An Examination of Certified Green Municipal Bonds in the U.S. through the Perspective of Local and Regional Government Issuers

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Abstract

The research on green-labeled municipal bonds, first introduced in 2013, has largely focused on broad trends in the green municipal bond market and the search for a pricing benefit or penalty for green municipal bond issuers. This research aims to examine how political and economic forces and risks to natural hazards have shaped the issuance of green municipal bonds and how the motivations and perceived benefits that led municipal issuers to float verified green municipal bonds compared to the actual benefits and outcomes as understood by current and former staff of city and regional governments. The Bloomberg Terminal database was used to identify a subset of green municipal bonds that have been issued by city, county, and regional ("local") governments and special-purpose local governments and independently verified to meet the International Capital Market Association's Green Bond Principles or Sustainability Bond Guidelines, meaning they are certified "green" or "sustainable." To uncover patterns in green municipal bond issuance, simple logistic regressions were used to examine the relationship between counties where certified green municipal bonds had been issued and their natural hazard risk and political leanings. This analysis found that the counties with greater risk from natural hazards predict the issuance of a certified green municipal bond and counties with a higher percentage of votes cast for the Democratic candidate in the 2020 presidential election, the more likely the local public entity or entities will have issued a certified green municipal bond. Localities that had issued certified green municipal bonds were further segmented by bond and issuer type to focus on city, regional, and other local government entities that had issued general obligation bonds for interviews. Many of the current and former city and government staff interviewed found green bonds to be politically popular and serve as an expression of their organization's values and alignment of their commitments to sustainability and climate action.

Staff and experts noted that attaching the green label can increase the visibility and marketability of the bond and may in effect increase investor interest. However, the recent backlash to applying Environmental, Social, and Governance (ESG) considerations to decision-making and investing, and fears over the loss of municipal bonds' tax exemption in the first half of 2025, has created uncertainty in the green municipal bond space.

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Chapter 1: Introduction and Background

Introduction

When the first green bond emerged in 2007, it was lauded as a game changer in the then-emerging world of climate and green finance (World Bank Group 2019). Green bonds are a spin-off on the centuries-old fixed-income debt instrument – bonds – with one important innovation. They are issued by public, private, and multilateral entities to channel capital to sustainable or climate-friendly projects (Chiang 2017). By raising funds for environmentally beneficial projects, green bonds help meet the critical need and demand for climate mitigation and adaptation financing (Nkombo 2024).

At the local level, public institutions, like city and municipal governments, spearhead mitigation and adaptation actions and steward much of the nation's infrastructure, shaping the quality of life of their constituents and their ability to withstand the impacts of climate change (Cox, Nuzzo, and Aspin 2023). Local governments finance new infrastructure projects and infrastructure upgrades largely through the issuance of bonds (Cox, Nuzzo, and Aspin 2023). Given the dual mandates to build and maintain infrastructure and adapt to the climate crisis (Fidelity Capital Markets 2021), it is no surprise that hundreds of municipal issuers have issued green bonds, following Massachusetts' lead, which issued the first-ever municipal green bond in 2013 (Climate Bonds Initiative 2014).

Like traditional bonds, green bonds are linked to the issuing entity's assets and backed by its balance sheet (Segal 2024). The difference between green bonds and conventional bonds is that the green bond's "use of proceeds" is earmarked for specific projects with an environmental benefit (Henry and North 2024), although this can be largely left up to the interpretation of the issuer. Projects with environmental benefits can include those related to renewable energy,

energy efficiency upgrades, green infrastructure, waste and water management, or increasing the energy efficiency of public transportation systems (Center for Environmental Public Policy, n.d.; Fidelity Capital Markets 2021; Wilson 2024). Because bonds are a long-term debt instrument, they require that bond issuers have a good credit rating and balance sheet to secure lower borrowing costs.

Much of the existing literature on the green bond market and municipal green bonds revolves around identifying and measuring the existence of the elusive green premium or "greenium," which is the difference in yield between a regular bond and a green bond. In theory, the benefits of issuing a green bond versus a conventional bond materialize in a positive greenium wherein investors are willing to receive a lower yield or pay more to support green investments (Ando et al. 2023), thereby benefiting the municipal issuer because it costs the city and taxpayer less to borrow. Conclusions vary as to whether this green premium exists for green municipal bonds. There are certainly other potential benefits frequently cited in grey and peer-reviewed literature that make green bonds an attractive alternative to traditional bonds, including reputational benefits accrued to the issuer in portraying itself to be environmentally sustainable as a signaling or marketing strategy (ElBannan and Löffler 2024; Hardy 2023); expanding and diversifying the issuer's investor pool (Henry and North 2024); and serving as an internal commitment device or a green-bonding mechanism for the issuer (Sangiorgi and Schopohl 2023). Yet, the scholarship on the experiences of local governments that have issued green municipal bonds as their own distinct category, separate from nations, supranational entities, and states in the case of the U.S., is limited.

This research examines the perceptions, considerations, expectations, and external factors that shaped an issuer's decision to issue a green municipal bond, as well as the benefits and

drawbacks of a green municipal bond. The insights gleaned through this process could make for timely and helpful guidance for the staff of municipal entities considering a green bond issuance. It is important to note that this research focuses on a specific type of green municipal bonds, ones which are "verified" or "certified." For the purposes of this research, "verified" or "certified" green municipal bonds are bonds that are externally verified or certified by an external, independent reviewer to meet all components of a set of well-established guidelines, principles, or standards.

The central questions guiding this research include:

- What do cities and other regional government entities expect are the plausible outcomes, impacts, and benefits of issuing a certified green bond and how does this compare to reality?
- How do the broader political and economic contexts influence a municipal bond issuer's decision to issue a green bond? To what degree does the level of risk from natural hazards, as well as political leanings, predict the issuance of a certified green bond? In challenging political or economic environments, how do municipal issuers, the municipal financial advisors that support them, and other green municipal bond experts perceive green municipal bonds?

The four components of this research process include a literature review, data searches and downloads, data and case study analysis, and interviews. First, a literature review was conducted to identify the potential benefits and drawbacks in issuing a green bond with a particular focus on municipal issuers and to synthesize and analyze the various green bond

certification processes in existence. Second, municipal green bonds that have been independently verified to meet the International Capital Market Association's Green Bond Principles or Sustainability Bond Guidelines were identified through the Bloomberg Terminal database by the name of the issuer and further segmented by whether the bond issued was a revenue or general obligation bond. Third, to examine relationships between where local or regional governmental entities have issued certified green municipal bonds and the level of risk to natural hazards and the political orientation of these places, simple logistic regressions were conducted using the data from Bloomberg. To identify issuers for more in-depth case studies, the segmented list of issuers of municipal green general obligation bonds from Bloomberg was reviewed to identify city, county-level, and regional governments and special-purpose districts for a more thorough analysis of the issuances (importantly the projects to be financed through the green municipal bond) and interviews with staff or experts familiar with the issuing entity or the issuance.

Fourth and lastly, interviews were conducted with current or former government staff of entities that had issued certified green general obligation bonds. These staff members included individuals who worked for Chief Financial Officers, Directors of Finance, and City Treasurers or the individuals that held these titles. The interviews explored how staff perceive the benefits and costs of green bond issuance, the initial motivations and expectations for issuing a green bond and how this compares to reality, and lessons learned. Many of these interview subjects, along with other public finance experts, provided insights into how shifting political contexts has or might shape the U.S green bond market and may or may not influence individual municipal issuer's decisions.

Background

1. The basics of bonds

Municipal (muni) bonds are an indispensable public finance tool for cities, counties, states, and other entities serving the public (U.S. Securities and Exchange Commission, n.d.). They act much the same as any other type of bond or loan. In the case of municipal bonds, local or state governments or other public entities issue these debt obligations and investors buy the bonds, thereby lending funds to the issuing entity in promise of receiving interest on the principal and the face value of the bond when it reaches maturity (Chen 2024; Municipal Securities Rulemaking Board 2024). Because of bond's liquidity on the secondary market, they are more efficient than bank loans according to one interview subject.

For cities, municipal bonds are used to raise revenue to support the daily operations of cities but also more importantly, they are used to finance large, long-term capital projects, like building schools and other public buildings, highways, and sewer systems (Municipal Securities Rulemaking Board 2024). Financing such projects would be difficult, if not impossible without bonds, because cities do not have the cash reserves on hand to finance most capital projects (U.S. Securities and Exchange Commission, n.d.). Case in point, about three quarters of the infrastructure built in the United States is financed through municipal bonds, according to a report by the National Association of Counties in 2017 (Cestau et al. 2019). Given that climate change is both a long-term problem that requires massive investments to transition from greenhouse gas emissions and adapt to the impacts of the climate crisis, bonds are an integral tool to raise such large funds and spread climate expenditures across decades (Bolton et al. 2023).

U.S. households comprise the largest percentage of municipal bondholders at 70 percent (Green City Bonds Coalition 2015; Tax Policy Center 2024). U.S. taxpayers buy muni bonds

independently or through managed accounts or mutual funds (Municipal Securities Rulemaking Board 2024). Commercial banks and life insurance companies also buy bonds, but they are a smaller proportion than individual households (Tax Policy Center 2024). Municipal bonds, whether of the green or vanilla variety, are an attractive investment for investors because they face low risk of default, and their interest is generally exempt from federal income taxes and in some cases even state and local income taxes (Chen 2024; Municipal Securities Rulemaking Board 2024). Due to this tax benefit, municipal bondholders are overwhelmingly those that pay U.S. federal taxes rather than foreign investors (Invesco 2025). Where the risk is higher, bondholders receive a higher return or yield, which is a combination of the purchase price of the municipal bond, its coupon rate or annual interest rate, and amount of time the bondholder holds the bond (Municipal Securities Rulemaking Board 2024). While this structure benefits investors, it hurts cities or municipalities deemed to be a riskier investment. Bondholders experience greater fluctuations in the revenue from the bond when the bond has longer maturities because these are more sensitive to interest rate changes than shorter maturities (Gallant 2024). Bondholders' investments are also sensitive to call provisions, which allows the issuer to recall the bond before it reaches maturity and reissue the bond at a lower interest rate, resulting in lost income from interest payment and lower returns (Chen 2024).

Regardless of the type of issuer or label attached to the bond, the two most common types of bonds are general obligation bonds and revenue bonds. General obligation bonds are backed by the "full faith and credit" of the issuer through a city's taxing power; whereas a revenue bond is backed by revenue streams from a specific project, like water infrastructure upgrades paid back through the money raised by the utility's ratepayer or a transportation authority's toll roads (Bonnell 2023). While municipal bonds have a lower risk of default than corporate bonds,

revenue bonds are generally perceived to be riskier than general obligation bonds because the repayment structure hinges on the funded project's ability to generate the revenue to pay back the bond (Chen 2024; Perennial Financial Services, n.d.).

There are a number of mechanisms cities can use to raise revenue to finance local climate projects, including creating a local tax like Los Angeles County's Measure M to fund transportation infrastructure, climate adaptation levies like Washington, D.C.'s Stormwater Retention Credits, and establishing a city green fund to catalyze private investment by using pooled public funds (C40 Cities 2019; C40 Cities 2024). While innovative funding strategies are worth further investigation, cities and municipalities are risk averse entities and are likely to fall back on tried-and-true methods of raising funds, of which debt instruments are one. Ninety percent of state and local capital spending is raised with debt financing (Marlowe 2015). According to a 2015 paper by the International City/County Management Association and the Government Finance Officers Association, financing capital projects through pay-as-you-go schemes or public-private partnerships are effective but are not yet a viable replacement for municipal bonds (Marlowe 2015).

2. Bonds as a green finance instrument

a. Defining green bonds

Green bonds are nearly identical to traditional bonds. Like traditional bonds, they are fixed income debt instruments that can be issued by corporations, national development banks, financial institutions, supranational organizations, sovereigns, and municipalities (Qadir and Pillay 2021). Green bonds can be general obligation or revenue bonds. The difference between a conventional bond and green bond is that the issuer publicly states that the proceeds of the bond will be used to finance or refinance new or existing projects that meet environmental,

sustainable, or climate goals (i.e., "green") in part or in full (Municipal Securities Rulemaking Board 2018). Projects with environmental benefits can include those related to renewable energy, energy efficiency upgrades, green infrastructure, waste and water management, or increasing the energy efficiency of public transportation systems (Center for Environmental Public Policy, n.d.; Fidelity Capital Markets 2021; Wilson 2024). There may be a number of reasons why investors choose to invest in green bonds. These include the tax benefits available with a muni bond issue and their own internal mandates to meet ESG goals.

