics to ensure the private sector role advances public goals.

This report gives a foundational understanding of existing constraints and opportunities, so that project leaders and policy makers can better address critical infrastructure needs to build a more equitable and resilient California.

I. INTRODUCTION

CONTEXT

Climate change is a global phenomenon with local impacts. As a result, planning for and adapting to climate change requires public and private sector involvement and leadership at local, regional, and state levels. To address climate change impacts, it is critical to invest in adaptation and resilience projects that will decrease vulnerability and increase communities' abilities to respond to changing conditions.

The challenges to investing in adaptation and resilience projects can be significant. Broadly, these challenges include: the high variability and uncertainty around climate change impacts, the barriers to raising new sources of revenue and the related fragile state of infrastructure in California, and the disproportionate impacts that climate change has on disadvantaged and vulnerable communities.

Conversely, the opportunities and benefits that may result from investing in adaptation and resilience projects are significant in magnitude. For example, investing in such projects can enable economic activity by creating jobs, while minimizing negative health and financial impacts by protecting people and properties from climate impacts such as flooding and sea level rise.

PURPOSE

Given the need for adaptation and resilience projects, and the challenges that must be overcome to realize such projects, this report is intended in part as a guide for leaders aiming to navigate California's complex funding and financing processes. It is intended to serve as a primer for those wishing to understand how such processes relate to adaptation and resilience projects. Note that the term "projects" is used here as an umbrella term that can include both infrastructure projects and social programs. Examples of infrastructure-focused adaptation and resilience projects include improvements to water, wastewater, and flood control facilities that enable them to function well in intense drought and/or rainy periods, as well as investments that strengthen the resilience of gas, electric, and transportation infrastructure to fire and other adverse events that are becoming more frequent and intense. Social programs can include: job training, public health outreach, emergency response education, and other capacity building programs that enable communities to build resources and respond more effectively to changing conditions.

KEY CONSIDERATIONS

Processes for developing adaptation and resilience infrastructure projects are often similar to those for traditional infrastructure projects, except that the additional adaptation and resilience benefits provided may be difficult to quantify or monetize, and require special attention. To the extent that equity is a consideration, projects that target economic or social benefits to historically disadvantaged or underserved communities are prioritized. A focus on broad-based engagement of those impacted by adaptation and resilience projects can ensure that those who receive the project's benefits understand them and support the project's implementation.

To inform the process of developing adaptation and resilience projects, five key considerations need to be addressed:

1. What am I trying to pay for?
2. Who will the project benefit?
3. What are the costs and how will they be funded and financed?
4. Who will execute the project?
5. What are key execution challenges and strategies to consider?

Although the response to each question is important, this report is project-agnostic, and thus focuses on questions two through five to suggest a framework that can be used to structure decision-making processes for funding and financing adaptation and resilience projects in California.¹

REPORT METHODOLOGY & STRUCTURE

This report represents a synthesis of information on tools, challenges, and strategies for funding and financing climate adaptation and resilience projects. It is not intended to be an exhaustive review of each and every consideration that can affect investments in this context.

The report is informed by interviews with subject matter experts from the public and private sectors and by a review of literature spanning academic research, legislative analyst reports, legal documentation, non-profit organization reports, federal and state agency publications, and credit agency publications. The research effort was primarily focused on securing insights related to the development or construction phase of adaptation and resilience projects. However, additional insights were gathered on the predevelopment (e.g., planning, and design, and permitting) and post-development (e.g., monitoring and evaluation) activities that are part of the full life-cycle of infrastructure projects.

The report is organized as follows:

- *Key Terms and Concepts*: definitions of terms and concepts that are related to adaptation and resilience projects, funding and financing, and equity;
- *Key Laws and Constitutional Provisions that Affect Revenue Generation in California*: short descriptions of provisions applicable to the generation of revenue for adaptation and resilience projects;
- *Funding and Financing Strategy*: summaries of funding and financing approaches that are commonly used and/or innovative;
- *Lead Institutions*: identification of institutions suited for executing adaptation and resilience projects;
- *Equity-Centered Considerations for Funding and Financing Adaptation and Resilience Projects*: highlight of equity principles and tools in planning and infrastructure;
- *Key Challenges for Funding and Financing Adaptation and Resilience Projects in California*: discussion of why investing in adaptation and resilience may be particularly difficult; and
- *Key Strategies for Funding and Financing Adaptation and Resilience Projects in California*: synthesis of strategies that can address cross-cutting challenges.

This report is intended to provide a foundational understanding of funding and financing strategies for new adaptation and resilience projects and the unique challenges and opportunities of this critical area of investment.

II. KEY TERMS AND CONCEPTS

The following key terms and concepts are fundamental to understanding how to fund and finance climate adaptation and resilience projects in California and to developing a common vernacular to analyze existing conditions related to these projects. Whenever possible, these definitions align with those previously used in California publications or legislation, including California Codes and reports

¹ Key examples of published reports used in this project include the San Francisco Seawall Study and the Resilient by Design Financing Guide. These reports informed many of the findings presented here, but differ in that they were created for a specific project, sector, or geography, potentially decreasing their broad applicability to statewide efforts or to efforts earlier in the planning stage.

from the California Legislative Analyst's Office, the California Ocean Protection Council, the Governor's Office of Planning and Research, and the California Office of the State Treasurer. Regulatory requirements referenced in the definitions below are specific to California.

Key terms and concepts are presented in three major categories: climate adaptation and resilience projects, funding and financing, and equity.

CLIMATE ADAPTATION AND RESILIENCE PROJECTS

In California, climate change is expected to result in changes in precipitation and storm patterns, earlier snowmelt, increased risk of wildfire, higher temperatures, rising sea levels, and increased frequency and intensity of heat waves.ⁱ These impacts are expected to have cascading effects throughout society, affecting public health, increasing demands on infrastructure and resources, altering agricultural practices, and harming ecosystems, among other possible outcomes, both predicted and still unknown.

Climate change: A change in climate due to natural processes or external activity (such as solar cycles and human-caused atmospheric changes) that persists over an extended period of time and that can be tracked by measuring differences in mean and/or variability of the climate's properties.ⁱⁱ

Vulnerability (also see Equity – Vulnerable community): A measure of the extent to which an individual, a system, or a community is susceptible to harm and its capacity to respond.ⁱⁱⁱ There are three commonly considered components of vulnerability: exposure (the degree to which a community or a system is exposed to a threat), sensitivity (the degree to which that threat impacts a community or system), and adaptive capacity (the ability of a community or system to respond to that threat).^{iv}

Climate change mitigation: An intervention that reduces climate change impacts, including measures that decrease greenhouse gas emissions or that expand and/or improve greenhouse gas sinks.^v Examples include: using renewable energy instead of fossil fuel-based energy and restoring forests and wetlands that can store carbon.

Climate adaptation: Adjustments made in human or natural systems to address existing or projected impacts of climate change in order to prevent or minimize negative outcomes and/or tap into potential opportunities.^{vi} Examples include: building a sea wall to decrease anticipated damage from flooding and storm surge as a result of rising sea levels, or instituting wetproofing building code requirements for areas that are projected to be subject to increased flooding.

Adaptive capacity: A system's ability to adjust to the impacts of change (here, to climate change), including the ability to deal with damages and take advantage of possible opportunities.^{vii} Adaptive capacity varies depending on the characteristics of the affected population, the nature of the changes, and the impacts of those changes.^{2viii}

Resilience: The capacity of an individual, a community, or an organization to prepare for, recover from, adapt to, and flourish in response to new circumstances, including disruption and uncertainty.^{ix} Resilience is often discussed in the context of disaster resilience or community resilience. Climate resilience is understood as capacity to prepare for, recover from, adapt to, and flourish in response to new circumstances that are caused in part or in full by climate change.

Resilience measures (structural & non-structural): Investments that help a community adapt to or protect themselves from climate change impacts. Resilience measures can be structural or non-structural.^x Structural examples include: coral reef enhancement, which can decrease storm damage; and rain gardens that limit stormwater runoff, which can reduce water contamination and related public health issues. Non-structural examples include: wetproofing or dryproofing code requirements for

² At a national level, research has found that literacy, civil and political rights and governance are strong indicators of adaptive capacity.

buildings in areas projected to experience flooding as a result of increased storm risk; and zoning a hazard-prone area for recreational or open-space use rather than commercial or residential development to decrease the potential for property damage.

Infrastructure: The physical and/or organizational structures that society or entities rely upon for the provision of services, which are often critical for human wellbeing. Examples of infrastructure include roads, water treatment facilities, and flood control structures. Because infrastructure projects are resource intensive to plan for and to construct, jurisdictions often have capital plans that outline anticipated investments over a defined period of time – generally five years or more. Such capital investments can include creation of new infrastructure assets or physical improvements to existing assets.

Predevelopment: This is the first stage of project development and includes formulating the concept for a project, identifying a project site, performing due diligence, obtaining the site (such as through acquisition or a long-term lease), and securing necessary entitlements. The **entitlement process** involves obtaining the necessary permitting and approvals from the appropriate public agencies. In California, the entitlement process also often includes environmental review under the California Environmental Quality Act (CEQA). The predevelopment phase can have a high level of uncertainty depending on the complexity of the project and any work and difficulties associated with bringing the project into compliance with applicable laws and regulations; accordingly, it can be difficult to fully predict how long or costly the process will be. **Financial analysis** is also conducted during the predevelopment stage, including identifying all needed funding and financing commitments and possible sources of revenue. In these early phases, it is common to use bridge financing sources. **Bridge financing** is interim financing often needed for planning and entitling before longer-term sources of money are procured.

Development: The primary component of the development phase is the construction of a project. This phase is where the majority of the project's budget is spent.^{xi} In addition to construction, the development phase includes securing project finance. **Project finance** is the financing of infrastructure construction based on a structure of debt and/or equity in which project proponents commit to repay money obtained up-front for project development to debt or equity holders using revenue that the project generates.

Operations and maintenance: Once constructed, infrastructure must be operated and maintained over time to provide the designed levels of service. Some sources of funding and financing can be used to pay both for capital investments and for operations and maintenance; other sources may be limited to one or the other. For example, in California, state general obligation bonds are typically limited to capital investments (i.e. the project development stage).

Decommissioning: A project can be shut down if it has reached the end of its life-cycle, if the provided services are no longer needed, or if the services can no longer be funded. Depending on applicable rules and/or commitments, decommissioning may include the removal of project infrastructure and remediation of the project site.

FUNDING AND FINANCING

For the purposes of this report, **funding** refers to money that is available on hand or that will be collected over time that does not need to be repaid. **Financing** refers to money that must be repaid (see Figure 1). Other reports often use “finance” as an umbrella term that encompasses the full process of funding and financing; here, for increased clarity, funding and financing do not overlap.^{xii}

Adaptation and resilience projects may require large upfront expenditures; financing is often necessary since it may be difficult to pay for the construction of a multimillion / multibillion dollar project in full with money that has been set aside prior to the start of a project or that is expected to be received reliably over the course of construction. *To secure financing, project proponents must be able to identify*

and commit to securing a dependable revenue source that is capable of repaying investors over a longer time period.

FIGURE 1. FUNDING AND FINANCING



Source AECOM October 2018

Funding: Money that is available on a one-time or limited time basis (e.g. a grant) or over time (e.g., taxes or fees) and does not need to be repaid.

Financing: Money that is obtained for a project and must eventually be repaid. An example of a financing tool is a loan from a bank, which is typically paid back over time with interest.³

Financing differs from a pay-as-you-go funding approach. A pay-as-you-go approach pays for a project with only currently-available money rather than with debt, which is money lent on the promise of future payment with a return. There are several reasons that larger projects may use financing rather than a pay-as-you-go approach:

- Larger infrastructure and development projects often require upfront capital investment that is greater than the resources that are readily available to proponents at the time of development.
- Financing allows revenues generated by a project, such as user fees, which are collected over the course of the asset's lifetime, to be used to pay for the asset.
- Infrastructure assets can have long life-cycles, in some cases between 75 and 100 years. By financing a project over the longer term, the cost is spread out to be borne in part by future users who may also benefit from the asset.
- Financing can facilitate a shorter construction period since the full amount of needed funds can be made available upfront.^{xiii}

Revenue: Income produced by a specific source. Revenue may be generated through funding tools such as taxes, fees, and grants; it may also be secured through financing. Governments use revenues to fund public expenses, including the payment of obligations such as bonds; the private sector uses revenues to fund private expenses, including the payment of obligations such as loans, as well as its payment of taxes and fees.

Public good: A non-rivalrous, non-excludable commodity or service. This means that the use of the commodity or service by one person does not decrease the ability of another person to use it, and that the commodity or service cannot be exclusive and instead applies to all users in a given population. By this definition, examples include: street lights and national defense programs because the services do not exclude any population and consumption by one individual does not impact consumption by

³ Other reports have used "finance" as an umbrella term that encompasses the full process of funding and financing. NHA Advisors, "Finance Guide for Resilient by Design Bay Area Challenge Design Teams"; Susanne C. Moser, Coffee, and Seville, "Rising to the Challenge, Together."

another. Roads are not a public good as they can be rivalrous when too many users generate congestion and decrease the ability of each user to use the road. Roads are also excludable, in that access to some roads, like toll roads, can be limited to paying users.

EQUITY

The definition of equity varies based on context. This report discusses equity in the social context, but equity in the financial context is defined below for clarity between the terms.

Equity (Financial): In finance, equity is the value of assets minus financial commitments. For example, a homeowner's equity is the difference in the market value of the home and the amount outstanding on his/her mortgage.

Equity (Social): Equity in a social context is the fair and just inclusion in a society that allows all to participate and to prosper.^{xiv} Equitable responses to climate change address the unequal distribution of climate change impacts, the accountability of who is responsible for causing and responding to climate change impacts, and the intersection of climate policy with other preexisting social and economic conditions.⁴ Ensuring equity in the context of funding and financing adaptation and resilience projects can include considerations such as: the decision of how money is raised, how money is spent, and who should make these decisions.

Intergenerational equity: Intergenerational equity in the context of climate change is the principle that all generations, present and future, have equal rights to the environment and natural resources.^{xv} Intergenerational equity is a fundamental underpinning of the concept of sustainable development as defined in *Our Common Future*, the United Nations' 1987 report by the Brundtland Commission, which states that **sustainable development** meets the needs of those in the present without compromising the ability for future generations to meet their needs.^{xvi} Intergenerational equity in the context of funding and financing is typically discussed as it relates to debt – taking out long-term debt for a project can result in the requirement that future users must pay for a project. Continually relying on debt can add increasing financial burden to future generations.

Disadvantaged community: In California, state law and policy define a disadvantaged community as one that is disproportionately impacted by pollution and other hazards that can cause negative public health outcomes, exposure, or degradation of the environment; and/or areas that have high concentrations of people with low-income, high unemployment rates, low rates of homeownership, high rent burdens, sensitive populations, or low educational attainment.^{xvii}

Vulnerable community: A community that has heightened risk and sensitivity to climate change and has less capacity and fewer resources to cope with, adapt to, or recover from the impacts that can result from changing environments or conditions under climate change. The Governor's Office of Planning and Research's guidance for vulnerable communities notes that these disproportionate effects are caused by certain physical, social, political, and/or economic factors, including but not limited to, race, class, sexual orientation and identification, income inequality, and national origin, and are exacerbated by climate impacts.^{xviii}

Frontline community: A community that is directly affected by negative impacts from climate change and is often the first to experience such impacts. Frontline communities, such as communities of color and low-income communities, often have faced historical and ongoing injustices, and are impacted by systemic inequities that affect their living and economic conditions and opportunities.^{xix}

⁴ The Intergovernmental Panel on Climate Change notes the following equity principles for understanding equitable burden sharing: responsibility for greenhouse gas emissions, capacity (e.g. a community's ability to pay for mitigation measures), development rights, and equality, typically with regards to the discussion of equal entitlement to produce emissions. M. Fleurbaey et al., "Sustainable Development and Equity."; California Natural Resources Agency and California Ocean Protection Council, "State of California Sea-Level Rise Guidance 2018 Update."

III. KEY LAWS AND CONSTITUTIONAL PROVISIONS THAT AFFECT REVENUE GENERATION IN CALIFORNIA

California has extensive state constitutional law and legislation that impact how revenue can be generated from taxes, fees, and assessments (for definitions, see Funding Tools). This body of law has created challenges for the state and for local governments in funding critical services ranging from education to infrastructure development and maintenance. These challenges must be considered in the context of the need for supporting adaptation and resilience projects. Though not exhaustive, the list below includes summaries of key constitutional provisions and laws that prescribe how revenue can be generated for adaptation and resilience projects.

PROPOSITION 13 (1978)

Proposition 13 set a maximum property tax rate at 1% of a property's value based on its purchase price at the time it was acquired for both residential and commercial properties.^{xx} Using the purchase price at the time of property acquisition, the taxable value can increase 2% annually thereafter or at the rate of inflation, whichever is less. Proposition 13 also required that all new special taxes imposed by local governments required a two-thirds voter approval, and taxes imposed by state government required approval of two-thirds of both houses of the Legislature.^{xxi} This was further clarified by Proposition 218 (see below).

