

Bay Area Air Quality Management District

CLIMATE TECH FINANCE

Impact Report

How Increasing Access to
Capital Is Reducing
Greenhouse Gases

March 2021



Climate Tech Finance: Executive Summary

What is Climate Tech Finance? It is an environmental finance partnership with a unique model to accelerate climate technology commercialization. Its mission is to reduce greenhouse gases by offsetting risk for lenders and increasing access to capital for entrepreneurs.

What does Climate Tech Finance do? It bridges a financial gap for entrepreneurs by securing working capital to commercialize technology faster. It also offers direct lending for customers to adopt climate technologies sooner.

How does Climate Tech Finance work? The initiative was designed in 2018 and fully launched in 2019. During its development and operation since then, the program has done the following:

- Built a partnership between the Bay Area Air Quality Management District (BAAQMD) and the California Infrastructure and Economic Development (IBank). This first-of-its-kind partnership combines **BAAQMD's technical expertise** on sources of pollution with **IBank's financial expertise** in lending and economic development.
- Launched a capital access program for emerging technology commercialization in the private sector. Entrepreneurs get earlier access to debt through commercial lending through a **loan guarantee that insures up to 90%** of a bank loan. These loan guarantees and the lending support provided through this partnership help banks find comfort supporting new technology ventures.
- Launched a direct financing program to spur technology adoption in the public sector. Public agencies can **borrow up to \$30M** on a term of up to 30 years. BAAQMD subsidizes the loan by contributing capital at 0% interest as an incentive for climate tech adoption projects.
- Published a *Climate Technology Review* that assesses nearly 200 climate technologies. This review highlights the **accessibility of climate technology** and reduces the information search costs for potential technology adopters. This report recommends technologies with demonstrated technical merit, high potential to reduce greenhouse gases, and strong economic credentials.
- Conducted outreach to over a thousand organizations, hosted technology showcase and networking events, and built bridges to technology R&D programs and incubators to help climate entrepreneurs make a successful **transition from demonstration projects into market growth**. Our continuing goal is to build these connections in the public and private sectors.

Climate Tech Finance at a glance

- Financing partnership that combines emission reduction expertise with community banking expertise
- Use of revolving funds to speed low-GHG tech to market and into use
- Loan guarantees of up to \$2.5M to support emerging climate tech
- Loans of up to \$30M to support climate tech adoption
- A growing network of participating lenders, with four new banks in the last year
- Identification of \$500M in fundable projects in the Bay Area

Outcomes of Climate Tech Finance So Far

- **Climate Tech loan guarantees have already accelerated two zero-emission technologies.** A \$5 million guaranteed loan is supporting commercialization of a first-of-its-kind hydrogen fuel cell ferry. A \$1 million guaranteed loan is accelerating installation of software-enabled, solar-battery microgrids at municipal facilities around the Bay Area.
- **Climate Tech Finance projects produce multiple co-benefits.** Funding for the zero-emission ferry is expected to reduce 30,000 metric tons CO₂e over five years, create 63 jobs, and reduce diesel emissions in disadvantaged communities around the Port of Oakland and eastern San Francisco. Microgrid deployments are expected to reduce 10,000 metric tons CO₂e over five years, support 12 jobs, increase electrical grid resiliency, and prevent use of diesel generators.
 - **75 jobs created by the first two Climate Tech Finance projects.**
- **We have qualified ten companies from diverse sectors for lending support.** Dozens more are in the pipeline, and we are building partnerships to connect with hundreds of others. We have focused efforts on advanced energy systems, including microgrids, distributed energy resources, and zero-emission backup/mobile power.
- **We bring commercial lenders to the climate investment space.** Over a dozen banks have been engaged in conversations about emerging technology, and four new banks have joined as certified lenders for climate projects, two of which have funded Climate Tech Finance projects.
- **We have identified ample demand for climate financing.** In total, we have engaged with dozens of climate projects in the Bay Area that are actively seeking financing totaling half a billion dollars.



\$500 million, amount of loan funds dozens of climate projects are pursuing in the Bay Area.

Key Insights of Climate Tech Finance So Far

- **Organizations need working capital to accelerate climate tech.** Our team has already identified nearly \$500 million in shovel-ready climate tech adoption opportunities in the Bay Area. A dedicated lending program would close the gap between the need for affordable capital that greatly exceeds available funds – and could transform the lending market for climate tech adoption.
- **Lending partnerships can accelerate climate technology innovation.** We have supported \$6 million in loans for our first two projects and have qualified eight additional projects for support on \$20 million in loans. Our pipeline of promising leads involves a dozen more projects and \$50 million in loans. Based on this deal flow, a dedicated \$50-100 million fund could accelerate climate tech development and adoption and drive the lending market for low-carbon technologies.
- **Lending leverages and revolves public funds for maximal impact.** The Climate Tech Finance program leverages up to \$10 in private capital for every \$1 of public capital encumbered. These funds generally revolve in 5 years or less.
- **Innovation financing accelerates reductions and aggregate impacts.** The first half dozen projects in our program will reduce nearly 30,000 metric tons CO₂e in the first year of their loans. After five years these ventures will be able to reduce almost 500,000 metric tons CO₂e or more annually.
- **Climate Tech Finance positions its partners at the center of climate tech innovation and investment.** In addition to attracting a tech development and deployment labor pool, climate tech innovation financing builds closer relationships between banks and new tech sectors that aid job and business growth.