There are many different flavors of green bonds. For example, blue bonds are a subset of green bonds that are directed to ocean conservation and climate bonds are directed toward the mitigation of greenhouse gas emissions and adaptation to the impacts of climate change. All of these label variations are colloquially understood to fall under the umbrella of green bonds. There are other distinct labels, like sustainability bonds, which merge climate and social goals, and social bonds, which aim to address a specific social goal and are a more recent outgrowth of the green bond market (International Capital Market Association 2020). There are still other classifications that stand as a distinct category, like environmental impact bonds or sustainability-linked bonds, which are structured and operate differently from green, social, and sustainability bonds.

b. Outlining the mechanics of a green bond issue

Many public entities at the local, regional, and state level have issued green bonds. These include city governments, school districts, utilities, transportation authorities, park and recreation districts, finance and development authorities, bond banks, and in the case of Connecticut, a green bank. Preparing to issue a green bond requires extensive coordination between the issuer's finance and sustainability departments or other relevant departments because issuance entails

identifying qualified assets and suitable projects. Issuers should be prepared to provide information to and field questions from investors about the green projects financed through the bond (Green City Bonds Coalition 2015). Additionally, given the requirements to report on the use of the green bonds, issuers must be able to track how the bond proceeds are allocated using special allocation codes (Green City Bonds Coalition 2015). Some municipal issuers might be deterred from green bonds because of these additional costs. Small cities' bond issuances may not reach the volumes considered reasonable for issuing a green bond in the first place. Cities with low credit ratings pay higher interest rates in issuing debt and due to a weak or non-existent greenium, these cities may not save any money issuing a green bond or it could prove too cumbersome and expensive for them to issue one.

c. The development of the municipal green bond market

The first green bonds were issued by the European Investment Bank and the World Bank in 2007 and 2008, spurred by the Intergovernmental Panel on Climate Change's 2007 report definitively linking human action to climate change and Swedish pension funds that wanted to invest their savings in climate-focused solutions (Pacific Investment Management Company LLC, n.d.; World Bank Group 2019). The first municipal green bond issued in the United States was issued by the state of Massachusetts in 2013 as a general property tax obligation bond. California, New York, and Washington, D.C. quickly followed suit, pioneering the green muni bond market in the U.S. (Soe et al. 2019). At the local level, the San Francisco Public Utilities Commission, Chicago Board of Education, District of Columbia Water and Sewer Authority, as well as the cities of Los Angeles, St. Paul, MN, Asheville, NC, Hartford, CT, Tacoma, WA, Venice, FL, and cities in the Puget Sound region were recognized as leaders of green city bonds (Climate Bonds Initiative 2015).

In its early years as a nascent market, a small number of large issuers, like the New York Metropolitan Transportation Authority, the San Francisco Bay Area Rapid Transit, and city water systems, were the majority of issuers of green municipal bonds (Levenstein and Michael, n.d.). Transportation and water-related infrastructure projects were the most common types of projects funded by green bonds (Saha 2016). Much like the entire sector of climate finance, there are fewer green bonds being directed to climate change adaptation projects (Qadir and Pillay 2021).

After the first muni green bond was issued in 2013, the U.S. green muni bond market expanded through 2017, reaching $12 billion (Levenstein and Michael, n.d.). In 2018, the market contracted to $5 billion due to the passage of the Tax Cuts and Jobs Act of 2017, which removed tax exemptions for advance refunding bonds (Levenstein and Michael, n.d.; Brennan 2020). Advanced refunding, as opposed to current refunding, applies to debt sold more than 90 days from the call date of the old bond and were used by issuers to secure more favorable rates when interest rates were lower; however, without the tax exemption, advanced refunding fell out of favor (Brennan 2020). The green muni bond market began to recover in 2019 (Levenstein and Michael, n.d.). In 2020 and 2021, the size of the green bond market set new records, surpassing $20 billion (Bredeson, Pabst, and Popoola 2024). This growth is reflected in the broader sector of green finance. According to Bloomberg, since 2014 green debt issuance trailed behind financing for oil, gas, and coal by a few orders of magnitude until 2021 when this gap closed, and green investments eked out a small lead (Henry and North 2024).

However, the market again contracted in 2022 and nearly regained its 2021 level in 2023 (Bredeson, Pabst, and Popoola 2024). While the “green, social, sustainability, and sustainability-linked” muni bonds segment broke records when it reached 11.1 percent of the overall U.S.

municipal bond market in 2023, the rate of increase year over year has cooled (Bredeson, Pabst, and Popoola 2024).

Political and market forces have shaped the growth and contraction of the green muni bond market over the past decade and will continue to influence its future trajectory. Green bonds, like conventional bonds, are susceptible to interest rate fluctuations, but they are also influenced by policy decisions, particularly those related to climate regulations (Antoniuk and Leirvik 2021). For example, the 2015 Paris Agreement on climate change had a positive impact on green bond indices, while the 2016 presidential election of Donald Trump and the U.S.' withdrawal from the Paris Agreement in 2017 had a negative impact on the returns of municipal green bonds (Antoniuk and Leirvik 2021). The temporary dip in municipal green bond issuance in 2018 previously mentioned is likely attributable to the passage of the Trump Tax Cuts and Jobs Act in 2017 (Li, Wang, and Yu 2023).

While it is difficult to detect how anti-ESG sentiment manifests in the muni green bond market, it is reasonable to expect that the legislation that Florida, Texas, and Utah passed in 2023 to prevent the use of ESG considerations in public investments has an impact on the muni green market (Farmer 2023). According to one Bloomberg Law article, as of July 2024, 20 states had enacted anti-ESG legislation (Kalra 2024). Advocates for local governments, like the National League of Cities, were bracing for changes to tax provisions in 2025 that could result in fewer bonds being issued. If Congress were to eliminate the tax-exempt status of municipal bonds, this would burden cities with higher borrowing costs and curb their ability to fund infrastructure projects (Moreno 2024). This is largely because the overwhelming majority of muni bonds issued are tax-exempt. In the first quarter of 2025, 90 percent of bonds issued by state and local governments were tax-exempt (Lautz 2025).

Chapter 2: Literature Review

The green label

Any entity may self-label bonds as "green." There are no regulatory requirements that entities must adhere to in issuing a self-labeled green bond or any one standard; however, over the past decade, the industry has coalesced around two, sometimes intertwining, methods of verification to give investors confidence in the environmental benefits of the bonds (Grene 2015; Green City Bonds Coalition 2015). The first is a second opinion by an independent, external party that reviews and verifies the greenness of the bond (Green City Bonds Coalition 2015). In fact, as the green municipal market has matured, it has become a more widely accepted practice for issuers to seek an independent review of their bonds. According to Kestrel, one such firm that verifies green bond issuances, 2022 was the first year more green bonds were independently verified than self-verified (Farmer 2023). There is an entire cottage industry that has emerged around providing external, independent reviews or second opinions of the "greenness" of green bonds. External reviewers can use their own methodologies or an established framework for verification of the bond (Bredeson et al. 2021). By following the latter process, issuers are pairing both verification methods because adherence to an established framework is the second method of verification.

Many frameworks have emerged that issuers of green bonds can voluntarily elect to follow to add credibility to their green bond issuance. While there are many non-binding, voluntary frameworks in existence, two of the most common are the Green Bond Principles and the Climate Bonds Standards, and they typify the difference between the alignment of a green bond to a set of guidelines and compliance to a set of standards to certify a green bond.

The Green Bond Principles were developed in 2014 by investment banks. Since the principles were first developed, they have moved under the management of an independent secretariat within the International Capital Market Association (ICMA) (Climate Bonds Initiative 2014). The Green Bond Principles have four main components, including:

1) the use of proceeds, which indicate in the legal documentation of the security that the proceeds of the bond will be used for eligible green projects (more on the categories of eligible green projects below);

2) the process for project evaluation and selection should be made clear to investors;

3) the management of proceeds of the green bond should be tracked by the issuer in a sub-account, sub-portfolio, or through some other formal internal process; and lastly,

4) reporting on the use of proceeds should be made available annually until the bond is fully allocated (International Capital Market Association 2021).

Eligible green bond projects recognized by the Green Bond Principles are broad and projects may fit within more than one category. The categories include renewable energy, energy efficiency, pollution prevention and control, environmentally sustainable management of living natural resources and land use, terrestrial and aquatic biodiversity, clean transportation, sustainable water and wastewater management, climate change adaptation, circular economy adapted products, production technologies and processes, and green buildings (International Capital Market Association 2021). Aside from these overarching categories of green projects, the Green Bond Principles offer complete latitude to issuers in determining the type of projects that are considered "green." Additionally, while it is recommended that an independent party conduct an external review to ensure that the green bond meets the four core components of the Green

Bond Principles, this is not a requirement of the principles (International Capital Market Association 2021).

Similar to the Green Bond Principles in scope, ICMA released the Sustainability Bond Guidelines framework in 2017 (Environmental Finance 2022). Sustainability bonds, according to these guidelines, must finance a combination of green and social projects exclusively (International Capital Market Association 2021). The New York State Housing Finance Agency is believed to be the first U.S. municipality to have followed the Sustainability Bond Guidelines for its almost $135 million issuance in 2019 to fund the construction of energy efficient affordable housing (Environmental Finance, n.d.). As a more recent innovation, there are fewer sustainability bonds than green bonds in the market, but this category is growing.

On the other hand, the Climate Bonds Standard, developed by the Climate Bonds Initiative (CBI), is the most stringent of the two (Yokoi-Arai and Altieri 2023). It was first developed in 2011 and is now in its fourth iteration. The Climate Bonds Standard differs from the Green Bond Principles in a couple of important ways. Unlike the Green Bond Principles, it requires an external review of the bond to be qualified to meet the Climate Bonds Standard (Garcidueñas Nieto 2023). Additionally, the Climate Bonds Standard is a framework with both a taxonomy and eligibility criteria that a green bond must meet to receive the Climate Bonds Standard certification, whereas the Green Bond Principles are a set of guidelines that encourage the use of existing taxonomies and project criteria (Yokoi-Arai and Altieri 2023). This means projects included in bonds that are Climate Bonds Standard-certified must meet a set of criteria to qualify as a "green" according to their particular project type (Green City Bonds Coalition 2015). There are standards for solar, wind, water, and low-carbon transportation, and low-carbon building projects to name a few (Green City Bonds Coalition 2015). Because of the additional

requirements, only a small subset of green bonds is Climate Bonds Standard-certified, in contrast to the Green Bond Principles, which cover almost the entire green bond market regardless of the issuer, the country in which the issuer is based, and the type of project(s) financed (Yokoi-Arai and Altieri 2023).

Build America Mutual's (BAM) GreenStar program arrived on the scene in 2018, later than ICMA's Green Bond Principles and CBI's Climate Bonds Standard (Levenstein and Michael, n.d.). BAM insures municipal bonds and it created the GreenStar program to "verify" bonds sold by its issuer-members that meet the ICMA's Green Bond Principles (Levenstein and Michael, n.d.). In this way, BAM serves as both a third-party verifier and offers its own verification program. However, inclusion in the BAM GreenStar program is not as rigorous as the Climate Bonds Standard and it offers no guarantee that bonds with BAM GreenStar stamp of approval meet all four of the ICMA Green Bond Principles. In designating a bond as a BAM GreenStar bond, the disclosure language states that the use of bond proceeds obtained by BAM aligns with *one* of the Green Bond Principles – not all (Build America Mutual Assurance Company 2024). Also, it "…does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives" (Build America Mutual Assurance Company 2024). The Climate Bonds Initiative recommends that issuers that receive GreenStar verification make the formal assurance statement from BAM public in its pre-issuance documentation. CBI also strongly encourages issuers to make information related to the details of the selection process of eligible projects, management of proceeds, and reporting practices publicly available to comply with best practice transparency standards (Climate Bonds Initiative 2019b; Climate Bonds Initiative 2019a). It is worth noting that the Bloomberg Terminal does not recognize BAM GreenStar verified bonds as meeting all four core components of the ICMA

Green Bond Principles. While the BAM GreenStar program may not be leading to more disclosure, transparency, and reporting on the impact of the projects funded through the bond, S&P Global reports that the introduction of the BAM GreenStar program in 2018 fueled more external reviews of green bonds among smaller issuers (Bredeson et al. 2021).