Prior to Proposition 13, property taxation was based on the market value of the property and jurisdictions relied heavily on property taxes to fund community services and investments. When Proposition 13 was enacted, local governments looked to other revenue generation options, such as special taxes, to make up the shortfall, and became more dependent on state funding. This restriction has created challenges for funding a number of important government services that are reliant on local general fund monies, including the provision of infrastructure, because demands for public services have increased faster than the ability to pay for such services with the Proposition 13 cap in place.

PROPOSITION 46 (1986)

Proposition 46 slightly relaxed Proposition 13's restraints on property taxes. It allows for local governments to increase property tax rates over the 1% rate capped by Proposition 13 to finance infrastructure bond debt if approved by a two-thirds local voter majority.⁵ This relaxation of Proposition 13 is particularly useful for adaptation and resilience projects given that it provides the option to use property taxes to fund infrastructure if enough voters support the project.

PROPOSITION 218 (1996)

In response to Proposition 13, it became common practice for local governments to increase fees and general taxes. Proposition 218 added limitations to this practice and established additional requirements for taxes, property-related fees, and assessments. It also allowed voters to repeal or reduce existing taxes, assessments, and fees through public referendums. Key impacts of Proposition 218 as they relate to funding and financing adaptation and resilience projects are described below in the context of taxes, property-related fees, and assessments:

TAXES

- Proposition 218 clarified the voter approval requirements for local general tax increases (simple majority) and local special tax increases (two-thirds approval).

⁵ School facilities bond measures that meet specific requirements require only a 55% voter approval (Proposition 39); Legislative Analyst's Office, "A Look at Voter-Approval Requirements for Local Taxes"; Mac Taylor, "A Look at Voter-Approval Requirements for Local Taxes."

- A 2017 California Supreme Court ruling may have limited the two-thirds voter approval requirements to local government-sponsored tax increase proposals and lowered the threshold for publicly sponsored initiatives to a simple majority. However, it is unclear how this ruling will be interpreted in practice and by the lower courts.^{xxii}
- Special districts are prohibited from levying general taxes and can only levy special taxes (for a definition of special districts, see SPECIAL DISTRICTS).
- All parcel taxes must be levied as special taxes.

PROPERTY-RELATED FEES

- Local governments can impose certain fees on property owners to pay for services. The revenues collected from fees cannot exceed the cost of service provision and must only be used for the original purpose under which they were originally approved. These fees must also not be greater than the proportional cost of the service that can be attributed to each parcel. Fees cannot be imposed to provide services that would be available to the general public in the same way that they would be to the paying property owners.
- Additional new voter approval requirements were put into place: under Proposition 218, any increases in property-related fees are subject to public hearings. If there is a majority protest, the fee increase cannot go forward. In the original Proposition 218 language, fee increases for some services, such as flood protection, must obtain approval from either a simple majority of affected property owners or from two-thirds of registered voters. Limitations of Proposition 218's restrictions include:
 - Water and wastewater fee changes are not subject to the voter approval requirement and are only subject to majority protest. Additionally, in 2017, SB 231 (Hertzberg) was passed, which allows stormwater and flood control fees to not be subject to this stricter requirement and to instead follow the majority protest process.^{xxiii} It is unclear if SB 231 will withstand potential constitutional challenges.
 - Wholesale water supply agencies operate assuming they are not subject to Proposition 218 since customers are not retail, though no court decisions have addressed this question. However, wholesale water agencies are subject to Proposition 26 (see below), which applies to all levies and charges imposed by government agencies, not only property-related fees (agencies have argued that rates are negotiated rather than imposed and therefore are not subject to Proposition 26).^{xxiv}
 - Privately owned water utilities, which deliver water to roughly 20 percent of the state's residents, are exempt from Proposition 218. Private utilities' rate setting is regulated by the California Public Utilities Commission (CPUC).^{xxv}
 - In 2017, the California Supreme Court concluded that groundwater pumping charges are not property-related fees.^{xxvi}

ASSESSMENTS

- Assessments can be used to pay for public improvements or services, such as flood control, that benefit properties. Assessments must be proportional to the benefits that a property receives. Typically assessments cannot be imposed to provide general public benefits (e.g., schools or libraries).
- To levy an assessment the local government must 1) verify that the property owners will receive a specific and direct benefit from the project that is funded by the assessment, 2) quantify the cost of that benefit provision to each property owner and demonstrate that the cost does not exceed the property's proportional share of total costs, and 3) mail assessment notices to

affected property owners. The assessment can only be imposed if a majority of property owners that respond to the mail-in form, weighted proportionally by the assessment each owner would pay, approve it.^{xxvii}

Proposition 218 makes funding adaptation and resilience projects that provide broad benefits, whether geographically broad benefits or benefits to broader populations, including future generations, particularly difficult due to the increased requirements for cost / benefit quantifications.

PROPOSITION 26 (2010)

Proposition 26 further restricts government revenue generation by defining most government-imposed revenue generation measures as taxes, making them subject to voter approval requirements. A government-imposed charge is considered a tax unless it falls within one of seven specific exceptions for local governments (or five for state imposed charges).⁶

As applicable to adaptation and resilience project funding, local property development charges and property-related fees and assessments are categorically exempt from being considered taxes. Charges for government services are exempt if the charges are not greater than the cost of provision, the services directly benefit the payers, and the services are not provided to people who do not pay. Regulatory fees are not considered taxes if the fee is limited to the cost of regulating the payer.

If the measure is still classified as a non-property-related fee, it can be imposed with a majority vote of the governing board and does not require voter approval.^{xxviii} Charges that exceed the cost of service provision or that provide benefits to the general public are considered special taxes, which require a two-thirds voter approval for local taxes. Fees that were in place before the passage of Proposition 26 are grandfathered and not subject to the new law.^{xxix}

Proposition 26 increases the need for voter approval for a number of government-imposed charges, which can be particularly difficult for adaptation and resilience projects that provide benefits that may be difficult to quantify.

SUMMARY OF IMPACT ON REVENUE GENERATION FOR ADAPTATION AND RESILIENCE PROJECTS

Proposition 13 is the main restriction on raising property taxes in California, and effectively limits funding for new adaptation and resilience projects given that historical underfunding and resulting deferred maintenance of infrastructure often results in commitment of property tax revenues to existing infrastructure needs. Importantly for adaptation and resilience projects, however, Proposition 46 slightly relaxed some of the restraints imposed by Proposition 13, and permits increases on property taxes for voter-approved debt that can be used to fund infrastructure. Propositions 218 and 26 have both increased the need to document how imposed fees and assessments relate to the costs of services provided to, and to the benefits received by, paying households or businesses. This can be particularly challenging for adaptation and resilience projects that provide benefits that are difficult to quantify, projects that offer benefits to broad geographies, and projects that offer benefits to dispersed populations or future generations.

IV. FUNDING AND FINANCING STRATEGY

This section outlines funding and financing tools available for use in California. While the tools discussed below are not exhaustive, they are either commonly used tools or innovative tools that may have

⁶ For a full list of local government charges that are exempt from voter approval requirements, see: Mac Taylor, "A Look at Voter-Approval Requirements for Local Taxes."

limited application to date but are increasingly discussed in literature as potential funding and financing options for adaptation and resilience projects.⁷

FUNDING TOOLS

There are many funding tools available for project development in California and it is common for projects to be supported by a mix of such tools. To help develop an effective funding strategy, it is important to consider each relevant funding tool's revenue potential, approval requirements, and cost burdens, as well as the administrative complexity of applying for and administering the funds. Additional criteria to evaluate tools may be useful for specific projects and contexts; for the San Francisco seawall funding strategy, for example, project leaders considered whether or not the funding tool would divert money from other City needs.

Table 1 presents the key characteristics, benefits, and drawbacks of funding tools commonly used in California. The tools are categorized into five general areas: grants, assessments, taxes, fees, and private involvement. Below this table are summary descriptions of each tool as well as brief discussion on the applicability for adaptation and resilience projects.

TABLE 1. KEY CHARACTERISTICS OF DIFFERENT FUNDING TOOLS

Funding Tools	Who Pays?	Key Benefits	Key Drawbacks
Grants	Federal, state, local funds / taxpayers	Money raised from broader geographies (e.g. federal level) can be invested locally Can be used to attract additional funding	High capacity needed to apply for and manage and report on funds Redirects money that could be used for other purposes
Assessments	Property Owners	Costs linked to benefits Flexible geography Not considered a tax under Prop. 26	Extensive documentation of benefits required Approval requires support of a majority of affected property owners
Taxes			
Ad valorem property tax for voter-approved debt	Property Owners	Potential for significant funding	Requires two-thirds voter approval ⁸
Parcel tax	Property Owners	Can be regional in scale Flexible use	Requires two-thirds voter approval ⁹ Flat rate is regressive
Tax-increment financing (TIF)	Property Owners	Not subject to Proposition 13 limitations	Issuance of TIF bond requires 55% voter approval in district Requires redirecting future property tax revenue Dependent on anticipated increases in value; limited for highly built-out areas Requires district property owners to voluntarily allocate increment to the district
Mello-Roos tax	Property Owners	Low approval thresholds for new	If more than 12 registered voters,

⁷ Such as: Hyde, "Innovative Finance: Emerging Tools for Investments in Resilience"; Office of Resilience and Capital Planning, City and County of San Francisco "Fortifying San Francisco's Great Seawall: Strategies for Funding the Seawall Resiliency Project."

⁸ School bond measures require 55% approval (Proposition 39). Two-thirds voter approval requirement is listed as a drawback because significant financial resources, efforts, and time are often needed to educate and mobilize the voters needed for two-thirds approval and because such a high threshold may allow the will of the minority to override the will of the majority, even where there is documented need for revenues to pay for investments that are supported by a majority of voters.

⁹ If the tax increase is proposed via ballot initiative, it may only require a majority voter approval.

Funding Tools	Who Pays?	Key Benefits	Key Drawbacks
		development ¹⁰ Boundaries do not need to be contiguous Tax could be based on relative risk-reducing benefits	requires two-thirds approval of district's registered voters
Other taxes (e.g., sales, gas, hotel, utility users, business license)	Residents, Businesses, Visitors	Typically general taxes, which require only a simple majority for cities and counties to levy (less than two-thirds threshold for special taxes) or two-thirds of legislature for state general taxes ^{11xxx} Flexible use	Can be regressive
Fees			
Property-Related Fees: Water, stormwater, and wastewater fees	Users	Majority protest threshold for publicly owned utilities is lower than other voter approval thresholds Privately owned water utilities are exempt from Proposition 218 (these deliver water to roughly 20% of the state's residents) Not considered a tax under Prop. 26	Publicly owned utilities subject to Proposition 218; Funds raised must directly support operations and rates cannot be tiered to address affordability issues Private utilities' rate setting is regulated by the California Public Utilities Commission (CPUC)
Non-Property-Related Fees: Gas, electric fees	Users	Not subject to Proposition 218 No voter approval required; not considered a tax under Prop. 26	Funds raised must directly support operations; Rate setting regulated by CPUC for privately owned utilities or by elected boards for publicly owned utilities
Developer impact fees	Developers, Property Owners	Can be used to ensure new development is resilient No voter approval required; not considered a tax under Prop. 26	Tied to market conditions which are often cyclical and difficult to forecast Requires new development / major redevelopment to manifest resilience at a meaningful scale
Other user fees (e.g., Transit fares, tolls)	Users	Fees charged to those who use and benefit from the services	Participation of disadvantaged and vulnerable communities may be limited without subsidies / affordability programs
Private Involvement			
Business Improvement Districts	Businesses, Consumers	Useful for district-wide infrastructure that could benefit from economies of scale (e.g., stormwater infrastructure) Contributes private revenues to public or shared goods	Limited revenue generation Require contiguous boundaries
Enterprise revenues (e.g., naming rights, concessions)	Businesses	Contributes private revenues to public good Effective for funding operations and maintenance expenses	Limited revenue generation Commercialization of and less public control over public space
Incentives (e.g., exemptions, discounts)	Businesses, Developers, Property Owners	Encourages investment that may otherwise not occur	Jurisdictions forfeiting potential revenue sources

¹⁰ If there are fewer than 12 registered voters in the proposed district, a Mello-Roos tax can be imposed with only a two-thirds approval of affected landowners

¹¹ While increasing state taxes requires two-thirds approval of each house of the Legislature, the Legislature requires only a majority of each house of the Legislature to levy fees and other charges.

Funding Tools	Who Pays?	Key Benefits	Key Drawbacks
Community benefit agreements	Businesses, Developers, Property Owners	Can involve communities in the planning and development process	Can be time and resource intensive to adequately determine and address community needs, and negotiate between key players
Regulations (e.g. building codes)	Businesses, Developers, Property Owners	Passes upfront costs to the private sector, placing less burden on public to invest in adaptation needs / disaster bailouts Institutionalizes building standards that account for future risk	Requires regulatory action by appropriate state agency Can deter development

Source AECOM October 2018

GRANTS

Government agencies and philanthropies offer grants that are applicable to a wide range of adaptation and resilience projects. For larger adaptation and resilience projects, grants typically do not cover the full project cost. However, grants are particularly useful to fund early project stages, to attract additional capital and financing, and to support technical assistance and capacity building programs.

Examples of applicable federal grant programs include: Coastal Resilience Grants offered by the National Oceanic and Atmospheric Administration to help communities increase preparation for extreme weather events and climate change, and to recover after a disaster; FEMA's Hazard Mitigation Grant Program to help communities promote resilience both pre- and post-disaster; and the National Coastal Wetlands Conservation Grant Program administered by the U.S. Fish and Wildlife Service to acquire, restore, and enhance wetlands and protect habitat.

Funding for grants can come from funds already collected or from sources that are dependent on future revenues. Proposition 68, which California voters passed in June 2018, authorized the state to sell \$4.1 billion in general obligation bonds for natural resource-related projects including flood and coastal protection projects. Bond funds will be disbursed in the form of grants to agencies and non-profits and will be repaid over time from the state's General Fund.

ASSESSMENTS

An assessment is a charge imposed on property owners in a specified geographic area or district, to fund projects or services that provide direct benefits to properties in that district. Most applicable to adaptation and resilience projects, the amount of the charge must correlate with the benefit that the property owners are anticipated to receive and the cost of the service provision. This requirement can be particularly challenging for adaptation and resilience projects that provide benefits at broad scales rather than to specific, well-defined properties. Assessments cannot fund general public benefit services or improvements, such as schools or public safety-related investments. An assessment can only be imposed if approved by a majority of property owners that respond to the mail-in form, weighted proportionally by the assessment each owner would pay.^{xxxii}

TAXES

A tax is a charge to fund services or projects. Generally, a government-imposed charge is considered a tax unless it is exempt under Proposition 26 and subsequently defined in the State Constitution.^{xxxii} State and local taxes can be used to fund general purposes (general taxes) or specific projects or programs (special taxes). Special taxes are levied by a local or state government entity.¹²

¹² Special taxes fall under three categories: taxes levied by special-purpose districts (except property taxes for infrastructure bonds); taxes in which the funds go towards a dedicated purpose

With regard to adaptation and resilience, a tax would likely be a special tax if imposed to pay for a particular purpose or program. Due to voter approval requirements, a special tax can be difficult to establish unless there is a broad public understanding of the purpose of the tax and the benefits it will provide. If a local entity seeks to establish, increase, or extend a special tax, a two-thirds voter approval is required; general taxes can pass with a simple majority. A 2017 California Supreme Court ruling may have lowered the threshold for publicly sponsored special tax initiatives to a simple majority, though it is unclear how this ruling will be interpreted in practice.^{xxxiii} Changes in state taxes require a two-thirds approval of the legislature and signature by the governor.¹³

AD VALOREM PROPERTY TAXES

Ad valorem property taxes are taxes based on property value. There are two components of ad valorem property taxes in California: 1) a 1% tax based on a property's assessed value that is a general tax that can fund any public purpose and potentially 2) additional tax for voter-approved debt repayments, typically for general obligation bonds for local infrastructure.¹⁴ This second component is most applicable to adaptation and resilience projects as the money generated by the 1% tax is often committed to existing services. Under Proposition 13, local government bonds issued since 1978 to buy or improve real property require two-thirds voter approval, except for local school bond measures which only require 55% approval (Proposition 39).

or service; and all property-related taxes that do not fall under the category of property tax, such as a parcel tax.

¹³ Proposition 26 (2010) instituted the supermajority requirement for new taxes and fees; There is a proposed ballot initiative for the 2018 election called "California Voter Approval for Gas and Vehicle Taxes Initiative" that would require a majority voter approval for any levy, increase, or extension on gas or diesel fuel taxes. If approved, this initiative would also eliminate existing gas taxes approved by the legislature in 2017 to pay for transportation and related infrastructure and services. League of California Cities, "Propositions 26 and 218: Implementation Guide."

