

Enabling Conditions for the Use of Certified Climate Financing in Public Infrastructure Projects in the United States

A Comparative Case Study of Seattle and San Francisco

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Abstract

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Over 70% of global carbon emissions can be attributed to energy use in cities. As of 2021, it was understood that up to 90% of those emissions could be reduced using existing technologies, creating potential economic opportunities over \$24 trillion USD. Since 2008, cities have been able to secure climate financing, or specific funding for projects that align with the Paris Agreement. However, through 2023, the portion of the international bond market that is considered “green” or “climate-aligned” has been falling short of needs on a global scale. This is particularly true for local governments in the United States, where the issuance of municipal bonds is standard practice to fund capital improvement projects. Some cities, like San Francisco, have had repeated success in utilizing climate-aligned financing, while many others, including environmentally progressive cities like Seattle, have not.

Through a comparative case study and policy analysis, this thesis explores the enabling conditions for climate financing that are present in San Francisco, and evaluates the extent to which the capital planning process, as presented in each city’s Capital Improvement Plan, has played a role in securing these funds. The Capital Improvement Plans for Seattle and San Francisco are evaluated against the same criteria, which are developed from examples of climate policy evaluation in the literature and in practice. San Francisco’s Capital Improvement Plan scored higher than Seattle’s across criteria, formulating the conclusion that, through a more holistic approach to capital planning and better integration of climate and capital planning, San Francisco is more obviously implementing projects that align with its climate goals and is therefore better suited to utilize climate financing for those projects. Policy recommendations for Seattle are presented based on the results of the comparison.

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1.0 Introduction

Energy use in cities accounts for 70% of global carbon emissions. As of 2021, it was understood that up to 90% of carbon emissions in cities could be reduced by 2050 using existing technologies, creating potential economic opportunities in excess of \$24 trillion USD.¹ This is well understood among local government leaders—cities around the globe have formed climate coalitions like C40 and the United Nations’ Climate Ambition Alliance, signed pledges, including the Paris agreement, and developed Climate Action Plans, all with a shared commitment to reach net-zero emissions by 2050.² Investments in cities, specifically in infrastructure systems and in other aspects of the built environment, must be designed with climate targets in mind, as the systems and buildings constructed today will have lifespans of 50-100 years and will be part of a net-zero future. Public infrastructure investments play a critical role for climate mitigation and adaptation efforts in cities around the world.

Cities can secure climate financing, or specific funding for projects that align with the Paris Agreement. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate finance as “local, national, or transnational financing—drawn from public, private and alternative sources of financing – that seeks to support mitigation and adaptation actions that will address climate change”.³ Markets for climate financing, as reported by the Climate Bonds Initiative, are continuing to rebound from the economic downturn that resulted from the COVID-19 pandemic.⁴ Theoretically, cities should be able to utilize “green”, “sustainability”, and other climate-labelled bonds or loans to finance improvement projects that are aligned with their stated goals. However, climate finance flows to cities are falling short of needs on a global scale.⁵ Different enabling conditions exist in different cities around the world to determine if and how

¹ Climate Policy Initiative, “State of Cities Climate Finance Executive Summary” (2021), 1-12.

² “About C40,” C40 Cities, accessed November 14, 2023, <https://www.c40.org/about-c40/#leadershipstandards>

³ “Introduction to Climate Finance,” United Nations Framework Convention on Climate Change, United Nations, accessed May 13, 2024, <https://unfccc.int/topics/introduction-to-climate-finance>

⁴ Climate Bonds Initiative, “Sustainable Debt Market Summary H1 2023” (2023), 1-9.

⁵ Climate Policy Initiative, State of Cities Climate Finance Executive Summary, 3.

investments in climate-smart infrastructure can be mobilized, which is tied to the authority city governments are given to regulate development, provide infrastructure services, and collect revenues.⁶

As the bridge between policy, planning, and implementation, the capital improvement plan is among the most powerful instruments of action that cities have in their toolbox. The CIP allocates funds directly to projects within a five to six year planning horizon, theoretically facilitating the implementation of policies and planning objectives included in a city's Comprehensive Plan or Climate Action Plan. The effects of changes to the CIP are therefore much more immediate than changes to longer-range documents and policies like the Climate Action Plan or the Comprehensive Plan, which look 20-30 years into the future.⁷ This is the pace of infrastructure investment that cities need to keep to meet their 2050 goals for both decarbonization and climate adaptation, as the scope of infrastructure needing retrofit will take at least 25 years to complete with current construction timeframes.

Among cities with relative autonomy and robust capital planning processes who have made climate commitments, little research exists discussing the progress made to-date in leveraging that autonomy to meet their climate commitments. Specifically, it is not well understood how cities with climate commitments have incorporated those commitments into their capital improvement planning process, nor is there readily available literature discussing how successful such cities have been in securing climate financing for infrastructure projects. Understanding how some cities have navigated this process, and others have not, will be a critical lesson for local officials and policymakers worldwide as the 2050 net-zero deadline approaches.

As of October 2023, cities in California had secured more climate-certified financing than any other state in the United States.⁸ California has both the most individual entities issuing climate

⁶ Ibid, 5.

⁷ Jan Whittington, Adrienne Greve, Stefanie Young, and Giovanni Migliaccio, "Mainstreaming City Climate Action", *Unpublished manuscript*, (ND): 17.

⁸ "Certified Climate Bonds Database," Climate Bonds Initiative, accessed November 14, 2023, <https://www.climatebonds.net/certification/certified-bonds>

bonds and the largest dollar amount of climate financing received since 2017, the earliest date included in the Climate Bonds Initiative (CBI) database. Within California, San Francisco has been repeatedly issuing green bonds for a diverse portfolio of infrastructure projects, and Los Angeles has been leveraging climate bonds as a secure revenue stream for its metro system improvements since 2017. Somewhat surprisingly, only one CBI-certified climate bond has been issued in the State of Washington, by the City of Edmonds. Seattle, a city that is often compared to San Francisco in terms of size, geography, economy, and growth trends, has yet to issue a CBI-certified a green bond for a public infrastructure project.

1.1 Research Objectives

The statistics above pose the question: what is San Francisco doing right? What enabling conditions exist at the state and local level that have led to their issuing of over \$10.1 trillion in certified climate bonds across 5 agencies since 2017?⁹ What role, if any, has the capital improvement planning process at each of these agencies played in securing these funds? What can Seattle learn from successes in San Francisco?

This thesis seeks to answer the questions stated above in six distinct sections. The first provides an overview of climate financing from the literature, and how it differs from traditional financing mechanisms for public projects. This includes a brief history of bond use, including general obligation bonds and revenue bonds, to fund public infrastructure projects in the United States, as well as a discussion of the history of the green/climate bond market. This overview starts with the World Bank's efforts to provide sustainable funding streams to developing countries, progresses through the Paris Agreement and includes the creation of Climate Bonds Initiative. Current criteria for climate bond certification from CBI and the World Bank's International Capital Market Association (ICMA) will be discussed in this section, as will recent trends in the climate finance market.

⁹ "Certified Climate Bonds Database," Climate Bonds Initiative, accessed November 14, 2023, <https://www.climatebonds.net/certification/certified-bonds>

The methods section discusses the development of a policy evaluation framework used to evaluate the capital improvement plan in each case study city. The framework was developed building on examples from both academic literature and practice, as many governmental institutions around the world are at the forefront of evaluation efforts. A case study of San Francisco follows the methods section, providing a summary of projects funded with green bonds in the City as reported by Climate Bonds Initiative and an overview of what the research has determined to be enabling conditions for climate bond issuance in the city. The analysis discusses regulatory, economic, and other relevant conditions in San Francisco as they relate to the capital planning process and the issuance of climate bonds.

A case study of Seattle, following the same structure as that for San Francisco, follows. The review of Seattle's capital improvement plan includes the identification of potential gaps or areas where Seattle's plan is determined to hinder the issuance of climate financing. The thesis concludes with a list of policy recommendations for Seattle to consider to better leverage the climate finance market for public infrastructure projects.

2.0 Literature Review

2.1 Bond Use for Public Infrastructure Projects

Local governments in the United States use bonds, a form of debt financing, to make resources available for capital projects with a long design life.¹⁰ Municipal debt is divided into two categories: general obligation (GO) bonds and revenue bonds. GO bonds are based on the “full faith and credit” of the government issuing the bond, and are guaranteed by the government’s tax revenues, while revenue bonds are issued by governmental departments or special districts that collect user fees, like a water utility or a toll road, and are guaranteed by those fees. Debt financing has been used for infrastructure investments including schools, utilities, healthcare facilities, and transportation improvements since the 1800s, when such securities were issued to finance the construction of railroads.¹¹ In deciding to issue a bond, a state, county, city, or special district decides to allocate a portion of its revenue stream towards the debt associated with that project until the bond matures. Often, the maturity of a bond is aligned with the expected useful life of a capital expenditure, ensuring that future taxpayers pay their fair share of cost, since they benefit from the asset.¹²

The price of debt for government entities is tied to the interest rate they can secure for each bond, which is in turn tied to the government’s credit rating.¹³ Credit ratings in the United States are determined by one of three independent commercial agencies—Moody’s, Standard & Poors, and Fitch, and reflect the determined creditworthiness of the entity. In other words, the credit rating reflects the likelihood that an entity will default on its debt, as determined by evaluating its existing debt balances, stability of revenues, economic environment, tax burden, government stability, and local demographics.¹⁴ Entities with high quality credit ratings qualify for lower

¹⁰ John R. Bartle, W. Bartley Hildreth, and Justin Marlowe (eds), *Management Policies in Local Government Finance* (Washington, DC: ICMA, 2013), 280-285.

¹¹ *Ibid.*, 280.

¹² *Ibid.*, 281.

¹³ *Ibid.*, 281.

¹⁴ Bartle, Hildreth, and Marlowe, *Management Policies in Local Government Finance*, 283.

interest rates, or cheaper debt. This can be critical for governments to stay below a certain debt cap, which is often defined by the state or local charter as a percentage of annual revenues or assessed value within the municipality.^{15,16}

Municipal bonds are often exempt from federal, and in some cases state and local, tax.¹⁷ Municipal bonds have a historically lower rate of default than bonds issued by private entities, making the risk associated with purchasing a municipal bond relatively low.¹⁸ The 10-year cumulative default rate for municipal bonds across credit ratings is 0.15%, lower than the 0.35% default rate for the highest-rated private sector bonds.¹⁹ While interest rates, or yields, from municipal bonds are often lower than those associated with private sector debt, a tax-free, low-risk income stream is attractive for investors, leading to over \$3.8 trillion in outstanding debt in the US municipal bond market at the end of 2022.²⁰ This is roughly the same size as the global sustainable debt market across public and private sectors, which had a cumulative volume of \$3.7 trillion at the end of 2022 and \$4.2 trillion through September 2023.²¹ The majority of municipal bonds issued in the United States do not meet green, sustainability, or other climate criteria— climate-certified municipal bonds issued between 2016 and 2022 in the United States totaled \$30.3 billion before discounting, or less than one percent of the total market.²² Criteria for climate-certified debt is discussed in more detail below.

¹⁵ City Controller's Office of Public Finance, "Debt Policy of the City and County of San Francisco" (San Francisco, CA, 2020), 10.

¹⁶ City of Seattle, "Debt Management Policies" (Resolution 31553, Seattle, WA, 2014), 2.

¹⁷ George F. Summers and Thomas R. Noland, "An introduction to the US municipal bond market," *International Journal on Governmental Financial Management* 8, no. 2 (2008): 145. URI: <https://hdl.handle.net/10657/6033>

¹⁸ Invesco, "Municipal Bond Investing: A Closer Look at Tax-Exempt Debt", (2023), 4.

¹⁹ *Ibid.*, 4.

²⁰ *Ibid.*, 4.

²¹ Climate Bonds Initiative, "Sustainable Debt Global State of the Market 2022" (2023), 2.

²² *Ibid.*, 2.

2.2 Green/Climate Bond Market History

The use of bond financing for infrastructure projects is not unique to the United States. While the individual issuers vary in different countries depending on the structure of infrastructure ownership, the bond market is utilized to finance capital projects internationally. Responding to the fact that some cities, countries, or institutions, especially in the developing world, may not have the creditworthiness to issue debt competitively, the World Bank aids in providing financing on their behalf.²³ After a 2007 International Panel on Climate Change (IPCC) report linked human action to global warming, and banks in Europe began searching for investments that would help the climate, the International Finance Corporation (IFC), one branch of the World Bank, issued the first labeled “green” bond in 2008.²⁴ The purpose of labeling bonds as green signals to the market that the bond’s proceeds will have a clear environmental benefit, and is accompanied by a commitment to increase disclosure around the intended use of proceeds for potential investors, and increase transparency around the use of the proceeds once they are received.²⁵

As the market for green bonds began to grow, a need for clear standards and procedures around the issuance of a green bond became apparent. The International Capital Market Association (ICMA), a subsidiary of the IFC, issued the first Green Bond Principles on January 13, 2014.²⁶ These principles, which have been updated and expanded in the ten years since they were first published, were the first voluntary process guidelines for issuing green bonds.²⁷ They included criteria for use of bond proceeds, process for project evaluation and selection, management of proceeds, and reporting, all in an effort to maintain legitimacy of the investment and avoid

²³ “Finance for Development”, The World Bank, accessed November 14, 2023, <https://www.worldbank.org/en/programs/finance-for-development>

²⁴ “Green Bonds”, The World Bank, accessed November 14, 2023, <https://treasury.worldbank.org/en/about/unit/treasury/ibrd/ibrd-green-bonds>

²⁵ Paul Rose, “Certifying the ‘Climate’ in Climate Bonds,” *Capital Markets Law Journal*, 14 no. 1 (2019), 1-20. DOI: <https://dx.doi.org/10.2139/ssrn.3243867>

²⁶ International Capital Market Association, “Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds,” (2014), 1. <https://www.climatebonds.net/files/uploads/2014/01/Green-Bond-Principles-FINAL.pdf>

²⁷ *Ibid.*, 1-7.

greenwashing, the term used for marketing a project as “green” when there is no clear environmental benefit.

At the 2015 United Nations Conference of the Parties (COP21), held in Paris, 196 countries signed the Paris Agreement, a legally binding treaty on climate change. Under this agreement, countries committed to reducing their greenhouse gas emissions to limit the global temperature increase to 2 degrees Celsius above pre-industrial levels.²⁸ Concurrent with the Paris Agreement, a group of investors representing \$11.2 trillion in assets worldwide issued the Paris Green Bonds Statement, identifying the need to respond to climate change through investments in clean energy, low-carbon transport, water infrastructure, and adaptation measures.²⁹ This statement solidified the position of green bonds as worthy investments within the market, leading to a significant increase in issuances in the following years. The impact of the Paris Green Bonds Statement on the size of the Green Bond market is demonstrated in Figure 2.1.