Overview of Climate Tech Finance

Climate Tech Finance is a financial services platform developed to shorten time to market for emerging climate technologies and to increase their uptake in the Bay Area and beyond. The financial services developed and tested on this platform are meant to improve access to capital and, in so doing, close funding gaps in technology innovation. The end goal is to speed up maturation of emerging technologies and to increase the probability that a wider range of climate tech will succeed in the market and be widely adopted.

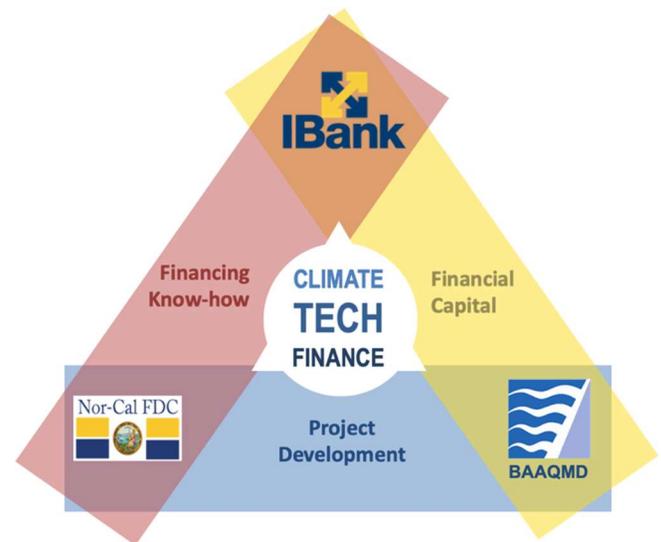
Over the last two years Climate Tech Finance has put a direct and an indirect capital access product into the marketplace. In doing so, it has sought to evaluate whether a low-interest loan can help public agencies install climate tech more easily or readily. It has similarly tested whether a tailored small business loan guarantee can help climate tech entrepreneurs introduce and expand product offerings more quickly and successfully.

Partnership Structure. Climate Tech Finance is a novel public-public environmental finance partnership. It was conceived at the Bay Area Air Quality Management District (Air District) and developed in partnership with the California Infrastructure and Economic Development Bank (IBank)¹ and with Northern California Financial Development Corporation (NorCal FDC).² It is the first partnership between IBank and one of California's thirty-five air districts and the first partnership between an air district and a regional financial development corporation like NorCal FDC. It is the first lending program at the Bay Area Air Quality Management District and its first acceleration program for emerging technology. In all, Climate Tech Finance creates a new set of relationships and brings together skills in an entrepreneurial way to develop new State capacity to address climate change.

Although the partnership does not follow in the footsteps of previous efforts, it has the benefit of drawing upon an existing set of financial instruments. Climate Tech lending products are variants of IBank's Infrastructure State Revolving Fund (ISRF) loans³ and of the loan guarantee offered through the State Loan Guarantee program.⁴ Building on top of these successful financial instruments has allowed partners to focus on applying them to spur emerging technologies and targeting them on low-carbon technologies and projects.

The partnership structure synergizes the talents of the Air District, IBank, and NorCal FDC (Figure 1). Our *Project Development* efforts leverage the local relationships of NorCal and the Air District to identify lending needs and technology acceleration opportunities. *Financing Know-how* draws on IBank and NorCal FDC's well-developed lending instruments as well as their accrued reputations in community banking and public finance. The *Financial Capital* for loans and loan guarantees is available through IBank, with the Air District providing capital to lower the interest rate for loans and to raise the percentage of a guarantee. In addition to these core functions, the partners provide various support

Figure 1. Climate Tech Finance Partnership



¹ <https://ibank.ca.gov/> or see IBank's [comprehensive annual report](#)

² <https://nor-calfdc.org/> or see [NorCal FDC's annual report](#)

³ <https://ibank.ca.gov/loans/infrastructure-loans/>

⁴ <https://ibank.ca.gov/small-business/loan-guarantees/>

services that help target climate tech and improve the viability of the lending projects. These services include climate technology review, climate impact assessment, technology development coaching, and financial network introductions.