¹⁴ Other charges included on a Californian's property tax bill include taxes and charges not based on the property's taxable value, including: parcel taxes, Mello-Roos taxes, and assessments. Legislative Analyst's Office, "Understanding California's Property Taxes."

PARCEL TAXES

Parcel taxes are special taxes that are based on a fixed amount of tax per parcel of land, rather than on the value of the land. They may be levied with two-thirds voter approval to fund a variety of local government services, including general public benefits (though this might be reduced to a simple majority if proposed via public initiative).¹⁵ This source of funds is particularly applicable for adaptation and resilience projects for which it may be more difficult to quantify costs and benefits to specific properties, as is needed for assessments and fees. In the San Francisco Bay Area in 2016, voters approved a \$12 parcel tax to fund \$25 million annually to fund shoreline restoration projects over twenty years.^{xxxiv}

The use of parcel tax revenues is restricted to the public purpose that voters approve when passing the parcel tax.¹⁶ Since parcel taxes are set at fixed amounts per parcel, they are typically regressive – affecting low-income households more than high-income households.

TAX-INCREMENT FINANCING

Tax-increment financing is a value capture tool that collects property tax revenue based on increases in property values that result from a particular enhancement or improvement.

Tax-increment financing to date has focused primarily on transit improvements, but there is potential for this tool to be used for adaptation and resilience projects. Adaptation and resilience projects that will provide a benefit to property and thus increase its value are a good opportunity for tax-increment financing. For example, green stormwater infrastructure investments can reduce negative impacts of

¹⁵ This is based on a 2017 California Supreme Court ruling stating that the two-thirds voter approval requirement for special local taxes is required only for taxes proposed by government, implying that those imposed by local initiatives would only require a simple majority. Board, Chronicle Editorial. "Editorial: A Major Change to Four Decades of California Tax Policy." San Francisco Chronicle, August 29, 2017.

¹⁶ Since parcel taxes do not vary with assessed property value, they do not violate Proposition 13 ad valorem property tax rate limitation requirements. Legislative Analyst's Office, "Understanding California's Property Taxes."

runoff and increase recreational and aesthetic value thus leading to property value increases.¹⁷

Tax-increment financing does not affect property tax rates but rather captures the added value that a project induces.¹⁸ In California, Enhanced Infrastructure Finance Districts (EIFDs) and Community Revitalization and Investment Authorities (CRIAs) are authorized to use tax-increment financing and can issue revenue bonds backed by tax-increment financing.^{xxxv} Annexation Development Plans can also utilize tax-increment financing.¹⁹ Under California Assembly Bill 733 (Berman), enacted in 2017, EIFDs may be used to pay for “projects that enable communities to adapt to the impacts of climate change.”^{xxxvi}

MELLO-ROOS TAXES

Mello-Roos taxes are special taxes that local agencies can levy to pay for public facilities (including facility acquisition, construction, rehabilitation or expansion), and/or services. Permitted service examples include: open space maintenance, environmental remediation services, and operation and maintenance of stormwater infrastructure.

Mello-Roos taxes may be particularly applicable to adaptation and resilience projects given that 1) they are often created for new development where new infrastructure can be designed according to resilience-oriented principles or objectives, 2) there is flexibility in the Rate and Method of Apportionment (RMA), which may allow for risk exposure to be accounted for within the tax rate structure, and 3) there is

flexibility in determining what properties will be taxed (properties do not need to be contiguous) which can be beneficial for adaptation and resilience projects that have geographically dispersed benefits.^{xxxvii}

To levy a Mello-Roos tax it is necessary to form a Community Facilities District (CFD) that outlines the boundaries of who will pay the tax. Once the boundaries of the CFD are determined, two-thirds of qualified electors in the district must approve of the special tax. If there are fewer than 12 voters in the CFD, the qualified electors are the landowners and each receives one vote per acre or portion of their ownership.²⁰ Due to this unique voter qualification, it is common for developers of new residential and commercial developments to use Mello-Roos taxes to fund new infrastructure.^{xxxviii}

The tax’s RMA can be based on a variety of factors such as square footage, number of bedrooms, or estimate of benefits to parcels. If reasonable, different land uses and areas can be subject to different rates: for example, lower rates can be set for properties owned by senior citizens, or for low-income housing properties. The revenue generated by the tax can go towards direct payments or to service bond debt for proposed improvements.

FEES

A fee is a charge that is imposed to pay for a service or use of a facility. For adaptation and resilience projects, utility fees in particular will likely be critical for funding projects that protect and enhance infrastructure. Many utility-owned assets are located along vulnerable shorelines or in wildlife-prone areas, and utility companies have capacity for and interest in long-term planning.^{xxxix}

PROPERTY-RELATED FEES

Property-related fees are fees that local governments impose to provide services that have a direct relationship to property ownership. Examples include fees for water

¹⁷ A study completed in 2016 reporting on the first five years of Philadelphia’s Green City, Clean Waters program found that residential property values increased just over 10% for properties located near green stormwater infrastructure projects.

¹⁸ To execute tax-increment financing, a base year assessed value is chosen and an expected inflationary increase in property value is projected; a percentage of the projected property tax revenue increase (based on the projected increase in property value) is dedicated to the project that spurred the value increase.

¹⁹ Annexation Development Plans outline service provisions for disadvantaged unincorporated communities (as per SB614). League of California Cities, “Annexation Development Plans: A Tool to Address Infrastructure and Service Issues Associated With the Annexation of a ‘Disadvantaged Unincorporated Community.’”

²⁰ If there are more than 12 voters, registered voters are considered qualified electors.

delivery, sewer service, and stormwater management.

Property-related fees are subject to Proposition 218, which requires that any increase in fees must first be presented at a public hearing. If there is a majority protest, the fee increase cannot go forward. Water and wastewater fee changes are subject to this majority protest threshold. In the original Proposition 218 language, fee increases for some services had stricter approval requirements, and required approval from either a simple majority of affected property owners or from two-thirds of registered voters.

In 2017, California passed SB 231 (Hertzberg), which allows stormwater and flood control fees to not be subject to this stricter requirement and to instead follow the majority protest process.^{xi} If not overturned by the courts, this bill could result in more access to property-related fees that could be used for adaptation and resilience projects that address water supply and flood risks. Wholesale water supply agencies and private utilities are not subject to Proposition 218, although privately owned water utilities' rate setting is regulated by the California Public Utilities Commission (CPUC).^{xii}

NON-PROPERTY-RELATED FEES

Non-property-related fees can be imposed to provide services unrelated to property ownership. Non-property-related fees can typically be imposed by local agencies without voter approval as long as the costs of the fees do not exceed the reasonable costs of provision of the services that the fees will be used to pay for and as long as the fees are not considered taxes under Proposition 26.^{xiii}

Common non-property-related fees include gas and electric fees, fees for services or products such as transit, and fees for reasonable regulatory costs such as processing of building permits.²¹

²¹ Investor owned utilities are regulated by the California Public Utilities Commission; rates are not subject to voter approval requirements. Rate setting for publicly owned utilities is regulated by locally elected boards and/or city councils in a public forum. Toll increases may be subject to voter approval requirements – for

DEVELOPMENT IMPACT FEES

Development impact fees are a type of non-property-related fee and are imposed by local governments to pay for infrastructure and public services expansion. Development impact fees are particularly useful to ensure that new infrastructure can be designed according to resilience-oriented principles or objectives. A key benefit of development impact fees is that they do not require voter approval and are specifically exempt from Propositions 218 and 26.²²

Agencies imposing development impact fees must follow procedural and substantive parameters including: demonstrating that the amount of the fee is reasonable and related to the cost of the infrastructure, and documenting the relationship between the charged fees, the new service benefits, and the proportional cost allocation.²³ The fees are either taken out of a developer's profits or passed on to new residents or tenants, which can potentially lead to increased costs for buyers and renters.^{xliii}

PRIVATE INVOLVEMENT

The private sector is more likely to pay for projects when there are financial incentives to invest or when the private sector is required to do so by law. The private sector could gain from adaptation and resilience investments if: the project decreases risk and potential losses, the project increases customer appeal such as through investments that improve aesthetic or

example, the Bay Area Toll Authority is authorized by law to increase toll rates for specific purposes such as meeting the requirements of voter-approved regional measures. Michael Colantuono, "Proposition 26 Impacts on Taxes and Fees"; California Energy Commission, "Differences Between Publicly and Investor-Owned Utilities"; San Francisco County Transportation Authority, "State Legislation - Proposed New Positions and Updates on Activity This Session."

²² Development impact fees fall into the category of non-property related fees, as Proposition 218 specifically does not affect fees or charges that are conditions of property development, and Proposition 26 excludes charges related to conditions of property development from the definition of "tax." Michael Colantuono, "Proposition 26 Impacts on Taxes and Fees."

²³ The Mitigation Fee Act, legislation related to development impact fees was passed in 1987 by the California Legislature as AB 1600 and is in the California Government Code Sections (GC §) 66000 through 66008 ("Mitigation Fee Act"). City of Oakland, "Impact Fee Nexus Study | Planning and Zoning."

recreational value, and/or the project improves branding or image.

BUSINESS IMPROVEMENT DISTRICTS (BIDS)

Business improvement districts are typically formed to enhance existing public services or to provide additional services.²⁴ BIDs are particularly applicable for adaptation and resilience projects that improve customer experience (e.g. enhance recreational or aesthetic value) and that benefit from economies of scale, such as district-wide stormwater infrastructure improvements.

There are two types of BIDs: Property-based (PBIDs) and Business-based (BBIDs). For PBIDs, fees are based on a property value formula; for BBIDs fees are based on sales revenue or the size of the business, or are imposed as a business license fee.²⁵ It is important to note that BIDs are not separate government entities (see SPECIAL DISTRICTS), but are instead programs of the municipality in which they are established. This feature can be a positive in that it can decrease administrative complexity and a negative in that BIDs are not entities with independent legal authority to raise revenues or charge fees for services.^{xliv} The term “district” used in Business Improvement District is to describe the geographic area rather than a governmental subdivision.^{xlv}

ENTERPRISE REVENUES

Enterprise revenues are generated by businesses, services, or branding associated with a project or located on the premises. Private companies may buy goods or services that are not directly related to the development of a specific project but that are associated with the built facility.

Naming rights are one common source of enterprise revenues, such as Salesforce buying the naming rights to the Transbay Terminal in San Francisco for a 25-year term for \$110 million. Such funds are typically not substantial or reliable enough to fund entire projects or to borrow against, but they can potentially be used for a portion of upfront funding or ongoing operations and maintenance expenses.

For adaptation and resilience projects, enterprise revenues may be less applicable if the project does not have any retail space or if the project is not in the public eye (such as a levee). In addition, while naming rights do not require public approval, naming public facilities after private companies has sometimes been met with public backlash where there is a perception that doing so commercializes public space.^{xlvi}

INCENTIVES

Incentives are tools that encourage a certain action or investment through some form of reward. Common incentive tools include tax credits, regulatory streamlining, and exemptions from processes or standards. The public sector, local landowners, and the private sector (such as the insurance industry) all use incentives to encourage specific types of development or investment.

Incentives that encourage adaptation and resilience investment are particularly applicable when a monetizable risk is avoided – for example: FEMA’s Community Rating System offers discounts between 5% and 45% on insurance premiums to reward risk-reducing investments or actions.^{xlvii}

COMMUNITY BENEFIT AGREEMENTS (CBAs)

Community benefit agreements are contracts between private developers and local community representatives in which a local community agrees to support a development in exchange for the ability to share in the benefits that the development may generate.

CBAs commonly include commitments to decrease the negative environmental impacts associated with new development (such as

²⁴ BIDs are established through a protest vote of the properties or businesses in the proposed district, meaning that unless more than half of the votes are “no,” establishment of the BID is approved. BIDs require contiguous boundaries. Josh Meyer et al., “Smart-Growth Money: New Funding Strategies for Community Improvements.”

²⁵ PBIDs are typically subject to Proposition 218 requirements as the funds are raised through property taxes.

pollution mitigation) and increase environmental benefits (such as parks).^{xlviii} For example, a community benefits agreement for the Los Angeles International Airport included measures that would mitigate the negative impacts of development and promote local economic opportunity. Measures included: noise mitigation commitments, pollutant emissions-reducing actions, job training and living wage requirements, among others.^{xlix}

There is untapped potential for CBAs to incorporate adaptation and resilience-oriented investment, such as protection from sea-level rise or investment in groundwater supply infrastructure.

REGULATIONS

Regulations are rules put into place by a government or other authority to control, require, or incentivize certain actions. Regulating the private sector can improve resiliency of the built environment over the long term.

Using building codes is one key way to regulate new development and major redevelopment. For example, California has taken steps to regulate the building sector to improve energy efficiency and reduce greenhouse gas emissions with CALGreen, the state's green building standards code. At the federal level, FEMA's National Flood Insurance Program requires minimum design and construction standards for new construction in floodplain areas to reduce the risk of property damage.¹

Regulation, however, can also affect the cost of development and it is important to identify and prioritize effective regulations.

FINANCING TOOLS

Financing tools allow for funds generated over time to be used as a form of repayment. They provide necessary upfront capital for project development before all revenues are collected. To help develop an effective financing strategy, it is important to consider a financing tool's use in the market, investor appeal, and complexity to structure and deploy.ⁱⁱ Additional criteria to evaluate tools may be useful for specific projects and contexts; for example, municipalities seeking private financing might compare the interest burden of private versus public finance tools.

There are a number of newer and “innovative” finance tools, such as social impact bonds and insurance-linked securities, presented in the literature on funding and financing infrastructure in general and/or specifically in the context of adaptation and resilience projects.ⁱⁱⁱ However, interviewed experts consistently noted these tools are largely unproven in the mainstream financing market, and as a result, not feasible in the near term. The main reasons for low near-term feasibility of such finance tools include the presence or perception of risk given the lack of a data on performance, and the need for additional data and management requirements that increase administrative burdens and costs.

Interviewed experts further noted that, in general, access to sources of financing is not the major challenge for communities; rather the bigger issue is the shortage of funding that can pay back financing, mainstream or otherwise. Rather than focusing on “innovative tools,” communities can best meet the challenge of project development by focusing their attention on ensuring underlying funding is available and using this funding to engage conventional, proven financing tools.

Table 2 presents key characteristics, benefits, and drawbacks of financing tools commonly used in California. The tools are categorized into two general areas: bonds and loans. Below this table are summary descriptions of each tool as well as brief discussion on their applicability for adaptation and resilience projects.

TABLE 2. KEY CHARACTERISTICS OF DIFFERENT FINANCING TOOLS

Financing Tools	Who are the Key Issuers / Involved Parties?	Key Benefits	Key Drawbacks
Bonds			
Municipal Bonds (General Obligation Bonds, Revenue Bonds)	Local or state government	Commonly used	Subject to voter approval requirements
Private Activity Bonds	Local or state government on behalf of private sector	Encourages private sector participation	Limited application and amount
Pay for Success Financing (Social Impact bonds, Environmental Bonds)	Partnership between public agency, private provider, and third-party verifier	Transfers risk of achieving intended outcomes from public sector to private sector	Limited use to date Significant monitoring and evaluation required
Green Bonds	Local or state government	Social impact investor appeal Publicizes commitment of spending towards environmental purposes	Limited use to date Lack of standardization of what it means to be “green” Administrative complexity

Financing Tools	Who are the Key Issuers / Involved Parties?	Key Benefits	Key Drawbacks
Insurance-Linked Securities (Catastrophe Bonds, Resilience Bonds)	(Re)Insurance companies, public and private organizations	Less or no correlation with markets adds investor appeal	No resilience bonds as of 2017
Loans			
Federal Loans	Federal issues; borrower can be private or public entity	Commonly used Applicable dedicated loans for transportation and water infrastructure	Dependent on authorization from Congress
Revolving Loan Funds	State issues; borrower can be non-profits or public entity	Dedicated state programs focused on water and infrastructure programs	Sustainability of programs dependent on loan repayment
Program Related Investments (PRIs)	Philanthropies	Flexible application	Requires alignment of philanthropic goals with adaptation and resilience outcomes

Source AECOM October 2018

BONDS

A bond is a financing tool where money is borrowed from investors or the public and paid back with interest. Bonds are bought and sold on the bond market. Corporations or governments can finance a project by issuing bonds. Specific types of bonds are described below.

MUNICIPAL BONDS

Municipal bonds are issued by local or state governments or government agencies. Municipal bonds are a tax-exempt debt financing tool used by state and local government agencies to fund capital projects and public services. Bond issuance may be subject to voter approval requirements depending on the type of bond and form of repayment. Municipal bonds can be general obligation bonds or revenue bonds.

GENERAL OBLIGATION BONDS (GO BONDS)

General obligation bonds are backed either by the full faith and credit of the issuer or by a promise that ad valorem property taxes will be levied to pay off the debt.^{liii} Most applicable for adaptation and resilience projects, local governments can increase property tax rates over the 1% rate capped by Proposition 13 to

pay for voter-approved debt. To issue new general obligation bonds at the local level, a two-thirds voter approval is required.²⁶ This allows for new funding to be generated from property taxes, which is critical given that the 1% property tax is not sufficient to fund both existing and new infrastructure.