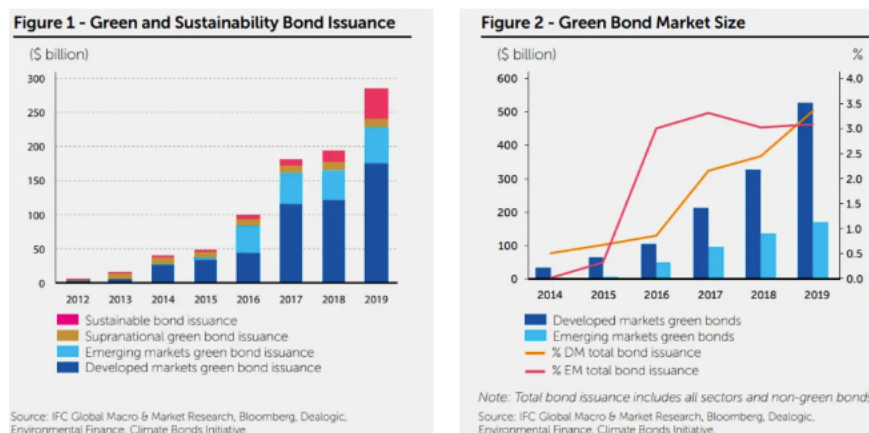


Figure 2.1: Trends in Green Bond Issuance, 2012-2019. Source: CBI via Corporate Finance Institute³⁰

²⁸ “The Paris Agreement,” United Nations, accessed November 14, 2023, <https://www.un.org/en/climatechange/paris-agreement>

²⁹ “The Paris Green Bonds Statement,” Climate Bonds Initiative, published December 9, 2015, accessed November 14, 2023, https://www.climatebonds.net/files/files/Paris_Investor_Statement_9Dec15.pdf

³⁰ CFI Team, “Green Bond,” Corporate Finance Institute, accessed March 20, 2024, <https://corporatefinanceinstitute.com/resources/esg/green-bond/>

While ICMA initially published its green bond principles as “voluntary” guidelines, it recommended that issuers utilize external parties to ensure that their bonds align with the published principles.³¹ The work of certifying green bonds, which are increasingly referred to as “climate bonds” to encompass a broader field of investments with environmental, social, and/or governance (ESG) benefits, has largely been undertaken by Climate Bonds Initiative (CBI). Founded in 2009, CBI is an international not-for-profit organization committed to helping countries meet their emissions reductions and adaptation goals through a liquid climate bond market.³² CBI has developed its own Climate Bond Standards, which include more prescriptive pre- and post-issuance requirements than the ICMA principles. CBI certifies both individual bond issuances as well as issuing entities, providing a “pre-approval” option that lowers the opportunity cost of entering the climate finance market and therefore incentivizes repeat issuances. Today, CBI is the leading entity for climate bond market reporting and research, maintaining the climate bonds standards, and providing policy models and advice for issuing entities.³³

2.3 Criteria for Climate Bond Certification

Both CBI and ICMA actively certify climate bonds for issuing entities. As the market began to grow, ICMA updated their 2014 Green Bond Principles in 2022, which is the standard used today. Climate Bonds Initiative’s Climate Bond Standard builds on that set by ICMA, and is more strict with regards to its transparency and reporting requirements.³⁴ CBI has developed sector-specific criteria, providing certification at increasing levels of granularity. This section provides a summary of the CBI Standard, as any bond or entity certified to meet CBI standards effectively meets ICMA Standards, and the industry recognizes CBI as the “gold standard” for climate finance certification.

³¹ Rose, *Certifying the ‘Climate’ in Climate Bonds*, 3.

³² *Ibid.*, 4.

³³ “About Us,” Climate Bonds Initiative, accessed March 20, 2024, <https://www.climatebonds.net/about>

³⁴ Rose, *Certifying the ‘Climate’ in Climate Bonds*, 5.

The vocabulary of green bonds has expanded since 2008. Bonds with demonstrated environmental benefits are collectively referred to as “climate bonds” or “GSS+ bonds”, umbrella terms which encompasses “green”, “social”, “sustainability”, “transition”, and “sustainability-linked” labels. These labels are defined as follows:³⁵

- “Green”: dedicated environmental benefits, which may include renewable energy or low-carbon transport
- “Social”: dedicated social benefits, which may include health, employment, gender equity, affordable housing, etc.
- “Sustainability”: green and social benefits combined in one instrument
- “Sustainability-linked”: changes in interest rate (usually step-ups) linked to performance against entity-level sustainability performance targets
- “Transition”: use-of-proceeds supporting transition to a Paris Agreement-Aligned project, even if the project itself is not low- or zero-emission

Under each label, CBI is actively developing certification criteria at the sector level to ensure that bonds with a CBI certification meet its strict performance standards. Use-of-proceeds standards have been developed for the energy, transport, water, buildings, land use, industry, and waste sectors, with standards for assets and entity certification to follow. The sector criteria generally provide a list of assets, methods, or other applicable activities that are or are not permitted for projects within that sector, which are evaluated through a checklist. Emissions inventories for different assets or methods are generally required for certification, as is an assessment of potential future damages due to climate impacts. CBI requires climate bonds to be verified by an approved third-party verifiers prior to issuance.³⁶

³⁵ Climate Bonds Initiative, “Sustainable Debt Global State of the Market 2022” (2023), 3.

³⁶ “Become an Approved Verifier,” Climate Bonds Initiative, accessed March 20, 2024, <https://www.climatebonds.net/certification/approved-verifier>

2.4 Recent Trends in Climate Finance Market

As of November 2023, a cumulative \$4.2 trillion in CBI-certified debt had been issued since the screening criteria was put into use, accounting for just 5% of the total international bond market.³⁷ The actual share of climate-aligned debt certified by different entities may be higher, but is not tracked and reported to the same extent as debt meeting the Climate Bond Initiative GSS+ standard. “Green”, “social”, and “sustainability” comprise 98% of issued GSS+ bonds to date, with 62% of climate bonds meeting “green” criteria.³⁸ Supranational entities, like the European Union, are the largest issuers of GSS+ debt; the United States is the second-largest followed by France. Government-backed entities, financial corporations, non-financial corporations, and development banks collectively occupy 84% of the climate debt market.³⁹

The amount of GSS+ aligned debt has been increasing exponentially since 2013, however issuances slowed dropped by 23% in Q3 of 2023 compared to Q2, and by 13% compared to the same period in 2022. While overall GSS+ issuance was decreasing, the amount of “green” bonds issued through Q3 in 2023 increased by 3% compared to the same period in 2022. The climate bond market, like the rest of the global debt market, is sensitive to world events that trigger periods of inflation and high interest rates – issuances of all categories of bonds declined in 2022, as the Russian invasion of Ukraine caused energy prices to surge, creating high inflation and raising interest rates.⁴⁰ While the overall volume of debt in the market decreased year-over-year as a result, the share of the market that holds a climate label did not. The share of the total debt market holding a GSS+ label has remained at 5% since 2021.⁴¹

The climate finance market is growing because of the benefits that GSS+ bonds offer to issuers, investors, and policymakers, however there are still issues that are limiting the market’s

³⁷ Climate Bonds Initiative, “Sustainable Debt Market Summary Q3.” (2023), 1.

³⁸ Ibid., 1.

³⁹ Ibid., 1.

⁴⁰ Climate Bonds Initiative, “Sustainable Debt Global State of the Market 2022” (2023), 3.

⁴¹ Ibid., 4.

scalability.⁴² The payback period of green bonds aligns with project maturities, green bonds reduce the expenses associated with debt finance through lower interest rates, and they help meet climate targets and goals through climate-aligned investment. Previous studies have cited the disharmony of global standards for certification, the risk of greenwashing, the perception of higher costs for issuers, the lack of supply of bonds for investors, and the general youth of the market as barriers limiting its scalability.⁴³ Despite the growing prevalence of entities like the Climate Bonds Initiative, there is still a multitude of potential definitions of climate-aligned investing, which is an obstacle to growth and is a significant barrier for cities and towns to enter the market.⁴⁴ There are over 14 national, regional, and international standards or frameworks for climate bond issuance worldwide, making it difficult for communities to align their growth policies and infrastructure plans with market preferences. The fact that the climate-aligned market share of global debt has held steady at 5% for three years may be as related to the lack of consensus within the market as it is to the lack of tangible climate action being taken by government entities worldwide.

⁴² Pauline Deschryver and Frederic de Mariz, "What Future for the Green Bond Market? How Can Policymakers, Companies, Companies, and Investors Unlock the Potential of the Green Bond Market?" *Journal of Risk and Financial Management* 13, no. 3 (2020): 61-86.

⁴³ *Ibid.*, 62.

⁴⁴ *Ibid.*, 83.

3.0 Methods

This research investigates the enabling conditions for securing climate finance for public infrastructure projects in San Francisco and Seattle. These conditions may include state and local regulations, climate commitments, growth policies, and other planning documents for each municipality, as discussed in more detail below. The research looks deeply at the role that the capital improvement planning process for agencies in each case study municipality has played in securing climate financing, where applicable. By limiting the scope to two cities in two states in the same country, this strategy allows for a deep dive into the policy environments of San Francisco and Seattle, as well as a detailed analysis of the climate financing each city secured to date.

The case study cities were chosen based on observed trends in certified climate financing from the Climate Bonds Initiative (CBI) database. As of October 2023, only 107 CBI-certified bonds had been issued by public entities in the US since 2017, with the vast majority (88) issued by public entities in New York State or California. In New York, bond issuers were not municipalities or regional entities, rather state-level agencies like the New York Metropolitan Transportation Authority, NY State Housing Finance Agency, and NY State Energy and Research Development Authority—entities that do not necessarily have the authority to issue general obligation (GO) bonds. In California, multiple public entities, including city governments, public utility commissions, and transit agencies have issued climate bonds certified by the strict CBI criteria. San Francisco has the largest variety of agencies that have certified bonds, which is why it was chosen for this study. Seattle is often compared to San Francisco in terms of size, geographic setting, and recent growth trends, and has many agencies/departments that mirror those in San Francisco, but has not issued any CBI-certified climate bonds. There is no true sampling method employed in this research design, as case study cities were chosen based on the already limited list of city governments in the US who have issued certified climate bonds. Table 3.1 outlines demographic, economic, and financial similarities between San Francisco and Seattle.

Table 3.1: San Francisco & Seattle Characteristics for Comparison		
	San Francisco	Seattle
Population ¹	851,036	734,603
Land Area (sq. miles) ²	46.7	84
Total Housing Units ²	406,628	368,308
10-year Population Growth Rate ³	5%	20%
Median Household Income ⁴	\$136,692	\$115,409
Employment Rate ²	66.4%	70.9%
Credit Rating – Moody's*	Aaa	Aaa
Credit Rating – S&P*	AAA	AAA
Credit Rating – Fitch*	AA+	AAA
City GO Debt Limit	3% of total assessed value	2.5% of total assessed value
¹ American Community Survey, 2022 5-Year Estimate ² US Census Bureau Community Profiles, 2024 ³ Growth rate determined from 2012 & 2022 American Community Survey 5-Year Estimates ⁴ American Community Survey, 2022 1-Year Estimate *General Government Credit Ratings as of November 2023		

Table 3.1 shows that Seattle and San Francisco have similar populations, number of housing units, median household incomes, and employment rates. Both cities are growing—however Seattle is growing faster, and Seattle covers more land and is therefore less dense. Most importantly, the cities have similar credit ratings across financial institutions and similar GO debt limits, meaning that they should have similar ease in securing financing for projects in the municipal bond market. If one city had a significantly higher debt limit or lower credit rating, that would be confounding variable with a significant impact on the city's ability to issue any municipal bond, including a climate bond, which could invalidate the analysis. As both cities have good credit ratings, they should be able to receive similar coupons for their bond issuance.

The evaluation of each city's Capital Improvement Plan as it relates to their climate commitments is similar to that performed by third-party verifiers prior to the issuance of climate financing.⁴⁵ However, as no certification criteria currently exists for governmental bodies issuing climate finance, an evaluation methodology was developed based on recommendations in the literature, as discussed below. I anticipate that this evaluation strategy will point to specific policy advantages in San Francisco, and highlight policy barriers/gaps in Seattle, specifically within their capital improvement plans.

3.1 Policy Evaluation

Both academic literature and white papers related to policy evaluation were consulted to develop a framework for this comparative case study. The study requires an ex-post evaluation, rooted in the notion that the evaluation should assess the "merit, worth, and value of administration, output, and outcome of government interventions, which is intended to play a role in future practical action situations".⁴⁶ In this case, the primary government intervention to be evaluated is the entity's Capital Improvement Plan, with the desired output or outcome the issuance of certified climate finance to fund the projects included in the CIP. The merit of the CIP as a climate policy instrument is being evaluated and compared for each case study municipality.

The evaluation framework utilized in this research is based on examples from the European Union, which evaluates environment and climate policy interventions based on four overarching criteria: relevance, effectiveness, efficiency, and coherence.⁴⁷ The "relevance" criteria determine the extent to which the program's objectives correspond to stated needs. The "effectiveness" criteria determine the extent to which the program caused observed changes, and the extent to which those changes correspond to the program's objectives. "Efficiency" criteria determine if

⁴⁵ Climate Bonds Initiative, "Climate Bonds Guide to Certification – Entities" (ND), 2-8. https://www.climatebonds.net/files/files/certification/Entities_160823.pdf

⁴⁶ Jonas Schoenefeld and Andrew Jordan, "Governing Policy Evaluation? Toward a New Typology," *Evaluation* 23, no. 3, (2017): 274-293. DOI: 10.1177/1356389017715366

⁴⁷ European Environment Agency, "Environment and climate policy evaluation," (European Union EEA Report No. 18/2016, Luxembourg, 2016), 1-24.

the costs associated with the program were justified, and “coherence” criteria determine the extent to which the intervention was coherent with other interventions, including those at higher levels of government.^{48,49} This framework is represented in Figure 3.1.

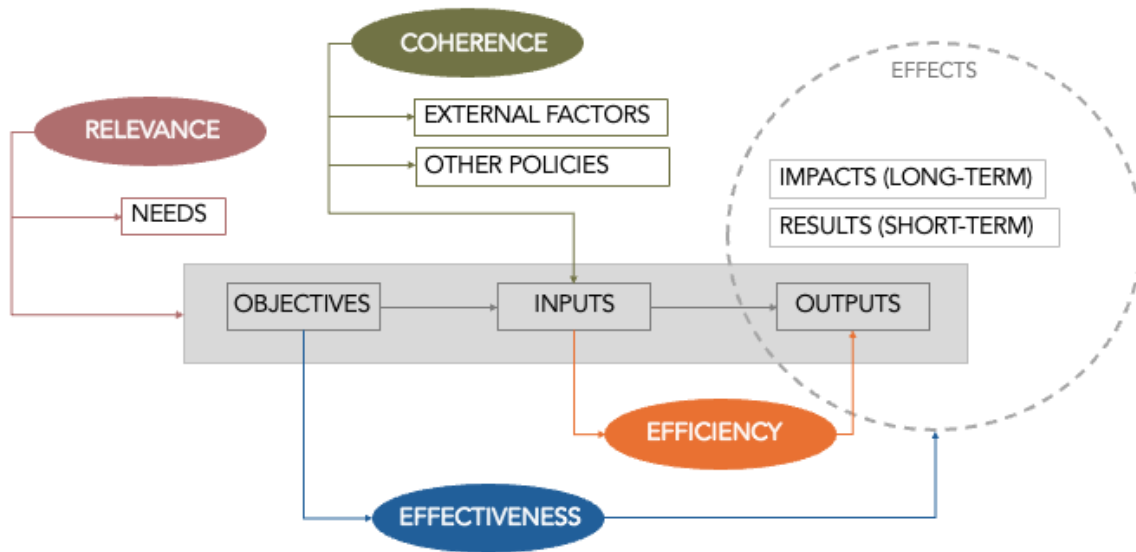


Figure 3.1: Policy Evaluation Framework Conceptual Model

Figure 3.1 illustrates the need to evaluate policy interventions as both stand-alone actions and within the broader context of the community they have been developed for. In this case, the policy intervention is the CIP, represented by the grey box in the middle of the figure. Each CIP document has certain stated objectives, which inform the plan’s inputs—typically the varying infrastructure needs of a community, available funding, and ranking criteria—which in turn create outputs—a list of projects with allocated funding for the next 5-6 years. These outputs create results—the implementation of a project—which have long-term impacts for the community. Collectively, the outputs, results, and impacts constitute the CIP’s effects. The “effectiveness” and “efficiency” criteria described above evaluate the CIP outputs relative to its inputs and objectives; the “relevance” and “coherence” criteria evaluate the CIP in the broader policy

⁴⁸ Ibid., 10.