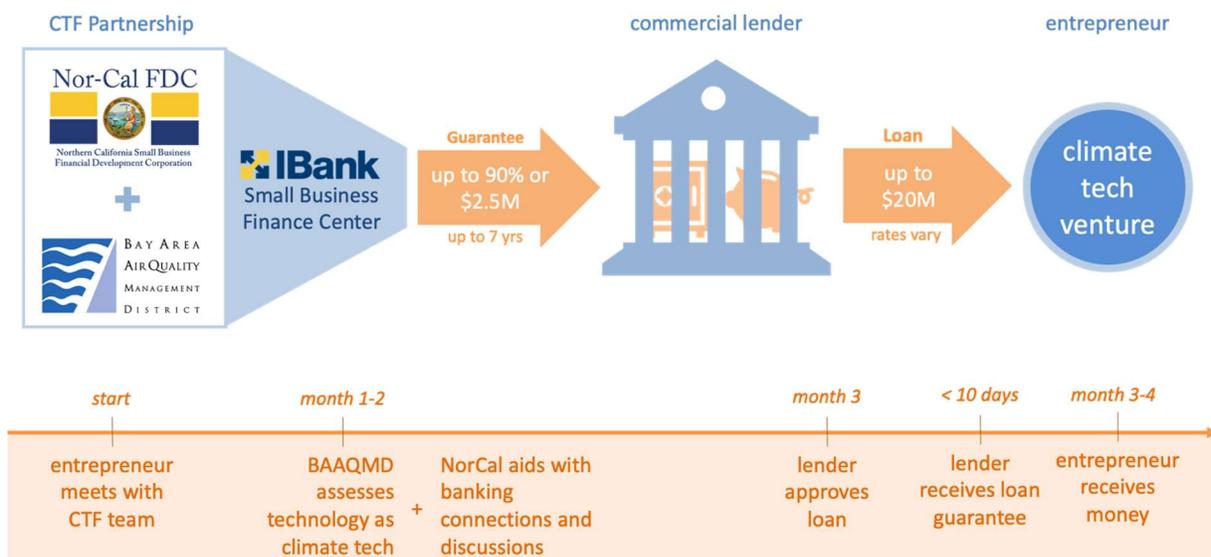
In short, the partnership combines the expertise and services of three organizations to develop fundable projects, and the products are used to fund technology projects that are both emerging and lower-carbon solutions. It also enhances the ability of regional government to guide and drive economic development.

Financial Products. Over the last two years the Climate Tech Finance partnership has introduced two lending products into the marketplace. These products have been designed to expand access to commercial lending markets and to aid cash flow management.

One product is a **Climate Tech loan guarantee**. This product supports commercialization of climate technology and is available to private-sector organizations. It insures up to 90% of the value of a commercial loan to an entrepreneur of low-carbon technology. This financial insurance is effectively a higher-tier version of the standard loan guarantee backed by the trust fund of the fifty-year-old State Loan Guarantee program. Financial development corporations like NorCal FDC identify and develop loan guarantee recommendations, and the Small Business Finance Center within IBank administers the trust fund and issues a loan guarantee upon origination of a commercial loan. Along with IBank, the Air District is a capital contributor to the loan guarantee.

Climate Tech loan guarantees draw together staff from the Air District and from NorCal FDC into cross-organizational teams. These teams blend the scientific and engineering expertise of the Air District with the community banking and economic development expertise of NorCal FDC, and they collaborate on the identification of potentially fundable products and on the development of loan guarantees for them. The Air District takes the lead in work with an entrepreneur to estimate the climate impacts of each unique emerging technology. NorCal FDC works with the potential borrower to develop successful relationships with commercial lenders. This team works together to attract and recruit commercial banks, credit unions, and community development financial institutions to participate in the loan guarantee program. Their participation is key, given that effect of a Climate Tech loan guarantee is to de-risk working capital loans to climate tech entrepreneurs for commercial lenders (Figure 2).

Figure 2. Support for Tech Development: Small Business Loan Guarantee for Entrepreneurs



The other product is a **Climate Tech loan**. This product can be used to finance public projects that adopt new climate tech. Loans can be up to \$30 million and can amortize funds for up to 30 years. Climate Tech loan interest rates are based on the market, but the interest rate is subsidized by a 0% interest capital contribution from the Air District of up to 25% of the loan value or a maximum of \$1 million. Like the loan guarantee, both IBank and the Air District are capital contributors on a Climate Tech loan.

Climate Tech loans blend the technology and project development expertise of the Air District with the lending expertise of IBank. The Air District takes the lead identifying potential projects and attracting client interest in the lending opportunity. The Air District also works with an organization to estimate the climate impacts of the project and assure that it includes relevant climate tech. IBank reviews a project’s creditworthiness and provides all administrative services over the life of the loan (Figure 3).