Unlike local GO bonds, which are pledged against property taxes, state-issued GO bonds are typically full faith and credit bonds pledged by the general fund, which is comprised mainly of income and sales tax revenue. State GO bonds must be approved by a majority of voters.^{liv}

REVENUE BONDS

Revenue bonds are backed by a specific revenue stream. There are a number of types of

²⁶ These property tax revenues used to repay general obligation bonds are a form of debt service repayment, and are therefore considered distinct from general property tax collections. Article XVI, Section 18 of the State Constitution states that local agencies cannot incur indebtedness without two-thirds voter approval; this was modified in 2000 by Proposition 39 which lowers the threshold for approval to 55% for school facilities bond measures that meet specific requirements. Legislative Analyst's Office, "Understanding California's Property Taxes"; Mac Taylor, "A Look at Voter-Approval Requirements for Local Taxes"; Nova Edwards, "An Overview of Local Government General Obligation Bond Issuance Trends 1985-2005."

revenue bonds including public enterprise revenue bonds (backed by the revenues of an enterprise, such as toll revenues raised by a bridge management agency) and public lease revenue bonds (backed by lease payments). Important for adaptation and resilience projects, many revenue bonds do not require voter approval.²⁷ A public enterprise revenue bond issued to fund a water facility and repaid through water utility payments would not require voter approval to issue the bond. Lease revenue bonds are specifically exempt from debt-related approval requirements as courts have interpreted service contracts as ongoing expenses rather than debt.^{iv} Revenue bonds are not guaranteed and thus typically have higher interest rates than general obligation bonds.^{lvi}

PRIVATE ACTIVITY BONDS (PABs)

Private activity bonds are issued by state or local governments on behalf of a project's private developers. PABs allow a private entity to benefit from federal income tax exemptions. Congress limits what private activities can qualify for tax-exempt financing and, depending on the activity, also limits the amount of qualified PABs using an annual state volume cap.²⁸ Twenty seven private activities are eligible for private activity bonds, including a number of adaptation and resilience-oriented projects such as sewage facilities, solid waste disposal facilities, and qualified green building and sustainable design projects.^{lvii}

PAY FOR SUCCESS FINANCING

Pay for Success financing is when a government agency partners with a private sector entity that is responsible for initial capital investment and

ongoing service provision. Private investors loan money for upfront financing and ongoing operations. The service is expected to achieve specific outcomes; there are strict reporting and target standards with a third-party evaluator and verifier. If the private entity is successful in its service delivery, the government agency reimburses the upfront capital to the private sector entity, which then repays the private investors.^{lviii} The government agency may also provide success payments as the service achieves milestones. Pay for Success financing requires significant public sector capacity to develop contracts with private sector service providers and to manage a monitoring and evaluation program.

SOCIAL IMPACT BONDS

Social impact bonds use a Pay for Success model to fund social services. The social service programs are expected to achieve cost savings through cost avoidance. If milestones are achieved, the public repays the private sector service provider.

The application of social impact bonds to date has mostly been related to recidivism and incarceration. In Massachusetts, the Pay for Success Initiative is an investment program in life skills and job training as well as community outreach with the overall goal of reducing incarceration rates. Such types of prevention programs can result in avoided costs of more expensive services at a later date. This structure decreases the public's risk in an investment and offers a way to pay for a preventative service that otherwise might not be realized.

ENVIRONMENTAL IMPACT BONDS (EIBs)

Environmental impact bonds use a Pay for Success model and are issued to fund projects with environmental goals, such as reducing pollution in local waterways.^{lix} EIBs can transfer risk from the public sector to the private sector which can be particularly useful for piloting new types of green infrastructure. EIB use is limited to date in the United States. Washington D.C. issued the country's first environmental impact

²⁷ Courts have determined that the voter approval requirements related to public debt are not applicable to obligations paid from special funds if the special fund revenues would not otherwise go towards the local government's general fund (referred to as the Special Fund Doctrine).

²⁸ In 2018, the state volume capacity limit for the majority of qualifying activities is \$311.38 million or \$105 per capita (whichever is greater). For more information on specific volume caps and a full list of qualifying activities see: Private Activity Bonds: An Introduction (Maguire, Hughes, 2018)

bond in 2016 to fund its stormwater runoff management program.

GREEN BONDS

Green bonds are issued by municipalities and businesses to fund projects with environmental goals, including those with adaptation and resilience goals.^{lx} Green bonds can be issued as municipal bonds, allowing the issuing government and investors to receive tax-exemptions.²⁹ Overall, it is unclear whether green bonds provide any financial incentive over a typical municipal bond except that they might attract social impact investors. For adaptation and resilience projects, expanding the investor pool using green bonds could be attractive but could also come with higher administrative costs. To avoid “greenwashing,” a number of certification processes have been created, but issuers have not adopted a single standardized process to date; the external review and additional reporting requirements can be seen as increasing administrative burden of the issuance.^{lxi}

INSURANCE-LINKED SECURITIES

Insurance-linked securities are a unique financing tool distinguishable from conventional bonds in that there is an additional step that transfers risk to the market through contracts. An organization, such as a government agency, pays premiums to a bond issuer in exchange for coverage against damages. The bond issuer then sells bonds to investors and invests the premiums and bond proceeds into low-risk securities.³⁰

²⁹ This tax exempt status allows for lower yields and investors that cannot take advantage of the tax exemption, such as international investors, are less likely to invest. California Office of the State Treasurer, “Growing the U.S. Green Bond Market.”

³⁰ Generally, securities are proof of debt or property, such as bonds, stocks, or notes, which can be held to earn interest, used as collateral, or sold for a profit. Swiss Re Capital Markets, “What Are Insurance Linked Securities (ILS), and Why Should They Be Considered?”; Iain Hyde, “Innovative Finance: Emerging Tools for Investments in Resilience”; Artemis, “What Is a Catastrophe Bond?” - Artemis Resource Library.”

Insurance-linked securities are a new field of financing. The majority of insurance-linked securities are issued as catastrophe bonds (explained below). The value of the bond is linked to the risk of the loss – such as the risk of natural disasters or likelihood of other physical events. The bonds are therefore seen to have little or no correlation with traditional market risk, which can be attractive to investors.^{lxii}

CATASTROPHE BONDS

Catastrophe bonds are one type of insurance linked security, and are typically issued for high-risk areas vulnerable to natural hazards such as earthquakes, flooding, and storms. Investors purchase the bonds and agree to pay damages if a “triggering event” occurs. A triggering event is an agreed-upon disaster or hazard event that meets objective criteria or thresholds described in the risk transfer contract.³¹ If the triggering event does not occur, investors receive their principal plus interest. Due to the high risk of the investment, the bonds get above-market yields and the maturity rates are short, typically three to five years.³²

RESILIENCE BONDS

Resilience bonds are similar to catastrophe bonds but, as proposed, include future premium discounts or rebates that account for protection offered by a resilience project. As of 2017, no resilience bonds had been issued.^{lxiii}

LOANS

Loans are a financing tool whereby a party borrows money from a single source such as a bank or the government for a specific purpose;

³¹ The three main approaches for determining a “triggering event” are 1) indemnity, based on the actual losses incurred by the sponsoring insurer 2) industry loss, based on the losses incurred by the insurance industry and 3) parametric, based on the physical characteristics of an event; this could be as basic as the magnitude of an earthquake or can involve more complexity based on an index of event parameters. Risk Management Solutions, “Cat Bonds Demystified: RMS Guide to the Asset Class.”

³² Catastrophe bonds have average returns of between 4.5% and 9% but can vary widely. Iain Hyde, “Innovative Finance: Emerging Tools for Investments in Resilience.”

by contrast, bond money is borrowed from investors or the public and available for trade on a market. Corporations or governments can finance a project by taking out loans. Loans can have fixed interest rates like bonds, but often have variable rates. Commercial loans tend to have higher interest rates and shorter terms compared to public loans. Below are commonly used loans for public finance that could be applied to adaptation and resilience projects.

FEDERAL LOANS

Federal loans are often suitable for adaptation and resilience projects and offer appealing terms such as long repayment periods and fixed low-interest rates. Key examples include loan programs authorized by Congress including the Transportation Infrastructure Finance and Innovation Act (TIFIA) Program, administered by the U.S. Department of Transportation; the Water Infrastructure Finance and Innovation Act (WIFIA) Program, administered by the U.S. EPA; and the Railroad Rehabilitation and Improvement Financing Program (also administered by the U.S. Department of Transportation). Loans from such programs are long-term with fixed, low interest rates that are not tied to project risk, unlike private market loans.³³ Repayments can start five years after the project has reached “substantial completion.” If the project is eligible, the borrower can be public or private.^{lxiv}

REVOLVING LOAN FUNDS

Revolving loan funds are pools of public capital from which loans can be made; the repayments of principal from old loans are used to issue new loans; typically, the collected interest funds

the administrative costs of running the revolving loan fund.^{lxv}

State revolving loan funds were established by the Clean Water Act and the Safe Drinking Water Act. California has a Clean Water State Revolving Fund (CWSRF) and a Drinking Water State Revolving Fund (DWSRF). The Clean Water State Revolving Fund offers low-interest loans for water supply and water quality projects, including: new wastewater facilities, wastewater facility expansion and renovation, water purification systems, and solar installations to increase onsite power supply at water treatment plants.^{lxvi} The Carlsbad Municipal Water District used loan funding to expand its recycled water system to increase capacity by 2 million gallons per day, install new piping, and relocate and construct new recycled wastewater storage.^{lxvii}

The Drinking Water State Revolving Fund (DWSRF) offers low-interest loans for drinking water and other water capacity projects including treatment and distribution systems.³⁴ The City of Livingston used DWSRF financing for an arsenic removal treatment system; the City of Joaquin used financing for a water meter Installation.^{lxviii}

California’s Infrastructure State Revolving Fund (ISRF) provides financing to non-profits and public agencies for infrastructure and economic development (excluding housing). The California Infrastructure Economic Development Bank administers the Infrastructure State Revolving Fund and is discussed more in Lead Institutions, below. The Pico Water District received Infrastructure State Revolving Funds to replace a well with a new energy efficient well that will bolster the groundwater production, reduce electricity costs, and improve reliability.^{lxix}

³³ Projects applying for these programs must be evaluated for creditworthiness. TIFIA and WIFIA require a dedicated revenue source pledged to secure the debt financing in order to be eligible. RRIF does not require collateral but it does influence the program’s Credit Risk Premium (a charge imposed on the borrower to offset the cost of the government providing financial assistance). For each of the programs, interest rates are based on the rate paid by the U.S. to borrow and are not tied to project risk.

³⁴ In conjunction with the Drinking Water State Revolving Fund loans, the California State Water Board also offers principal forgiveness and technical assistance to encourage small water systems to apply for planning and construction funding. (State Water Resources Control Board Division of Financial Assistance, “Drinking Water State Revolving Fund: Annual Report State Fiscal Year 2016-2017.”)

PROGRAM RELATED INVESTMENTS (PRIs)

Program-related investments are administered by philanthropic foundations and often structured as revolving loan funds. Foundations use PRIs to invest in programs that align with their mission and goals. Foundation PRI programs recognize that they might not receive a full return on their investment; for example, the Gates Foundation anticipates 90 cents returned for every \$1 invested out of its PRI portfolio. PRIs can be structured as convertible loans so that if a recipient cannot repay the full loan, a portion of the funding can convert to a grant.^{lxx}

V. LEAD INSTITUTIONS

Funding and financing tools must be administered by an institution that can collect revenue, pay debts, and contract for work to be performed. In practice, determining what institution should lead a project can vary considerably based on political conditions, the type of the project, administrative capacity, community priorities, historical context, and other location-specific considerations.

This report analyzes three main categories of lead institutions: 1) Non-profits and Educational Institutions, 2) Public Sector Institutions, and 3) Private Sector Institutions. Specific types of institutions in each of these three categories are defined below, and discussed in depth after Table 3. Table 3 highlights when to involve particular types of institutions and key benefits and drawbacks of involving each. On occasion, institutions are included in the table but not defined in the summaries below due to their prevalence and expected familiarity for most readers— such as academic and research institutions, and the federal government.

In the course of selecting an institution to lead a project, it is also important to consider whether an existing institution or a new institution would best serve the project’s goals. Although it may be possible to create a new institution to lead a project, doing so can require additional up-front resources and ongoing administrative costs. Given these additional considerations, existing institutions may be more attractive.

Even if there is no existing institution dedicated to a project’s purpose, California policymakers and project leaders may consider, for example, amending or expanding the authorities of an existing special district through the Local Agency Formation Commission (LAFCO) activation approval process, rather than creating a new special district.^{lxxi} It is also possible to consider expanding the geographic authority of a nearby district through annexation.

Lastly, existing agencies can enter into joint powers organizations to create projects that can serve multiple jurisdictions. These partnerships are particularly attractive for adaptation and resilience projects because their agreements allow agencies to fund projects and expand services; doing so is often more cost effective than independently investing in infrastructure projects.

TABLE 3. KEY CHARACTERISTICS OF DIFFERENT LEAD INSTITUTIONS

Institution	Funding/Financing Tool	When to Involve	Key Benefits	Key Drawbacks
Non-Profit / Educational				
Academic and Research Institutions	Grants	Evaluation of costs and benefits Recommendations for new technologies Post-completion monitoring and evaluation	Can access research grants that fund data collection and analysis Independent oversight	Limited in funding capacity
Community Development Corporation	Grants, donations, loans	Community-oriented developments and services including affordable housing Job training programs	Continual involvement in community	Limited in funding capacity

Institution	Funding/Financing Tool	When to Involve	Key Benefits	Key Drawbacks
Community Development Financial Institutions	Grants, donations, loans	Predevelopment Bridge financing Workforce development ³⁵	Can offer smaller and less burdensome loans to communities that cannot access larger funding opportunities	Limited in funding capacity
Community Land Trusts	Grants, Donations	Community-oriented developments including affordable housing and recreational space	Continual involvement in community and long-term affordability mission	Limited in involvement May be limited in funding capacity Resource-intensive to establish
Think Tanks	Grants, Donations	Community engagement in planning and oversight processes Performance evaluations Support revenue generation efforts (e.g. ballot initiatives) ³⁶	Can access private donations and membership fees Can provide space for community engagement and debate Independent oversight	Limited in funding capacity
Public Sector				
Federal	Bonds, grants, taxes	Can fund major infrastructure projects with long timeframes	Can levy taxes Oriented towards provision of public goods Access to low-cost financing	Constitutional limitations on taxing power Changing administrations can affect funding priorities
State	Bonds, grants, general & special taxes, fees	Can fund major infrastructure projects with long timeframes	Can levy taxes Oriented towards provision of public goods Access to low-cost financing	Proposition 13, Proposition 218, and Proposition 26 limit tax and fee raising opportunities Changing administrations can affect funding priorities
Counties & Cities	Bonds, grants, general & special taxes, assessments, fees	Can fund major infrastructure projects with long timeframes	Can levy taxes Oriented towards provision of public goods Access to low-cost financing	Proposition 13, Proposition 218, and Proposition 26 drastically limit tax and fee raising opportunities Changing administrations can affect funding priorities
California Infrastructure and Economic Development Bank	Loans, grants, user fees, taxes, assessments	Infrastructure Economic development	Revolving loan funds offer low-cost financing	Sustainability of programs dependent on loan repayment

³⁵ The Rural Community Assistance Corp (RCAC), a CDFI headquartered in West Sacramento, offers programs ranging from emergency and disaster response planning to the fundamentals of distribution system operations.

³⁶ 501(c)(3) organizations cannot expressly support ballot initiatives in an electoral campaign. However, they can provide nonpartisan analysis. In the Bay Area, SPUR publishes reports related to infrastructure development, equity and community concerns, and policy recommendations. SPUR also hosts panels and events to allow for local leaders to participate in policy discussions. SPUR is primarily funded through membership fees and donations. In San Jose, SPUR analyzed the city's budget and advocated for additional revenue generation, such as through an increase sales tax. The sales tax increase was put on the ballot in 2016 and was passed by voters.