Certainly, a third-party review of bonds is an added cost to issuers. This, in addition to higher transaction costs, may lead one to wonder why a public entity would be willing to incur these costs to the taxpayer if the entity could finance the same green projects through a traditional bond issuance. Curtis, Weidemaier, and Gulati suggest that investors are driving this expectation because it provides increased transparency and certainty that the issuer will direct the green funds to environmental objectives (2023). There have been instances when issuers have folded projects of dubious nature into a green bond. For example, the Massachusetts State College Building Authority found itself in hot water when it came out that one of the projects included in its 2014 green bond issue was the construction of a 725-spot parking garage, which included electric vehicle charging stations (Bishop 2019). Critics argued that the expansion of car infrastructure is not an appropriate use of the green label (Darby 2015).

1. Greenwashing concerns

The sector coalescing around best practice standards like the ICMA Green Bond Principles should assuage fears of greenwashing, although it bears repeating that issuers are not bound by these principles nor obligated to obtain independent certification of the bond (Curtis, Weidemaier, and Gulati 2023). Some experts point to cracks in this system of checks and balances that may undermine the credibility of green bonds. Most green bonds' use of proceeds include language that states that the issuer will use funding to support green activities; however, Curtis, Weidemaier, and Gulati note that this promissory language is not necessarily a firm

commitment nor is it enforceable (2023). A stellar report from an independent reviewer is also no guarantee. Conducting adequate research and due diligence as part of the second party opinion does not necessarily ensure that it will be used for green purposes. For example, Mexico City Airport Trust issued $6 billion in green bonds in 2016 and 2017 to finance construction of the airport. It had exemplary green credentials but with a change in leadership, the government halted airport construction and Moody's lowered its assessment score, and S&P Global withdrew its green evaluation report.

Moreover, there are essentially no consequences if the issuer does not use the proceeds as originally stated (Curtis, Weidemaier, and Gulati 2023). Due to the nature of the bonds issued by U.S. municipalities, reneging on green commitments may be less of a concern because the use of proceeds is baked into the mission of the issuer, such as a water and sewer district's green bond to finance water infrastructure improvements (Curtis, Weidemaier, and Gulati 2023).

Even so, complete adherence to the Green Bond Principles does not ensure that the proceeds of the bond are used for transformative mitigation and adaptation actions and there are no standards or even requirements to measure the impact of the projects, let alone environmental, social or climate-related metrics. This means that it is left up to the issuer to ensure that the water infrastructure improvements proposed provide measurable and marked benefits to the environment. On the flipside, it would be important to ensure that the "green" label is not affixed to an environmentally questionable industrial practice that only aims to make its processes more environmentally friendly. Ostensibly, a green bond could be issued to build a road and qualify as green if it reduces congestion (Grene 2015).

Motivations driving municipal green bond issuance

1. Monetary

An oft-cited reason an issuer may choose to issue a green-labeled bond is the monetary benefits in the form of the green premium. Because the greenium is simply the difference in yield, the term can refer to both a positive and negative difference in yield. But in practice, a greenium most often refers to the lower or negative yield of the green bond as compared to a conventional bond, meaning an investor is willing to receive a lower return on bond to support "green" purposes. Where the greenium exists, cities save money by issuing a green bond over a vanilla bond. The presence of the greenium is an indicator that the issuer of a green bond receives some monetary gain from it. Research that has studied the greenium in corporate, sovereign, and municipal bond markets finds mixed results (Curtis et al. 2023).

Karpf and Mandel found that municipal green bonds are priced more favorably than vanilla bonds by a margin of eight basis points (2018). Yet, Lacker and Watts found the greenium to be nonexistent for U.S. municipal green bonds (2020). According to their research, in a sample of 640 pairs of green and non-green bond issues, where the pairs were identical both in maturity and rating, the difference in yield between green and non-green issues was zero (Larcker and Watts 2020).

Other research suggests that green bonds issued by different types of entities that have been externally certified have a higher premium than self-labeled green bonds (Sangiorgi and Schopohl 2023). Dorfleitner, Eckberg, and Utz found that green municipal bonds with a second party opinion have higher liquidity than those without (2023).

In the case of sovereign green bonds, Bolton et al. found that countries that are more exposed to climate change and have higher climate vulnerability have a higher greenium, suggesting that there is an appetite among investors to fund climate mitigation and adaptation

projects where they are most needed (2022). A one standard deviation increase in climate vulnerability is associated with an 11 basis points increase in the greenium (Bolton et al. 2022). However, this effect has not been studied at the subnational level.

2. Marketing

Unlike price advantages, the non-monetary benefits of green bonds that are frequently cited in literature, whether the issuers are municipalities or corporations, are generally more difficult to measure. The first of these benefits is the signaling or marketability of an issuer's good environmental intentions, leading to reputational gains (ElBannan and Löffler 2024; Hardy 2023). For cities specifically, green bond issuance framed as a marketing strategy manifests as drawing attention to the city's climate plans, priorities, and strategies to draw investors (C40 Cities 2022). Two separate surveys sought to identify the motivations of issuers in issuing green bonds. By surveying green bond issuers across sector and continents, Gyura found that the majority respondents were driven to issue green bonds because it fit with their communication and marketing strategy or to fulfill or enhance their corporate sustainability program (2020). Similarly, Sangiorgi and Schopohl found that the reputational benefits were the strongest motivating factor for issuing a green bond, followed by the desire to signal to the market (2023). In both surveys, municipal issuers were not the only type of respondents nor were survey responses subset by issuer type, so it is impossible to know in what ways their responses differ from other issuers, representing the private sector or financial institution.

3. Investor demand

Expanding and diversifying the pool of investors with an interest in the city is another benefit frequently noted, particularly those bent towards socially responsible investing. Sources highlight a larger investor base could have cascading benefits. Cities may find that their bonds

are oversubscribed, have more favorable pricing, and even reduced borrowing costs (Henry and North 2024). DC Water and Sewer Authority was the first water utility in the U.S. to issue a green municipal revenue bond (Green City Bonds Coalition 2015). According to the CFO of the water utility, its initial $300 million offer was oversubscribed, with $1.1 billion in orders, so it increased its bond to $350 million. DC Water was able to lower the bond yield spread by 15 basis points, meaning investors were willing to accept a lower premium, thereby saving the utility and ratepayer money (Green City Bonds Coalition 2015; Ganti 2024). Nearly a third of the investors of its $350 million green bond were socially responsible investors (Green City Bonds Coalition 2015). Other water agencies have reported that their green bonds, which are more likely to have been green revenue bonds, have attracted greater interest from non-traditional investors, as well as instilled trust with their ratepayers and helped smaller utilities who are not issuing debt as frequently as larger issuers increase the visibility of their bonds (Association of Metropolitan Water Agencies 2021).

4. Honoring commitments

Other advantages of issuing a green bond are that it builds collaboration and internal processes between environmental and finance departments within cities and helps cities maintain a heightened focus on environmentally beneficial projects, although no evidence is offered to this effect (C40 Cities 2022; Green City Bonds Coalition 2015). Sangiorgi and Schopohl's research suggests that green bonds can function as an internal commitment device or a green-bonding mechanism for the issuer (2023). Through surveys of green bond issuers of all types, they found three quarters of their respondents indicated that issuing green bonds strengthened their internal commitments to sustainability (Sangiorgi and Schopohl 2023). ElBannan and Löffler extrapolate

these findings to suggest that green bonds provide organizational benefits, which could by extension lead to improved environmental performance (2024).

5. Measuring the impact of green bonds

Green bonds are often criticized or questioned for their lack of "additionality," meaning that the green projects proposed were going to be included as part of a bond issuance regardless of whether they had a green label attached to them, casting doubt as to whether the green bond market is contributing any new funding (Grene 2015) or responsible for additional environmental projects (Gyura 2020). The presence of a greenium, in theory, may indicate that cities are able to fund more green projects than would be possible with a vanilla bond (Grene 2015) but in the absence of cheaper funds, green bonds may not be generating new or additional projects. In Gyura's survey, most green bond issuers of all stripes indicated that the projects would have been accomplished even if the green bond had not been issued (2020). Since a sizable portion of green bonds are refinanced projects that are relabeled as green, skeptics claim that green bonds do not lead to investments in new green projects (Curtis et al. 2023). Proponents of green bonds counter that this fact does not discount their impact. Campi, Peters, and Richards found municipal green bond issuance correlated to pollution reduction in nine counties in California (2024). However, there was a weaker correlation between municipal green bond issuance and climate change mitigation. Moreover, while the Green Bond Principles state that issuers should report on the use of proceeds of the bond, they are not under any obligation to provide an accounting of the environmental or climate impact of the projects funded by the issuance (Green City Bonds Coalition 2015).

Chapter 3: Methods

The goals of this research are two-fold: to explore 1) the motivations and perceived benefits driving the issuance of green bonds and 2) how political and economic contexts and forces in the first six months of 2025 are shaping the green municipal bond market. Interviews with city staff and other subject matter experts were central to this research to ascertain the perceptions driving and shaping green bond issuance. Interviews were conducted with staff in finance departments of the issuing entities and public finance experts who work with municipalities and are knowledgeable about green municipal bonds.

Cities that had issued certified green general obligation bonds were identified as prospective interview subjects using the Bloomberg Terminal, a software that allows users to find data on fixed-income securities, like municipal bonds (The Investopedia Team 2025). Searches using the Bloomberg database produced lists of municipal green bonds issuers from the first green municipal bond issued in the United States by the state of Massachusetts in 2013 to November 2024. Because there are more verified green and sustainable bonds than can be analyzed within the time constraints of this research, only municipal bonds that were verified by an independent party to be aligned with the ICMA Green Bond Principles or Sustainability Bond Guidelines were included.

Additionally, separate searches were conducted to identify and distinguish between issuers of green revenue and green general obligation bonds. As described below, these lists served two functions. First, when analyzed together these lists were comprehensive of all green municipal bonds issued in the U.S., assuming that the Bloomberg database identified all of them and tagged them correctly. Included in the lists were verified green municipal bonds of all types, including revenue and general obligation bonds, and from any type of issuer of municipal bonds,

including city governments, water and other public utilities, transportation and development authorities, and even school districts. As such, these lists allowed for a macro-scale analysis of green municipal bond issuances in the U.S. conducted through statistical methods. Second, the segmented list of municipal issuers of green general obligation bonds identified from the Bloomberg Terminal from which city and regional governments and other local government entities were selected was used for a more thorough analysis of the issuances and interviews with staff or experts familiar with the issuing entity or the issuance.

Preparing data for statistical analysis

To prepare the list of green municipal bond issuers originating from Bloomberg for the statistical analysis, the geographic area(s) served by the issuance by county had to be manually identified and added to the data. The Bloomberg database only provides the name of the issuing entity and the state where the issuing entity is located. It does not include the geographic area(s) served by the issuance. For the purposes of this analysis, municipal green bond issuances at the state level were manually identified and excluded so as to focus solely on issuances at the local level. Yet, even among local entities that issue green municipal bonds, there are different scales of geographic areas served by an issuance. While some of these entities serve an entire county or multiple counties, in the case of city governments, their bond issuance is limited to the city boundary. It was assumed that every issue served an entire county, *even if* the issuer of the bond was a city government that did not serve the entire county in which it is located.

To understand the level of risk faced by the counties where green municipal bonds have been issued, the list of certified green municipal bonds was joined with the U.S. Federal Emergency Management Agency's (FEMA) National Risk Index in ArcGIS Pro. FEMA's National Risk Index is both a dataset and online tool that combines data related to estimated

annual loss attributable to 18 environmental hazards, social vulnerabilities, and community resilience into a risk composite score at both the census tract- and county-level. A county's composite score comes from its percentile ranking of risk among all other counties. The higher a county's National Risk Index Composite Score, the more risk to natural hazards the county faces. While this analysis used the National Risk Index as a proxy for risk to climate change, it is important to note that this is an imperfect measure. The index was not built to factor in climate projections, and it measures risk from environmental hazards, not explicitly climate risks. The data contained within the tool was last collected between June 1, 2021 through December 31, 2022.

A simple logistic regression was run using the generalized linear regression tool in ArcGIS Pro to determine if the level of natural hazard risk at the county-level or county presidential election returns for 2020 can predict the issuance of a green municipal bond. The independent variable in this model was the FEMA National Risk Composite Score, and the dependent, dichotomous variable was whether a certified green municipal bond issuance had been issued within the county (coded as 1) or not (coded as 0). The regression was used to determine whether the relationship between the two variables was statistically significant and to measure the strength and direction of the relationship.

Separate regression models were run for the disaggregated factors that make up a county's overall risk score. These include the composite score of the expected annual losses from environmental hazards, the social vulnerability score, and the community resilience score. In each of these separate models as explained above, the independent variable was one of the four composite scores listed above, and the dependent variable was the issuance of a certified green municipal bond. Each of these four models are detailed in Table 1 below.