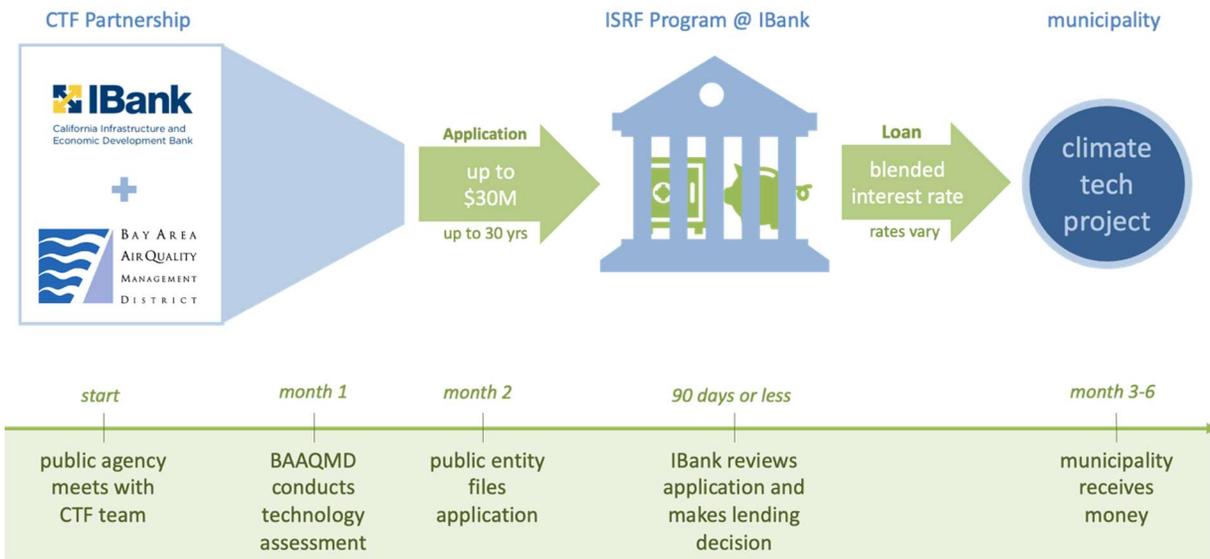
Climate Tech loan guarantee

- Tech qualification required
- Issued to commercial lender
- Up to 90% of a loan value
- Maximum payout of \$2.5M
- Last up to seven years
- Sunsets upon repayment

Climate Tech loan

- Project qualification required
- Lent to public entity
- From \$0.5M to \$30M
- Up to 30 years
- Subsidized interest rate

Figure 3. Support for Tech Adoption: Low-interest Loans for Public Projects



Actions & Outcomes

Over the last two years the Climate Tech Finance partnership introduced Climate Tech loans and loan guarantees into the marketplace. This section summarizes actions taken and describes outputs and outcomes.

Actions Taken. Climate Tech lending products were new to the marketplace when we began this effort. To raise awareness and attract consideration of them, the partnership relied on a combination of outbound and inbound marketing techniques. Our outbound marketing relied on virtual and in-person events. These included webinars, on-site presentations, mini-conferences, and technology open houses. We used marketing emails and outreach phone calls to identify potential funding prospects. Our inbound techniques relied on word-of-mouth communication and on the engagement networks of the underlying entities engaged in the Climate Tech Finance partnership.



In our marketing efforts, we looked for market channels⁵ that could be a source of leads for our efforts.

- We looked to establish funding pipelines with technology innovation funding or incubation programs upstream of our efforts. Our objective has been for technology ventures exiting demonstration phase and beginning commercialization phases of venture development to know about Climate Tech Finance. We worked toward channels with four initiatives: two technology incubators, one technology accelerator, and one State government R&D program. We found two of our qualified projects this way.
- We worked to introduce and socialize Climate Tech lending products by connecting with business and industry sector associations. In doing so, we looked for feedback about the ability of our products to support financing needs and to encourage word-of-mouth communication that could help identify project leads. We worked to establish channels with four technology networks: two statewide trade groups, one regional trade group, and one technology alliance.

In addition to market channels, we look to complementary programs that we thought could be sources of potential financing leads. Such programs are those that would help us identify infrastructure development or upgrade projects that were or could be deploying climate tech. The goal was to see whether these projects might accelerate through the availability of our funding and/or might be able to make modest changes to their

⁵ We use the term “market channels” in reference to technology innovation pipelines that can “graduate” entrepreneurs from R&D programs, incubators, and successful pilot projects into early commercialization and readiness for Climate Tech Finance products. We also use it in reference to technology innovation networks and trade associations that can connect us with organizations who are developing projects whose design might be shaped or supported by Climate Tech Finance products.

technology deployment and funding plans to take advantage of our lending products. We drew data from four such programs: an air district permitting database, the State database of projects going through review under the California Environmental Quality Act (CEQA), and the EPA WIFIA Program and California’s Clean Water State Revolving loan Fund (CWSRF) that fund upgrades to water and wastewater treatment facilities.

We combined direct client marketing and market channel identification with network-based matchmaking events. These events provided opportunities to promote Climate Tech lending products, but they were primarily designed to facilitate connections between climate tech vendors and potential customers. In this sense, the objective of these events was to create peer-learning circumstances for current and future adopters of climate tech. In short, the Air District explored the possibility of accelerating technology not only by placing lending products in the market, but also by creating learning spaces for climate tech deployment. Our matchmaking engagements included our mini-conference *Climate Tech Network* meetings and our technology showcase *Climate Tech Marketplace* events.



Outputs and Outcomes. Climate Tech Finance marketing focused on growing market awareness of Climate Tech lending products, on identifying fundable low-carbon technology projects, and on facilitating connections among vendors and potential customers that support tech deployment. In the process of doing this work, we documented our contacts with entrepreneurs and public agencies in a customer relationship management (CRM) database. This CRM helped us track our marketing efforts. It also helped us log projects details about potential climate tech projects and gauge the size of the potential climate tech marketplace.