Institution	Funding/Financing Tool	When to Involve	Key Benefits	Key Drawbacks
Enhanced Infrastructure Financing (EIFD) Districts	Tax-increment financing (future property value increases)	Projects located in areas with increased development potential	EIFD formation does not require voter approval Not subject to Proposition 13 limitations	Issuance of TIF bond requires 55% voter approval in district Requires redirecting future property tax revenue Dependent on anticipated increases in value; limited for highly built-out areas
Geologic Hazard Abatement Districts	Assessments	Geologic hazards or structural hazards caused by geologic hazards; can address coastal hazards	Can support long-term property values Can set aside operations and maintenance costs as well as reserve funds for future repairs	Limited revenue generating potential Subject to Proposition 218
Joint Powers Authorities	Bonds, user fees, taxes or assessments levied by participating agencies	Infrastructure expansion or development	Can issue revenue bonds without voter approval ³⁷ Can be authorized to own property, incur debt, issue revenue bonds, provide utility services, & set utility rates ³⁸ Can be used to promote regional coordination Effective for sharing resources and lowering administrative costs	Cannot levy own taxes or assessments as the JPA (though participating agencies can do so subject to voter approval requirements) ³⁸ Powers of JPAs are limited by those that are common to all participating agencies
Publicly-Owned Utilities	User fees, bonds	Utility infrastructure Vulnerable shoreline assets	Access to tax-free bonds Rates can be raised for water, sewer, and stormwater unless majority protest Gas and electric rates are set by district's elected governing board in a public forum ³⁸	High administrative capacity required to form a POU if not already established
Special Districts	Bonds, special taxes, assessments, service fees	Additional or enhanced public services	A government entity with authority to issue bonds and levy special taxes Can establish a Communities Facility District	Require continual overhead funding Subject to same voter approval laws as Counties and Cities Cannot levy general taxes
Private Involvement				
Public Private Partnerships	User fees, taxes	Risk can be effectively transferred Outcomes can be quantified	Can sometimes offer cheaper cost service delivery Access to private capital / avoidance of public debt	Complex to structure High transaction costs Equity concerns Cost savings to ratepayers not guaranteed

³⁷ Forming a JPA does not require voter approval. JPAs can issue revenue bonds without voter approval as long as each of the member agencies' boards or councils adopts authorizing ordinances. Voters can oppose these local ordinances through referendum elections, but this is uncommon.

³⁸ Participating agencies can levy their own taxes or assessments subject to voter approval requirements.

Institution	Funding/Financing Tool	When to Involve	Key Benefits	Key Drawbacks
Investor-Owned Utilities	User fees	Utility infrastructure Vulnerable shoreline assets	High discretion over rate setting Can establish tiered rate structures / lifeline rates High engineering capacity Long-range capital planning horizons	Rates subject to CPUC approval ^{lxxxv}

Source AECOM October 2018

NON-PROFIT / EDUCATIONAL INSTITUTIONS

Non-profits and educational institutions can be useful for executing community outreach, conducting project monitoring and evaluation, and providing alternative funding sources that may not otherwise be accessible (e.g. research grants). It can be beneficial to partner with a non-profit or educational institution particularly if they bring independent funding to a project. Often, their funding comes from grants that do not need to be repaid.

COMMUNITY DEVELOPMENT CORPORATIONS (CDCs)

Community development corporations are non-profit community-based organizations that frequently serve low-income neighborhoods and often have Boards of Directors that are comprised of local residents. CDCs are typically used to develop affordable housing, as well as to provide community services and job training programs, and are funded by local, state, and federal funds. CDCs can also receive philanthropic donations and reuse dollars through revolving loan funds.

COMMUNITY DEVELOPMENT FINANCIAL INSTITUTIONS (CDFIs)

Community development financial institutions offer financial services to low-income and disadvantaged communities to support economic development.³⁹ CDFIs can support

³⁹ Types of CDFIs include: community development banks, community development credit unions, community development loan funds, and community development venture capital funds. The U.S. Department of the Treasury supports local CDFIs through

predevelopment efforts, offer bridge financing, fund workforce development, and offer small loans for projects in low-income communities. CDFIs' loan application processes can be less burdensome and more accessible to communities that have limited capacity to apply for larger state and federal grant opportunities. CDFI investors' typically include banks,⁴⁰ philanthropy, and federal funding programs.^{lxxxvi}

COMMUNITY LAND TRUSTS (CLTs)

Community land trusts are non-profit organizations, often funded by grants, federal programs, and donations, that purchase land to build community-oriented developments such as affordable housing.⁴¹ It is common for CLTs to partner with other organizations and receive assistance from outside expertise, as forming a CLT can be resource intensive, requiring significant upfront funding and strategic planning.^{lxxxvii}

PUBLIC SECTOR INSTITUTIONS

Public sector institutions, which include federal, state, and local government entities (including special districts), are likely to be involved in

the Community Development Financial Institutions Fund (U.S. Department of the Treasury, "CDFI Certification")

⁴⁰ Banks can receive Community Reinvestment Act consideration if investing in a CDFI, which can improve a bank's Community Reinvestment Act rating

⁴¹ CLTs own the land and enter into long-term leases, for example, with prospective homeowners. At the end of the lease, the resident earns some percentage of the property value increase, while the CLTs receive the remainder. CLTs work to ensure continual affordability: resale prices are often determined by a formula in which the residents can receive a limited return. Josh Meyer et al., "Smart-Growth Money: New Funding Strategies for Community Improvements."

projects that provide public goods, involve equity concerns, offer no financial gain that would attract private investment, and/or have long timeframes that the private sector would consider prohibitive. State and local government agencies' fundraising ability is strictly limited by the California Constitution and associated voter approval processes, discussed above in Key Laws and Constitutional Provisions that Affect Revenue Generation in California.

STATE INFRASTRUCTURE BANK

State infrastructure banks are revolving loan funds that receive federal transportation dollars and state funds to provide loan guarantees and low-cost debt financing for specified projects. California's State Infrastructure Bank (IBank) manages California's Infrastructure State Revolving Fund Program, which provides financing to non-profits and public agencies for infrastructure and economic development. IBank financing is typically repaid through enterprise revenues (e.g., water, sewer), general fund revenues, assessments, Mello-Roos, and/or special taxes.⁴²

ENHANCED INFRASTRUCTURE FINANCING DISTRICTS (EIFDs)

Enhanced infrastructure financing districts are government entities that can finance the construction or rehabilitation of specific public infrastructure assets and private facilities.⁴³ In relation to adaptation and resilience, EIFDs are specifically authorized to fund water treatment facilities, flood control projects such as levees and dams, and drainage channels; as of 2017,

⁴² California's Infrastructure and Economic Development Bank (IBank) has financed roughly \$39 billion in infrastructure and economic development as of 2017. California Infrastructure and Economic Development Bank, "Infrastructure State Revolving Fund Program."

⁴³ Main categories include: highways, sewage and water reclamation / treatment plants, solid waste facilities, flood control levees and dams, parks and recreational facilities, environmental mitigation, acquisition / construction / repair of industrial structure for private use, low or moderate income housing / social services in mixed-income housing developments. For a full list, see Beall, Enhanced infrastructure financing districts.

EIFDs also have broad authority to fund projects that support adaptation to climate change.⁴⁴

EIFDs are unique in that they have authority to use tax-increment financing in addition to other more conventional funding sources such as fees or assessments.^{lxxviii} EIFDs are particularly useful for incorporating resilience-oriented designs into new development: if there are fewer than 12 registered voters, bond issuance is approved with 55% landowner approval.⁴⁵

Additionally, EIFDs can include non-contiguous properties provided the connection between the project and the district is detailed in an infrastructure financing and all participating entities agree to contribute their tax increment to the EIFD. This is primarily beneficial for adaptation and resilience projects that have geographically-dispersed benefits.^{lxxix}

GEOLOGIC HAZARD ABATEMENT DISTRICTS (GHADs)

Geologic hazard abatement districts are political subdivisions of the state that can be formed to address geologic hazards or structural hazards caused by geologic hazards,^{lxxx} potentially including hazards that may be caused or exacerbated by climate change, such as erosion.⁴⁶ Funding is typically raised through

⁴⁴ AB 733 (2017): "Projects that enable communities to adapt to the impacts of climate change, including, but not limited to, higher average temperatures, decreased air and water quality, the spread of infectious and vector-borne diseases, other public health impacts, extreme weather events, sea level rise, flooding, heat waves, wildfires, and drought."; Josh Meyer et al., "Smart-Growth Money: New Funding Strategies for Community Improvements."

⁴⁵ If there are more than 12 registered voters, bond issuance requires 55% voter approval of registered voters within the EIFD boundaries.

⁴⁶ There are two options to initiate GHAD formation 1) a local legislative body initiates formation by resolution 2) landowners submit a petition with signatures of at least 10% of property owners within the proposed district. Public hearings must then be held. If owners of more than 50% of the assessed valuation of the proposed district object, the formation cannot go forward. If owners of more than half of the assessed valuation do not object, the legislative body can adopt a resolution that approves the formation and can appoint a Board of Directors. Using assessed valuation as part of the formation process gives property owners with higher value properties increased say regardless of risk, which can raise equity concerns. The petition to form a district

assessments that are subject to Proposition 218; raised funds can go towards both development and operations and maintenance costs.^{lxxxix} Properties in the district do not need to be contiguous but must specially benefit from the proposed project(s).

JOINT POWERS AUTHORITIES (JPAs)

Joint powers authorities are government organizations created by partnerships between two or more public agencies to deliver a service, receive a service, or fund a project or investment.⁴⁷ JPAs are commonly used for habitat conservation, regional transportation projects, and groundwater and wastewater management.^{lxxxii} JPAs can be an effective means of sharing resources and can lower capital and maintenance and operations costs per taxpayer.^{lxxxiii}

JPAs are particularly applicable for adaptation and resilience projects that may offer broad geographic benefits, such as a coastal restoration project that impacts multiple jurisdictions.

Additionally, JPAs can issue revenue bonds without voter approval as long as each of the member agencies' boards or councils adopts authorizing ordinances.⁴⁸ Some nongovernmental entities have authority to participate in joint powers agreements: for

example, mutual water companies⁴⁹ may enter agreements with public water agencies.⁵⁰

SPECIAL DISTRICTS

Special districts are local government entities that offer specific public services. For example, municipal utility districts (MUDs) are a type of special district formed to provide utility services. While the majority of California's special districts were created to provide a single service, some, such as community services districts, can provide multiple services.

Special districts have legal authority to raise revenues and are permitted to charge fees for their services. Enterprise districts are special districts that raise money through service fees for specified services (e.g. water supply districts), while non-enterprise districts are funded mainly through assessments and property taxes, typically for public good-oriented services (e.g. fire districts).^{lxxxiv}

Special districts can use funding from the 1% property tax and/or can issue general obligation bonds or revenue bonds.^{lxxxv} Special districts can also raise special taxes and establish assessment and Mello-Roos districts subject to voter or landowner approval requirements.

PRIVATE SECTOR INSTITUTIONS

Private sector institutions will be most interested in involvement in projects that have a financial return. The public sector may consider partnering with the private sector when it is financially beneficial for both parties. Considerations for private sector involvement

must include a detail hazard assessment plan called a "plan of control" that must be prepared by a certified California engineering geologist. California Association of Geologic Hazard Abatement Districts, "General Outline of GHAD Formation Process"; Robert B. Olshansky, "Geologic Hazard Abatement Districts."

⁴⁷ Note that agencies can also enter joint powers agreements without forming a Joint Powers Authority – this occurs when an existing member agency is responsible for delivering the service and no new government organization is formed.

⁴⁸ As the JPA is the entity issuing the bonds (and not the member agencies) the JPA process is followed, which does not require approval, even if individual member agencies' revenue bond issuance may typically require voter approval (which varies by agency and by type of revenue bond). Trish Cypher and Colin Grinnel, "Governments Working Together: A Citizen's Guide to Joint Powers Agreements."

⁴⁹ According to California Public Utilities Code, a mutual water company means "any private corporation or association organized for the purposes of delivering water to its stockholders and members at cost, including use of works for conserving, treating and reclaiming water." Mutual Water Company Information.

⁵⁰ JPAs can be formed with different levels of government but the powers of JPAs are limited by those that are common to all participating agencies (i.e. the JPA can have only the powers of the agency with the least authority). Formation of a JPA does not require voter approval. Trish Cypher and Colin Grinnel, "Governments Working Together: A Citizen's Guide to Joint Powers Agreements."

include: private sector cost advantage for project delivery over public sector delivery alone, existence of supporting legislation or contracts that regulates private gains and minimizes public losses, ease of monitoring and evaluation of private delivery of public services, and increased access to funding tools through private involvement.

public control. This consideration can increase the complexity of constructing PPPs, which can result in high transaction costs.^{lxxxviii}

PUBLIC PRIVATE PARTNERSHIPS (PPPs)

Public private partnerships involve long-term agreements between private and public entities for the provision of assets or services.^{lxxxvi} Public private partnerships differ from traditional design-bid-build approaches in that two or more project phases are integrated⁵¹, with expressed goals of risk sharing between the public and private sectors, securing private financing, and engaging best-suited project proponents rather lowest bidders.^{lxxxvii}

The main potential benefits of PPPs include access to private capital, avoidance of public debt and associated debt-raising requirements, the ability to share risk between the public and private sector and assign the risk to the partner best equipped to manage or avert it, and use of private sector knowledge. Additionally, working with one private entity for all project phases (from design through operations) can encourage designs that will make maintenance and operations easier or more consistent in the long term. In the context of adaptation and resilience projects, these characteristics can be helpful to manage risk as well as support maintenance and operations activities for projects with long lifespans.

For public entities entering into PPPs, it is important to create accountable, equitable, and cost-effective agreements that do not relinquish too much control of public sector assets to private partners and expose the public to unnecessary risk and liability that is outside

⁵¹ The most involvement a private sector entity can have in a Public Private Partnership typically includes four phases: Design, Build, Finance, and Operate.

VI. EQUITY-CENTERED CONSIDERATIONS FOR FUNDING AND FINANCING ADAPTATION AND RESILIENCE PROJECTS

It is critical that funding and financing strategies for adaptation and resilience projects incorporate equity as an underlying principle because research shows that climate change effects disproportionately impact disadvantaged, low-income, and other vulnerable communities.^{lxxxix} Such communities may use the term “frontline”^{xc} communities to describe their proximity to the negative impacts of development and of climate change (see Equity in Key Terms and Concepts).

In addition, ongoing and historical injustices increase the challenges that certain communities, such as low-income communities and communities of color, must overcome to support adaptation measures and increase climate resilience. For example, limited wealth-building opportunities, such as restricted access to credit and homeownership, greatly reduce access to traditional financing.⁵² Historical disinvestment increases existing needs related to rising deferred maintenance and lack of sufficient and sustainable infrastructure. Historically, major federal investment in infrastructure, such as the interstate highway system, has disrupted and physically fragmented disadvantaged and vulnerable communities.

Funding and financing strategies that do not address such disproportionate impacts can have cascading effects. Unless properly structured, taxes, fees, and charges imposed to fund and finance adaptation and resilience projects could consume a greater percentage of low-income households’ income as compared to higher-income households, leaving less funds available to low-income households for other essential needs. Communities with fewer resources will generally have limited capacity to pursue funding, secure financing, and deploy monies in support of adaptation and resilience projects, which could reinforce existing disparities. Existing institutionalized financial practices will only further this negative feedback loop if such practices do not change to incorporate equity concerns. For example, credit rating agencies’ downgrading of municipal bond ratings for communities that face challenges in recovering from climate-related disasters will only increase the cost of borrowing for the funds needed for economic recovery in those communities.

Leaders developing a funding and financing strategy for adaptation and resilience projects must address these historical injustices by avoiding regressive tools and focusing on equitable processes and outcomes. This includes recognizing the social capital and expertise of communities who will be paying for and impacted by a project. A number of tools have been developed specifically to incorporate equity into planning and budgeting processes, and in procurement and contracting. Examples of such tools and practices that can help address equity concerns and promote more equitable outcomes include: CalEnviroScreen⁵³, the Framework for Long-term whole-system, equity based reflection (FLOWER), participatory budgeting, and inclusive procurement and contracting commitments.

There is also literature specific to equity principles in funding and financing infrastructure. Key considerations include: how money should be raised, how it should be spent, and who should make decisions on each. The sections below highlight key considerations in each of these areas.

⁵² Minority-owned businesses have been found to have higher loan interest rates and credit application rejection rates, and have been found to be less likely to apply for loans. In a study of the 2015 home mortgage market, black and Hispanic applicants are denied a mortgage at higher rates than Asian and white applicants. The most commonly cited reasons included credit history and debt to income ratios. Robert W. Fairlie, Ph. D and Alicia M. Robb, Ph.D, “Disparities in Capital Access between Minority and Non-Minority Businesses: The Troubling Reality of Capital Limitations Faced by MBEs”; Drew DeSilver and Kristen Bialik, “Blacks and Hispanics Face Extra Challenges in Getting Home Loans.”

⁵³ In California, SB535 and AB1550 require that a certain percentage of cap-and-trade proceeds fund projects that are located within and that benefit individuals living in disadvantaged communities (see Equity – Disadvantaged Community). The CalEnviroScreen tool determines what communities qualify; the CalEnviroScreen tool incorporates exposure metrics (e.g. ozone concentrations), environmental effects (e.g. presence of solid waste sites and facilities), population sensitivity metrics (e.g. asthma rates), and socioeconomic factors (e.g. poverty). California Environmental Protection Agency State Water Resources Control Board and Office of Environmental Health Hazard Assessment, “CalEnviroScreen 3.0.”<https://oehha.ca.gov/media/downloads/calenviroscreen/report/ces3report.pdf>

HOW MONEY SHOULD BE RAISED

Two equity principles are commonly used in this context: the benefits principle, in which charges are levied in relation to the services received, and the ability-to-pay principle, in which income is considered when levying charges.^{xcⁱ} Intergenerational equity (see Equity – Intergenerational Equity) is also a relevant consideration when determining how to raise money for a project.