⁴⁹ Laura Tagle and Serafino Celano, “Reverse Evaluation to Enhance Strategies (REVES): Place-Based Evaluation of Central Policies,” *Evaluation* 24, no. 3 (2018): 267–283, <https://doi.org/10.1177/1356389018783846>.

context of the community is has been developed for. This provides a more holistic evaluation approach.

For the purposes of this evaluation, “relevance” criteria refers to the community’s stated climate needs, both for mitigation and adaptation. A plan scoring high for “relevance” would discuss emissions reduction targets and specific climate hazards facing the community. Understanding that policy evaluation must take into account the impacts of central actors, local knowledge, strategies, and values, as well as the fact that some enabling conditions for climate finance may exist outside of the CIP, integration of the CIP with other municipal and state-level regulations was evaluated under “coherence”.⁵⁰ CIPs scoring high for “coherence” would explicitly demonstrate how the projects included in the CIP implement the intentions of the city’s Comprehensive Plan, Climate Action Plan, or other relevant policy documents.

While a cost-benefit analysis (CBA) or cost-effectiveness analysis (CEA) is not entirely appropriate for this study, the framework borrows from CEA in its evaluation criteria under the “efficiency” category, as a means to relate allocated funds to progress in meeting climate goals.⁵¹ Specific questions under the “efficiency” criteria were drawn from Whittington & Lynch, 2015, who suggest that CIPs should include life-cycle emissions and cost estimates for each project, include climate-smart project prioritization criteria, and generate low-carbon alternatives to conventional projects before allocating funds to its design or construction.⁵² A high efficiency score would imply that the CIP is efficiently allocating the city’s resources towards projects that reduce greenhouse gas emissions or build climate resiliency in the community.

As the desired outcome for the purposes of this research is the issuance of climate financing for projects included in the CIP, questions under “effectiveness” relate to the amount of climate

⁵⁰ Ibid., 268.

⁵¹ Stephanie Cellini and James Kee, “Chapter 24: Cost-Effectiveness and Cost-Benefit Analysis,” in *Handbook of Practical Program Evaluation*, ed. Kathryn Newcomer (2015), 636-672.

⁵² Jan Whittington and Catherine Lynch, “Climate Informed Decisions: The Capital Investment Plan as a Mechanism for Lowering Carbon Emissions,” World Bank Group (Policy Research Working Paper 7381, 2015), 2-32.

financing secured by the entity or the extent to which the entity discusses climate financing as a legitimate funding source for its CIP. State-level climate planning guidance documents, including the Washington Department of Commerce's recommendations for the climate element of local comprehensive plans, were referenced to add specific questions related to relevance, coherence, and efficiency. The full list of evaluation questions included in the CIP evaluation matrix is included in Table 1, below.

Each question was asked of each section of the CIP for each community, and answered using a 0-2 scale. Scores were assigned as follows:

- 0 for no mention of the topic or implied alignment
- 1 for some mention or an implied alignment to the topic
- 2 for explicit mentioning of the question being asked or clear references to a location where the topic in question is addressed.

To answer question 3d, each project description included in the CIP was reviewed for mention of a climate-aligned keyword, and the total project cost over the CIP timeline was noted. This exercise was performed for each individual department in each CIP as appropriate. Each question was weighted equally with the exception of question 3d, which is a percentage, and 4b, which is a value, and the average score of each category was used to determine the extent to which each CIP is aligned with the community's climate goals and, by extension, criteria for climate financing.

Table 3.2: CIP Evaluation Questions

Criteria Category	Evaluation Question
<p>RELEVANCE (to what extent do the objectives stated in the CIP correspond to the community's stated climate needs, both in terms of mitigation and adaptation?) (Note: this section assumes that the community has expressed a need to reduce emissions and adapt to climate change)</p>	Do projects or ranking criteria consider future emissions (increases or reductions) or state that they meet certain emissions targets?
	Do projects or ranking criteria consider potential losses from future climate impacts?
	Do projects or ranking criteria emphasize or prioritize energy efficiency?
	Do projects or ranking criteria emphasize or prioritize creation of carbon sinks?
	Does the CIP identify and/or prioritize all relevant climate hazards (ie, flooding, extreme heat, drought, etc.)?
<p>COHERENCE (with the surrounding climate policy & regulatory environment)</p>	Do projects demonstrate that they are meeting GHG targets across scopes?
	To what extent does the CIP align with the City's Climate Action Plan, Comprehensive Plan, and/or other relevant local policy/regulatory documents?
	To what extent does the CIP align with State-level climate regulations?
	Does the CIP reflect engagement with local communities?
	What criteria are used to rank projects?
<p>EFFICIENCY (were costs, in this case amount of money included in the CIP, justified, considering the climate/environmental benefits stated in project descriptions?)</p>	Do projects or ranking criteria consider life cycle costs?
	Do projects or ranking criteria consider life cycle emissions?
	Does the CIP encourage projects that create cobenefits for communities?
	Approximately what percentage of the CIP (in terms of spending) has a noted climate benefit in its description? (Keywords may include: mitigation, emissions reduction, energy efficiency, adaptation, resilience, carbon sink, sustainability, conservation, etc.)
<p>EFFECTIVENESS (what effect does the CIP have in securing climate finance?)</p>	To what extent does the CIP reference climate financing as a potential funding source for public projects?
	How much, if any, CBI-certified climate financing has the entity/department secured for projects in the CIP?

4.0 Climate Finance in San Francisco and Seattle, 2016 - Present

Public entities in the San Francisco area are issuing more CBI-certified climate bonds across a more diverse sector profile than most of the United States, with the exception of New York State.⁵³ As of November 2023, five entities in the Bay Area had issued a total of \$7.8 billion in climate finance since January 2016, the earliest entry in the CBI database. These entities include the City and County of San Francisco, the San Francisco Public Utilities Commission, San Francisco Bay Area Rapid Transit (BART), Peninsula Corridor Joint Powers Board, and Transbay Joint Powers Authority. In comparison, three entities in the entirety of New York State have issued \$20.3 billion in climate finance since 2017, with most bonds issued by the New York Metropolitan Transportation Authority. Following New York State and the Bay Area, the next largest issuer of climate finance among public entities in the United States is Washington, DC, where the Washington Metropolitan Area Transit Authority has issued \$1.2 billion since 2021. Like New York, Washington, DC, and the rest of the United States, the majority of climate financing in San Francisco to-date has been dedicated to low-carbon transportation infrastructure, with some financing for water infrastructure issued by the San Francisco Public Utilities Commission. Figures 4.1-4.4 summarize the current status of CBI-certified bonds for public infrastructure projects in the US, California, and the San Francisco Bay Area.

⁵³ Certified Climate Bonds Database,” Climate Bonds Initiative, accessed November 14, 2023, <https://www.climatebonds.net/certification/certified-bonds>

Figure 4.1: CBI-Certified Bond Issuance by State Since 2016

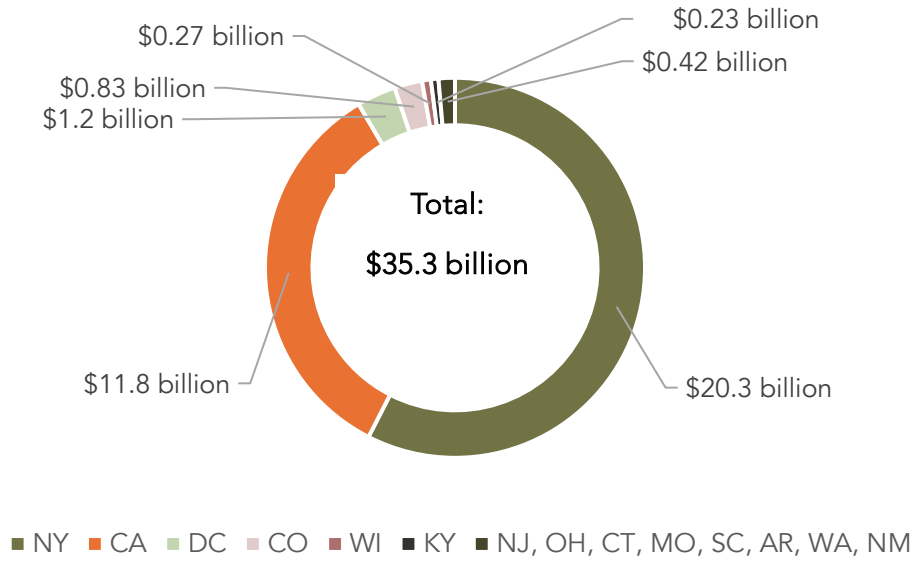


Figure 4.2: CBI-Certified Bond Issuance by Sector in US Since 2016

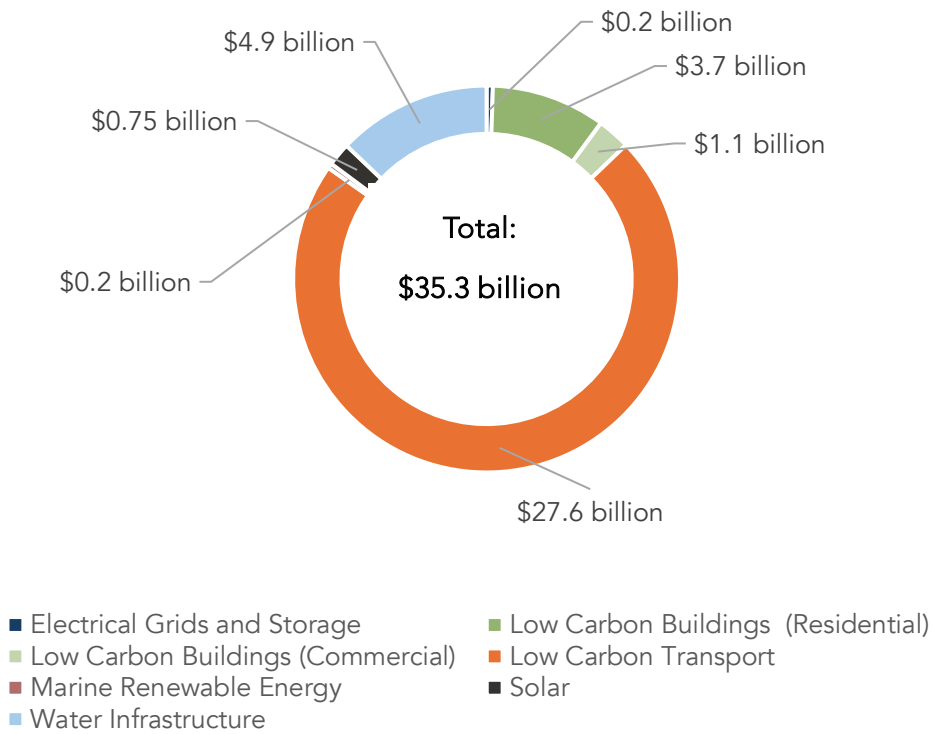


Figure 4.3: CBI-Certified Bond Issuance in California Since 2016

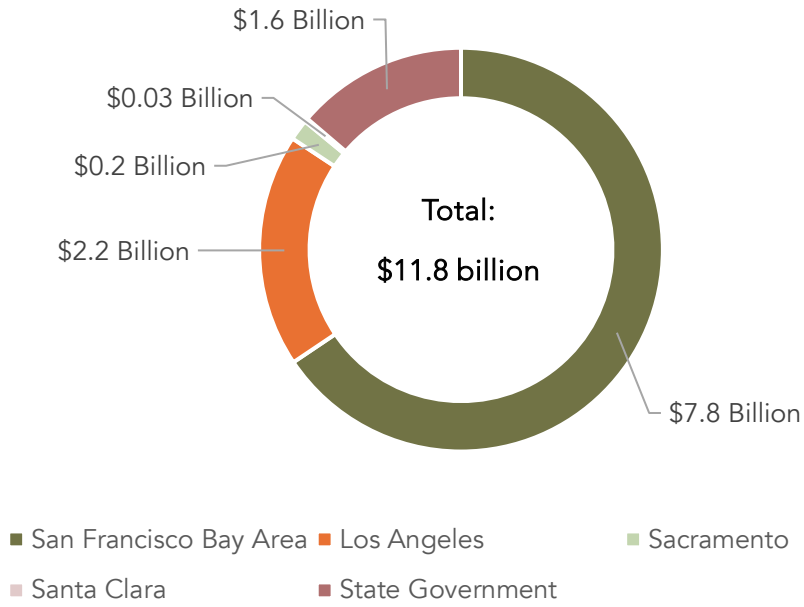
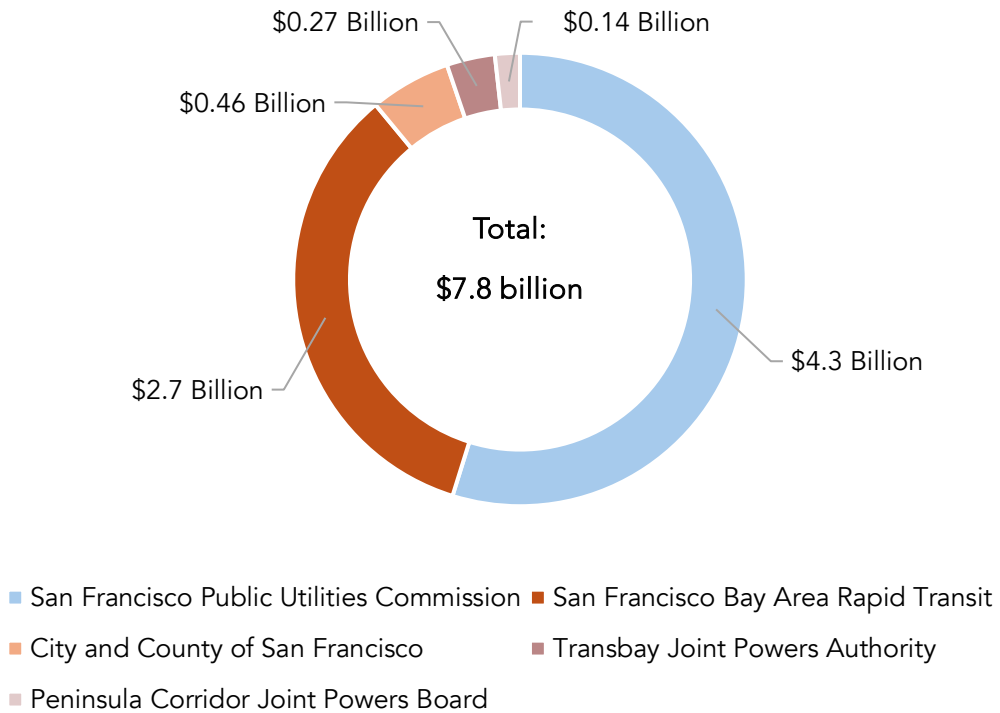


Figure 4.4: CBI-Certified Bond Issuance in SF Bay Area since 2016



4.1 Green Bond Use in San Francisco

City and County of San Francisco and Transbay Joint Powers Authority

The CBI-certified bonds issued by City and County of San Francisco finance redevelopment of the Transbay Transit Center, now known as Salesforce Transit Center, a regional transit hub in downtown San Francisco. Previously a bus terminal, the project connects local and regional bus service to San Francisco Municipal Rail, Caltrain regional rail and, eventually, will accommodate High Speed Rail trains from Southern California.⁵⁴ The City and County of San Francisco is one of the powers included in the Transbay Joint Powers Authority (TJPA), a partnership of local governments and transportation agencies in the Bay Area responsible for the design, construction, and long-term operation and maintenance of the facility. Combined, the City of San Francisco and TJPA have issued over \$726 million in CBI-certified financing for this project.