Based on data in our CRM about near-term project finance opportunities, we estimated the current market size for our loan guarantees at \$50 million. This number aggregated the potential market size for only those entrepreneurs engaged with us in detailed enough conversation for us to be able to quantify their working capital needs. Because our marketing was limited, we found it reasonable to estimate that the size of the climate tech marketplace for loan guarantees may be even larger.



Similarly based on our CRM, we estimated market size for Climate Tech adoption at \$500 million. This number was based on projects with funding gaps and likely eligibility for a Climate Tech loan. These projects were identified through direct engagement with organizations. Like our estimate of the marketplace for loan guarantees, our estimate of market size was limited by the number of direct contacts made. As a result, we estimated that actual size of the market may be well over \$1 billion.

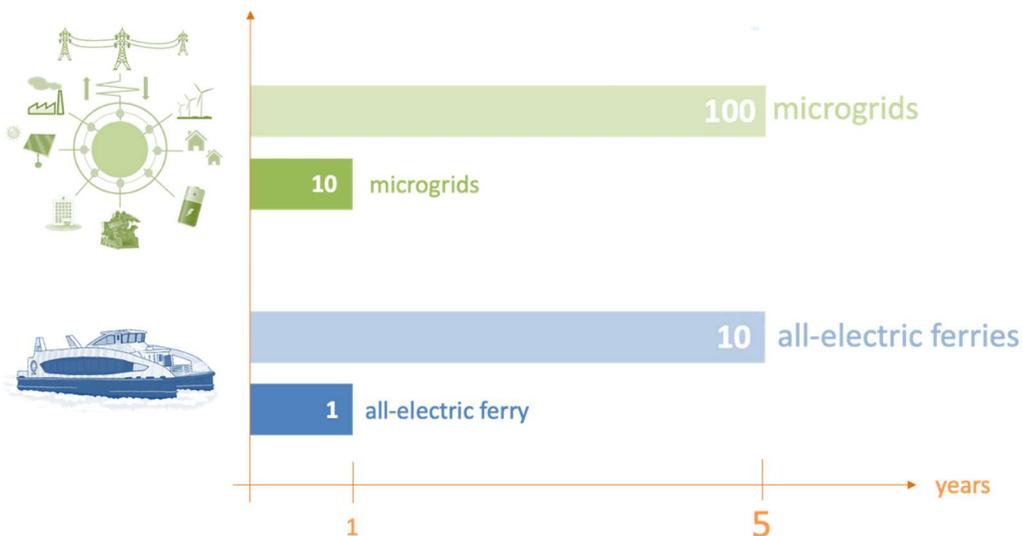
Project Examples. As of this report, Climate Tech lending tool has been used to fund two projects. Our first project uses a \$5 million term loan to accelerate the commercialization of a hydrogen fuel cell ferry into service on San Francisco Bay. This ferry will begin operating on a route between Oakland and San Francisco in the first half of 2021. In addition to reducing climate pollution, this project will reduce diesel emission impacts for disadvantaged communities around the Port of Oakland and San Francisco. It will also serve as the flagship for a planned fleet of similar zero-emission harborcraft.

Our second project uses a \$1 million line of credit to accelerate the installation of turn-key microgrids at municipal facilities. This technology integrates custom energy management software with solar photovoltaic systems, lithium-based battery systems, and delivery systems, such as building electrification and electric vehicle charging. These systems help to provide load balancing on the grid and to increase resilience of critical municipal facilities and will help prevent the spread of diesel-based back-up generators.

Climate Tech loan guarantees are intended to support development and expansion of an entrepreneur’s customer base. Their loans are based on their project flow in the next year, and their total technology impacts are based on anticipated deployments over the next five years (Figure 6).



Figure 6. Projected One-year and Five-year Technology Impacts



Similar to technology impacts, Climate Tech Finance evaluates the climate impacts of projects over a five-year timeframe. For these first two projects, climate tech deployments are anticipated to prevent 40,000 metric tons of carbon dioxide equivalent emissions over the next five years.

Figure 7. Projected One-year and Five-year Climate Mitigation Impacts (MTCO₂e)



Funded projects tell only part of the story. Eight additional technology development projects in our pipeline have undergone a technology review and greenhouse gas reduction impact analysis to qualify for a Climate Tech loan guarantee. These projects are now in loan development conversations with commercial lenders. Figure 8 highlights details about these projects.