HOW MONEY SHOULD BE SPENT

Commonly-applied principles of equity that reflect how money should be spent include, but are not limited to: market equity, opportunity equity, and outcome equity. For market equity, spending is proportional to what a geographic entity (e.g. a county), group of people (e.g. transit riders), or individual (e.g. taxpayer) pays. For opportunity equity, spending is distributed evenly across units (e.g. equal across jurisdictions). For outcome equity, spending is based on achieving equal service for all units (e.g. same level of access and mobility for all individuals).^{xcⁱⁱ}

WHO SHOULD DECIDE HOW MONEY IS RAISED AND SPENT

In the decision-making process, it is important that the decision-makers are representative of the population in the community where the decision will have impact, and include community members who may have historically been excluded from decision-making processes such as: low-income communities, communities of color, people with disabilities, and people who have limited English proficiency.

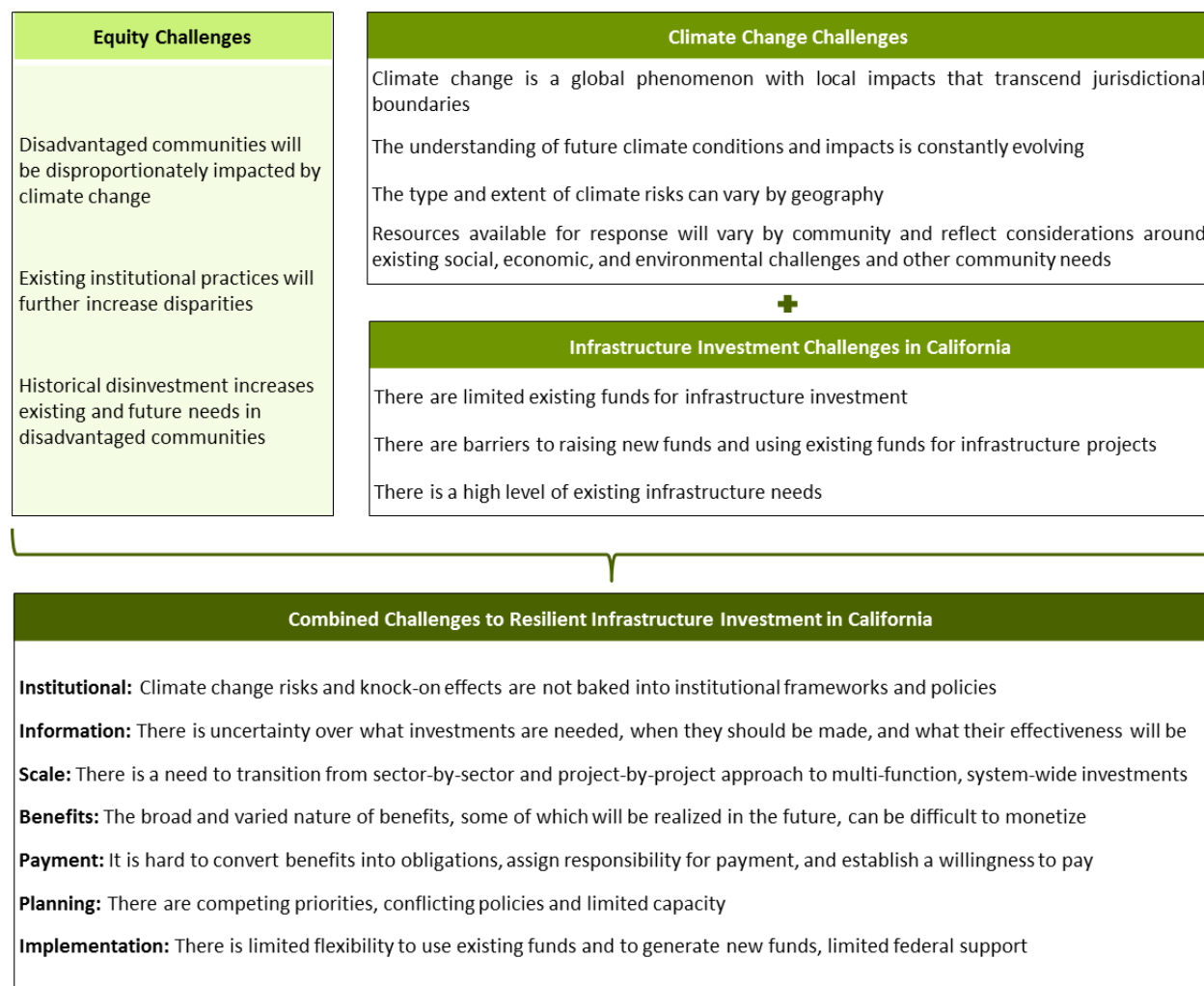
Addressing the equity concerns of climate change impacts is critical for ensuring that all Californians can adapt and thrive in the context of changing conditions. Effective adaptation and resilience projects will not only address past injustices but will also create opportunities for furthering an equitable society. Given that equity is a cross-cutting concept that must be considered throughout the entire funding and financing process, it is discussed primarily in this chapter but is also incorporated briefly in the next chapter.

VII. KEY CHALLENGES FOR FUNDING AND FINANCING ADAPTATION AND RESILIENCE PROJECTS IN CALIFORNIA

New investment in adaptation and resilience is necessary to address the impacts of climate change, but the need for new investment goes beyond what any one sector (government, non-profit, or for-profit) can manage alone due to the political, financial, and regulatory challenges inherent in responding to a phenomenon at the scale of climate change. This chapter summarizes key challenges for investment in climate adaptation and resilience projects in California. A discussion of strategies that address one or more of these challenges is found in the next chapter.

Three core challenge areas make investment in adaptation and resilience projects particularly difficult. Equity challenges are cross-cutting, and fundamental to the other two challenge areas. Figure 2 below summarizes how these three core challenge areas combine to affect every component of a project's funding and financing strategy.

FIGURE 2. CHALLENGES TO ADAPTATION AND RESILIENCE PROJECT INVESTMENT IN CALIFORNIA



Source AECOM October 2018

EQUITY CHALLENGES

Disadvantaged and vulnerable communities in many cases will be subject to disproportionate impacts from a changing climate. These frontline communities with fewer resources will generally have limited capacity to pursue funding, secure financing, and deploy monies in support of adaptation and resilience projects. Existing institutionalized funding and financing practices could further increase disparities in community resilience if such practices do not change to incorporate equity concerns as discussed above (see Equity-Centered Considerations for Funding and Financing Adaptation and Resilience Projects).

CLIMATE CHANGE CHALLENGES

Climate change is a global phenomenon, although the impacts are felt most acutely at the local level. As a result, communities have significant responsibility for figuring out how to plan for and adapt to this emergent reality. The work of communities includes identifying activities that bolster resilience to short-term shocks and longer-term stressors, as well as funding such activities. Communities that are more vulnerable to climate change, and that have fewer resources available for response, face higher barriers to adaptation.

The wide-ranging possible futures that climate change could bring make adaptation a daunting task, especially given that knowledge of future climate conditions is also evolving over time. This shifting

understanding introduces uncertainty into planning and development decisions, which requires the development of flexible, scalable solutions for a challenge that is not yet fully understood.

In addition to the challenges that communities are confronting on their own, the risks from climate change transcend community borders and regional collaboration will often be necessary to cost-effectively advance adaptation and resilience efforts. The need for neighboring communities to work closely together can pose significant coordination challenges. Negotiation and compromise will be necessary to support collective action, as communities have different resources to bring to the table and different opinions of where and how resources should be invested. Collective action will also be dependent on community-specific considerations including existing environmental, social, and economic challenges, and other community needs.

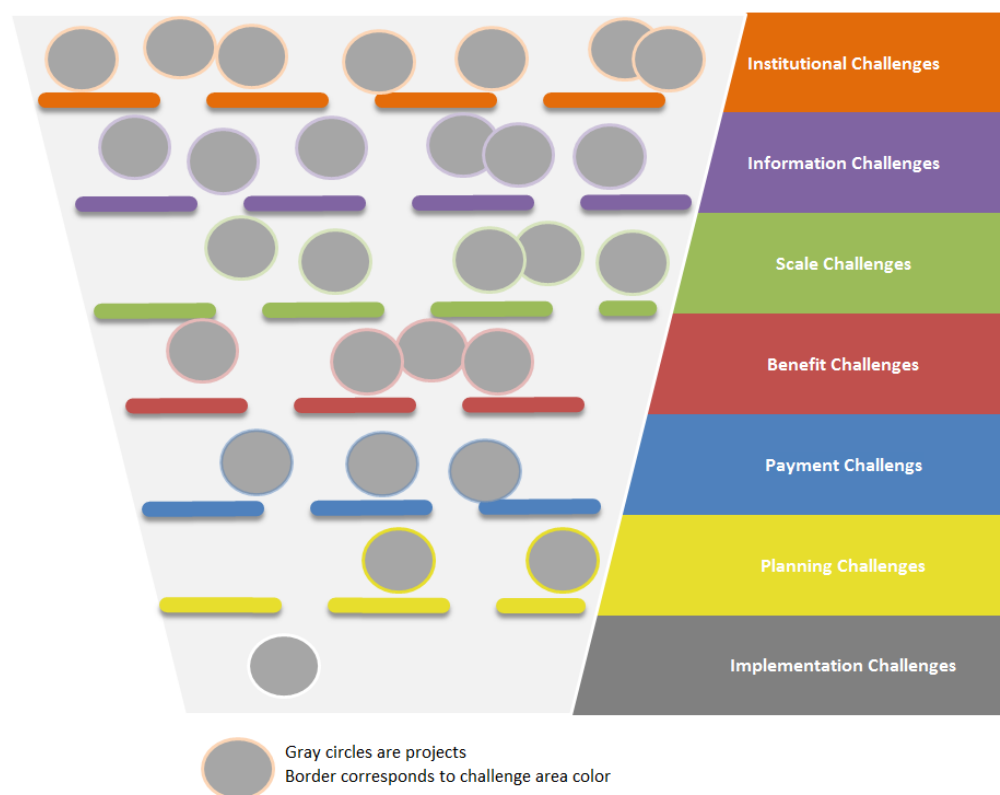
INFRASTRUCTURE INVESTMENT CHALLENGES IN CALIFORNIA

Many communities in California do not have sufficient funds to invest in core infrastructure needs, such as transportation, utilities, and housing. For many, existing revenue sources are already overcommitted and budgets across the state will likely be further strained in the future as communities are asked to direct more revenues to address unfunded pension liabilities. Funding for new infrastructure projects, including for projects that advance adaptation and resilience, will likely require communities to identify new sources of revenue, but the state's regulatory structure surrounding taxes, fees, and assessments makes such revenue generation efforts challenging. Proposition 13 and Proposition 218, in particular, have constrained the ability to raise funds for community infrastructure. These constraints not only decrease available funding but can also make assessment of new fees and taxes difficult due to voter approval requirements and other restrictions that limit how costs can be assigned for the provision of services and for what particular purposes payments can be used. This has resulted in a backlog of deferred maintenance needs that require significant investment. California must consider these issues when determining how to invest in adaptation and resilience.

COMBINED CHALLENGES TO INVESTMENT IN ADAPTATION AND RESILIENCE PROJECTS IN CALIFORNIA

Under current conditions, adaptation and resilience investments in California are hard to fund due to the combined challenges for climate change and infrastructure investment. Multiple challenges must be confronted before climate adaptation and resilience projects are realized, as depicted in Figure 3. As challenges mount, fewer and fewer projects can attain financial and institutional support required for implementation.

FIGURE 3. CHALLENGE PHASES OF ADAPTATION AND RESILIENCE INVESTMENT



Source AECOM October 2018

INSTITUTIONAL

Information about and measures to address risks from climate change and its knock-on-effects are not incorporated into most kinds of policies that govern public and private institutions. As a result, risky behavior is often incentivized and/or subsidized. At some point in the future, economic and financial realities will demand that climate risk is better accounted for in public and private sector policies and programs. To avoid significant shocks to the economy and society, it will be important for mechanisms that account for risk to be introduced in an orderly and equitable way.

In the public sector, for example, the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program (NFIP) has historically set premiums and surcharges using outdated flood maps that do not accurately reflect current risk. NFIP policies have also allowed for rebuilding of property that has experienced repetitive losses. In many cases, this course of action not only creates a moral hazard (i.e. relieves actors from internalizing the cost of risky behavior), but is also less cost-effective than relocating structures or activities to an area not subject to repetitive flood risk. Because of these operating principles, premiums collected by the NFIP have not been sufficient to cover losses; as of April 2018 the NFIP owed over \$20 billion to the U.S. Treasury.^{xciii} Additionally, FEMA flood insurance maps do not account for future climate risk considerations like sea-level rise, which will only increase flooding potential and could exacerbate the gap between revenue and risk.^{xciv}

In private sector markets, climate-related considerations have also often been overlooked. For example, in an S&P study of 9,000 credit rate adjustments, roughly 1% listed environmental and climate considerations as a key factor in the rating change. Just over half (56%) of such adjustments were in a negative direction and the remaining (44%) were in a positive direction.^{xcv} However, there is growing consensus that climate change should be accounted for in private sector financial investment decisions. A recent report by Moody's noted how a community's ability to be resilient to climate change-related

impacts is a relevant consideration for investors and markets.^{xvii} For example, a major natural disaster could shock local economies and increase stress on municipal operations, and lead to decreased tax revenues and higher debt burdens. These outcomes could trigger a downgrade of a municipal credit rating, further challenging the ability of a community to cost-effectively secure funds for post-disaster recovery.

INFORMATION

The constantly evolving understanding of climate change and the variety of possible impacts poses challenges for both the public and the private sector to institutionalize climate risk considerations into their policies and programs. Uncertainty about future climate conditions makes it difficult to know exactly what types of projects are needed and when they should be introduced. This challenge of what to plan for and when is compounded by a lack of data on how climate risk management investments perform. Comprehensive data on existing conditions and detailed information on future risk are often needed for effective planning and development of infrastructure projects, but such data is scarce and/or highly variable for adaptation and resilience projects. As a result, it can be difficult to make a business case for the value of proactive adaptation, which is critical for securing buy-in and a commitment for investment from both the public and private sector.

In California, the Ocean Protection Council, in collaboration with the Natural Resources Agency, has developed guidance for state agencies and local governments that takes into account the scientific consensus on sea-level rise and related hazards, and how this information can be considered in planning, permitting, and investment decisions. This guidance has been updated over time to reflect the evolving scientific understanding around sea-level rise, projections, which have changed significantly.⁵⁴

While it is helpful for communities to have access to up-to-date information on climate risks like sea-level rise, the shifting range of future conditions that communities are being asked to plan for can result in an unclear environment for decision-making. It can also hinder the ability for the public and private sectors to work together to achieve mutually beneficial outcomes, including investment in development, which coastal jurisdictions may be counting on as a way to fund adaptation and resilience projects as well as other core community services.

SCALE

Even given more certain knowledge of how the climate will change in the future, the magnitude of expected impacts creates a new set of challenges for planning and funding projects. For effective adaptation and resilience projects, a systemic approach to intervention will be needed. This new way of doing business will reflect a significant departure from past approaches to capital planning where agency-by-agency investment decisions were made in silos and targeted individual assets. It will require communities to think critically about how they design projects that can provide multiple co-benefits, and how budgets can be structured and aligned across agencies to promote system-wide outcomes that address multiple policy and community priorities.

BENEFITS

Adaptation and resilience projects that are scaled to address system-wide challenges can produce benefits that extend to people, the economy, and the environment. These benefits, which can be regional in scope, can be more difficult to isolate and quantify compared to conventional single-purpose projects like a pump station. There is limited guidance on how to account for such benefits in monetary terms, especially for potential social and environmental benefits that could be produced by adaptation and resilience projects. Challenges to monetizing the multitude of benefit types provided by multi-

⁵⁴ California's First Climate Change Assessment (2006) projected sea level to rise between 6 and 22 inches by 2100 while California's Fourth Climate Change Assessment includes projections from 14 to 94 inches by 2100, with an additional very low-probability worst-case estimate that exceeds 9 feet. Gary Griggs et al., "Rising Seas in California: An Update on Sea-Level Rise Science."

purpose projects, as well as uncertainty of when such benefits will be realized and how they should be valued in the future, can result in a skewed calculus in cost-benefit assessments when investments are planned.