The City and County of San Francisco has issued multiple bonds for various phases of this project between 2017 and 2022. Each issuance includes some multiple bond series, only some of which meet the CBI certification.⁵⁵ For example, in 2022, the City issued Series A and Series B bonds for the transit center under one statement. The designated use of proceeds for the 2022A bonds, which were not designated green bonds, was to:

“Finance, refinance, or reimburse a portion of the planning, design, engineering, and construction of streetscape and pedestrian improvements around the Salesforce Transit Center, acquisition of transit vehicles, and enhancements at SF BART Embarcadero Station at 298 Market Street”.⁵⁶

⁵⁴ “Salesforce Transit Center: New regional transit hub,” San Francisco Metropolitan Transportation Agency, accessed May 10, 2024, <https://www.sfmta.com/projects/salesforce-transit-center>

⁵⁵ “City and County of San Francisco CFD NO. 2014-1 (Transbay Transit Center) – Special Tax Bonds,” Electronic Municipal Market Access, accessed May 10, 2024, <https://emma.msrb.org/IssuerHomePage/Issuer?id=990D263293FD76FEE053151ED20A8B4E&type=M>

⁵⁶ City and County of San Francisco, “Community Facilities District No. 2014-1 (Transbay Transit Center),” (Official Statement for Series 2022A and 2022B Bonds, 2022), 2. <https://emma.msrb.org/P11636214-P11260306-P11685894.pdf>

The designated use of proceeds for the 2022B bonds, which were certified green bonds under the CBI standard, was to:

“Finance, refinance, or reimburse a portion of the costs of the planning, design, engineering, right of way acquisition and construction of certain capital improvements that are part of the Transbay Program, including the Downtown Rail Extension capital improvement project, by the Transbay Joint Powers Authority (the TJPA), a joint exercise of powers authority, including the engineering of the train components of the Salesforce Transit Center building and engineering work related to a new station at Fourth and Townsend.”⁵⁷

The distinction between certified and non-certified green projects in the official bond statement is indicative of the strict CBI criteria for certifying transportation projects. “green projects” are direct components of the Transbay Program, not supporting infrastructure, like the streetscape improvements mentioned in the 2022A series use of proceeds statement. The official statement also notes that the program, which includes extension of rail service to downtown San Francisco, is estimated to eliminate 36,000 metric tons of CO2 emissions annually once completed.⁵⁸

Peninsula Corridor Joint Powers Board

The Peninsula Corridor Joint Powers Board (PCJPB) owns and operates the Caltrain passenger rail system, which provides service along the San Francisco Peninsula. The collaborative entity, which includes San Francisco, San Mateo, and Santa Clara Counties, issued a \$140 million CBI-certified bond in March 2022 under CBI’s Low-Carbon Transport criteria. According to the bond’s official statement, use of proceeds is to finance a portion of the costs of electrification of the existing Caltrain passenger rail corridor between San Francisco and San Jose in CA, pay capitalized interest, and pay costs of issuance. The project “directly advances goals of Caltrain’s Sustainability Program and climate action plans of communities served throughout the corridor”

⁵⁷ Ibid., 2.

⁵⁸ Ibid., 5.

by financing infrastructure to fully electrify the corridor.⁵⁹ The PCJBP expects this project to reduce annual operational emissions by approximately 24,000 metric tons CO₂e, and provide cobenefits including regional air quality benefits, improved train performance, reduced train noise, and reduced fuel costs.

San Francisco Bay Area Rapid Transit

Like the City and County of San Francisco, San Francisco Bay Area Rapid Transit (BART) has issued multiple bond series since 2017, with portions of each issuance certified under CBI's Low Carbon Transport sector criteria.⁶⁰ In the 2022 Series bonds, BART chose the most climate-aligned portions of projects to issue as green bonds, such as system electrification and energy efficiency improvements.⁶¹ BART's 2019 Bonds were issued to:

"Finance or refinance projects under Measure AA and Measure RR that assist the District in providing mass transit services using an electrified railway that provides a low-carbon alternative to automobile travel as well as substantial investment in resiliency measures to reduce the susceptibility of BART's assets to earthquakes."⁶²

The BART official statements defer to their Capital Improvement Plan for actual project specifications, rather than providing a detailed use of proceeds statement for CBI-certified projects. This is possible because the entity has established a Green Bond Framework in accordance with CBI Standard 3.0.⁶³ This framework outlines performance measures to guide

⁵⁹ Kestrel Verifiers, "Verifier's Report: Peninsula Corridor Joint Powers Board Measure RR Sales Tax Revenue Bonds, 2022 Series A (Green Bonds – Climate Bond Certified)," Climate Bonds Initiative (2022), 6. https://www.climatebonds.net/files/files/Peninsula_Pre%20issuance%20assurance%20statement.pdf

⁶⁰ "San Francisco Calif Bay Area Rapid Tran Dist (CA)," Electronic Municipal Market Access, accessed May 10, 2024, <https://emma.msrb.org/IssuerHomePage/Issuer?id=FA2855068516FC2127BE05FE55634E87&type=G>

⁶¹ San Francisco Bay Area Rapid Transit District, "General Obligation Bonds," (Official Statement for 2022 Series D-1 and Series D-2 Bonds, 2022), 7. <https://emma.msrb.org/P11686351-P11236591-P11659601.pdf>

⁶² San Francisco Bay Area Rapid Transit District, "General Obligation Bonds," (Official Statement for 2019 Series B-1, B-2, F-1, F-2, and G Bonds), 9. <https://emma.msrb.org/ES1297617-ES1015453-ES1416786.pdf>

⁶³ San Francisco Bay Area Rapid Transit District, "Green Bonds Framework," (2021), 1. <https://www.bart.gov/sites/default/files/docs/2021.08.18%20BART%20Green%20Bond%20Framework.pdf>

project selection, including projects that help meet BART's goal of developing a "wholesale electric portfolio that has an average emission factor no greater than 100 lb CO₂e/MWh during 2017-2024; is from at least 50% eligible renewable sources and from at least 90% low and zero carbon sources by 2024; is 100% from zero carbon sources by 2035; is 100% from eligible renewable source by 2045".⁶⁴ The Green Bond Framework indicates that a BART has incorporated a significant amount of emissions accounting into its project planning and selection. Projects must demonstrate that they are providing mass transit services that "reduce the amount of carbon dioxide that would otherwise be released if BART riders used automobiles that emit CO₂" to be before they can be certified for CBI-certified financing.⁶⁵

San Francisco Public Utilities Commission

The San Francisco Public Utilities Commission (SFPUC) has issued multiple green bonds across its enterprises, some of which meet CBI criteria and others meeting the ICMA Green Bond Standard. Like the City of San Francisco and BART, the utility issues multiple bond series simultaneously, some of which are certified green bonds and others are not.⁶⁶ The utility has received multiple pre-issuance verification letters for water, wastewater, and stormwater projects. A recent letter certified multiple stormwater projects in the utility's Sewer System Improvement Program, including the Mission & Valencia Green Gateway, Wiggle Neighborhood Green Corridor, Chinatown Green Alley, Sunset Boulevard Green, Holloway Green Street, Yosemite Creek Daylighting, Visitacion Valley Green Nodes, and Baker Beach Green Street as eligible for climate financing under CBI's Water Infrastructure, Nature-Based Solutions criteria.⁶⁷

⁶⁴ Ibid., 2.

⁶⁵ Ibid., 3.

⁶⁶ Public Utilities Commission of The City and County of San Francisco, "San Francisco Water Revenue Bonds, 2023 Series CD," (Official Statement for 2023 Sub-Series C and Sub-Series D Bonds, 2023), 11. <https://emma.msrb.org/P31444744-P31122109-P31534138.pdf>

⁶⁷ Sustainalytics, "San Francisco Public Utilities Commission Pre-Issuance Verification Letter," Climate Bonds Initiative, (2018), 2. https://www.climatebonds.net/files/files/San%20francisco_pre-issuance-verification.pdf

SFPUC's Water System Improvement Program (WSIP), which repairs, replaces, and seismically upgrades crucial portions of the Hetch Hetchy Regional Water System, has also received pre-issuance verification, and has been funded through a steady stream of CBI-certified finance. The WSIP, which is certified under the Water Infrastructure CBI criteria, is a multi-year infrastructure improvement plan designed to meet all foreseeable local, state, and federal requirements, reduce vulnerability to damage from earthquakes, increase system reliability by providing redundancy to accommodate outages, and provide improvements for water. Multiple WSIP projects are included in the 2023 green bonds official statement.⁶⁸ Projects of note include a regional habitat reserve program, the Calaveras dam replacement, which replaces a seismically vulnerable dam with a new dam and a fish ladder to support aquatic species, treatment plant improvements to reduce seismic vulnerability and increase delivery reliability the City's emergency water system.

The use of proceeds for the 2023 bonds also discuss the New Irvington Tunnel, which would guarantee water service in the Bay Area counties within 24 hours of major weather or seismic events, the Peninsula Pipeline Seismic Upgrade, which includes landslide preparedness, and a regional groundwater storage and recovery program, which will provide storage for 7.5 years of drinking water supply to use in drought years.⁶⁹ Water redundancy projects, like improvements to the San Joaquin Pipeline System to provide flexibility of water supply during planned maintenance activities or unplanned outages due to "extreme weather conditions", and vegetation projects are also discussed as potential use of proceeds. Similar projects were included as "green projects" in the utility's 2015A Bonds, 2016A Bonds, 2017D Bonds, 2019 A bonds, and 2020E bonds.

SFPUC issues non-CBI certified bonds for its water system as well. For example, in 2023, the utility issued two non-certified revenue bonds—Subseries A, for Regional Water and Local Water,

⁶⁸ Public Utilities Commission of The City and County of San Francisco, "San Francisco Water Revenue Bonds, 2023 Series CD," (Official Statement for 2023 Sub-Series C and Sub-Series D Bonds, 2023), 11. <https://emma.msrb.org/P31444744-P31122109-P31534138.pdf>

⁶⁹ *Ibid.*, 5.

and Subseries B, for Hetch Hetchy Water.⁷⁰ Much less detail regarding use of proceeds is included in the official statement for these revenue bonds compared to the subseries C and D bonds discussed above. Instead of listing specific projects and benefits, like in the green bond statements, the use of the 2023 AB Bonds is described as “to finance and refinance a portion of the design, acquisition, and construction of various capital projects of benefit to the SFPUC’s Water Enterprise”.⁷¹ The official statements for these bonds provide much less information to investors, and do not attempt to convey a particular climate benefit. This gives the utility more flexibility to for use of the funds for projects types that are not covered by CBI’s Water Infrastructure criteria.

4.2 Green Bond Use in the Seattle Area

While the City of Seattle has not issued a CBI-certified green bond, green bonds certified under the ICMA Green Bond Standard have been issued for select projects in the Seattle region. Seattle City Light issued a \$198 million green bonds in 2020 for improvements to the utility’s hydroelectric power generation and distribution systems.⁷² Detailed use of proceeds are not included in the bond’s official statement, and City Light retains the right to change the portions of its CIP financed with proceeds of the green bond.⁷³ While improvements to a renewable energy utility meet the ICMA Green Bond Standard at face value, City Light notes that “there can be no assurances that any revisions to the capital improvement plan will have equivalent environmental benefits”.⁷⁴ There is no similar language in the official statements for the CBI-

⁷⁰ “San Francisco Public Utilities Commission (CA),” Electronic Municipal Market Access, accessed May 10, 2024, <https://emma.msrb.org/IssuerHomePage/Issuer?id=6B9FF7C2B2B234BFE053151E6E0A1139>

⁷¹ Public Utilities Commission of the City and County of San Francisco, “San Francisco Water Revenue Bonds, 2023 Series AB,” (Official Statement for 2023 Series AB Bonds, 2023), 12. <https://emma.msrb.org/P11687086-P11297878-P11728349.pdf>

⁷² The City of Seattle, Washington, “Municipal light and Power Improvement Revenue Bonds, 20202, Series A,” (Official Statement for 2020 Series A Bonds, 2020), 1-12. <https://emma.msrb.org/SS1393189-SS1083903-SS1491943.pdf>

⁷³ *Ibid.*, 4.

⁷⁴ *Ibid.*, 4.

certified bonds issued by agencies in San Francisco, reflecting the stricter standard for use of proceeds and transparency that CBI sets.

Sound Transit, the regional agency providing commuter rail, bus, and light rail service in the Seattle area, has also issued multiple ICMA-certified green bonds for its light rail extension project.⁷⁵ Its series 2015, 2016, and 2021 revenue bonds all met the Green Bond Standard for pollution prevention and control and clean transportation. Like BART and Caltrain, Sound Transit is calculating the emissions reduction attributable to its transit expansion and efficiency upgrades, both by calculating the reduction in emissions generated by its operations and by providing an alternative to individuals driving cars with internal combustion engines.⁷⁶ Sound Transit has decreased the emissions associated with its operations by 25% since 2018. Green bonds have financed almost \$2.5 billion worth of transit improvements since 2015, or approximately 15% of Sound Transit's capital expenditures over the same time period.

⁷⁵ Sound Transit, "2022 Green Bond Annual Report," (2023), 1-10.

https://www.soundtransit.org/st_sharepoint/download/sites/PRDA/FinalRecords/2023/7.3%20Report%20-%202022%20Green%20Bond%2007-20-23.pdf

⁷⁶ *Ibid.*, 6.

5.0 San Francisco Capital Improvement Plan

San Francisco has a complex and multi-tiered capital improvement planning process. As in many cities, the capital plan represents an agglomeration of projects and capital spending from different departments into a master document, which is adopted biannually by the city.⁷⁷ San Francisco's CIP covers a 10-year planning horizon; the most recent plan was adopted on May 9, 2023 and covers fiscal years 2024-2033. Rather than organizing the plan by department or individual entity, the plan categorizes its investments by service area, each of which compasses multiple departments. The 2024-2033 CIP includes the following service areas: affordable housing, economic & neighborhood development, general government services, Health & Human Services, Infrastructure & Streets, Public Safety, Recreation, Culture, & Education, and Transportation.

Some City departments with individual revenue streams, or entities that are organizationally distinct from the City of San Francisco but who conduct projects within or impacting the city, like the San Francisco Public Utilities Commission (SFPUC), Bay Area Rapid Transit (BART), and Caltrain, are included in the City's CIP, but also develop individual capital improvement plans to guide their individual budgeting efforts. SFPUC develops both a 10-year capital plan and a 10-year financial plan, which are updated annually and inform the Commission's annual budget.⁷⁸ The capital plan identifies, prioritizes, and schedules long-term capital programs, projects, and investments; the financial plan estimates how the projects included in the CIP, along with annual operating costs, will impact rates charged to public utility customers. The financial plan also ensures that the projects included in the CIP can be financed within the constraints of the utility's debt service and fund balance reserve policy requirements.⁷⁹ Both the San Francisco CIP and the SFPUC CIP were evaluated using the policy evaluation framework discussed in Section 3. BART

⁷⁷ The City and County of San Francisco, "Fiscal Years 2024-2033 Capital Plan," (2023).

⁷⁸ San Francisco Public Utilities Commission, "SFPUC FY 223-24 to FY2023-33 10-Year Capital Plan," (2023).

⁷⁹ Public Utilities Commission of the City and County of San Francisco, "San Francisco Water Revenue Bonds, 2023 Series AB," (Official Statement for 2023 Series AB Bonds, 2023), 65.