In replicating the simple logistic regression model above, the same generalized linear regression tool was used in ArcGIS Pro to determine whether the political context that may shape the decision-making of local government officials and staff predicts whether a certified green municipal bond was issued. First, the list of certified green municipal bonds was joined with county-level election return data from the 2020 U.S. presidential election. This polygon layer was prepared by Esri Tutorials with data from MIT Election Data and Science Lab's database "County Presidential Election Returns 2000-2020." Similar in structure to the first set of four regression models, these two regression models had as their independent variable, the 2020 presidential election returns by county. One logistic regression model's independent variable was the percent of votes by county for the Democratic candidate for the 2020 presidential election and the other model's independent variable was the percent of votes by county for the Republican candidate for the 2020 presidential election. The dependent, dichotomous variable in these two models was once again the presence of a certified green municipal bond issuance in the county (coded as a 1 or 0 depending on whether a certified green municipal bond had been issued). The two logistic regression models are included in Table 1. The regressions were designed to determine whether the 2020 presidential election returns correlate to the issuance of a certified green municipal environment and the strength and direction of this relationship if present.

Table 1: Logistic regression models run for quantitative analysis

Model	**Regression Type**	**Dependent Variable**	**Independent Variable**
1	Logistic	Issuance of bond (0 or 1)	National Risk Index Composite Score
2	Logistic	Issuance of bond (0 or 1)	Estimated Annual Loss Score
3	Logistic	Issuance of bond (0 or 1)	Social Vulnerability Score

4	Logistic	Issuance of bond (0 or 1)	Resilience Score
5	Logistic	Issuance of bond (0 or 1)	Percent of votes for Democratic presidential candidate by county
6	Logistic	Issuance of bond (0 or 1)	Percent of votes for Republican presidential candidate by county

Selecting municipal bond issuers for case study analysis

After reviewing the names of the entities that had issued either a certified green municipal revenue bond or a certified green municipal general obligation bond, it was determined that a subset of issuers of general obligation bonds would be selected for further study and analysis. The reasons for this are two-fold. Firstly, city, municipal, and other regional forms of government are more likely to issue a green general obligation bond than a green revenue bond, and as these entities are the focus of this research, general obligation bonds comprised all in-depth case studies. Secondly, even if a municipal government is listed as an issuer of a green revenue bond, by virtue of being a revenue bond, the supported project is a revenue generating project. The bulk of capital improvements and projects undertaken by city or municipal governments are not revenue generating. While valuable insights could be gleaned from focusing on green revenue bonds, the differences between revenue bonds and general obligation bonds make extrapolating lessons from either and applying to the other difficult.

Of the 20 issuers of certified green general obligation bonds, 12 were either city, county-level, or regional governments or a special-purpose district. The remaining eight issuers were water and/or sewer or transit districts and were excluded from further analysis because they are likely distinct from the local government that serves the same constituents. Unlike the park district and port authority included in the case study analysis, the excluded eight issuers provide a specific service to ratepayers or users rather than a multitude of services to constituents, like

the park district and port authority. In this way, the 12 issuers more closely resemble one another in terms of services provided.

Key information about each of the 12 issuers of certified green general obligation municipal bonds was collected from the official statements of each bond offering published by the Municipal Securities Rulemaking Board's Electronic Municipal Market Access, and in some cases supplemented by information provided on the issuer's website. The official statements were reviewed to determine the stated use of the bond proceeds and whether they were taxable.

Each of the 12 entities were contacted for interview requests to supplement the information collated from the official statements of the bond issuance. Seven phone or virtual interviews and one email correspondence were conducted with current or former staff of the 12 identified entities. The interview subjects are identified in Table 2 below. A smaller subset of the interviews is cited in the findings section. Several of the entities that issued green general obligation municipal bonds either did not respond to interview requests, did not provide enough detailed information or information beyond what was publicly available through the official statement, or directed the inquiry to the financial consulting company that helped them prepare the green bond. This financial consulting company, in turn, did not respond to requests for comments.

Six public finance experts who work or have worked with municipalities and are knowledgeable about green municipal bonds were also interviewed. The interview subjects are identified in Table 3 below. The public finance experts were contacts recommended by city staff or other experts. Other experts who have studied green bonds, capital planning processes, or provide second party assessments of green bonds were contacted but they did not respond to interview requests.

Each interview was unique but all centered on similar themes and questions, including the existence of a green premium or other intangible benefits, the decision-making process in determining to float a green-labeled bond, and in the case of government staff whether the entity is likely to issue a green bond in the future, and in other cases speculating what the future of municipal green bond market will look like. The initial interview questions are provided in Appendix A. However, as the research process evolved and, in an effort, to cater to the responses provided by the interview subjects in real-time, the questions posed were altered. The research was "not human subjects research" as determined by the Institutional Review Board (IRB). The IRB determination letter is provided in Appendix B.

Table 2: List of interviews with issuers of certified green general obligation bonds

Interviews with issuers of certified green general obligation bonds		
Name	**Job title and city affiliation**	**Interview Type**
Drew Smith	Former Treasurer and Deputy Chief Financial Officer at the City of Boston (MA)	Video conference
Mark Ruff	Former Chief Financial Officer and City Coordinator at the City of Minneapolis (MN)	Phone call
Allen Hoppe	Director of Banking, Investments, and Debt at the City of Minneapolis (MN)	Phone call
Holly Huston Sarah Brown Neal Younghans Michael Solomon	Vice President of Finance at the Saint Paul Port Authority (MN) Treasurer at the City of Saint Paul (MN) Debt Manager at the City of Saint Paul (MN) Chief Financial Officer at the Saint Paul Port Authority And former Treasurer at the City of Saint Paul (MN)	Video conference
Deborah Spaulding	Assistant General Manager for Finance and Management Services / CFO for the East Bay Regional Park District (CA)	Video conference
Karl Nygard	Finance and Administrative Services Manager at King County (WA)	Phone call
Beth Cohen	Policy Coordinator at Metro Regional Government (OR)	Video conference

Mario Arena	Deputy Finance Commissioner at the County of Westchester (NY)	Email correspondence

Table 3: List of interviews with public finance professionals and experts

Interviews with public finance professionals and experts		
Name	**Job title and professional affiliation**	**Interview Type**
David Brodsly	Managing Director at KNN Public Finance	Video conference
Mike Brown	Global Cities Lead at the Climate Bonds Initiative and former Environmental Finance Manager at the San Francisco Public Utilities Commission	Video conference
Craig Hill	Managing Principal at NHA Advisors, LLC	Phone call
Anonymous	Municipal Financial Advisor	Phone call
Raul Amezcua	Senior Managing Director, Samual A. Ramirez & Co., Inc., and member of the California Green Bond Market Development Committee	Phone call
Candace Partridge	Expert in the U.S. green municipal market, completing doctoral research on the topic	Video conference

Chapter 4: Findings

Local governments that issued certified green general obligation bonds and the financed projects

Since the first municipal green bond issuance in 2013 and up until November 2024, 12 local or regional governments have issued certified green general obligation bonds according to searches conducted through the Bloomberg Terminal (Bloomberg L.P. 2024). A list of these issuers, as well as information about the projects funded through the green bond issuance as specified through the official bond statement, is provided in Table 4 below.

Green revenue bonds have been excluded from this in-depth analysis because cities do not generally issue revenue bonds. Rather, water utilities, regional transit authorities, state-level housing and financing authorities, and county or state-level industrial development authorities issue green revenue bonds. There are 124 entities that have issued certified green municipal revenue bonds—many more than have issued certified green general obligation bonds.

Table 4: List of certified green general obligation bonds

Certified Green General Obligation (GO) Bonds Independently reviewed to ensure alignment with ICMA Green Bond Principles		
Issuer	**Projects supported by the bond(s) identified in the Official Statement**	**Bond Credit Rating**
City of Berkeley, CA	Through three series in 2020, the City of Berkeley: 1. Issued a $38M federally taxable GO sustainability bond in April to fund the construction or improvement of affordable housing using green building standards. The six affordable housing projects are designed to meet the Leadership in Energy and Environmental Design (LEED) or GreenPoint sustainable building design (City of Berkeley "2020 General Obligation Bonds" 2020). 2. Issued a $7.79M and $11.69M federally tax-exempt refunding GO	S&P: AA+

	green bonds in April and May respectively to refund the renovation and rebuilding of four neighborhood libraries. Two received LEED Silver, one received LEED Gold, and one received LEED Platinum certifications (City of Berkeley "2020 Refunding General Obligation Bonds, Series A" 2020; City of Berkeley "Refunding General Obligation Bonds, Series B" 2020).	
City of Boston, MA	Boston issued a $23.885M tax-exempt green GO bond in 2020 to fund: • Sea-level rise flood-proofing and energy efficiency renovations for a community center. • Elevating harborwalk four feet, raising athletic fields, and strengthening seawall of a park and playground. • Energy efficiency and indoor air quality improvements to meet LEED Silver standards for construction of new Boston Arts Academy building. • Renew Boston Trust program, which installs energy- and water-saving upgrades to 44 identified municipal buildings (City of Boston 2020).	S&P: AAA Moody's: Aaa
City of Minneapolis, MN	Through two separate tax-exempt green GO bond issuances, one in 2018 for $96.22M and the other in 2019 for $114.4M, Minneapolis financed construction of a new Public Service Center and a new storage and maintenance facility to operate the solid waste and recycling program, as well as a vehicle maintenance facility. Both projects were designed to LEED Gold certification and aligned with the strategies set forth in the City's Climate Action Plan (City of Minneapolis 2018; City of Minneapolis 2019).	S&P: AAA Fitch: AA+
Port Authority of Saint Paul, MN	The Saint Paul Port Authority issued a $16.04M sustainability GO bond in 2022, broken into a $10.02M tax-exempt bond series and a $6.02M taxable bond series, to fund the removal of thousands of ash trees that have been infested with the Emerald Ash Borer and the planting of approximately 13,000 diverse variety of trees on city boulevards, in the public right-of-way, and on other city land. According to official documents about the project, replanting efforts were to be expedited for neighborhoods with the lowest tree canopy, which are predominantly low-income or Black, Indigenous, and People of Color (BIPOC) communities to address disparities and exceed 1:1 replantings. The City and the Port Authority also created a jobs program related to the tree replanting program (Port Authority of the City of Saint Paul "Tax-Exempt General Obligation Bonds Series 2022-1" 2022; Port Authority of the City of Saint Paul "Taxable General Obligation Bonds Series 2022-2" 2022).	S&P: AAA

City of Groton, CT	City of Groton issued a $28.195M green GO bond in 2022 to finance wastewater upgrades, water distribution upgrades, electric transmission line, electric distribution upgrades, and improvements to water system (City of Groton 2022).	S&P: AA
Town of Wareham, MA	Town of Wareham issued a $13.52M green GO bond in 2020 to finance construction of a new energy efficient elementary school designed to achieve LEED for school standards and improve building energy and water conservation measures (Town of Wareham 2020).	S&P: AA+
City of Watertown, MA	City of Watertown issued a $26.79M green GO bond in 2022 to finance some of the state's first net-zero elementary schools and substantially improve the energy performance of another elementary school through renovations and additions. These facilities feature solar arrays, electric vehicle charging, high-performance building materials, and green stormwater infrastructure (City of Watertown 2022; City of Watertown, n.d.).	S&P: AAA
East Bay Regional Park District, CA	The Park District has issued two green GO bonds to finance land acquisition, habitat restoration, trail construction, and shoreline protection from sea level rise. Both bonds were authorized through a 2008 ballot measure that provided for the levy of an additional property tax to service the bonds. 1. Issued a $20.045M refunding series GO bond and a $30M GO bond series in 2017 (East Bay Regional Park District "Series 2017B-2 General Obligation Refunding Bonds" 2017; East Bay Regional Park District "Series 2017A-2 General Obligation Bonds" 2017). 2. Issued a $30M GO bond in 2022 (East Bay Regional Park District "General Obligation Bonds, Series 2022A-2" 2022).	S&P: AAA Moody's: Aaa
Tualatin Hills Park & Recreation District, OR	The Park District issued a $13.265M green GO refunding bond in 2021 to refund bonds issued in 2011 that financed natural area preservation, recreational facility improvements, and trail expansion projects (Tualatin Hills Park & Recreation District 2021).	Moody's: Aa1
King County, WA	King County issued a $31.23M limited tax green GO bond in 2017 to finance the development and construction of three transfer stations built to green-build standards and the undertaking of environmental remediation and habitat restoration to remove a dock from one of the County's transfer stations and to restore the sites of closed landfills (King County 2017).	S&P: AAA Moody's: Aaa Fitch: AAA