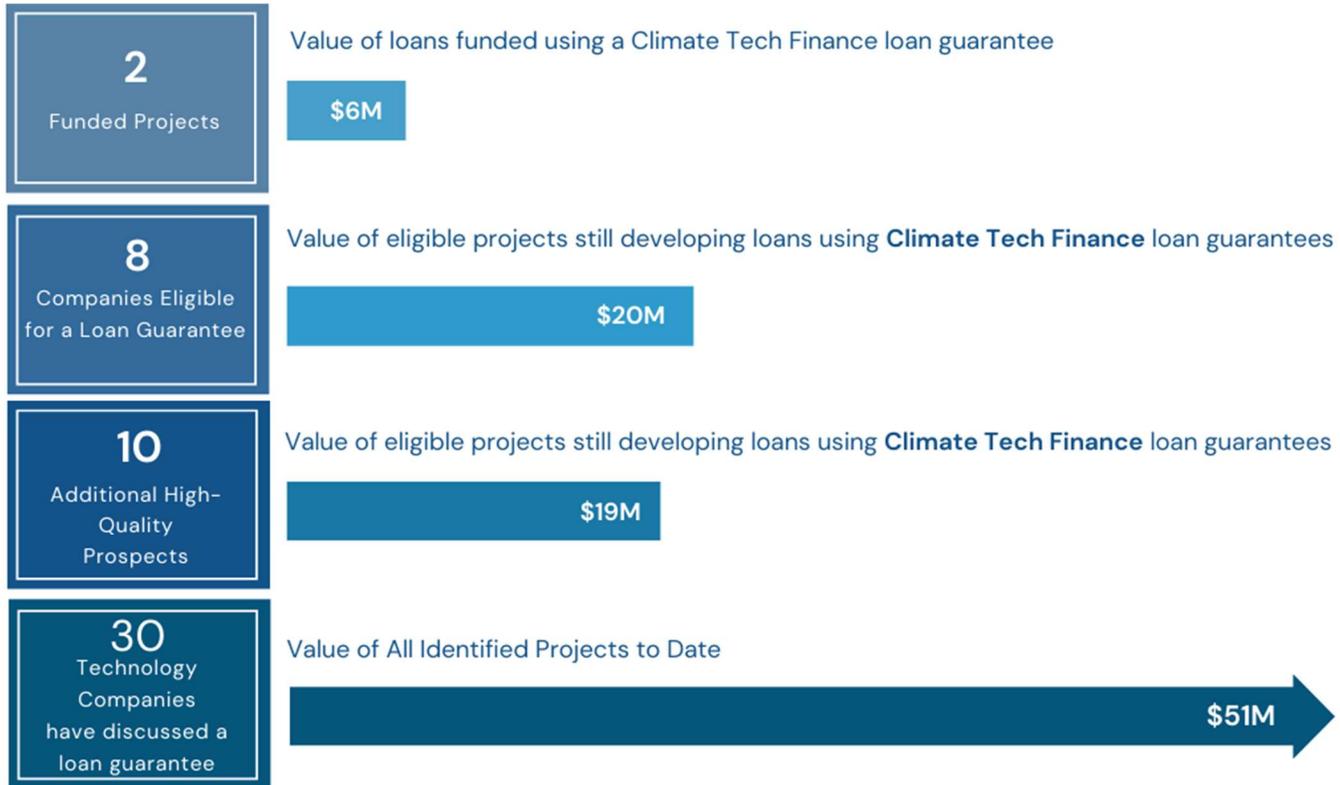
Figure 8. Projects Currently Seeking Funding Using Climate Tech Lending Products



Based on our technology review and greenhouse gas assessment for these projects, we predict that these projects will deploy technology at rates similar to our first two and will prevent half a million metric tons of carbon dioxide over five years.

In total, we have supported \$6 million in loans for two projects and have qualified eight additional projects for support on \$20 million in loans. If we look at the promising leads and prospects in our pipeline, we see potential to support a dozen more projects exceeding \$50 million in loans.

Figure 9. Project Pipeline for Climate Tech Lending Products



Beyond project funding, Climate Tech Finance outcomes might also be evaluated in terms of yield from our matchmaking efforts. While more qualitative in nature, our networking efforts have resulted in such outcomes as initiating talks for a wastewater treatment plant to buy an emerging biosolids treatment technology and facilitating a plant inviting a startup to build a pilot-scale production facility on site.

Lessons Learned

Our ultimate goal is to spur technology development and adoption. Our more proximate goal is to place our products into the marketplace and assess to what extent they are understandable and competitive enough to attract customers. To this end, we compiled data about the market response to our products as well as about financing gaps for climate tech adoption projects. We used these to make inferences about the demand for this kind of lending. Here we break these insights down for our lending products.

On Loan Guarantees to Expand Entrepreneurs' Access to Capital. As a form of financial insurance, a loan guarantee is an indirect lending product. It facilitates a “deal” between a commercial lender and an entrepreneur. For the lender it does so by absorbing some of risk of loan default that derives from economic and logistical contingencies that a lender and borrower may find difficult to assess for emerging technologies. In doing so, it enables a lender to reach new clients, lend in new sectors, and certainly find comfort making a deal that involves new technologies. For the entrepreneur, a loan guarantee increases access to working capital needed to grow a business. In addition to increasing capital access, it can adapt to an entrepreneur’s needs. This could include building inventory, servicing clients, investing in infrastructure, etc. It also be used to de-risk different types of loans, like term loans, delayed draft term loans, and lines of credit.