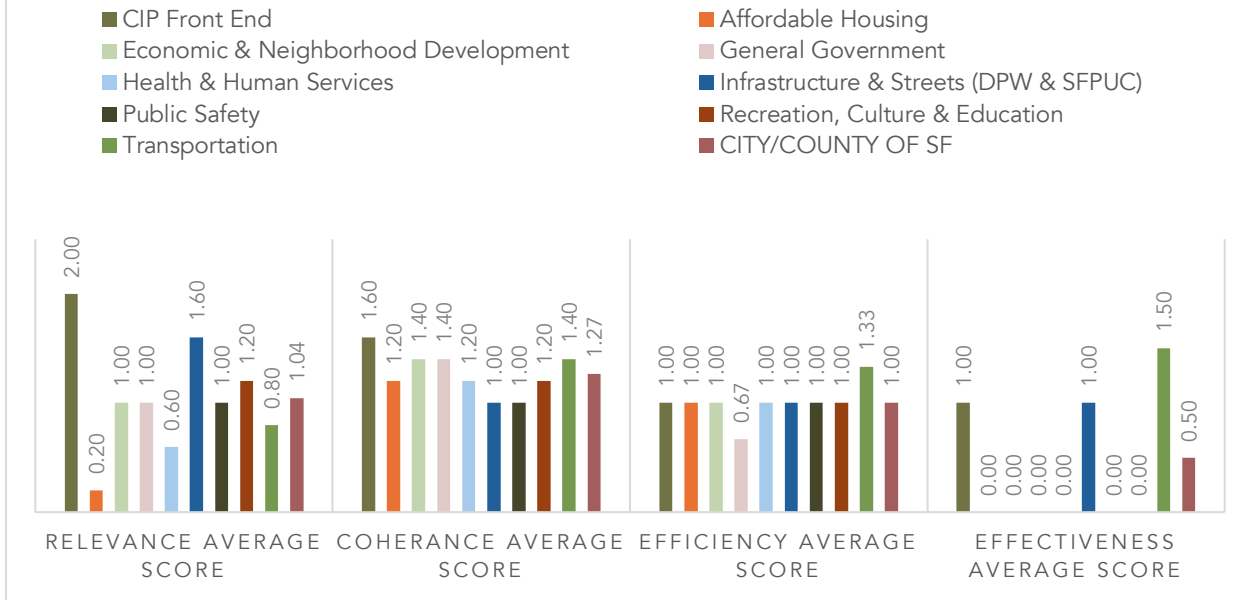
and Caltrains' CIPs were not evaluated individually, as their priority projects were sufficiently discussed in the Transportation section of San Francisco's document.

The front end of San Francisco's CIP includes a summary of expenditures and funding sources, a description of the prioritization criteria, or "funding principles", used to select projects, an overview of ongoing and completed capital investments, and a chapter entitled "Building Our Future". This chapter discusses climate resilience, sustainability, earthquake safety, and racial and social equity in San Francisco, drawing ties between the projects included in the CIP and city's goals in those areas. The front end of the CIP was evaluated as one section in the policy evaluation discussed below.

5.1 San Francisco CIP – Policy Evaluation Results

Each section of San Francisco's CIP was analyzed using the policy evaluation matrix discussed in Section 3.1. The criteria included in Table 1 were used to evaluate the front end as well as the sections for each investment area, and the sections were scored on a scale of 0-2 for each criteria. The evaluation results, presented by criteria category and service area, are included in Figures 5.1 and 5.2. Figure 5.1 groups the average score of each CIP section by criteria category, showing which service areas scored high or low for Relevance, Coherence, Efficiency, and Effectiveness. Figure 5.2 groups the average score in each criteria category by CIP section, more easily demonstrating relationships between criteria within each service area. While the 0-2 scoring was used to compare sections of the CIP to each other and to comparable departments between cities, additional narrative evidence was collected to support the scoring and provide a more robust analysis of the capital improvement planning process as well as the projects included in the plan.

FIGURE 5.1: CITY/COUNTY OF SAN FRANCISCO CIP EVALUATION RESULTS



The average score for the “relevance” criteria across San Francisco’s CIP was 1.02, with the front end scoring higher than all service area sections and the plan average. This is due to the “Resilience and Sustainability” and “Building Our Future” sections of the front end, which outline the specific climate hazards relevant to San Francisco as well as the emissions targets the City has committed to. These sections discuss the risk assessment process that the city uses to inform capital project prioritization, which consider climate hazards like sea level rise and extreme precipitation. The City also uses HAZUS, the risk assessment tool developed by the Federal Emergency Management Agency (FEMA), to conduct scenario planning and estimate losses in the aftermath of an earthquake, which informs capital spending. This section of the CIP discusses the City’s need to adapt its infrastructure to reduce strain on the electrical grid as buildings electrify, and mentions an incentive program to increase residential carbon sequestration.

The Infrastructure & Streets service area, followed by the Transportation service area, scored the second highest for relevance, as those sections included projects specific to providing renewable energy and clean water distribution, as well as meeting net-zero transit goals. The service area

scoring lowest for “Relevance” is Affordable Housing, which does not explicitly discuss emissions reductions or climate hazards in its overview or project descriptions.

The average score for the “coherence” criteria across San Francisco’s CIP was 1.27, with the front again scoring above average and higher than all service areas. The front end includes a section outlining the CIP’s alignment with specific goals of the City’s Climate Action Plan, Hazards and Resilience Plan, and General Plan (Comprehensive Plan) elements including Public Safety & Resilience, Housing, Transportation, and Environmental Justice. The CIP is indirectly aligned with State-level climate legislation through its alignment with the City’s Climate Action Plan and General Plan. The front end includes project prioritization criteria that apply to all service areas, some of which include enhancing resilience, ensuring asset preservation and sustainability. Most service areas scored similarly for Coherence—the lower-scoring service areas, Public Safety and Infrastructure and Streets, did not include a discussion of alignment with local or state climate legislation or plans in their overviews or project descriptions. No service area discussed emissions reductions across scopes, or included emissions accounting for the proposed projects.

The average score for “efficiency” criteria across San Francisco’s CIP was 1.00, with almost all service areas and the front end scoring similarly. Primarily concerned with life cycle costs, life cycle emissions, and cobenefits of individual projects, the results of this criteria were affected by the fact that all departments and service areas use a Facilities Renewal Resource Model (FRRM) to account for life-cycle costs, therefore all received the same score for that question. Question EFF-4, relating to the percentage of CIP spending with a stated climate benefit, was removed from this portion of the analysis, as not all projects included in San Francisco’s CIP had an estimated cost over the planning horizon—rather, they were part of larger programs or initiatives receiving an appropriation that may or may not feed the specific project. This question was used when comparing the SFPUC CIP, which was evaluated separately, to Seattle Public Utilities in Section 7.

The “General Government” service area, which includes City administration, technology department, the San Francisco Convention Center, and the Mayors Office on Disability, scored

lower than others in the Efficiency category because no cobenefits of proposed projects were identified or discernable in the project descriptions. The Transportation service area scored high for efficiency because it was the only service area to mention the need to both consider and reduce life-cycle emissions through capital investments.

The average score for the “effectiveness” category was 0.50, the lowest of the four criteria across the CIP. This is linked to the fact that CBI-certified climate bonds have only been issued for projects in two service areas: Transportation and Infrastructure & Streets, each of which received a 2 for Question EFFECT-2, which asked if CBI-certified bonds have been issued for projects in the service area. Climate-aligned financing is not identified as a distinct funding source in the front end’s “Capital Sources” section, however that section does discuss the City’s various GO bond programs, which include a “Waterfront and Climate Safety” program and a “Transportation” GO bond program. SFPUC’s CIP discusses its reliance on revenue bonds to finance capital projects, but does not mention its past or future intended use of climate-aligned financing. SFPUC does discuss its use of climate financing for various capital expenditures in its Green Bond Reports, which are published by enterprise each fiscal year.⁸⁰ There is no mention of the CBI, ICMA, or other climate standard for green debt issuance included in the City’s or SFPUC’s Capital Improvement Plan.

⁸⁰ “Green Bonds Reports,” San Francisco Public Utilities Commission, accessed May 10, 2024, <https://sfpuc.org/about-us/reports/debt-management-and-disclosure-reports>

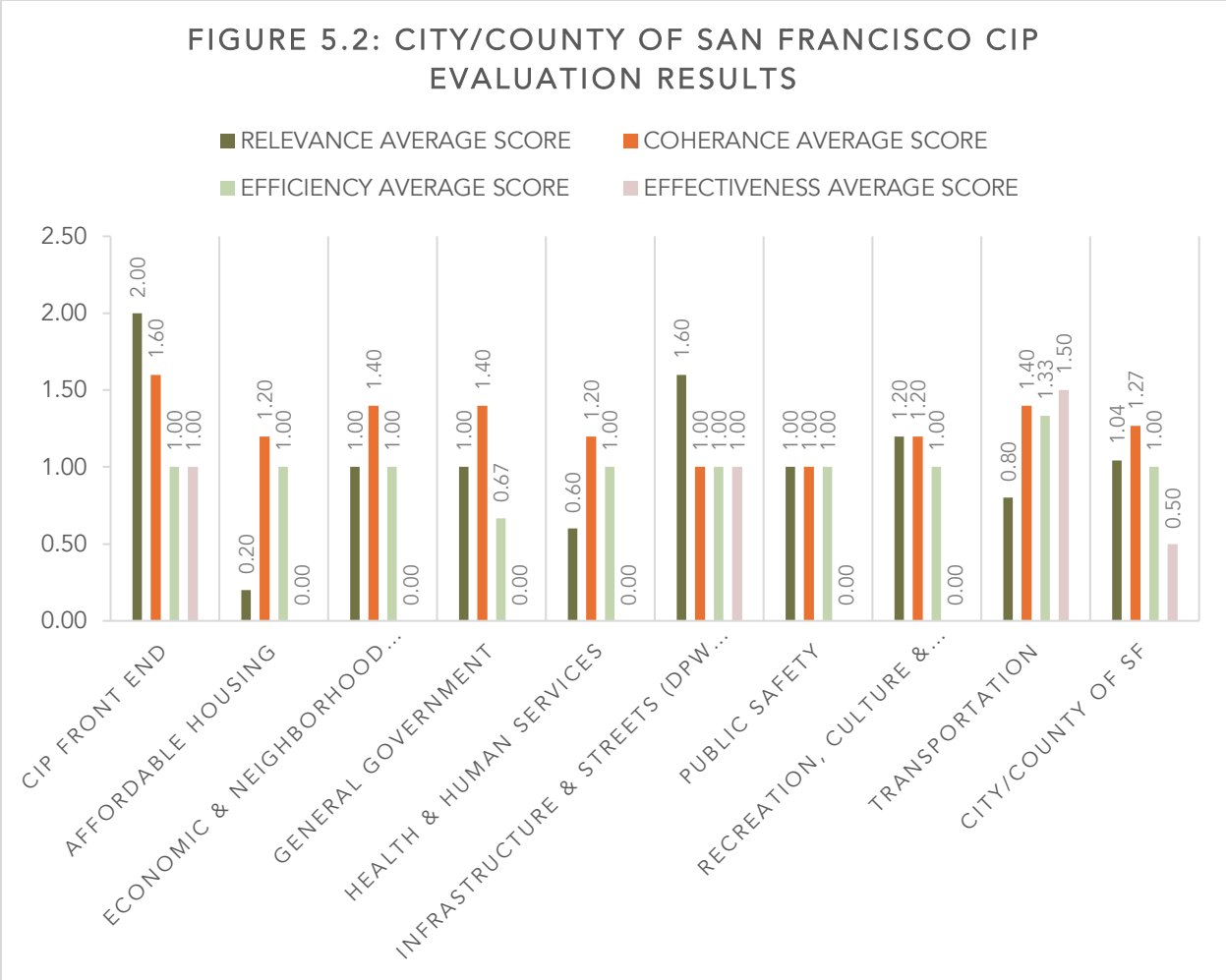


Figure 5.2 groups the average score in each criteria category by CIP section, including the front end and each service area. Most service areas scored lower for efficiency than coherence and relevance, though the service areas who have secured climate-aligned financing scored at or above average for efficiency. The Transportation service area is the only one with below-average relevance and above-average effectiveness—its relevance score is low because specific climate impacts to the transportation system are not discussed in the section overview or in project descriptions, however energy efficiency and net-zero transitions are. It is possible that specific climate impacts facing the assets of the different transportation agencies, including BART, Caltrains, the Transbay Joint Powers Authority, and the Port of San Francisco are discussed in different planning documents that were not reviewed as part of this evaluation, however they were not integrated into the greater CIP.

6.0 City of Seattle Capital Improvement Plan

The City of Seattle adopts its Capital Improvement Plan annually, with each plan covering a six-year horizon. The plan is compiled by the City Budget Office, based on proposals provided from 11 separate departments, each of whom have their own section in the document. Each department section includes an overview and a page for each funded project, including a project description, expected cost per year of the CIP, expected operations and maintenance costs, and the revenue source expected to fund the project. The most recent CIP, which was evaluated as part of this analysis covers a planning horizon from 2023-2028.⁸¹

Seattle's CIP includes capital projects administered by the following City departments: Parks & Recreation, Seattle Center, Public Library, Seattle Department of Transportation (SDOT), Seattle City Light, and Seattle Public Utilities (SPU), which is divided into Drainage and Wastewater (DWW), Water, and Solid Waste. The CIP also includes sections for finance, administrative services, and information technology, which were excluded from the analysis as they are not concerned with the construction of hard infrastructure. Seattle's CIP does not include projects conducted by non-city entities within City limits, such as Sound Transit, the regional transit agency responsible for the city's light rail system and regional rail system, or King County Metro, the bus system serving Seattle. It does include some projects required to supporting bus service, such as streetscape improvements and provision of overhead electric wires. SPU and Seattle City Light are revenue-generating departments within the larger city government, similar to how the San Francisco Public Utilities Commission operates. SPU does not appear to have a separate CIP document.

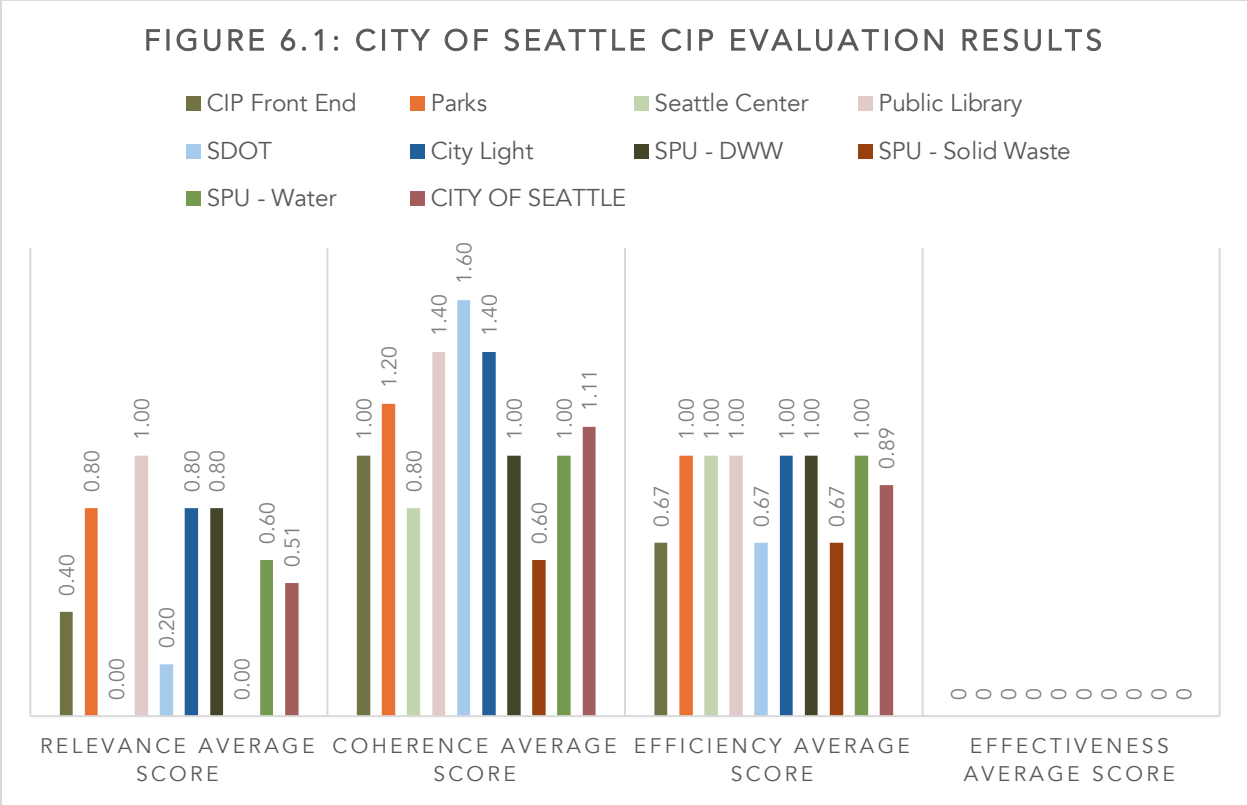
The front end of Seattle's CIP includes a Readers Guide and Overview section. The overview discusses the City's policies guiding capital planning and project prioritization, cost estimation, and revenue sources. It includes a summary of expenditures and funding sources included in the plan, and outlines the city, state, and federal-level policies and regulations driving the selection

⁸¹ City of Seattle, "2023-2028 Adopted Capital Improvement Plan," (2023).

of those projects. The front end was evaluated as its own section along with the section provided by each department.