Metro Oregon, OR	Metro Oregon, a regional government and metropolitan planning organization, issued a $90M taxable sustainability Go bond in 2020 as part of the 2019 voter-approved $475M bond measure to support environmental programs, community nature access projects, and preserving public parks. These project categories align with 2040 Growth Concept, Metro's long-range plan for sustainable development. Of the $90M bond: • $40M will be directed to a grants program that funds community-led projects that benefit marginalized communities and improve water quality, support climate resiliency, and increase access to nature. • $50M will be directed to support large-scale projects that increase access to nature in urban areas and leverage other investments in affordable housing and transit to connect communities to local parks (Metro, Oregon 2020).	S&P: AAA Moody's: Aaa
Westchester County, NY	County issued a $24.775M tax-exempt green GO bond in 2022 to finance nitrogen removal equipment, sewer system rehabilitation, upgrades to wastewater treatment plants and a pumping station, electric and hybrid bus replacement, and EV charging stations and infrastructure (County of Westchester 2022).	S&P: AA+ Moody's: Aa1 Fitch: AA+

1. <u>The connection between climate risk, political leanings, and certified green bonds</u>

The City of Boston, much like other coastal cities, is susceptible to sea-level rise, but unlike its peer cities, it is more reliant on property taxes to function (Yushchyshyn 2024). This is a dangerous combination that creates high fiscal exposure to climate change. In 2020, 67 percent of the city's general fund revenue came from property taxes, while property taxes in other cities like Atlanta, Washington, D.C., Philadelphia, and Houston make up between 14.5 to 50.3 percent of their revenue (Hincken 2022). In fiscal year 2026, nearly 72 percent of Boston's revenue is projected to come from property taxes (City of Boston 2025). Property tax revenue losses due to flooded taxable parcels swallowed up by encroaching sea level rise will put Boston in financial

precarity. Based on estimates from 2015 fiscal conditions, one study found that six feet of sea level rise will impact 16 percent of Boston's gross revenues (Shi and Varuzzo 2020).

It is within this landscape that the City of Boston issued its first green general obligation bond in 2020 to fund flood proofing measures and the much lauded Renew Boston Trust program. The City of Boston, like all the other cities and local entities listed above, would have issued a bond to support these projects regardless, whether as a green-labeled bond or as an unlabeled bond. Issuing the bonds as green bonds did not make the financed projects more green, sustainable, or climate conscious, but evidence suggests that issuers were more likely to issue certified green bonds where the risk to natural hazards are greater.

City and regional governments, school districts, metropolitan planning organizations, transportation and development authorities, and water and other public utilities in 135 counties (which include three independent cities in the state of Virginia and the District of Columbia) across the United States have issued certified green general obligation or revenue municipal bonds. The results from the simple logistic regression described in the Methods section suggest that a county with greater risk to environmental hazards – a proxy for climate change vulnerability – was more likely to have issued a certified green bond itself or have had a city within its boundaries issue a green bond. The regression measured the strength and direction of the relationship between the National Risk Index Composite Score and the dichotomous dependent variable indicating whether a certified green municipal bond had been issued in the county. The analysis concluded that the counties with greater risk from natural hazards predict the issuance of a certified green bond and the relationship between these variables is statistically significant, with a p-value less than 0.05 at 0.00 and a positive coefficient of 0.05. Similar regressions were run by taking the data from the three individual components that make up the

National Risk Index. The results of which are described in the subsequent paragraphs and captured in Table 5 below.

Table 5: Results from logistic regression models

Model	Regression Type	Dependent Variable	Independent Variable	Coefficient (standard error)	P-Value
1	Logistic	Issuance of bond (0 or 1)	National Risk Index Composite Score	0.045726 (0.004888)	0.00
2	Logistic	Issuance of bond (0 or 1)	Estimated Annual Loss Score	0.047759 (0.005021)	0.00
3	Logistic	Issuance of bond (0 or 1)	Social Vulnerability Score	-0.003464 (0.003282)	0.54
4	Logistic	Issuance of bond (0 or 1)	Resilience Score	0.02067 (0.003641)	0.00
5	Logistic	Issuance of bond (0 or 1)	Percent of votes for Democratic presidential candidate by county	0.058914 (0.005362)	0.00
6	Logistic	Issuance of bond (0 or 1)	Percent of votes for Republican presidential candidate by county	-0.058888 (0.005349)	0.00

The Expected Annual Loss score for a county is the average economic losses to buildings, population, and agriculture caused by natural hazards and it is quantified for each of the 18 hazard types, including drought, coastal and riverine flooding, and wildfire, to name a few (Zuzak et al. 2023). The results of the regression show that the higher expected annual losses from environmental hazards, the more likely the county will have issued a certified green municipal bond. The relationship between these two variables is statistically significant, with a p-value of 0.00. The variables move together, which means that if the expected annual loss score is lower for a county, the probability that a green municipal bond would have been issued in its boundaries is much lower. The coefficient was 0.05. Intuitively, this result makes sense because

local government entities would likely face more pressure to reduce losses if they faced more risk to their population, buildings, and agricultural production than their neighbors.

The Social Vulnerability score is comprised of 16 socioeconomic variables that impact a county's susceptibility to environmental hazards and its ability to prepare and recover from such hazards (Ibid). Socioeconomic variables include economic characteristics, like the percentage of residents with housing cost burdens and those that live below 150% poverty, and social characteristics, like the percentage of residents aged 65 years and older (Ibid). The results of this regression show that there is a weak, negative correlation between social vulnerability and municipal green bond issuance. The coefficient is -0.00. It is unsurprising that the higher the social vulnerability score a county has, the less likely it would have a green bond issuance. Green bond issuances, even more so than vanilla bond issuances, require additional costs and administrative burden to staff to prepare all the materials necessary for an issuance, as well as reporting on the use of proceeds of a green bond. Counties with greater social vulnerability may have fewer local public resources at their disposal because of a lower-income tax base to issue a green bond. However, even though the direction trended in the direction one would expect, the results are not statistically significant, with a p-value of 0.54.

FEMA's Community Resilience score is based on the University of South Carolina's Hazards and Vulnerability Research Institute's Baseline Resilience Indicators for Communities Index (Ibid). It uses 49 indicators across six different types of resilience: social, economic, community capital, institutional capacity, housing/infrastructure, and environmental (Ibid). The results of the regression indicate that counties that are better prepared to recover from natural hazards are more likely to issue a certified green municipal bond, and this relationship is statistically significant, with a p-value of 0.00. However, the strength of the relationship is not

particularly strong, as the coefficient is 0.02. This relationship might also move in the opposite direction as well, meaning issuing a certified green bond may indirectly boost the resilience score.

The separate simple logistic regression using the presidential election returns found that there is a statistically significant relationship between the percentage of GOP and Democratic votes in the 2020 presidential election by county and the issuance of a certified green municipal bond within the county boundary, with p-values less than 0.05 at 0.00. Counties with a higher percentage of votes cast for the Democratic candidate in the 2020 presidential election, the more likely the local public entity or entities will have issued a green municipal bond (coefficient is +0.06). And inversely, the higher the percentage of votes cast in the county for the GOP candidate in the 2020 presidential election, the less likely local governments in the county were to have issued a certified green bond (coefficient is -0.06). It is important to note that this analysis is based off one election cycle. There are undoubtedly limitations in measuring relationships between variables that are years removed from one another. Some of these bonds were issued as far back as 2014 and the political context is likely to have changed from the six years between issuance and the 2020 election, as well as in the five years since the 2020 election from present day.

While this analysis did not control for other variables, such as the population size of the county or the credit ratings of the issuing entity and the size of its annual budget, it indicates that municipal issuers may be more willing or feel compelled to experiment with this green finance strategy if the risk to climate change impacts is significant. With the caveat that, like climate change itself, green bonds as a green finance tool might be susceptible to politicization.

From capital planning to bonds: the journey of green projects

This section synthesizes conversations with city and local government staff and independent research.

1. How issuers determine whether to finance a project through a bond issuance

It bears repeating that the decision to issue a green-labeled bond starts first with the decision to issue a bond to finance a specific project or projects as outlined in the capital plan. This means municipal issuers choose bonds as the financing mechanism when it is the most cost-effective strategy, and it is only from this point that issuers may determine to float the bond with the green label. The City of Saint Paul and the Saint Paul Port Authority's 2022 sustainability bond demonstrates this. A bond issuance enabled the city to secure enough funding to eliminate a liability more quickly through the removal of trees infected with Emerald Ash Borer and replant new trees in a shorter timeframe than if funding had to be in hand before a tree was replanted. In short, what would have been a 20-year project to remove and replace trees with the annual forestry budget took five or six years. The city had also considered issuing a green bond for a geothermal project but ultimately determined to pay for it with cash.

Depending on the laws dictating municipal bond issuance, generally municipal issuers must seek approval from voters to issue bonds (Tax Policy Center 2024). The East Bay Regional Park District (EBRPD) is one such case. Voters approved a $500 million bond measure to expand regional parks and preserve open space and wildlife habitat in 2008 (East Bay Regional Park District, n.d.). As part of the $500 million bond measure, EBRPD issued $30 million bond as a green bond in 2017. According to Deborah Spaulding, Assistant General Manager, Finance & Management Services/CFO at EBRPD, projects that have a clear proximity and link to voters receive higher voter approval. Because the District spans two counties, covering a wide

geographic area, EBPRD has found that voters are more supportive of projects that demonstrate tangible benefits to their community. In this way, issuers whose broad reach touches multiple counties have a different orientation than cities when bringing projects to voters. The efforts and actions undertaken by city governments to address the impacts of climate change can be more diffuse. Cities can afford to be theoretical in a way that park districts cannot.

2. The green projects that comprise a green bond

The decision to issue a bond is largely influenced by the pipeline of projects and their timeline for implementation, as dictated by the issuer's capital plan. A city or other municipal government would only issue a green bond series separate from other bond issuances if it made sense to have a project be a standalone series or can be packaged together with other projects that would be good candidates for a green bond issuance. According to Allen Hoppe, who directs debt issuance for the City of Minneapolis, the city's decision to issue a green bond in the future will likely be determined by whether the city has a set of green projects that require financing at the same time. Similarly, Mario Arena, Deputy Finance Commissioner at the County of Westchester, NY, believes that their administration would approve another green bond issuance if they had another year where there was a critical mass of qualifying projects.

Larger municipalities that issue bonds more frequently (Fulkerson, Haskell, and Johnston 2023) likely have a greater number of green projects to choose from. The City of Boston, a frequent issuer in the bond market, selected projects of the deepest shade of green for inclusion in its green bond issuance in 2020, while issuers with a smaller volume of issuances have fewer eligible projects.

Financing a project through a green bond does not make the project more environmentally friendly or accelerate the type of decarbonization or adaptation measures taken.

For example, during the Boston City Council Post Audit and Oversight hearing in 2021 regarding the city's 2020 green and social bond, a city councilor asked city leaders why they had not pursued a higher LEED certification for a building funded through its green bond issuance (Boston City Council 2021). The answer was cost considerations. Designing it to a higher LEED level would mean cutting costs elsewhere. In a similar vein, former Chief Financial Officer for Minneapolis Mark Ruff recalled debates around whether one of the buildings funded through the green bond issuance should be heated by natural gas and electricity, as LEED certification does not dictate the type of energy source used in the building. In this way, green bonds take a similar approach, evaluating the greenness of the project holistically.

3. Shaping project design and capital planning pre-issuance

It is in the early design and planning of projects that determines how "green" the bond-financed projects are. The dual social and environmental goals of two of the sustainability bond issues examined through this research were features of the project rather than solely a label applied at the time the bond is floated. As such, this means that to construct more climate ambitious or greener projects, whether for an eventual green bond issue or otherwise, requires intervening pre-issuance.

In city staff's recounting of the origins of Saint Paul's Emerald Ash Borer project, they recognized that there was a discrepancy in the way trees were being managed across the city, and it was constituents and residents calling about tree equity who moved the needle. It had been 10 years since tree canopy data had been last updated, so this project pushed the city to uncover data gaps. GIS mapping helped them understand where the trees infested with the Emerald Ash Borer were being taken down and where they were being replanted and proved to be useful tool in

identifying vulnerable populations improving tree equity. The focus on racial equity trickled down in other departments.