- **Entrepreneurs have shown strong interest in the loan guarantee.** As owners of small businesses producing early mature products, they need capital to fuel their growth, and they quickly learn that commercial lending is an attractive and lower-cost source of money. However, building bank confidence in their venture and creditworthiness is a challenge, and the Climate Tech loan guarantee helps grow a lender’s financial and business comfort with their product. In some cases it opens the door in a lending relationship. In others it helps keep it open.
- **Loan guarantees increase small businesses’ working capital flexibility and reinvestment potential.** This program spurs climate tech innovation by expanding access to capital. While equity providers offer a variety of resources for business startups (e.g., business advising, market connections, additional wealth networks), commercial lending offers less expensive and more flexible working capital. We assume that this flexibility in use of working capital makes it easier for entrepreneurs to grow and for a business owner to use profits for business reinvestment or expansion of their business portfolio. As an example, our first funded project looked to a commercial loan to accelerate its reinvestment of capital and to expand production a year earlier than its capital flows would have otherwise enabled.
- **Lenders have demonstrated interest in the loan guarantee** by registering for the State Loan Guarantee Program, which enables them to receive a Climate Tech loan guarantee. The first two funded Climate Tech Finance projects were with banks who filed new or renewed their certifications as participating lenders. We anticipate the next few funded projects may also bring new participating lenders into the State loan guarantee program. The ongoing marketing effort for Climate Tech Finance is building lender confidence in being lenders to emerging technology and in the trust fund for the State loan guarantee program.



- **There is a significant, untapped market for loan guarantees.** We have identified dozens of small business ventures advancing individual climate technologies and the market for climate technologies who reach the capital gap that we have identified. (Mature enough but not perceived to be low risk enough to access capital via a bank.) On average over the last year we have identified 1-2 such ventures every month and qualified roughly 1 per month.
- **Enhancing capital access works by building bank comfort with unfamiliar technologies.** Lending for a new business means that a bank must assure that the venture has the resources and skills likely to succeed in loan repayment. Lending to a new business with emerging technology involves additional contingencies associated with getting a new technology to work and its market going. A loan guarantee serves the purpose primarily of helping a bank manage this second set of contingencies. It de-risks this outer layer of concern that may lie beyond a banker's experience and that it cannot analyze confidently. This is the primary service of an emerging tech loan guarantee. A loan guarantee does not change a banker's risk management requirements or the banking regulations. It also does not appear to change the terms of a loan. The financial insurance primarily grows the comfort of banks. It helps them hedge against contingencies that they cannot anticipate.
- **Going through the process of developing a loan guarantee may itself reduce risk.** The third-party technology and financial reviews that are part of the Climate Tech loan guarantee eligibility evaluation may do more than qualify a project. They also create environmental, technological, and financial observation that can increase the viability of a project and its probability of success.

On Loans to Accelerate Public Sector Adoption of Climate Tech. Our early marketing of direct loans targeted the Bay Area wastewater sector. We took this approach for two reasons: the Air District regulates emissions from industrial facilities, and the capital deployed through Climate Tech Finance direct loans must remain under public ownership. Wastewater treatment plants match these characteristics. Additionally, there are several types of climate tech that wastewater treatment plants can adopt to lower their greenhouse gas emissions.



Over the last two years roughly five dozen wastewater treatment facilities in the Bay Area have been introduced to new low-carbon technologies and the availability of financing support through the efforts of Climate Tech Finance. Because wastewater treatment plants have periodic capital planning projects that often take between five and ten years to execute, we anticipate only a half dozen significant improvement projects in any given year. Over the last year six wastewater treatment plants considered this financial tool, two of which took it to their board. We have not seen rapid uptake of Climate Tech loans, but we have found evidence of substantial interest in project financing. We see ways that the Climate Tech loans could meet this interest under different market conditions or with a different structure. We summarize these insights here.

- **Funding gaps are potentially widespread.** During our marketing of Climate Tech loans to facilities around the Bay Area, we identified over \$500 million in funding needs associated with projects adopting climate tech. Because our observations are drawn from focused marketing in one industry sector (wastewater treatment) and more casual for one technology (advanced energy systems) and an emerging resource management sector (biomass recovery), we speculate that financing interests are more widespread and bigger than what we have seen.



- **Current Climate Tech loans do not offer superior enough lending to spur the market.** Climate Tech loans have been able to offer capital at a lending rate between 2.4 and 3.4 percent, depending on project size, location, and loan term. Initially this lending rate was competitive, but not more than marginally superior. Over the last year interest rates have fallen to below 2 percent, both in the bond market and from commercial lenders. Niche government programs, such as US EPA’s Water Infrastructure Finance and Innovation Act (WIFIA) program, may also offer larger loans or half-market rates. To be superior as a technology accelerator, Climate Tech loans need a deeper subsidy that enable them to outcompete alternative, cheaper, but sluggish loan or bond options.
- **Loans satisfy a capital need but are not a subsidy.** Loans do not reduce the cost or “buy down” the cost of a new technology. Instead, they enable that cost to spread out over time provide access to capital for a technology that is affordable but whose purchase is limited by cash flow. Without a compelling reason or existing plan to adopt a new technology, it is difficult to attract their interest with a loan. Thus, loans work best when they align with an existing plan or compelling need. Alternatively, even a small subsidy may psychologically assist lending as a technology driver. Even if it does not have a substantive impact on the overall costs, some organizations may be motivated by the existence of a subsidy, even if of only modest or symbolic size. Some sectors (e.g., schools) see rebates as an important part of their project currency. (This may be based on people’s relative thinking about expenditures, per recent social science. It may be a psychological/social hurdle for them to take finance without a rebate.) It is unclear if our current offering to cover fees (which would be in the \$10k range) is attractive.