6.1 Seattle CIP Policy Evaluation Results

Each section of Seattle's CIP was analyzed using the policy evaluation matrix discussed in Section 3.1. The criteria included in Table 1 were used to evaluate the front end as well as the sections for department, and the sections were scored on a scale of 0-2 for each criteria. The evaluation results, presented by criteria category and department, are included in Figures 6.1 and 6.2. Figure 6.1 groups the average score of each CIP section by criteria category, showing which departments scored high or low for Relevance, Coherence, Efficiency, and Effectiveness. Figure 6.2 groups the average score in each criteria category by CIP section, more easily demonstrating relationships between criteria within departments. While the 0-2 scoring was used to compare sections of the CIP to each other and to comparable departments between cities, additional narrative evidence was collected to support the scoring and provide a more robust analysis of the capital improvement planning process as well as the projects included in the plan.



The average “relevance” score across Seattle’s CIP was 0.51. Departments scoring higher include the Public Library, City Light, and the Drainage and Wastewater business line of SPU, which mention emissions reductions and climate impacts to varying degrees. The Public Library overview section discusses aligning their projects with the emissions reduction goals included in Seattle’s Green New Deal, and discusses the need for libraries to be “resilience hubs” and/or cooling centers during periods of extreme heat or smoke. The DWW section highlights the need to address sea level rise and increasing rainfall intensities, prioritizing green infrastructure and nature-based solutions, which create carbon sinks, as solutions. Seattle City Light mentions prioritizing emissions reductions in their projects to become a low-cost, carbon free power source. The Seattle Center and Solid Waste business line of SPU make no mention of reducing emissions or adapting to climate impacts; the front end of the CIP mentions emissions reductions related to priorities of the Federal Bipartisan infrastructure Law & Inflation Reduction Act, which are revenue source for some projects in the CIP, but does not include a discussion of climate goals that the CIP has been developed to accomplish.

The average “coherence” score across Seattle’s CIP was 1.11, with SDOT scoring the highest and the Solid Waste division of SPU scoring the lowest. SDOT’s section discusses efforts to “implement the Climate Action Plan in every case”, which is evident in the project list. SDOT also outlines the extent to which the proposed projects align with the City’s Comprehensive Plan, Complete Streets Policy, and Racial and Social Justice Initiative. While there is no explicit mention of Washington State’s Climate Commitment Act in the CIP, the project list aligns with the “Transit Efficiency” goal of that legislation. The Public Library and City Light also scored high for coherence, as their overview and project lists discuss alignment with Green New Deal goals and clean building standards.

Conversely, the Solid Waste division does not discuss alignment with any local or state climate regulations, nor is climate mitigation or adaptation included in departmental project ranking criteria. The section does discuss meeting state requirements for solid waste disposal and landfill gas, however those regulations are not necessarily intended to address climate change. No sections of the CIP explicitly mention reducing greenhouse gas emissions across scopes, nor is emissions accounting performed for proposed projects in the CIP.

The average score for the “efficiency” criteria across the Seattle CIP was 0.89. Many departments scored similarly in this category, as Seattle’s Resolution 31203, which guides CIP development, requires the Plan to include Operation & Maintenance (O&M) costs for each project. Question EFF-4, relating to the percentage of CIP spending with a stated climate benefit, was removed from this portion of the analysis, as different project description language was used between departments and efforts to distinguish certain projects as providing a climate benefit proved to be too subjective to provide meaningful insight. The Parks, Seattle Center, Public Library, City Light, DWW, and Water division of SPU scored above average for “efficiency” because those departments either mention or encourage projects that create cobenefits for communities, such as building upgrades addressing seismic and energy efficiency needs simultaneously, or utilizing nature-based solutions to build resilience to flooding, improve water quality, and mitigate the urban heat island effect. No departments in Seattle’s CIP explicitly discuss life-cycle emissions associated with their capital expenditures.

As no section of the CIP discusses the current or potential use of climate-certified financing for the projects included in the CIP, nor had any department issued a CBI-certified bond as of January 2024, the average score for “effectiveness” across the CIP was 0.00. While not an entity included in Seattle’s CIP, Sound Transit has issued several ICMA-certified green bonds for the Link Light Rail Extension Project. Seattle City Light has secured an ICMA-certified green bond for “capital improvements to and conservation programs for the Light System”. As a carbon-neutral electric utility, improvements to the system and expansion of grid capacity qualify for green bond certification under ICMA standards. Question EFFECT-2 category is specific to CBI-certified financing because CBI requires stricter criteria for use-of-proceeds, transparency, and reporting that create a higher level of accountability in addressing climate change. The Seattle City Light green bond was therefore not accounted for under question EFFECT-2 for that department.

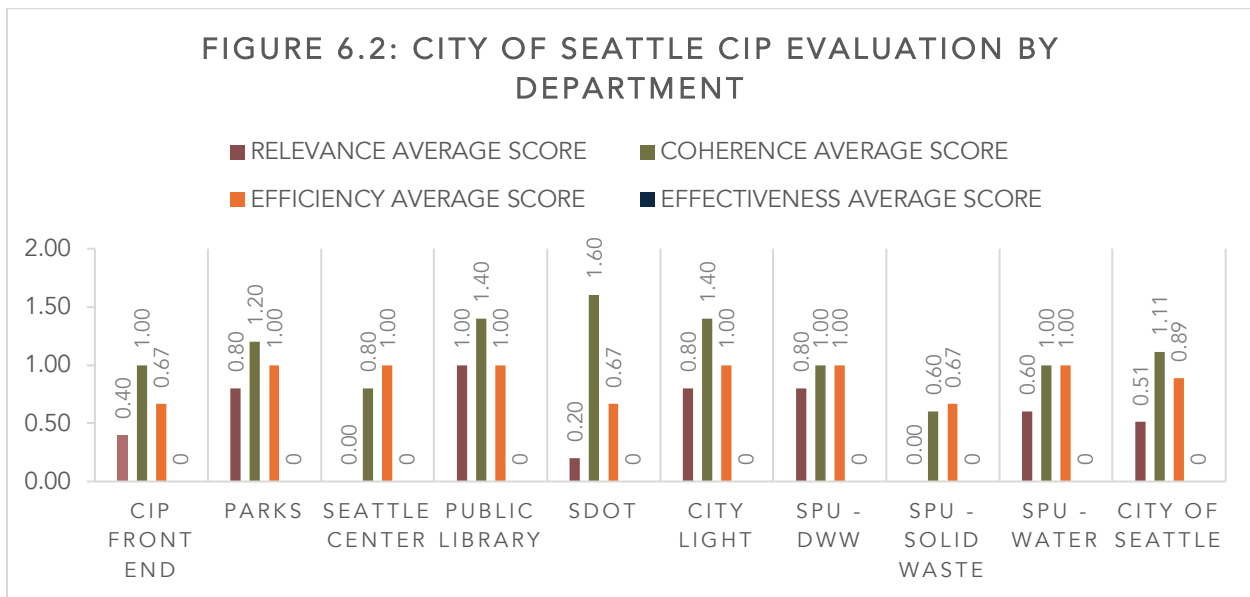


Figure 6.2 groups the average score in each criteria category by CIP section, including the front end and each department. All departments, including the front end, scored higher for “coherence” than “relevance”, and all sections scored higher for “coherence” than “efficiency” with the exception of Seattle Center and SPU Solid Waste, whose “coherence” scores are low because the sections do not explicitly discuss alignment with any local or state level climate policies or regulations. SPU Solid Waste is the only department that scored below average for all

three criteria, demonstrating a lack of explicit or implied alignment in that department's capital decision-making.

7.0 Discussion - City Comparison

This section expands on the policy evaluation results discussed above and provides direct comparisons between San Francisco and Seattle for each evaluation criteria. The cities' CIPs are first compared in totality, followed by a direct comparison of each document's public utilities sections. These sections were chosen because a significant portion of CBI-certified financing that has been issued by the City of San Francisco is the SFPUC, which is discussed in the Infrastructure & Streets section of the CIP and in the department's individual CIP. The equivalent sections of the Seattle CIP are Seattle Public Utilities and Seattle City Light. The SFPUC has its own CIP, which was evaluated along the same framework as discussed in Section 5 for the purposes of comparison to Seattle Public Utilities in this section. This comparison was determined to be more valuable than examining the transportation sections in more detail, as Seattle's CIP does not include projects led by regional transportation agencies. San Francisco does, and the CBI-certified bonds it has issued that are not tied to SFPUC are related to the Transbay Transit Center, a transportation project being completed in partnership with BART, Caltrains, the Transbay Joint Powers Authority, and other entities. Climate-aligned financing has not been issued by San Francisco's Municipal Transportation Authority, the SDOT equivalent department, therefore further comparison between the two is unlikely to provide insight to enabling conditions for its issuance.

7.1 Overall CIP Comparison

To compare the results of San Francisco and Seattle's CIPs against the policy evaluation criteria, the average score for each section, including the front end, was calculated for each evaluation question. The results of this exercise are shown in Figures 7.1-7.4. The evaluation questions accompanying each figure are restated in Tables 7.1-7.4.

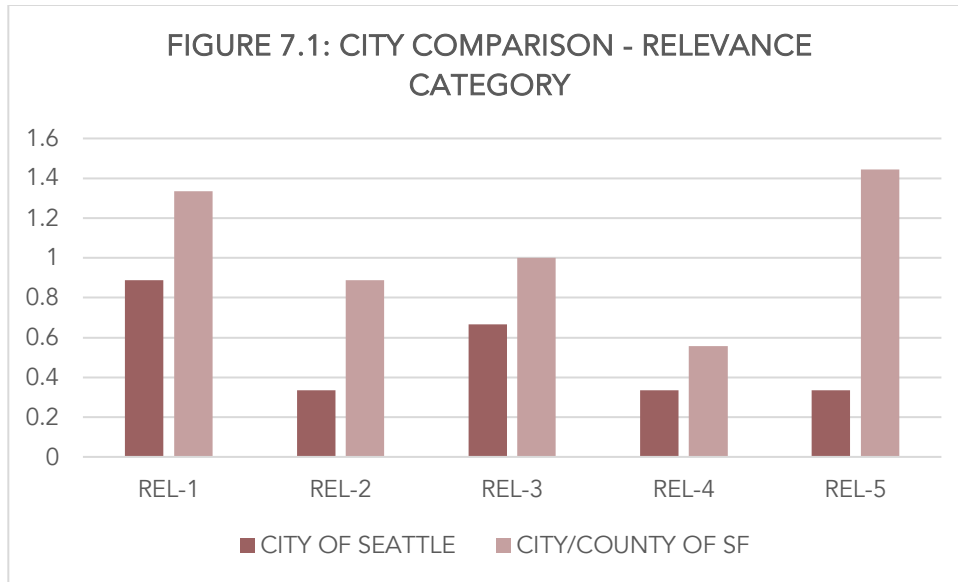


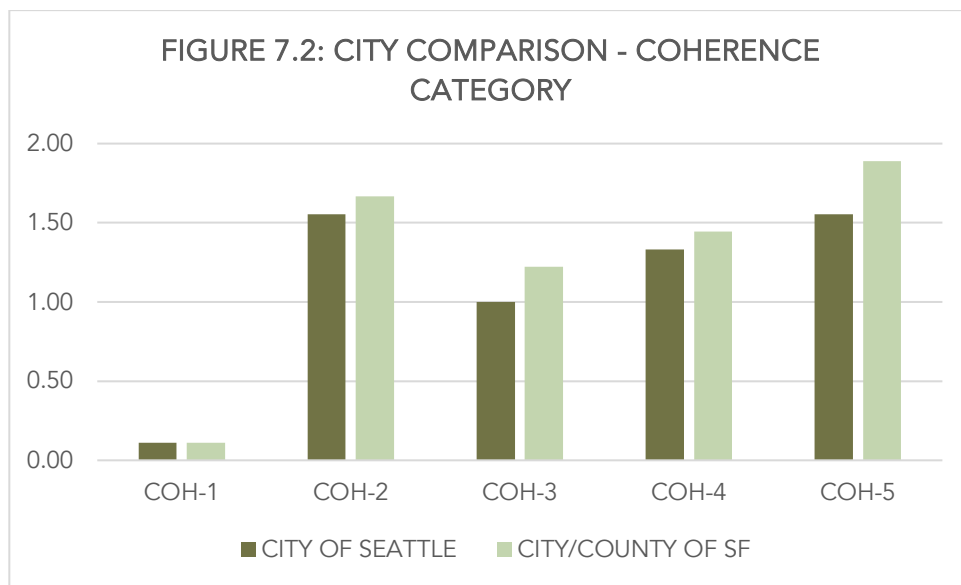
TABLE 7.1 – RELEVANCE EVALUATION QUESTIONS

REL-1	Do projects or ranking criteria consider future emissions (increases or reductions) or state that they meet certain emissions targets?
REL-2	Do projects or ranking criteria consider potential losses from future climate impacts?
REL-3	Do projects or ranking criteria emphasize or prioritize energy efficiency?
REL-4	Do projects or ranking criteria emphasize or prioritize creation of carbon sinks?
REL-5	Does the CIP identify and/or prioritize all relevant climate hazards (ie, flooding, extreme heat, drought, etc.)?

San Francisco’s CIP scored higher than Seattle’s CIP for all relevance criteria. The largest discrepancy in average score is for questions REL-2 and REL-5, both of which evaluate the extent to which the CIP is building resilience to future climate impacts. San Francisco’s CIP includes a robust description of climate impacts, resilience needs, and adaptation goals in the front end, which Seattle’s does not. The theme of anticipating and building resilience to climate impacts is restated in the service area overviews and project descriptions in San Francisco’s CIP in a way that they are not in most sections of Seattle’s CIP. This may be related to the fact that the City has both a Climate Action Plan and a Hazards and Resilience Plan, while Seattle has a Climate Action Plan and Green New Deal, which are focused on climate mitigation, but mentions

adaptation to current and future climate impacts in only one page in its Hazard Mitigation Plan.⁸² Based on this analysis, Seattle appears to be behind in adapting its infrastructure systems to climate impacts.

This discrepancy in parent planning documents could be a result of differences in state-level climate planning requirements. Washington’s Department of Commerce did not require a climate change element in their Comprehensive Plans and Hazard Mitigation Plans until 2023, with guidance for communities published in May 2023.⁸³ California, meanwhile, has been requiring local governments to plan for climate change since 2015.⁸⁴ It is important to understand the surrounding policy environment to contextualize the observed differences between Seattle and San Francisco’s Capital Improvement Plans—while some relevant legislation was reviewed, a full evaluation of state-level climate policy was not in the scope of this research.