For the City of Berkeley, CA, its first sustainability bond to fund affordable housing and green building design can trace its origins long before the first green municipal bond was issued in the United States. The David Brower Center and Oxford Plaza in Berkeley were built in 2009 as a mixed-use development that includes residential meeting space, office space, retail, a restaurant, public parking, and 97 units of affordable housing (David Brower Center, n.d.). The Center received a LEED Platinum rating and was the first building of its kind in Berkeley (David Brower Center, n.d.). According to Craig Hill, it created a model that other affordable housing projects in the city have since emulated. Thus, when the city issued its first green and sustainability bond in 2020, it had a pipeline of projects that were a good fit for the green and sustainability designation.

While these examples are illustrative, they do not represent systematic efforts to influence all projects before they are floated as bonds. To have a broader impact, interventions must be aimed at the capital planning process. A Milken Institute report calls for the integration of sustainability in municipal capital planning before a green bond is issued (Brennan 2020). While cities like Minneapolis and Dallas include environmental sustainability as a part of their scoring framework for capital project proposals, the report recommends that all projects be analyzed for the amount of water, pollution, or greenhouse gas emissions reductions it contributes, the lifecycle cost to protect the asset from climate change and the cost of not investing in sustainability based on anticipated climate hazards (Brennan 2020). According to the report, this information would be totaled across all projects included as part of the bond issuance

(Brennan 2020). However, it is unclear if any cities have adopted such a comprehensive approach as of yet.

If implementing citywide decarbonization plans is any guide, most U.S. cities appear to struggle with articulating their funding and financing strategies to meet their climate goals. According to a report published by the Brookings Institution that examined 50 of the largest U.S. cities' decarbonization plans, most U.S. cities are still struggling to identify long-term funding or financing mechanisms to implement their decarbonization plans (George, Kane, and Tomer 2023). It is worth noting that while a city's decarbonization plan and their capital plan is certainly related, these processes are distinct.

One promising development has emerged from the City of Dallas. While it does not appear that the city will require the type of impact accounting proposed in the Milken Institute report, the city passed a resolution in the summer of 2024 to advance its Comprehensive Environmental and Climate Action Plan through its 2024 Bond program's infrastructure projects (City of Dallas Office of Environmental Quality and Sustainability 2024). This resolution would require that city projects financed through its bond program meet the building efficiency and sustainability goals of its climate plan; however, the city is still determining how to implement this directive (Seamans 2024).

Measuring the impact of green municipal bonds

Important findings from interviews or correspondence with current or former staff, or people familiar with the bond issuances, of eight of the public institutions listed in Table 4 above are detailed in this section. Additionally, these findings are supplemented by the perspective of financial experts who have worked with cities as financial advisors to assist in the preparation of a green bond issuance or have previously worked within public agencies issuing green

bonds. Table 6 below summarizes the overarching themes of these interviews and are further explored in the following narrative. Many of these findings and conclusions echo the research of Beverly Bunch and Robert P. Strauss captured in the article "Evolution of U.S. State and Local Government Green Bond Issuance," which was published concurrent to this research (Bunch and Strauss 2025).

Table 6: Presentation of common themes summarized from interviews

Common themes from interviews with experts and green bond issuers
Motivations for issuing certified green general obligation bonds • Expression of the issuing entity's values and alignment of stated goals • Desire to be leader in development of the green municipal bond market (and in one case to prove the pricing benefit) • Politically popular with elected officials
Impacts of certified green general obligation bond issuance • Benefits of green bonds exist but can be difficult to quantify • Some instances of a pricing benefit • Marketing benefits • Increased investor interest
Challenges hindering development of green municipal bond market in the U.S. • Lack of standardization of the green bond label • Politically motivated backlash to ESG • Proportion of U.S. investors held to ESG mandates is insufficient to skew demand • Centralized control of the primary market by a small number of large investment banks • General unease about the possibility of losing the municipal bond tax exemption

1. The search for a pricing benefit

The allure of green bonds stems from the idea that investors are willing to forgo a higher yield on green bonds to support the financing of environmentally beneficial and socially responsible projects. In turn, issuers would receive a price advantage when issuing green-labeled bonds rather than traditional bonds, thereby saving their entities and taxpayers money that could be funneled back into additional climate- or environmentally positive projects. It is widely understood among all the practitioners interviewed, and the sector, that the presence of a pricing

benefit often referred to as a "greenium" is the most important aspect of the policy discussion that surrounds green bonds.

While there have been instances where green revenue bonds have received favorable pricing, generally, cities and other public entities that issued green or sustainability general obligation bonds and were interviewed did not find a pricing benefit for these labeled bonds compared to conventional bonds. Some of these issuers found it difficult to measure whether green bonds achieved lower financing costs than conventional bonds. A pricing benefit is more readily apparent in a negotiated sale of a bond rather than a competitive sale. Additionally, to make an accurate comparison, a green bond would have to be floated at the same time and be comparable to its nongreen counterpart to evaluate the pricing difference. Even if these variables are held equal, the pricing of a bond on a given day is subject to market conditions and supply and demand of municipal bonds on that day.

There is a more pronounced pricing benefit on the secondary market, but it can be difficult to find enough data on the secondary market to prove the benefit. The secondary market for green bonds is not exceptionally large because investors hold onto green bonds at a higher rate than traditional bonds so there is less trading of them back and forth. Moreover, more trading of green bonds in the secondary market does not directly benefit the issuer.

The two public entities of the eight that experienced a pricing benefit to their green general obligation bond were the City of Boston when it issued a green bond in 2020 and the East Bay Regional Park District when it issued a refunding and new green bonds in 2017 (East Bay Regional Park District "Series 2017B-2 General Obligation Refunding Bonds" 2017; East Bay Regional Park District "Series 2017A-2 General Obligation Bonds" 2017). The City of Boston's 2020 $23.885 million green bond maturing in 2040 was priced three basis points lower

than the $121.660 million conventional bond issued at the same time to capture a price differential (City of Boston 2020). The East Bay Regional Park District's pricing benefit between the $30 million new money green bond and the $50 million new money conventional bond issued at the same time and both maturing in 2037 was smaller than Boston's pricing benefit and negligible at 0.003 basis points (East Bay Regional Park District "Series 2017A-2 General Obligation Bonds" 2017; Cooper, Hurley, and Durrieu 2017). However, EBPRD's $20.045 million green refunding bonds priced 3 basis points lower than the $24.505 million non-green refunding bonds issued at the same time, with both maturing in 2029 (East Bay Regional Park District "Series 2017B-2 General Obligation Refunding Bonds" 2017; Cooper, Hurley, and Durrieu 2017). EBRPD calculated that this green pricing benefit saved the Park District $45,000.

The former head of Treasury for the City of Boston Drew Smith worked on the green bond issued by the state of Massachusetts in 2013 – the very first green muni bond issued in the U.S. He wanted to test the pricing differential at the City of Boston by issuing a green bond and a vanilla bond at the same time through a negotiated sale, the first time in 20 years the city elected not to use a competitive sale approach (Boston Municipal Research Bureau 2021). They sent out a preliminary wire to the market so investors would not be blindsided and actively set the price of the green bond 3 basis points lower than the vanilla bond, which was chosen very explicitly so the differential would be material and unable to be explained away. What he found was that the green bonds sold at this lower price, although he concedes that this interest in the market could have been attributed to the fact that there were not that many green bonds issued so some of this green premium might have to do with their availability in the market. The Boston Municipal Research Bureau reported that the green bond sale, combined with social bond sale issued as a separate issuance at the same time, saved the city $11.2 million over 14 years (2021). Smith

would like to see other cities come forward to follow Boston's lead and run this experiment a second and third time to further the nascent green market. Yet, another expert was wary of this approach wondering if artificially setting a price benefit can be an indication of a true greenium.

The municipal advisors interviewed and other experts in the municipal green bond sector were unanimous in their assessment that the presence of a pricing benefit for green-labeled municipal bonds is for the most part anecdotal. As one public finance expert explained, the pricing benefit of a municipal bond with a green purpose is as nebulous as the benefit of having credit ratings from three credit rating agencies versus two. It may be difficult to empirically measure the value of obtaining a third credit rating, yet it is widely understood that having three credit ratings is better than two. There was consensus among the experts that once or if there is a clear financial benefit, it will be easy to make the case for green bonds. Until then, they are transparent with the cities that they work with that if they choose to issue a green bond, they may not find a financial benefit.

The experts interviewed indicated that this paradigm shift is more likely to happen if the ESG mutual funds that purchase municipal bonds, or investors of bonds more generally, have mandates for green investments. Designated ESG funds are growing. Yet, relative to the whole tax-exempt bond market, these ESG mutual funds are not yet large enough to move the pricing needle in the United States. There is a visible pricing benefit in some parts of Europe, where the green bond market is more mature, because pension funds in Europe have ESG mandates and because the European Commission has introduced a voluntary Green Bond Standard across the European Union to provide uniformity and ensure the integrity of the green bond label (de Barros Fritz 2025). According to Candace Partridge, an expert and scholar of green municipal bonds, China is even outpacing Europe.

2. The meaning of the green label

Public entities that have issued certified green bonds recognize that certifying bonds requires additional staff time and resources, and staff are wary of certification processes that require overly onerous disclosure and tracking requirements. Some concede that the certification process is unnecessary, so long as the benefits can be explained to investors. St. Paul Regional Water Services saw little need to secure a third-party verification for its green bonds. Given the nature of water and sewer infrastructure projects, there is an easy connection to be made between the capital projects of water utilities and green bonds, which is likely why so many green municipal bond issuers are water utilities.

For Raul Amezcua, investors including ESG-minded investors purchasing bonds in the tax-exempt bond market do not care if a bond carries a green label or has received third party verification, as long as the positive environmental impact and benefit of the green project is provided to investors. A half page or page disclosing the environmental impact of the project in the official statement is sufficient to meet the needs of investors. Having worked on a number of deals involving investors with an ESG mandate, Amezcua has found that the ability to answer a couple of questions about the environmental impact of a project enables the bond to be purchased for an ESG portfolio – no accompanying third-party verification report needed.

The exception to this general rule is international investors. International investors, which only hold three percent of all municipal bonds in the United States (BNY Investments 2025), are different in that they prefer bonds that are third-party verified. As stated above, a greater percentage of institutional investors have ESG mandates dictating their purchasing habits in the municipal bond market.

If the European green bond market is any guide, then it may very well be that issuers will have to certify their bonds or provide more detailed carbon tracking and quantify climate impacts

in exchange for a visible pricing benefit. One issuer recounts an investor that wanted detailed carbon tracking, information that the issuer did not collect. Even though the issuer did not have the data the investor was requesting, they still bought the green bond. However, in a more regulated market, it is possible that issuers will have to provide such detailed information. Mark Ruff, former Chief Financial Officer for the City of Minneapolis, thinks the lack of standardization of the green bond label is a hurdle in the development of the green bond market in the United States. Before there is widespread adoption of green bonds, he believes there needs to be a better certification process and definition of the green label.

3. Motivations driving issuances of certified green bonds

Absent the expectation of a pricing benefit, cities and other public organizations were able to issue a green bond because the cultures of their organizations welcomed innovative ideas. Former staff with the City of Boston and the City of Minneapolis perceived their cities to be leaders in sustainability and climate action, so issuing a green bond is a natural alignment of their values. One former city leader said that issuing a green bond set an example for other governmental entities in the state. Given their city's ethos when it comes to action on climate change, they perceived their cities as pioneers of the green muni bond market, acknowledging that the only way for the market to mature is to be one of the first cities to issue a green muni bond. For larger cities, the cost to certify the bonds is not prohibitively expensive, but for smaller entities, with smaller budgets, these costs could prevent them from certifying a green bond.

Ultimately, most experts and city staff who worked on green bond issuances concluded that the decision to issue a green bond is political. For some of the governments of smaller communities, it is more likely that they were advised by their municipal advisors to issue a green

bond because of the possibility of getting a more favorable rate and reaching a broader investor audience.

Universally, current and former staff of cities and other regional agencies found that elected officials and their boards support the green bond issuance because it is an expression of the city's values and signals to the public, and more specifically their constituents, their green commitments. Because green bonds do not as a rule price lower than conventional bonds, they function as a form of social influence, providing reputational benefits. One public finance expert, who estimates that he has helped six cities and public agencies issue green bonds as a municipal advisor, likens green bonds to a statement of values – it is "the bumper sticker of municipal finance." The St. Paul Regional Water Services, a public water utility, began issuing green revenue bonds in 2015 and 2016 because it saw them as a concrete way to contribute to the Mayor's climate goals, in a line of work where there are not a lot of opportunities to directly contribute to those goals. The lack of a pricing benefit has and will discourage some public organizations from issuing another green bond, but others appear undeterred and would probably continue issuing them because their city councils and boards are supportive on principle.