PAYMENT

Even if there were no challenges to reliably assessing climate risk and monetizing the full suite of benefits provided by projects, communities would still need to convert anticipated benefits to obligations and assign responsibility for payment. In many cases, the benefits provided by adaptation and resilience projects, especially those that may be designed expressly as multi-benefit projects, may be more similar to public goods (non-rivalrous, non-excludable commodities or services) than to direct benefits for a specific population (e.g. water service to homes with meters). Many of these benefits may not be realized until far in the future and may be premised on nuanced concepts such as avoided costs or unrealized damages that can be challenging to communicate in a way that is easily understood by the public.

Assigning payment responsibilities for multi-purpose projects that provide dispersed community benefits is challenging, especially in California, where many funding tools require a direct correlation between how much is charged and the cost of providing the service, while other tools require that investments are made within geographies with contiguous benefits. The level of precision required for identifying anticipated benefits, and the requirement for determining specific beneficiaries, can make assigning payment responsibilities for adaptation and resilience projects using traditional revenue generating tools, such as assessments, difficult. Under such constraints, general taxation would be the primary alternative tool to raising funds for adaptation and resilience projects. Yet, there are discrepancies between expressed public support for investment in infrastructure projects and voters' willingness to tax themselves to pay for such projects.⁵⁵

PLANNING

Local communities have limited funds and already face a number of existing challenges related to the provision of core community infrastructure services. Issues related to transportation and housing for instance, are often of immediate concern to the public, and can take priority in budgets over projects designed to address future climate risks. For example, a 2017 statewide survey found that 61% of California adults believe it is important for the state to spend more money on flood management and water infrastructure. But when asked what is the most important issue that people in California are presently facing, water and drought were listed as the fourth most important issue after jobs / economy, immigration / illegal immigration, and government / elected officials.^{xvii} As long as climate change and associated impacts are viewed as problems that will happen in the future, adaptation and resilience projects face an uphill battle in competing for funding, both existing and new, with core infrastructure projects that affect people's lives today.

Further complicating matters is the level of effort required to plan for adaptation and resilience projects, which may require more upfront resources for coordination and community engagement, and may require complex design, engineering, and economic considerations associated with large-scale projects. Local governments are already operating with constrained resources and have limited capacity to take on additional responsibilities. Limited capacity can also affect a community's ability to pursue funding, secure financing, and deploy monies in support of adaptation and resilience projects. Even if grant funding is available for projects, some agencies do not have the capacity to onboard grant funds and

⁵⁵ While there seems to be a general trend towards public and legislative support for major infrastructure projects (e.g. Proposition 1, SB1), six in ten Californians believe that they pay more state and local tax than they should. This opposition to more taxes is playing out now. A new initiative, proposed on the November 2018 ballot, would effectively repeal SB1. The initiative would require majority voter approval to levy, increase, or extend taxes on gas, diesel fuel, or vehicle operation on public highways, thereby further constraining the ability to raise funds in support maintaining and rehabilitating California's transportation systems. Mark Baldassare et al., "Californians & Their Government."

administer or spend the monies in an efficient and effective manner; in some cases, grant administration requirements can be so significant that jurisdictions forego applying altogether. Finally, as discussed above, many funding tools, such as taxes, require administrative resources to engender the broad public support necessary for meeting voter approval thresholds.

Planning for adaptation and resilience projects is also challenging because both at the programmatic and project level, communities can face guidance that is conflicting or hard to reconcile on what needs to be done. For instance, the state is advocating for coastal communities to consider sea-level rise in their decision-making, while simultaneously asking the same communities to increase their housing stock. Coastal communities in particular face significant shortages in housing, and opportunities for development can potentially fall in low-lying areas that could be subject to risks from future increases in sea-level. Another current example of this challenge is currently being faced in Sonoma County, California. The recent fires that devastated many homes in the area demonstrate the risks of living at the wildland urban interface, yet the loss of existing housing makes community members more vulnerable to displacement and other social and economic impacts. Further, redevelopment of homes in the same locations could, without thoughtful planning and development requirements, continue a pattern of exacerbating climate-related risk.

IMPLEMENTATION

Local communities face a number of challenges moving from planning to implementation of adaptation and resilience projects. At the forefront of these challenges are barriers to securing funding that can pay for projects upfront, or reliable streams of money that can pay back financial investors.

At the state level, these barriers stem from a regulatory structure surrounding taxes, fees, and assessments that make it difficult to raise new funds to pay for infrastructure. At the federal level, existing funding is restricted by competing priorities and geographies as well as policies that silo spending and limit comprehensive climate change adaptation and resilience investment.⁵⁶ For instance, FEMA's disaster recovery funding typically must be spent under tight deadlines, is limited to the geography of affected areas (which can challenge potentially more effective regional solutions), and has historically been designed to restore communities back to their states prior to disasters, rather than encouraging proactive investment that incorporates new standards that account for the risks of a changing climate.

Some jurisdictions in California may anticipate that the federal government will fund climate adaptation and resilience projects but in reality, there is limited federal funding available for such efforts, and there are also increasing financial constraints on existing federal funding sources (such as the NFIP, see Institutional above) that challenge their long-term viability. Additionally, Congress and/or an administration can change federal funding priorities, which can result in fewer resources for climate change-related investments. Collectively, these factors makes it unlikely that California will be able to look to the federal government as a reliable funding source for adaptation and resilience projects in the near future.

Because adaptation and resilience projects are often large in scale and designed to provide multiple types of benefits, climate change adaptation and resilience projects will require tapping into a number of different sources of funding for them to be realized. However, procedural and administrative requirements outlined in both state and federal funding sources can make it difficult to combine funding streams. Funding is typically restricted by the types of projects or specific populations that can apply for them.^{xviii} For instance, SB 1 (Beall, 2017) and Proposition 1 (2014) funding in California is restricted

⁵⁶ The main sources of federal funding for adaptation and resilience projects come from the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the Army Corps of Engineers (USACE), and the U.S. Department of Housing and Urban Development (HUD).

primarily to transportation and water projects, respectively. Additionally, funding for major infrastructure projects from the local level up to the federal level is oriented towards capital costs rather than operations and maintenance. Collectively, this will demand that communities identify many different sources of money to address the full life-cycle costs for adaptation and resilience projects, and work hard to fit them into a single plan for development, operations, and maintenance.

VIII. KEY STRATEGIES FOR FUNDING AND FINANCING ADAPTATION AND RESILIENCE PROJECTS IN CALIFORNIA

The challenges to investment in adaptation and resilience projects in California are many, as discussed in the previous chapter of this report. Many of these challenges are interconnected, and failure to address them collectively could stall the development of much needed projects. This chapter discusses key strategies relevant to addressing these combined challenges to more effectively plan for and invest in climate adaptation and resilience projects in California given existing constraints.

DEVELOP FINANCIAL STANDARDS: *INCORPORATE ADAPTATION AND RESILIENCE STANDARDS INTO EXISTING FUNDING STREAMS AND TOOLS*

Resilience should be considered an integrated component of all infrastructure-related policies, programs and investment decisions, rather than an “add on” cost or feature. While creating new funding streams for adaptation and resilience projects is well-meaning and important, this could create an unnecessary and unhelpful distinction between “resilience” and “non-resilience” projects. Incorporating adaptation and resilience standards into existing funding streams could ensure that all projects and programs account for climate risks and include adaptive components. In many cases, this approach will be easier to implement than the creation of new funding streams that require broad administrative, political, and public support. Adapting the standards of existing funding tools to include clear, measurable, and consistent criteria for evaluating and comparing project risks could help reduce the burden of understanding the vulnerabilities of projects to climate risks, direct existing resources in support of projects that minimize climate change exposure, and limit the need for future costly interventions that may be required when climate change exposure is not considered.

“Green bonds” are an example of a potentially valuable tool for incorporating resilience goals and features into projects, but one in which standard development would be beneficial. Green bonds are not a new type of financing tool, but rather are a restructuring of traditional bonds with specific goals and objectives related to environmental benefits. As a result, they do not pose a significant learning curve to put into place or administer. To date, the green bond market in the United States appears to be redirecting existing investments rather than bringing new capital into the markets. Key to further developing this sector of the bond market will be standardized and agreed upon criteria for what qualifies as “green.” Certification standards have been developed, such as the Climate Bonds Standard & Certification Scheme by the Climate Bonds Initiative, but they are not yet commonly applied.⁵⁷

DISCLOSE CLIMATE RISK: *INTRODUCE CLIMATE RISK CONSIDERATIONS INTO DISCLOSURE REQUIREMENTS AND FIDUCIARY RESPONSIBILITY STANDARDS*

Investor decision-making is often driven by considerations for maximizing short-term profits. Because climate change is often perceived as a slow-moving phenomenon with impacts far into the future, climate risks are undervalued or not accounted for at all in many types of market investments. When climate risks are not considered in investor calculus, it is difficult to realize adaptation and resilience investments and associated benefits. The adoption of new disclosure requirements and fiduciary

⁵⁷ The California State Treasurer’s Office noted that there is a need for standardized metrics and administrative and reporting processes for the green bond market. California Office of the State Treasurer, “Growing the U.S. Green Bond Market.” Mobile Source Control Division, California Air Resources Board

responsibility standards that account for climate risks can help to steer market investment toward projects and institutions that are exposed to less climate risk – and therefore less financial risk – and that can help to advance more sustainable environmental, social, and governance outcomes.⁵⁸

In California, some transparency around climate risk is mandated as the state requires insurers to disclose their climate risk through an annual Climate Risk Disclosure Survey.^{xcix} While this information helps to provide transparency on how insurance companies account for climate risk in the investment considerations, there are more expansive disclosure reporting requirements in many other international economies. In most G20 jurisdictions, companies that have public debt or equity are legally obligated to disclose material climate-related risk in their financial reporting.^c France also requires institutional investors to report on how climate change factors are incorporated into investment policies.⁵⁹

In addition to disclosure, advancing investments in sustainable and resilient assets will also require new fiduciary standards that incorporate the consideration of climate impacts so that investors have a mechanism through which to demand the selection of climate adaptation and resilience investments.

INCENTIVIZE INVESTMENT: INCREASE MARKET INCENTIVES THAT CAN HELP TO PROMOTE PRIVATE INVESTMENT IN ADAPTATION AND RESILIENCE ACTIONS

Government regulations and policies alone are not sufficient to promote investment in adaptation and resilience at a scale that will meet the needs of most communities. Markets have played a key role in helping society address a number of key challenges in fields as varied as medicine and technology, and could be further leveraged to communicate the benefits of actions that address the risks posed by a changing climate as those risks are better understood. Risk reduction can result in cost differentials that can then incentivize private sector investment in projects that increase resilience.

In particular, properly functioning insurance markets have been shown to be useful in incentivizing actions to reduce potential risk from disaster. The California Earthquake Authority, a publicly managed, privately funded provider, sets premiums specific to each policyholder's risk potential. Policyholders at a higher risk for damage pay higher premiums than policyholders at lower risk. Premium reductions are offered to policyholders if they take actions to reduce their risks to earthquake damage – for instance, by reinforcing or strengthening their property.

A number of insurers and mortgage underwriters give discounts for green certified properties. For instance, Fireman's Fund started to offer insurance premium discounts for LEED buildings over ten years ago. Even though the premiums are lower, the coverage is actually more extensive as the company expects decreased long-term losses compared what would be expected for traditionally constructed buildings. Insurers even offer discounts on various policies including general liability and workers' compensation for companies that locate in LEED-certified buildings.^{ci}

Similar incentives could also be offered for resilience investments, especially in the insurance and home mortgage markets. Fannie Mae offers Green Building Certification discounts for already-certified structures as well as financing for green retrofits. These loans are also then classified as Green mortgage-backed securities (Green MBS), which are marketed as having positive triple bottom line outcomes.^{cii} Since the introduction of LEED, the portfolio of standards has expanded to include beyond-

⁵⁸ The Task Force on Climate-related Financial Disclosures published a report that provides recommendations for climate-related financial disclosures that would be most effective for conveying risk. High-Level Expert Group on Sustainable Finance, "Financing a Sustainable European Economy."; Task Force on Climate-related Financial Disclosures, "Recommendations of the Task Force on Climate-Related Financial Disclosures."

⁵⁹ In 2018, the EU published the report *Financing a Sustainable European Economy*, which outlines necessary policy changes to improve sustainable financing. Main recommendations from the report include: extending investor's time horizons and incorporating environmental, social and governance considerations in investor decision-making, standardizing sustainability metrics in Europe for financial assets such as green bonds, and including sustainability risks and opportunities in disclosures. Susanna Rust, "France Aims High with First-Ever Investor Climate-Reporting Law | News | IPE"; Mirjam Wolfrum, "3 Takeaways from Europe's Landmark Sustainable Finance Roadmap - CDP."

building standards and resilience-oriented credit programs. These include SITES (landscape oriented), Envision (infrastructure oriented), WELL (health oriented), and WEDG (waterfront oriented). Expanding financial incentive programs to align with these newer certification programs could result in increased adoption, lower risks, and resulting cost differentials that provide for incentives.^{ciii}

In addition, the private sector owns or has a financial stake in a significant number of assets in California communities, many of which are already exposed to climate risks. As a result, the private sector could experience financial loss in the absence of adaptation and resilience investments. Because the private sector stands to gain from investments in adaptation, it should have strong involvement, if not a leadership role, in advancing investment in adaptation and resilience projects. State and local governments should consider ways to incentivize the private sector, especially developers and property owners, to invest in adaptation and resilience. For instance, jurisdictions could develop programs in which property owners can opt in to commit to quality building standards and outcomes in return for a tax break. Jurisdictions could also require investment in resilience by updating building codes and standards to ensure changing climate conditions are incorporated. This would help to mainstream adaptation in local land use activities and ensure the private sector bears an appropriate share of the cost of action.

As an example, the City of Philadelphia addressed major deferred maintenance issues with its stormwater system by adopting and implementing the Green City, Clean Waters program. This 25-year initiative couples a green stormwater infrastructure plan with regulations and incentives that encourage private investment in stormwater management and decrease future demand on citywide infrastructure that must function in future climate conditions as well as today.⁶⁰ Under this system, the City requires large developments to manage rainwater onsite.^{civ} Prior to receiving any building permits, developers must sign agreements that outline the specific stormwater infrastructure that will be on the property and schedules for maintenance. Developers can be exempted from certain stormwater management requirements and qualify for streamlined reviews if their projects decrease the amount of impervious areas connected to the City's sewer system. Existing stormwater customers can qualify for discounted fees by reducing the amount of onsite impervious area or by taking actions to better manage runoff from impervious area.^{cv} The City financially incentivizes beneficial private investment through grant programs, free design assistance, and low interest loans. One grant program specifically targets project aggregators (e.g., business improvement districts, non-profits, and smaller firms that provide stormwater management services) to achieve economies of scale that can support the development of district-scale projects.^{cvi}

TRANSFER KNOWLEDGE: *DEVELOP AND SHARE INFORMATION ON CLIMATE CHANGE RISK AND RISK MANAGEMENT APPROACHES*

There is a high administrative and cost burden to understanding, planning for, and adapting to climate risk. Fundamentally, robust data and analysis are required to assess climate risk in a manner that can justify large investments in adaptation and resilience projects that can stand the test of time in an uncertain future. The capacity to develop action plans for addressing climate risk varies greatly by community. Continued public funding to develop and maintain venues for sharing climate data and tools, as well as approaches to adaptation and lessons learned (e.g., the Governor's Office of Planning and Research Integrated Climate Adaptation and Resiliency Program's Adaptation Clearinghouse, University of California, Berkeley's Cal-Adapt) is of great importance to communities with fewer resources and less capacity to independently produce such information. This type of information and

⁶⁰ "Green stormwater infrastructure represents water-soil-plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, and in some cases, release a portion of it slowly back into the sewer system recreating the natural water cycle in a dense urban area"; Econsult Solutions, "The Economic Impact of Green City, Clean Waters: The First Five Years."

resources can also support the evaluation and ranking of projects according to their ability to reduce climate risk with consistent, relevant data.

The public sector and the private sector both have a stake in understanding and adapting to climate risk. These sectors should be in dialogue with each other, especially with regard to how risk management approaches evolve with developing knowledge of climate change and its potential impacts.

Transparency on this front will better position society to take predictable actions to mitigate both risks and costs, and enable investment today that will reduce long-term costs. The Tree Mortality Taskforce being convened by CalFire is an example of how various actors and stakeholders from the public and private sector can coordinate and share information about approaches to manage and adapt to climate risk.

ASSESS COST/BENEFITS: INVEST IN STUDIES THAT EVALUATE THE COSTS AND BENEFITS OF ADAPTATION ACTION, AS COMPARED TO THE COSTS OF INACTION

Adaptation will be expensive in many cases, but the costs of action are expected to be less than the costs of doing nothing. Information that compares the costs of adaptation to the costs of inaction can help communities determine what types of investment are likely to be cost-effective and justifiable, as well as understand what may be at risk using differing approaches to climate adaptation and resilience. Such knowledge can help to support evaluation and ranking of potential projects in the context of competing priorities, and to steer investment toward projects that minimize future risks and societal impacts consistent with community priorities.