⁸² City of Seattle Office of Emergency Management, “2021-2026 All-Hazards Mitigation Plan,” (2021), 22. https://www.seattle.gov/documents/Departments/Emergency/PlansOEM/HazardMitigation/2021%20HMP%20Draft%20115_2021%20for%20Web.pdf

⁸³ Washington Department of Commerce, “Draft Intermediate Climate Element Planning Guidance – Comment Period,” published October 23, 2023, accessed May 14, 2024, <https://www.commerce.wa.gov/programs/gms/gms-news/draft-intermediate-climate-element-planning-guidance-comment-period/>

⁸⁴ Berkeley Law, “California Climate Policy Dashboard,” UC Berkeley School of Law, accessed May 14, 2024, <https://www.law.berkeley.edu/research/cee/research/climate/climate-policy-dashboard/>.

TABLE 7.2 – COHERENCE EVALUATION QUESTIONS

COH-1	Do projects demonstrate that they are meeting GHG targets across scopes?
COH-2	To what extent does the CIP align with the City's Climate Action Plan, Comprehensive Plan, and/or other relevant local policy/regulatory documents?
COH-3	To what extent does the CIP align with State-level climate regulations?
COH-4	Does the CIP reflect engagement with local communities?
COH-5	What criteria are used to rank projects?

San Francisco also scored higher than Seattle in the coherence category, though the scores were closer than the “relevance” category across questions. Both documents list relevant local and state policies and regulations that have informed development of the plan, including more general documents like their Comprehensive/General Plans and their Climate Action Plans. Department/service area sections also outline how the proposed projects fit in to more department-specific initiatives related to climate mitigation or adaptation, like their respective net-zero fleet targets and goals for urban forestry. San Francisco’s CIP was more explicit in citing guiding plans or policies throughout the document, but Seattle’s CIP was found to be generally aligned with the surrounding legislation.

The largest discrepancy is in the scoring for evaluation question COH-5. For this question, project prioritization criteria that included both climate mitigation and adaptation considerations were scored with a 2, criteria including just one or alluding to climate considerations (for example, “improves energy efficiency”) were scored with a 1, and criteria with no stated or implied climate benefit were scored with a 0. Both San Francisco and Seattle include umbrella project ranking criteria in the front end of their CIPs, as well as department/service-area specific criteria in each section. San Francisco includes “address climate change” in its umbrella criteria; Seattle is less overt in its language choice, including “pursue conservation and sustainability investments” as a guiding principle in project selection. Discrepancies in language choice is a common theme

between Seattle and San Francisco—departments in Seattle tend to imply alignment with climate standards and goals, which San Francisco service areas state them outright.

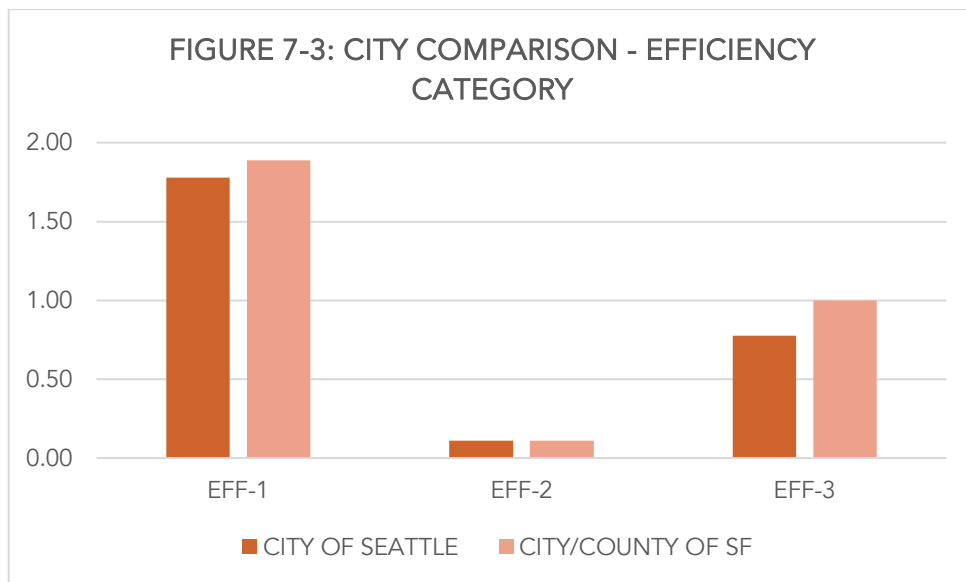


TABLE 7-3 – EFFICIENCY EVALUATION QUESTIONS	
EFF-1	Do projects or ranking criteria consider life cycle costs?
EFF-2	Do projects or ranking criteria consider life cycle emissions?
EFF-3	Does the CIP encourage projects that create cobenefits for communities?
EFF-4*	Approximately what percentage of the CIP (in terms of spending) has a noted climate benefit in its description? (Keywords may include: mitigation, emissions reduction, energy efficiency, adaptation, resilience, carbon sink, sustainability, conservation, transit, capture, etc.)

San Francisco scored higher than Seattle for questions EFF-1 and EFF-3; the two cities scored the same for evaluation question EFF-2. Evaluation question EFF-4 was excluded from this portion of the analysis both because San Francisco did not include an expected dollar value for all projects included in the CIP and because the language used between departments in Seattle’s CIP was too inconsistent to identify certain projects as climate-aligned without introducing additional bias into the evaluation. While both cities account for operation and maintenance costs in the CIP, San Francisco scored higher on question EFF-1 because its requires all capital projects to be entered into a Facilities Renewal Resource Model (FRRM), which accounts for

replacement and refurbishment as well as operation and maintenance. It is therefore a more accurate prediction of life-cycle costs than accounting for annual O&M needs.

Neither Seattle nor San Francisco address life-cycle emission directly in their capital improvement plans. While both documents at least mention the need to reduce emissions as an overall goal, there is no emissions accounting or discussion of low-carbon alternatives in the project descriptions, except for some transportation projects in both cities. Both cities have developed greenhouse gas inventories, which account for emission by sector including transportation, municipal buildings, and utilities, however no effort to marry capital planning with emissions reduction forecasting is evident in either city's Plan.

Both Seattle and San Francisco indirectly seek to include projects that create environmental or social cobenefits in their CIPs. While the creating of cobenefits is not an explicit project prioritization criteria or goal of either plan, the project descriptions for many departments or service areas either outline or allude to cobenefits, particularly for green infrastructure and nature-based solutions. Social cobenefits are emphasized more in San Francisco's plan, which may be related to the specific Affordable Housing service area, something Seattle does not include in its capital investments. Both cities include addressing racial and social inequities as a primary driver of their capital planning process, but San Francisco is more clear in articulating how the goal is addressed by specific projects.

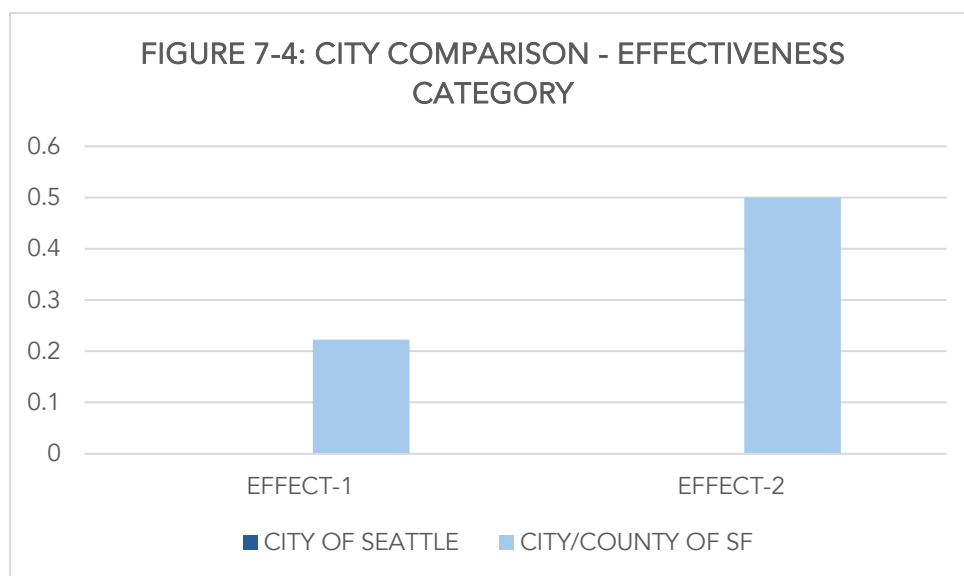


TABLE 7-4: EFFECTIVENESS EVALUATION QUESTIONS

EFFECT-1	To what extent does the CIP reference climate financing as a potential funding source for public projects?
EFFECT-2	How much, if any, CBI-certified climate financing has the entity/department secured for projects in the CIP?

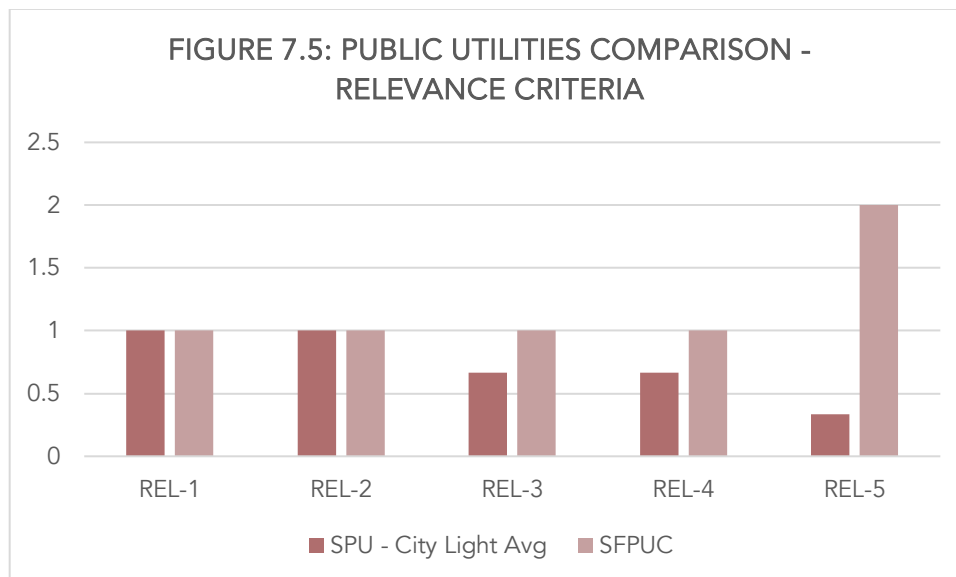
San Francisco scored higher than Seattle for both “effectiveness” evaluation questions. It was known ahead of selecting Seattle for this case study that the city had not issued any CBI-certified financing ahead of January 2024, therefore it was expected that Seattle’s EFFECT-2 score would be 0.00. However, the scores for question EFFECT-1 were unknown ahead of evaluating the CIPs. Seattle makes no mention of climate-aligned financing or even specific bond programs in its CIP, noting only that the City issues both GO and revenue bonds to fund different project types. San Francisco does include a list of its bond programs in the CIP, some of which are specific to waterfront resilience and transportation improvements, but does not discuss the efforts made to certify specific bond programs using CBI criteria. There is no goal of issuing a certain amount of climate-certified financing in the San Francisco or SFPUC capital improvement plans, nor is there a section discussing the past usage of climate bonds. Given the strict nature of CBI certification criteria and the changing nature of capital project scopes, this could be related to the limited project information that is available during the capital planning phase, especially if the status quo is not to design projects to meet climate criteria.

By scoring higher than Seattle in almost every evaluation criteria, San Francisco’s CIP appears to be more aligned with climate goals and with standards for climate financing than Seattle’s. The city’s project prioritization criteria, identification of how certain projects address climate impacts and/or reduce emissions, and realistic life-cycle cost analysis all outscore Seattle, informing the policy recommendations summarized in Section 9. The following subsection directly compares the SFPUC CIP to the Seattle Public Utilities and City Light sections of the CIP, as these departments serve similar functions and are organizationally similar, yet SFPUC has issued over

\$4.3 billion in CBI-certified bonds since 2016, while Seattle Public Utilities and City Light have issued \$0.

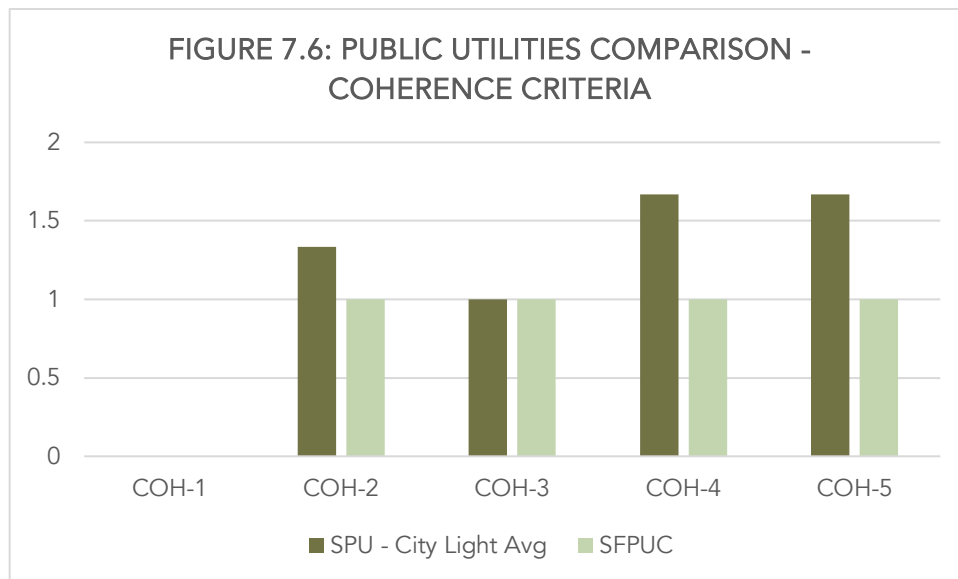
7.2 Public Utilities Comparison

To draw comparisons between the relative climate alignment of the capital planning process for public utility projects in Seattle and San Francisco, the CIP evaluation results for Seattle City Light, Seattle Public Utilities (SPU) – Drainage & Wastewater (DWW) and SPU – Water were compared to an evaluation of the San Francisco Public Utilities Commission SFPUC FY24-FY33 10-Year Capital Plan. This plan, which covers SFPUC’s Water, Wastewater and Power enterprises, provided more detail on proposed projects than the City CIP, and included more detailed insight into the utility’s capital planning process. The Solid Waste division of SPU was omitted from this comparison, as SFPUC does not provide an equivalent service. The results of this comparison are presented in Figures 7.5-7.9 and discussed below.



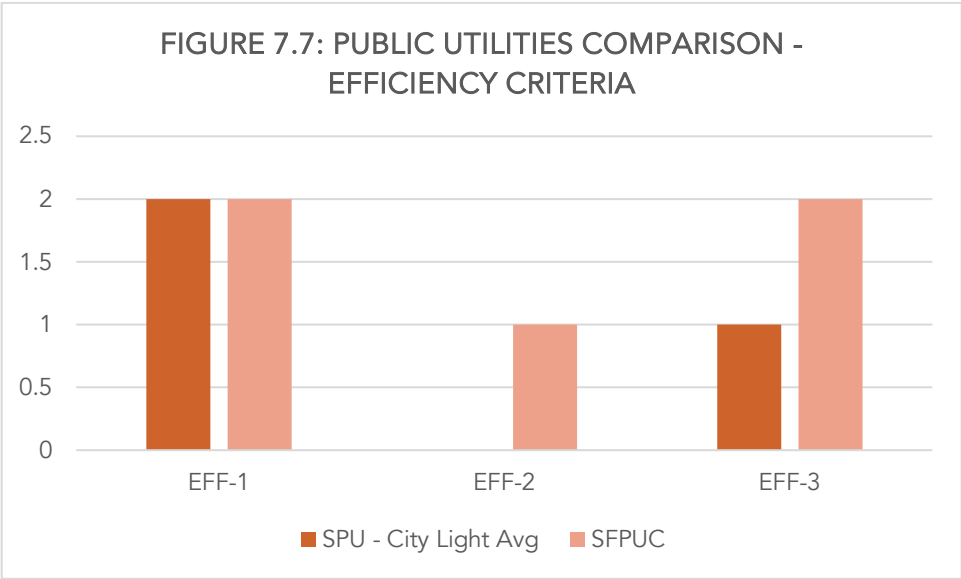
SFPUC scored higher than the Seattle utilities on evaluation questions REL-3, REL-4, and REL-5. These evaluation questions determine whether the utilities prioritize energy efficiency and creation of carbon sinks in their capital projects, and if the CIPs outline specific climate hazards facing the utility. Seattle City Light recognizes that climate change is affecting reservoir levels and seasonal energy consumption, causing volatility in both supply and demand of electricity.