Many issuers of green bonds noted that the bonds generated positive public relations and marketing for the entity. Global Cities Lead Mike Brown with Climate Bonds Initiative noted that issuers may have articles written about the green bond, generating free media so when an issuer goes to the market to sell the bond it might already be on the radar of investors. The San Francisco Public Utilities Commission, where Brown used to work as the Environmental Finance Manager, would normally pay for some marketing of their bond issuances. Having this free media might make the bond more attractive to retail investors and less price sensitive but there is a dearth of good data on this effect, and it is hard to prove. Naturally, this media buzz dissipates

over time and may be more pronounced for an issuer doing something novel, according to Smith. The Saint Paul Port Authority and City of Saint Paul received a blurb in the Bond Buyer and a 2023 Environmental Finance award for Sustainability Project Bond of the Year for its green-labeled bond financing the Emerald Ash Borer project. Staff interviewed credit the innovative nature of the project with the good press that was generated.

Measuring the impact a green bond issuance may have on a city's credit quality is difficult, not least because the rating agencies are long overdue on incorporating climate change preparedness into credit ratings, although there are signs this is starting to change. Green bonds may serve as one data point that is factored into the city's credit ratings, reducing its cost to borrow and creating a halo effect for the city. Mike Brown believes green bonds may also indicate improved transparency. During his time with the San Francisco Public Utilities Commission, he recalls that the entity was transparent about the vulnerability and risks the city is facing with climate change, including sea level rise. Its green bond issuances demonstrate that the city and public utilities commission is taking steps to address this risk.

Some of the experts and a smaller number of former city staff mentioned that cities that issue green bonds may find that there is more investor interest in bond transactions, leading to an expansion in the investor base and demand for green bonds. Raul Amezcua found that green bonds, both labeled and unlabeled, had greater investor interest and the orders to purchase these bonds were larger (i.e., a $5M order rather than a $2M order) than bonds that do not serve a green purpose. This was true for both taxable and tax-exempt bonds. In Mike Brown's experience, increased investor interest is more likely to occur where cities or other public issuers are issuing taxable green muni bonds because taxable bonds are more likely to attract foreign investors. The San Francisco Public Utilities Commission had one investor investing in taxable

green revenue bonds on behalf of a Dutch pension fund that preferred the green label. Now that interest rates are higher, an expanded investor base may serve cities well because this expanded base may translate to increased demand for the city's bonds, thereby helping to offset the negative impact of higher interest rates. However, another expert who has helped cities prepare green bond issuances was unable to definitively identify an expanded investor base resulting from green bonds.

According to Mark Ruff's experiences with the City of Minneapolis, almost every bond sold today, regardless of the label, is oversubscribed because the demand for municipal bond exceeds the supply. Where the green label could conceivably be effective is for cities that have lower credit quality and face more difficulty securing financing. The green label could serve as the narrative that accompanies the bond to secure a better interest rate. In municipal finance parlance this is referred to as a "story bond," meaning the story used to attract investors and sell the bond.

4. Green bonds magnify common challenges in municipal government

City leaders and elected officials of cities and public agencies that have issued green bonds are supportive of the idea. Green bonds may be one of a set of ambitious goals, objectives, and mandates they want the city to accomplish. As these decisions trickle down from leadership, it is the professional staff who must determine how to implement the decisions and accomplish the stated goals. Professional staff are not likely to willingly advocate for more to be added to their overburdened workloads. This natural tension is not unique to green bonds, and it even exists amongst professional staff across departments with different missions. Programmatic staff charged with meeting environmental and sustainability goals are generally supportive of green bonds, but finance staff are more reticent not on principle but because of the lack of clear

financial benefit. As one former city leader stated the best way to secure buy-in and get everyone on board up front requires change management. Municipal government is also rife with risk aversion. If a project is selected for a green bond and it is not as green as purported, then the city could take a reputational hit.

5. The state of the green municipal bond market

Most of the financial professionals and city staff interviewed who have worked on green bond issuances perceived a waning appetite for green bonds and less chatter in the muni bond market over time. This story could be told in one of two ways or in some combination of the two.

On the one hand, green-labeled municipal bonds could have been a passing fad that fell out of favor, absent a pricing benefit. If this were the case, this would mean cities and other local government agencies are subsuming their green-bond-eligible projects under traditional bond issuances, instead of issuing separate, green-labeled bond series for eligible projects. Anecdotally, Raul Amezcua has noticed a drop in the number of green-labeled bonds but not a corresponding reduction in projects that improve climate resiliency or mitigate carbon footprints. According to Amezcua, investors still care about supporting these types of projects.

On the other hand, muni green bonds could simply reflect broader trends in the muni bond market. The volume of new municipal bonds issued in 2022 and 2023 fell from 2020 and 2021 levels due to inflation and higher interest rates (Lerner 2024). Likewise, the volume of climate-aligned green bonds dipped in 2022 and 2023 according to Candace Partridge. As Municipal Advisor Craig Hill explains, high interest rates meant fewer bonds were being issued over the past couple of years. Where building a library was going to cost $40M at an interest rate of 3 percent, costs jumped to $50M at 4.5 percent interest. The significantly higher debt service payment, in the form of higher principal amount and interest rates, may mean that cities must

make tough decisions whether to postpone or cut back the number of projects they undertake. It is possible that this combination of factors could have stalled the types of projects that local governments would have funded through green-labeled bonds.

The ability of local governments to draw on federal aid provided during the pandemic to fund projects could also mean they were less reliant on debt issuance or borrowing for financing (Lerner 2024). As Mark Ruff explained, the Infrastructure Investment and Jobs Act and Inflation Reduction Act provided a lot of funding for greenhouse gas mitigation and climate adaptation. The Inflation Reduction Act incentivized each state to set up a green bank, but this is unlikely to come to fruition under the current political climate. Even before the second term of the Trump administration, cities have long been distrustful of funding from the federal government because they could complete a project, thinking they will receive a rebate, and the federal government may in turn decide the project is not valuable anymore, never following through on repayment.

Complicating observers' perceptions of diminishing interest in green-labeled bonds is the fact that climate-aligned and sustainability-aligned green bonds grew in 2024 and was larger than in the three years preceding 2024 according to Candace Partridge; however, given the present political climate, it is unlikely that these thematic muni bonds will continue to grow.

6. An uncertain future for the municipal bond market

In 2025, the volume of municipal bonds was expected to be strong, exceeding the 2024 volume. However, this outlook was marred by uncertainties over tax policy changes. There have long been threats to remove the tax exemption of municipal bonds. But many observers worried that the 119th Congress would remove the tax exemption to pay for its proposed tax cuts in the One, Big, Beautiful Bill, and there were discussions to do so (Lightfoot 2025). Local governments watched the reconciliation process closely, dreading the elimination of the tax

exemption. The National League of Cities and the Government Finance Officers Association launched a joint campaign called #BuiltByBonds to raise awareness of the importance of tax-exempt municipal bonds in late 2024 (National League of Cities 2024). Ultimately, Congress stepped back from this cliff, retaining the tax-exempt status of municipal bonds quelling fears (Lightfoot 2025).

Experts and current and former city staff agreed that revoking the tax exemption would upend the municipal bond market. In the immediate term, this would have a negative impact on local government's ability to issue bonds, as it will almost certainly cost them more to borrow. A report by the Public Finance Network found that removing the tax-exemption would cost cities and states nearly $824 billion over 10 years to borrow and those costs would be passed on to the taxpayer (Public Finance Network 2025). Local governments will then have to decide if they can afford to undertake the capital project with increased funding costs and if not, reduce the number of projects undertaken. The City of St. Paul conducted scenario planning and constructed models to understand how the city would need to reduce its debt obligations should the elimination come to pass. St. Paul, MN, along with the City of Bloomington, has published a one-pager about the potential impacts on taxpayers and were advocating at the state and federal level to keep the exemption in place (Huston et al. 2025). Both St. Paul and Minneapolis have been tracking H.R. 1879 – No Tax Breaks for Sanctuary Cities Act, which would strip the bonds issued by sanctuary cities, like Minneapolis and St. Paul, of their tax-exempt status (Mace 2025). While H.R. 1879 was not included in the House of Representatives' reconciliation bill, the threat has not subsided.

Drew Smith, the former head of Treasury for the City of Boston, noted that the removal of the tax exemption is a marked departure from how the financial world works and does not discount it from happening. Because green bonds are a label and are not subject to any special

treatment currently, like subsidies, from Smith's perspective they are not likely to receive any particularized impact.

Another financial advisor, who has decades of experience working on state-level public financing, would expect to see a consolidation of small municipal bond issuers should the tax exemption be eliminated. In such a world, bond deals smaller than $500 million would no longer be feasible, thereby remaking the U.S. muni bond market as only the largest cities can issue deals of that size. The aforementioned financial advisor reasoned that more state authorities would form to serve the aggregate of small issuers through bond banks. Sometimes referred to as an infrastructure bank or green bank, depending on their specific focus, these state-level financial institutions help local governments access capital by pooling bond issues and can lower transaction fees significantly (Gaughan and Tomer 2024). Similarly, when prompted to speculate how cities might respond to the loss in tax exemption, Mark Ruff theorized that municipal bond issuances might need to look more "corporate" and would likely be larger issuances to compete in the taxable bond market. Instead of one city floating a bond, 100 cities might all join together in pooled bond financing so they can differentiate themselves in a much larger market and in that situation, they can differentiate themselves by calling them green bonds.

Craig Hill speculated that perversely the elimination of the tax exemption could expand the opportunity for green municipal bonds to mean something. If municipal bonds' tax exemption is removed, municipal bonds become indistinguishable from corporate bonds. This means municipal bonds would compete with corporate bonds in a much larger bond buying market. Hypothetically, if a green muni bond is competing with a corporate bond of the same credit quality and the green muni bond creates more liquidity than the conventional muni bond, investors may be more inclined to purchase a green muni bond. The bond buyer market for green

tax-exempt bonds is a much smaller universe than corporate bonds, so opening municipal bonds to the taxable bond market could introduce green municipal bonds to a much larger investor pool: a silver lining to a dire situation.

In this hypothetical future, the U.S. muni bond market would become open to international markets, which would hurt American retail investors – a nail in the coffin of financial democracy according to Candace Partridge. The U.S. muni bond market is unique in that it allows individual investors to buy bonds that fund projects in their community; however, with the loss in tax exemption, there would be less incentive for American retail investors to participate. Investment banks are likely to continue to crowd out retail investors because it is a lucrative business for them to control the bond underwriting desk. Moreover, in Partridge's opinion investment banks have little incentive to change their business practices or oversee the type of disruption to the muni bond market that would be required to eventually realize the greenium. For Partridge, Connecticut's Green Bank charts a path forward. In 2020, the Bank issued its first Green Liberty Bonds to support a residential solar program (Donalds 2022). These certified green bonds were designed with the express goal to attract individual retail investors to "democratize public finance" (Honeycomb Credit 2025). On the first day of a two-day sale, Connecticut retail investors were given exclusive preference to place their orders (Donalds 2022). Two years later in 2022, the Bank issued its first Green Liberty Notes (Barnett 2022). Designed as a companion to the Green Liberty Bonds, the notes can be purchased at a lower minimum and a shorter maturity without the use of a broker to attract a wider audience of everyday people, further democratizing investment opportunities (Connecticut Green Bank 2022).

Many of the experts interviewed believe that backlash to ESG, which began gaining momentum in 2021, is stunting the growth of the green-labeled muni bond market in the United States. As a result, it will be a while before the market develops according to Mark Ruff. As the wave of anti-ESG sentiment reaches a new fever pitch, some institutions may drop the green label to avoid attracting ire, taking part in a practice known as green hushing.

A financial advisor who works with a state agency in a red state where legislators are averse to ESG principles notes that this agency has stopped labeling its bonds as green. Even without the label, this financial advisor expects the same ESG and non-ESG investors to come through the door to purchase its bonds. The only difference is that the bonds will no longer be wrapped in the green label. Another expert notes that while some issuers will not flaunt the green credentials of their projects, there has not been an actual reduction in projects that meet climate and carbon reduction goals. Moreover, investors still care about these projects.

Other cities may take a different tactic. Motivated by the federal government's retrenchment on climate and environmental action, other experts speculate that these entities may issue green bonds to double down on their values as an act of defiance.

In the long run, some see the anti-ESG fervor as a temporary blip. According to Amezcua, opponents of ESG investing will be unable to stem the tide of the great wealth transfer in which more than $60 trillion in assets is projected to move from baby boomers to younger generations (Girvin 2025). As younger people—and disproportionately women—take control of these assets, they tend to be more motivated to invest their money in an environmentally and socially responsible manner (Dickler 2025). The growth of Separately Managed Accounts, which went from managing $760 billion in assets in 2013 to managing $2.4 trillion in 2024, has more

easily enabled investors to channel their investments using ESG considerations (Milinchuk 2024).