Though adaptation and resilience projects can generate social and environmental benefits in addition to standard financial benefits, there is limited agreement and guidance on how to define, evaluate, and value the full range of such benefits, especially in monetary terms. Much of the developing research on approaches for incorporating benefits from resilience projects that extend beyond the value of protecting assets is still theoretical. For these concepts to gain traction, they need to be applied in a real world setting. While it is challenging to accurately estimate resilience needs and quantify the benefits offered by adaptation and resilience projects, advances in this arena are critical for making a business case for investment in such projects. More clearly defined definitions and standards for what qualifies as a benefit, and who can be considered a project beneficiary and to what degree, can support the transparent assignment of obligations of payment and help to determine the eligibility of public funding sources that can support adaptation and resilience projects.^{cvi}

A growing number of case studies in California (primarily in the coastal sector) address the costs and benefits of adaptation, yet such case studies are often limited in scope and caveated to note that the results are intended for “planning purposes” only. Risk-based economic assessments that can be used to justify the construction of expensive projects at large scales must robustly account for uncertainty and different potential outcomes. These types of analyses require significant data collection, analysis and interpretation, and can come with a high price tag. Increasing the availability of funding for these types of feasibility assessments will be a prerequisite for realizing on-the-ground adaptation and resilience projects, especially at the regional scale.

FUND THE LIFE-CYCLE: ENSURE FUNDING PLANS ADDRESS ALL PHASES OF ADAPTATION AND RESILIENCE PROJECTS

Adaptation and resilience projects require reliable funding to be realized at multiple stages. This includes funding for predevelopment, development, and post-development activities. However, many existing climate vulnerability assessments and adaptation plans identify potential projects to improve resilience without consideration of funding feasibility, prioritization, or phasing. A number of actions can be taken to better support the success of a resilience project from beginning to end.

For example, funds dedicated to project planning, especially grants, could include a requirement that recipients explicitly consider the funding and financing potential of identified adaptation projects. For

projects approaching the implementation phase, requirements could ensure that funding and financing plans disclose the full suite of anticipated costs, including operations and maintenance and renewal, which have been historically underfunded; and monitoring and evaluation, which are critically important for adaptation projects that are intended to test relatively unproven and phased solutions.

Requirements for communities to plan for the full life-cycle costs of adaptation and resilience projects could support project formulation that matches local priorities in both the near-and longer term, and the design and selection of projects that are eligible for a wide range of funding sources. Bringing more transparency to the full life-cycle costs of a project could help to prevent situations where the public sector must scramble to find funding in ways that increase overall costs or that result in unplanned financial burdens for the public.

Funders and financiers could also consider extending the time horizon under which investment considerations are made. The financing terms for many infrastructure projects are generally capped between 30 and 40 years, yet the useful life of projects can extend well beyond this term. Regulations and statutes that dictate financing terms could be changed to allow for project designs to be scaled and costs to be allocated to future generations of beneficiaries.⁶¹

Additional changes could also be made to address procedural and administrative requirements that make it difficult to combine different funding streams. This would make it less challenging to stitch together the diverse types of funds needed for multi-purpose adaptation and resilience projects.

POOL RESOURCES: POOL EXISTING RESOURCES TO MAXIMIZE COST EFFECTIVENESS AND SUPPORT KNOWLEDGE TRANSFER

The extent to which jurisdictions are planning for adaptation and resilience projects varies greatly depending on social, political, and economic factors. California state policies require General Plan and Hazard Mitigation Plan Updates to incorporate climate adaptation and resilience goals and policies, identify feasible implementation measures to minimize the impacts of climate change based on risks identified in a climate vulnerability assessment, and address environmental justice issues (SB 379, SB 1000).⁶² However, these policies were recently adopted in 2015 and 2016, and must be implemented in the course of local plan updates over the coming years, so it is too early to fully understand their impact.

Jurisdictions are taking a variety of approaches to plan for adaptation and resilience needs and to secure project funding and financing. Jurisdictions with more resources have found that traditional financing tools are the best option in the coming years to secure capital funds: for example, San Francisco's Seawall Finance Group has recommended that the City use general obligation bonds as the primary source of financing for Phase 1 of a proposed seawall project.^{cviii} Jurisdictions with fewer resources are often more reliant on grant funding than on tools that raise money locally, such as by increasing taxes, but are also limited in their capacity to apply for and administer those grants. Less-resourced jurisdictions have found success in raising money locally when a resilience project's goals were aligned with existing needs and priorities of the community. For example, Fresno has fewer resources at its disposal than a jurisdiction like San Francisco, yet was able to secure public funding support for water supply and reliability projects in part because its residents are acutely aware of the societal consequences that can manifest during sustained periods of drought.

⁶¹ Washington, D.C. recently sold \$350 million in green bonds with a 100-year maturity. However, there are few other examples of this type of longer-term financial structuring, and further adoption will require a growing body of investors with a longer term outlook.

⁶² In support of these policies, and as mandated by Executive Order B-30-15, the Governor's Office of Planning and Research established a Technical Advisory Group, which has published guidance on how to integrate climate change in both planning efforts and in investment. It has also provided guides for how to involve communities in the process and for key questions to ask to determine social equity implications for plans and investments. Governor's Office of Planning and Research, California, "Planning and Investing for a Resilient California: A Guidebook for State Agencies."

Whenever feasible, adaptation planning efforts should be long term, comprehensive, and integrated across entities. Closely coordinating adaptation planning efforts and pooling resources can help to tap into efficiencies of scale and can support the design of multi-function projects that can qualify for a wider range of funding sources. These actions can improve the capacity and effectiveness of infrastructure investments to meet public needs, and can result in more funds available for projects as a wider range of funds can be tapped, even given competing priorities for investment.

The degree of coordination between agencies and departments that are actively working to incorporate adaptation and resilience considerations varies greatly by community. San Francisco, for instance, has a stand-alone institution to support capital planning and resilience policies, initiatives, and financial strategies. The advantages of having a dedicated institution to coordinate cross-agency, resilience-related infrastructure activities are many, as discussed above, yet this arrangement may not be suitable and/or feasible for many communities.

When this is the case, efforts should focus on adapting existing institutions that have knowledge about community priorities (e.g. if emphasizing flood protection is more important than drought control), local barriers (e.g. bureaucracy), and opportunities (e.g. other community advocacy groups and networks that can be partners). Communities with no existing institutions with capacity to focus efforts on resilience should explore opportunities to partner with neighboring jurisdictions that have institutions with these capabilities.

Partnering with institutions in neighboring communities can have multiple benefits including district-scale systems that can support coordination between geographies, allow for cost sharing, and reduce the need for new project investment. For example, rather than building a new stormwater management plant in one community, which would require both upfront capital and staff for operations and maintenance, an existing plant in a neighboring jurisdiction could instead be expanded. This could result in cost savings for both jurisdictions.

BUILD COMMUNITY: *PROMOTE EQUITY THROUGH INVESTMENT IN COMMUNITY ENGAGEMENT, CAPACITY BUILDING, AND AFFORDABILITY PROGRAMS*

Continuous funding is needed to support community engagement in each phase (e.g., predevelopment, development, post-development) of an adaptation and resilience project. A comprehensive approach to community engagement can help to account for the priorities of disadvantaged and vulnerable communities in projects designed to reduce exposure to climate risks, and can promote equitable outcomes in project selection and design.⁶³ Increased investment in community engagement could also provide longer-term co-benefits of building local capacity to pursue financial resources that require additional administration, such as grants. Effective community engagement can also strengthen the relationship between the public and government which can build trust and engender support for future projects.

State and local governments can make progress in addressing inequitable outcomes in climate change planning and adaptation by bringing together all affected parties including local residents and organizations, agency staff, policymakers, project funders, and planners. Community-based participatory processes have shown promise in their ability to identify and prioritize communities' needs. The Metropolitan Transportation Commission (MTC) in the Bay Area employed this type of process to develop Community-Based Transportation Plans that identify potential funding sources and stakeholders to execute the proposals.^{cix} Cities have also used community-based participatory budgeting to help determine what projects should receive funding support.

⁶³ A Bay Area survey (for the Adapting to Rising Tides Project) addressing equity considerations in the context sea-level rise adaptation, identified three main areas of funding concerns: funding community engagement, planning for vulnerable communities, and critical asset protection. Heidi Nutters, "Addressing Social Vulnerability and Equity in Climate Change Adaptation Planning."

The Fresno Transformative Climate Communities Engagement Process is perhaps the largest community-based participatory budgeting example in the country. Neighborhood residents, workers, and business owners participated in project proposal development and prioritization to identify 25 projects worth \$216 million, of which \$77 million came from the state's Transformative Climate Communities, which is funded by proceeds from California's cap-and-trade auction program.^{cx}

Adequate funding and high-level support are critical for successful community engagement processes. The Fresno process took course over 90 days, and included 10 public meetings. A consulting facilitator, multiple staff members from the City of Fresno, and support from the Central Valley Community Foundation were critical to effectively administering the process.

Planning for climate change impacts is a complicated endeavor given the technical and political issues involved. The State of California could take a lead role in developing or supporting a climate change adaptation certification program to increase the capacity of individuals, especially representatives from disadvantaged and vulnerable communities that may have limited access to resources and training, to address climate change risks and solutions at the local level.

The ability to pay for immediate or longer-term adaptation projects can vary greatly by household, business, or larger community. The state should continue to play a leading role in promoting affordability programs that include grants, rebates, and low-interest loans for infrastructure activities that addresses climate risks. For example, in 2017 budget legislation (SB 108) California allocated general fund monies for the State Water Resource Control Board to provide grants for economically disadvantaged citizens that have inadequate access to clean drinking water and inadequate sanitation to protect public health.^{cxⁱ} These grant funds, which are distributed to public agencies, public water systems, and non-profit organizations, are helping to replace failed drinking water wells, repair failed water system components, and connect homes to public wastewater treatment infrastructure. The state could also include language in general obligation bond acts that calls for the allocation of funds to support affordability programs in infrastructure projects that rely on these monies.^{cxⁱⁱ}

Applying for and reporting on the use of public funds in support of adaptation and resilience projects can come with a high administrative and cost burden, which can disproportionately impact communities with fewer resources. The State of California could play a leading role in streamlining application processes. Examples of efforts to streamline application processes include New York State's Consolidated Funding Application, which allows comprehensive projects related to economic development to apply to multiple state funds with one application.^{cxⁱⁱⁱ} California's Department of Education has a Consolidated Application and Reporting System which allows for streamlined funding applications and reporting on received funds.^{cx^{iv}} In April of 2018, the California Air Resources Board announced a grant solicitation for an administrator to implement the One-Stop-Shop Pilot Project, a single application for low-income consumers to apply and qualify for CARB's Low Carbon Transportation Equity Projects.^{cx^v} The solicitation also emphasizes the need for providing community-based outreach and education to maximize program participation in low-income communities, disadvantaged communities, and low-income households. The awarded grantee will also be responsible for evaluating opportunities to expand the One-Stop-Shop system with through inclusion of other housing and energy related consumer-based incentives. The rollout of this effort should be monitored closely to identify where efforts are successful in streamlining and increasing participation of low-income consumers in climate mitigation related investments, and how the One-Stop-Shop framework could be further extended to address climate adaptation and resilience needs of low-income communities.

INVOLVE THE PRIVATE SECTOR RESPONSIBLY: *ENCOURAGE PRIVATE SECTOR PARTICIPATION THAT IS ACCOUNTABLE TO PUBLIC NEEDS*

There is growing interest in the use of public private partnerships (PPPs or P3s) to advance infrastructure projects both domestically and internationally. The private sector is often viewed as being on the cutting

edge of innovation, and in a position to provide cost savings in delivering a project. While there can be benefits from private sector participation in public infrastructure projects, including access to financing that can support multi-function projects at large scale and more flexibility in raising and deploying funds in support of projects, it is important to acknowledge that private sector participation in any type of investment is heavily influenced by the private sector entity’s ability to secure a positive financial return. Furthermore, when it comes to funding infrastructure, citizens will ultimately pay the bill, whether through taxes or user fees. Because of this arrangement, it is critical that partnership agreements are structured to ensure that private sector actions produce cost-effective and desirable public outcomes in both the short and long term.

There are a growing number of examples of PPPs that are structured in manner that can result in undesirable public outcomes, including relinquishing decision-making control of local assets, long-term payment commitments that can lock in government budgets for decades, and a requirement for payment regardless of the future level of public demand for the infrastructure service.^{cxvi} For example, the \$1 billion taxpayer-backed Carlsbad desalination plant includes a 30-year “take or pay” contract with the private operator which specifies that regardless of how much water is used, the public must pay the same amount. The public is also responsible to pay for any additional costs incurred that are not the result of gross negligence by the private operator. The Carlsbad project was subject to public debate around the cost and need for the desalination plant given cheaper alternatives such as imported water or recycled water systems. Since construction of the plant finished in 2015, it has faced additional scrutiny over its failure to deliver the full amount of promised water and for violating water pollution standards. In light of these considerations, and petitions to develop similar PPPs such as the Huntington Beach desalination plant, it is important that all types of PPP agreements in support of adaptation and resilience infrastructure include metrics and processes to evaluate whether the private provision of service is meeting the public partner’s goals for service provision.

APPLYING STRATEGIES TO SPECIFIC CHALLENGE PHASES

Figure 4 below relates the key strategies to the challenges that they address in the context of investment in adaptation and resilience projects in California. The green boxes represent the challenge addressed by the strategy in the left hand column. Note that projects in this table are used to mean adaptation and resilience projects while risk is climate change risk, though these descriptions are removed in the table due to space constraints.

FIGURE 4. KEY STRATEGIES AND CHALLENGES ADDRESSED

Challenge	Strategy								
	Develop Financial Standards	Disclose Climate Risk	Incentivize Investment	Transfer Knowledge	Assess Cost/Benefits	Fund the Life-Cycle	Pool Resources	Build Community	Involve the Private Sector Responsibly
<i>Institutional:</i> Climate change risk is rarely accounted via policies and actions	Standards define comparative project risks; support for lower-risk projects increases	Projects + institutions with less risk receive more investment	Regulations + incentives result in private sector investment to reduce risk						
<i>Information:</i> There is uncertainty on type, timing, and effectiveness of investments				Supports predictable responses to risk that enable project investment					
<i>Scale:</i> There is need to transition to multi-function, system-wide investments							Use of multiple funding sources with varied goals supports projects with multiple functions	Increasing community capacity can lead to projects that serve the community in multiple ways	Private sector financing may support multi-function projects at large scale + provide cost savings
<i>Benefits:</i> The broad and varied nature of benefits can be difficult to monetize					Information on the costs of inaction supports spending on projects that minimize future costs				
<i>Payment:</i> It is hard to convert benefits into funding for projects			Incentives demonstrate the financial benefit of projects / investments		Definition of benefits + builds business case for investment				
<i>Planning:</i> There are competing priorities, conflicting policies, and limited capacity	Standards yield better information on project risks + reduce burden to understand project risk			Information on risk allows for ranking of priorities with consistent, relevant data	Benefits support ranking of projects in the context of competing priorities	Complete planning assists in project definition that matches community priorities	Pooling can result in more funds available for projects, even given competing priorities	Increasing community capacity can allow for the assessment of risk-reducing projects	Private sector investment may be less constrained by conflicting policies
<i>Implementation:</i> There is limited funding and flexibility of existing funds	Standards ensure investments are used for risk-reducing projects, decreasing overall financial need		Private sector participation increases financial support available, and may also increase flexibility of investment		Definition of benefits assists in determining eligibility for public funding sources	Complete planning can allow projects to be formed so that they are eligible for a wide range of funding sources	Projects shared across multiple jurisdictions can reduce the need for new project investment	Increasing community capacity can expand access to more funding + financing opportunities that require administration	

Source: AECOM October 2018

IX. CONCLUSION

Investing in adaptation and resilience projects is necessary for ensuring that all California communities can prosper under changing climate conditions. Obtaining funding and financing is one of the largest hurdles for such investment due to a number of laws and policies that restrict the levying of taxes and fees. It is therefore critical to use existing funding wisely and to incorporate adaptation and resilience principles in all projects – whether new infrastructure projects or projects that address deferred maintenance of existing infrastructure. Policy changes that thoughtfully evaluate and update restrictions on raising funds could significantly help to raise much-needed funding.

As local, regional, and state leaders invest in adaptation and resilience projects, a strategic approach can help to maximize existing resources. Benefit quantification and risk sharing can help to prioritize projects. Choosing the most appropriate institution to lead a project can reduce administrative burdens and overall costs. Engaging communities, especially disadvantaged and vulnerable communities, in every step of the project process – from budgeting through implementation – can result in more effective projects, public support for funding, and investments that create access to economic and social opportunities.

Adaptation and resilience projects should not be seen as a new type of project or a burdensome investment. While there are many challenges that need to be addressed when developing adaptation and resilience projects, these projects provide valuable opportunities to create a more equitable and resilient California and can serve as a model domestically and abroad, continuing California's leadership in addressing climate change impacts.

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