They do not, however, discuss the specific climate impacts, like drought and changing precipitation patterns, that are responsible for changes in reservoir levels. SPU does not mention drought or changes in precipitation as potentially affecting water supply, but does prioritize efficiency of the water distribution system and habitat conservation in watershed areas, which increases potential for carbon sequestration. SFPUC identifies the specific climate hazards that will impact the utility and its assets, including drought, intense storm events, and sea level rise. Differences in local climate, especially when considering the differences in water supply in Washington compared to California, may affect the utility’s planning process and the emphasis placed on specific climate impacts.



SPU and Seattle City Light scored higher or equal to SFPUC for all “coherence” evaluation questions. While Seattle City Light and SFPUC mention the need to align investments with their respective cities’ net-zero emissions goals in a broad sense, neither include an emissions inventory in the CIP or discuss meeting specific GHG targets across scopes. SPU does not mention the need to reduce greenhouse gas emissions in its CIP overview or project descriptions. Seattle City Light and SFPUC are similar in that both leverage hydroelectric power to provide renewable energy to their customers. The priorities of their net-zero transitions are therefore not to decarbonize the grid, which is already majority-renewable, but to increase grid capacity to accommodate electrification of the buildings and transportation sector. Seattle City Light states this in its CIP narrative, and a significant portion of its projects are related to increasing grid

capacity. SFPUC’s Power Enterprise mentions that it seeks to implement goals and policies of the City’s Climate Action Plan, but because of budget constraints is currently deprioritizing expansion projects in favor of necessary rehabilitation. Fiscal management appears to have been an issue in the utility in recent years, which is reflected in the prioritization criteria included in SFPUC’s FY24-33 CIP. Projects are prioritized by deliverability and risk-based prioritization, while Seattle City Light and SPU are incorporating concepts like environmental sustainability and race and social justice into their project ranking criteria. This accounts for Seattle’s higher scores in the “coherence” category.



As discussed in Section 7.1, both Seattle and San Francisco require capital projects to account for life-cycle costs. Life-cycle emissions are not discussed by Seattle City Light or SPU, but are mentioned in some project descriptions in the SFPUC CIP. SFPUC has two separate power enterprises—Hetch Hetchy Power, which provides hydroelectric power from a City-owned dam in Yosemite to the Bay Area, and CleanPowerSF, which purchases electricity from renewable sources like wind and solar owned by external entities and delivers it to residences to supplement the electricity generated by Hetch Hetchy. This allows the utility to increase its supply without constructing or maintaining additional infrastructure, which decreases the life-cycle emissions associated with providing electricity to customers.

Utility projects have the potential to provide multiple environmental and social cobenefits, which are discussed by Seattle City Light and SPU but emphasized more by SFPUC in its project descriptions. For example, the Ocean Beach Climate Adaptation Project included in the SFPUC Wastewater Enterprise will simultaneously reduce erosion issues, preserve marine habitat, and provide important protections for a combined sewer facility, pump station, and treatment plant, whose current operations are threatened by sea level rise. While SFPUC project descriptions include more listed cobenefits, the term “cobenefit” is not used in their CIP or mentioned in project ranking criteria. The term “cobenefit” is not used by Seattle City Light or SPU either.

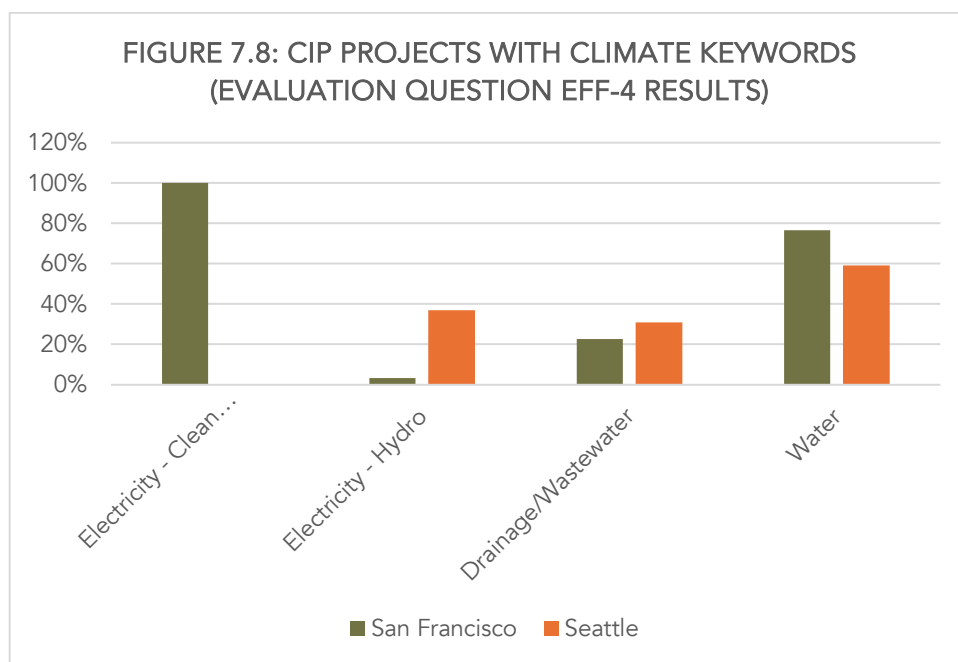
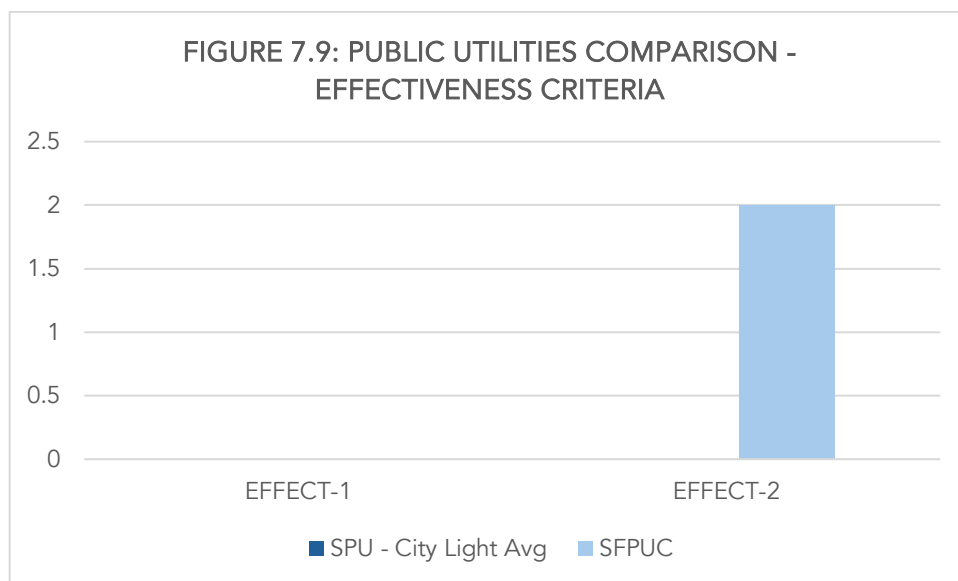


Figure 7.8 shows the results of evaluation question EFF-4, which examined the percentage of CIP funding that was tied to a project with a stated climate benefit in its description. This question was not used to evaluate the full city CIPs for reasons state above, but was included in this analysis because of the similarities between Seattle Public Utilities, City Light, and SFPUC. The SFPUC Capital Improvement Plan also provided dollar values for all slated projects, while the “Infrastructure and Streets” service area of San Francisco’s CIP, which included appropriations for the utility as a whole, did not. Project descriptions for each enterprise were evaluated for climate-aligned keywords including mitigation, emissions reduction, energy efficiency, adaptation, resilience, carbon sink, sustainability, conservation, carbon capture, and similar terms. The dollar

amount of those projects was noted and summed by enterprise, so that a percent of total enterprise spending could be calculated.

Figure 7.8 shows that SPU-DWW and Seattle City Light have a higher percentage of projects in their current CIP with stated climate benefits in their descriptions than the equivalent enterprises within SFPUC. However, SFPUC’s water enterprise, which is the enterprise that has issued the most CBI-certified debt for its infrastructure projects, has a higher percentage of projects with stated climate benefits than SPU-Water. This supports the hypothesis that the capital planning process at SFPUC is an enabling condition for securing climate finance.



The difference in language used to describe projects in the CIP was not significant between the two cities—most Seattle City Light and SFPUC Power enterprise projects that were flagged mentioned energy efficiency; most SPU-DWW and SFPUC Wastewater projects mentioned flood mitigation and capacity building; most SPU-Water and SFPUC Water projects mentioned drought resilience, water source diversification to build resiliency and redundancy in the system, and habitat conservation. The projects proposed by each utility appear, at the planning level, to be similar in scope and intent. SFPUC does not have significantly more projects with a stated climate benefit in its CIP than City Light and SPU do, except for CleanPowerSF, for which Seattle does not have an equivalent. Yet, as demonstrated in Figure 7-9, SFPUC has been much more effective than SPU and Seattle City Light in issuing CBI-certified funding for its projects, despite its CIP

not mentioning the use of climate financing for its projects. This informs the conclusion that, while the CIP is one enabling condition, it is likely not the primary tool used to secure climate financing in San Francisco.

8.0 Limitations and Opportunities for Further Research

The results and subsequent conclusions of this comparative case study is limited by multiple factors. The first is the somewhat subjective nature of policy evaluation, and the bias introduced by a sole evaluator. The scoring of each CIP could have been strengthened by a consensus-based evaluation, in which multiple evaluators reviewed the documents individually, and the scores for each criteria were determined based on a discussion and collaborative decision following the individual evaluation. Due to time constraints and the individual nature of a master's thesis, a collaborative approach was not feasible.

The analysis also could have been strengthened by a third case study city. Originally, the intent was to evaluate Los Angeles' CIP along the same criteria as Seattle and San Francisco, as it appeared that Los Angeles had issued CBI-certified bonds in the past, and could be an intermediate case. However, after further research, it became clear that it was not the City of Los Angeles but the Los Angeles County Metropolitan Transportation Authority (LACMTA), that had issued the CBI-certified financing. As independent transportation agencies like Sound Transit, in the Seattle area, and BART, in the San Francisco area, were not evaluated independently, a comparison between a transit agency's Capital Improvement Plan and the two cities was not considered valid in identifying indicators of climate alignment in the CIP process.

Once this conclusion was drawn, time constrained the evaluation of other small cities in California and Washington that have issued CBI-certified financing for individual projects. Both Santa Clara, CA, who issued a \$34.5 million, 26-year maturity bond in 2023 for sustainability and resilience improvements to their regional wastewater treatment facility, and Edmonds, WA, who issued a \$13.8 million, 25-year maturity bond in 2020 for a Carbon Recovery and Biosolids Pyrolysis

project at its wastewater treatment plant, were considered as third case study cities.^{85,86} Cities outside of California and Washington were not considered because of different physical, regulatory, and political environments that could have impacted the analysis.

The project also could have benefitted from interviews with city officials and staff members in both Seattle and San Francisco. While a certain amount of insight about a city's priorities and proceedings can be gathered from policy evaluation alone, the analysis lacks perspective from someone who was privy to the process of plan development, or who is familiar with the decision-making process surrounding the issuance of climate-aligned finance. While time constraints prevented interviews to be conducted as part of this work, it is something that should be considered for future, similar research efforts.

⁸⁵ Kestrel Verifiers, "Verifiers Report for City of Santa Clara Wastewater Revenue Certificates of Participation, Series 2023 (Green Bonds – Climate Bond Certified)", Climate Bonds Initiative, (2023), 1-36. https://www.climatebonds.net/files/files/city%20of%20santa%20clara_Pre%20issuance%20assurance%20statement.pdf

⁸⁶ Kestrel Verifiers, "Verifiers Report for City of Edmonds Water and Sewer Revenue Bonds, 2020 (Green Bonds)," Climate Bonds Initiative, (2020), 1-18. <https://www.climatebonds.net/files/files/City-of-Edmonds-pre-issuance-verification.pdf>

9.0 Conclusions

In a 2021 presentation to the California Water Commission, the Assistant General Manager of the San Francisco Public Utilities Commission noted that green bonds “may influence project selection and lead to [a] virtuous cycle of climate aligned projects financed at a lower cost”.⁸⁷ If the opportunity to secure green bonds is affecting project selection in San Francisco, that fact, as determined through this research, is not explicitly stated in their Capital Improvement Plan. However, San Francisco’s CIP did, as expected, score higher than Seattle’s CIP across evaluation criteria, implying that their capital planning process is more strongly aligned with global climate goals and best practices for climate planning, which better enables them to issue certified climate financing for their public projects. San Francisco has adopted a more holistic approach to both climate and capital planning, than Seattle, integrating climate goals and milestones across agencies into a singular capital planning document.

Specific policy recommendations for Seattle that have been identified from this research include the following:

- **Include a robust discussion of the City’s greenhouse gas reduction goals and climate adaptation needs in the front end of the CIP, reflecting an audit of capital projects against climate goals.** This addition to the document would make it clear to the public and to future investors in municipal bonds that the City is accounting for climate change in its infrastructure investments, facilitating future green bond certification.
- **Integrate the City’s Emissions Inventory with the CIP.** Seattle could estimate the emissions reduction or resiliency benefits of its proposed projects at the planning level, and leverage the CIP as a tool to implement its Climate Action Plan.

⁸⁷ Eric Sandler, “SFPUC Green Bond Program,” San Francisco Public Utilities Commission, (Presentation to the California Water Commission, 2021), 1-7. https://cwc.ca.gov/-/media/CWC-Website/Files/Documents/2021/02_February/February2021_Item_9_Attach_7_SFPUCPowerPoint_Final.pdf

- **Adopt a “Service Area” or similar organizational structure for the CIP.** San Francisco’s document discusses all projects within its jurisdictional boundary, providing a more holistic picture of capital needs and priorities. This structure better encompasses regional projects and projects with climate benefits for which the City is a partner but may not be responsible for directly financing, like transit projects.
- **Develop a Green Bond Framework.** The San Francisco Public Utilities Commission has a specific document indicating the types of projects for which it will pursue climate financing. Seattle could develop something similar, or integrate language to this effect into its CIP to facilitate issuance of climate finance in the future.

The results of this evaluation do not indicate that the City of Seattle is failing to meet its climate goals through its infrastructure investments. Rather, the City is not framing its infrastructure investments in such a way that the climate benefits associated with them are made explicit. While San Francisco’s capital planning has shortcomings related to emissions accounting, especially in the context of life-cycle emissions, certain sections read as implementation mechanisms for a Climate Action Plan, not a traditional Comprehensive Plan. If the City of Seattle wants to pursue climate-certified financing for infrastructure projects, making a similar adjustment to their capital planning process is an important first step.

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