Chapter 5: Recommendations, Limitations, and Future Research

Recommendations

Local governments interested in floating a certified, green-labeled bond should approach the issuance with eyes wide open, recognizing that they may not find a pricing benefit. However, based on the experiences of public finance experts, issuers may find more investor interest and larger orders for a green bond issuance. For some cities, these benefits may offer sufficient motivation to continue issuing green bonds or provide justification to another city contemplating their first green bond issuance. One interview subject hypothesized that a green label may provide a competitive edge to entities that have lower credit quality or for various reasons stand to benefit from the story that the green bonds can tell. While unverified through research or anecdotes, cities that find themselves in unfavorable market conditions or difficult financial positions could consider a green bond issuance for the boost it may give the bond in terms of marketability.

Furthermore, issuers might consider following the lead set by the City of Boston in 2020 by pricing the green bond issuance lower than its conventional bond counterpart, as recommended by Drew Smith. This could artificially draw out a pricing benefit, provide an additional data point, and further the development of the muni green bond market in the United States. The bond market is different than it was when Boston floated its green bond in 2020. A 3-basis point difference was material enough to prove a pricing benefit. However, by Smith's own admission, if he were to float this bond today, he would try to engineer a higher differential.

To ensure the longevity of a green bond program, city governments need to both establish and maintain collaboration across departments that have a hand in a green bond issuance, namely finance and sustainability departments. Otherwise, after the first green bond issuance, the

momentum may not be in place to leverage future opportunities when another green bond may be issued.

Lastly, from a 30,000-foot view, putting aside the relative utility and importance of the green label, municipal bonds are attractive to investors because of their tax-exempt status. Because the interest earned on municipal bonds is exempt from federal income taxes, and even state and local income taxes in some cases, municipal bondholders use muni bonds as a tax shelter, incentivizing investors to purchase government bonds that in turn provide the financing needed both for day-to-day government operations and large-scale climate investments. Maintaining municipal bonds' tax exemption ensures governments can receive financing at lower interest rates. Removing this incentive structure jeopardizes the ability of cities and local governments to find a market for their bonds and will lead to higher borrowing costs. Local government officials and other municipal finance specialists understand this risk. It would be short-sighted for the federal government to remove the tax exemption of municipal bonds and to strain the ability of local governments to provide essential public services like education and emergency response services, not to mention upgrades and investments in climate resilience and adaptation.

Limitations

This research excluded self-labeled green bonds from analysis. Only cities that had issued green bonds that were third-party certified to have met ICMA's Green Bond Principles or Sustainability Bond Guidelines were identified through Bloomberg and selected for case studies and interviews. As a result, this exclusion could provide a warped sense of the costs and benefits of a green bond issuance, both because self-labeled bonds do not have the added cost of a third-party certification and because of their potential to be perceived differently by investors.

The statistical analysis conducted to examine relationships between certified green municipal bonds and risk was rudimentary and as such the influence of confounding variables and limitations in the data used should not be overlooked. There are likely confounding variables that are influencing the strength and direction of the relationship between risk factors, political leanings, and green bond issuance that were not built into these regression models. For instance, the population size of a city or county or the number of ratepayers served by a utility could play a larger role in determining whether a municipal green bond is issued than the factors studied in this analysis. Based on a logistic regression, the population size of the county is positively correlated to whether the county has been a beneficiary of a green bond issuance. Other variables, like the credit rating of the issuing entity and the size of its annual budget, might explain the results that are not controlled for in the regression models.

While the quantitative analysis included certified green general obligation and revenue bonds, the in-depth case studies and interviews excluded green revenue bonds, which are most certified green municipal bonds. By excluding these entities and revenue bonds from interviews, it is not known how their perspective may differ from the insights gleaned from city staff. For instance, it is not known whether self-labeled green municipal bonds and/or green revenue bonds experienced a greenium at rates higher or lower than the certified green general obligation bonds analyzed in this research. Future areas of study could include interviewing or surveying the experiences of green revenue bond issuers to understand if they saw a pricing benefit or any other benefits to a green bond issuance that differed from the narrow category of issuers captured in this research.

Because larger cities were more responsive to interview requests, it should be noted that the findings that emerged through these conversations are skewed to the perspective of cities and

other public entities that serve populations over 400,000. A critical perspective absent from this study of municipal green bond issuers are the entities that determined not to issue a green bond for whatever reason. Their reasons for not issuing a self-labeled or certified green bond could reveal key obstacles or drawbacks to a green bond issuance that is missing from this analysis.

Future directions for research

The cities and regional governments interviewed had floated their certified green general obligation bonds between 2017 and 2022. In the years since and through the first half of 2025, the muni bond market and perceptions around green finance in the United States has changed. The once universal reputational advantages ascribed to green muni bond issuers appear to have become dependent on the political context operating within the state or region. For local governments in environments hostile to ESG, their efforts to attract ESG-minded investors will likely be done more covertly. By averting the green label but keeping the green projects in the bond issuance, these muni bond issuers may still be able to get their issuances in front of ESG investors and reap the benefits according to two public finance experts.

If issuers do not need green bond certification to interest investors in buying their bonds, going so far as to remove the green label for political reasons, then the principal impediment to issuing a green bond – the cost to certify and the staff time and resources required to float it – disappears. While unexplored in this research, the importance and necessity of certification of green bonds and the green bond label is worth examining, particularly as issuers attempt to navigate anti-ESG fervor. Future research could seek to uncover the importance of third-party certification to different types of investors and track how the entities investing in green bonds has changed over time and the evolution in their green mandates.

Finally, green labeled bonds are only one part of the much larger suite of green finance strategies, and they are largely separate from solutions designed to help cities more rapidly implement projects that will tackle the climate crisis. To ensure that the projects selected for a bond issuance, whether it be a green or vanilla bond, are designed to the deepest shade of green or as climate conscious as possible, means changing the capital planning process. Future research could examine the innovative ways cities are integrating climate considerations into their capital projects. Eventually, these efforts can be paired with green bonds to learn whether more robust capital planning processes that both mandate that projects be built to certain green or climate standards and require calculating the avoided carbon emissions and energy or water usage of these projects results in greater demand from investors for these bonds.

Chapter 6: Conclusion

Municipal green bonds have been in existence for more than a decade; however, there has been little documentation of municipal issuers' experiences with green bonds. The goal of this research was to capture how issuers of certified green general obligation bonds perceive the benefits and challenges of issuing a green bond. Given the tumultuous political landscape of the first half of 2025, this research also sought to examine how uncertainty over the tax status of muni bonds, the continued crusade against ESG, and a bond market with higher interest rates shapes these issuers' decision making.

The Bloomberg database was used to identify certified green municipal bonds for quantitative analysis and pinpoint local government issuers of certified green general obligation bonds. After singling out the city, county, and regional-level government entities from this list, their green bonds were analyzed by referencing their official statement to understand the projects financed through the issuance and other key details about the issuance. Once this background research was completed, staff of the government entity currently or formerly affiliated with the bond issuance in some way or who would be knowledgeable about the green bond(s) were contacted for interviews. It was through these interviews with current and former government staff or public financial advisors and other experts that the most important findings of this research emerged.

Many of the current and former city and government staff interviewed saw their city or entity's foray into green bonds as an exercise worth doing, even if only two cities found a visible pricing benefit to their green bond issuance. For some, green bonds serve lofty goals as an expression of their institution's values and commitments to the environment and climate action. And still more simply, embedded in the green bonds are projects the issuer was going to fund

regardless, so decision-makers calculate that it makes sense for their organization to get credit for the work they were already planning to do. Absent a pricing benefit, many of the staff interviewed characterized the benefits of floating a green bond in terms of increasing visibility and marketability, as well as being politically popular among elected officials. Observers note that these advantages can translate into increased investor interest.

While the municipal bond tax exemption emerged unscathed from the reconciliation process of the Big Beautiful Bill, it looks like uncertainty and volatility will continue to plague the green municipal bond market in the U.S. The raft of anti-ESG legislation and the assault on the environment from the federal government and some states through the first half of 2025 appears to be influencing whether some issuers use the green label on their bonds according to experts interviewed. Yet, shedding the green label has not translated to a reduction in climate-focused projects. The political context raises important questions about the utility of the green label in 2025. For this reason, the evolution of green-labeled muni bonds presently and into the future merit study. Some observers take the long view. For them, there is no reversing the march of time. Investors will drive the market and as wealth changes hands, it could lead to ever more interest in ESG-driven investing.

Appendices

Appendix A- Sample Interview Questions

1. Based on your professional experience, would you say people in your department and elected officials are aware of green or climate bonds as a green finance mechanism? How well are green bonds and green finance mechanisms understood by other departments or elected officials?

2. Would the city you work for be interested in issuing a green municipal bond?

3. Has the interest in green municipal bonds changed over the past decade or over the past few years? To what do you attribute that change?

4. What is the value, if any, in issuing a green muni bond versus a conventional, vanilla bond?

5. What were and are the motivations for issuing a green municipal bond? What benefits would have to be present and were/are most important for your entity to decide to issue a green municipal bond?

6. What are the most significant challenges to issuing a green municipal bond? Aside from the administrative burden, what are the challenges to issuing a green municipal bond? Based on your professional experience, are you aware of any policy solutions that might address these challenges and barriers?

7. What external factors or conditions have shaped or are shaping the calculus in determining whether to issue a green municipal bond?

8. Does your entity find that political and cultural contexts influence whether there is an appetite to explore a municipal green bond issuance? Are there political and cultural barriers to municipal green bond issuance and what are these?

9. If shifting political winds mean there is less federal funding available to cities for climate mitigation and climate adaptation projects, are green muni bonds a way to meet gaps in funding? Or are the projects tied to federal funding versus a bond issuance separate streams that are not interchangeable?

10. For the City of Dallas and other cities where relevant, what is the advantage of integrating its Comprehensive Environmental and Climate Action Plan into its 2024 Bond Program rather than issuing a green bond?

11. What ensured that the city was able to issue the green bond?

12. If the entity you work for issued a green bond but will not do it again, why? What were your entity's expectations and in what ways did the issuance of the green municipal bond not meet those expectations?

13. For entities that have defined their municipal green issuance as a success, in what ways did issuing a green municipal bond meet or exceed your entity's expectations? What were the benefits (both tangible and intangible) your entity noticed? And what benefits were most important to the entity you work for?

14. What projects were funded with green bonds that could not have been funded otherwise?

15. To aid other cities and entities interested in issuing a green municipal bond, what steps help prepare a city to issue a green bond?

16. How were projects identified for inclusion in green bond use of proceeds? What worked well in this process and what did not?

17. To what degree were climate plans and adaptation actions incorporated into the municipal green bond issuance? With hindsight or looking forward, how might the entity better incorporate climate goals and actions into the green bond issuance?

18. What sort of enabling conditions or plans must be in place to ensure that ambitious climate-aligned projects are included in the issuance? If capital improvement plans are key to this, how might this process be improved to create a pipeline of projects focused on climate adaptation?

19. What are the ways in which cities that find themselves in environments unfriendly to ESG can meet climate goals with a bond issuance? Are there other green finance mechanisms that you find promising for your city or entity?

20. Does the issuance of bonds overcome resistance to ESG or climate action? Does it lay the groundwork or create a positive feedback loop for more climate action?

21. What effect did issuing a green bond have in terms of the city's commitment to climate change action or sustainability, if any?

22. For cities that have issued green bonds, has the city provided impact reporting to investors?

Appendix B- IRB Determination

Tufts UNIVERSITY | Social, Behavioral, and Educational Research IRB

NOT HUMAN SUBJECTS RESEARCH

January 13, 2025

Anna M. LaCombe
Tufts University
Anna.LaCombe@tufts.edu

Dear Anna M. LaCombe:

On 1/13/2025, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Motivations driving Issuers of Municipal Green Bonds
Investigator:	Anna M. LaCombe
IRB ID:	STUDY00005630
Funding:	TU Urban & Environmental Policy & Planning - A&S
Documents Reviewed:	• Informed Consent Interview Script, Category: Consent Form;• Sample Interview Questions, Category: Other;• SBER IRB NR-NHSR, Category: IRB Protocol;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a modification request to the IRB for a determination. You can create a modification by completing the "Create Modification/CR" activity in eIRB.

Sincerely,
A O'Brien

Amanda O'Brien
IRB Analyst

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