On Creating a Sustainable Financing Platform. Climate Tech Finance has used a novel public-public financial partnership to leverage the assets of three organizations. We turn here to lessons learned about starting a lending program, reflecting on this structure and on our marketing strategy.

- **Partnerships that combine assets accelerate program growth.** The novelty of this partnership is its combination of the Air District’s technical expertise and knowledge about emission sources with IBank and NorCal FDC’s financial expertise and trust among capital lenders. The partnership was able to leverage IBank’s ISRF program and the State small business loan guarantee program to accelerate climate tech, NorCal FDC’s network of banking relationships and community reputation, and the Air District’s technical knowledge. The blending of this expertise helped the partnership generate momentum. This was particularly true for lead generation and loan development, given that lending benefits greatly from locale familiarity and local relationships.
- **Accelerating climate projects requires engaging with multiple clients.** For Climate Tech loans, there are two clients, and they are internal to the same organization. One is the facility designer, who selects climate tech as part of a facility design. The other is the public finance managers, who chooses how to finance debt for a project that includes climate tech. For Climate Tech loan guarantees, there are two clients, and they are different market actors. One is the entrepreneur who is looking to borrow capital. The other is the bank who lends capital. For Climate Tech loan guarantees we need to bring people together to make a

deal. For a Climate Tech loan we needed to bridge decision making within an organization to support a project.

- **A larger, lower-interest loan fund would accelerate project development.** We interpret progress to date as validation of the viability of the Climate Tech loan guarantee as an instrument for accelerating the commercialization of climate technologies. We have supported \$6 million in loans for two projects, qualified eight more worth \$20 million, and see potential to support a dozen more projects exceeding \$50 million in loans. Based on our outreach, we anticipate that the aggregate lending demand to accelerate climate tech adoption in the Bay Area is \$500 million or more. Establishing a dedicated, revolving fund of \$50-100 million to support these types of projects at superior rates could be a significant accelerator for climate tech entrepreneurship.
- **Lending leverages and revolves public funds for maximal impact.** The Climate Tech Finance program leverages up to \$10 in private capital for every \$1 of public capital encumbered. The historic loan default rate suggests that 98% or more of these funds will become available for subsequent lending, resulting in the public capital revolving every seven years or less.
- **Climate Tech Finance positions its partners at the center of climate tech innovation.** In addition to attracting entrepreneurs, it has the potential to add jobs and build a technology development and deployment labor pool. It also aids job and business growth by building closer relationships between banks and new tech sectors and greater economic development rapport between the State and the low-carbon economy.

Climate Tech Finance Case Study: SWITCH Maritime and Zero-Emission Harborcraft

The creation of zero-emission harborcraft on San Francisco Bay was a dream when Governor Newsom was Mayor. Today, with some help from Climate Tech Finance, that dream is about to come true.

What is SWITCH Maritime? SWITCH Maritime (SWITCH) is a company building the first fleet of zero-emissions vessels in North America. SWITCH's flagship vessel is an 84-passenger, fuel cell electric ferry (e-ferry) commencing operation in the Bay Area later this year. This project got started after a 2016 study at Sandia National Labs concluded that using fuel cell to power an electric ferry was now both technologically and economically feasible. In 2018 a startup named Golden Gate Zero Emission Marine (GGZEM) moved to translate theory into practice and secured a \$3M grant from the California Air Resources Board (CARB) to demonstrate the viability of a hydrogen fuel cell powertrain in a marine environment. With the proceeds from the grant, GGZEM developed plans and contracted with a shipyard in the Bay Area to start vessel construction. Later that same year, SWITCH solidified its investment case for funding completion of vessel construction and took the lead role by purchasing the vessel. Shortly thereafter, SWITCH met Climate Tech Finance.

How Did Climate Tech Finance Help SWITCH Accelerate? Key to completing this project was securing additional funding for an emerging technology. SWITCH's initial equity contribution and the \$3M grant from CARB were enough to fund research and development and the start of construction, but another \$5M was needed to complete the build and ready the vessel for commercial service. SWITCH looked to a bank loan as part of its financing strategy but found that the newness of the technology made commercial lenders wary of involvement, despite a robust 5-year bareboat charter contract with a best-in-class ferry operator. Climate Tech Finance worked with SWITCH and a commercial bank to come up with a strategy to de-risk the technology venture that included providing a \$2.5M loan guarantee through California's Small Business Loan Guarantee program. With this support, SWITCH and a commercial bank were able to agree on terms for a \$5M loan that fully funds e-ferry through commercialization. The experience has been positive enough that SWITCH and the bank are in discussion about development deals for additional zero-emission harborcraft.

How Does Climate Tech Finance Create Value? Climate Tech Finance offers loan guarantees to commercial lenders when they fund emerging tech ventures that reduce greenhouse gases. The goal of this de-risking insurance is to expand access to capital for climate tech entrepreneurs and to speed commercialization of their product. Climate Tech Finance is able to provide this risk mitigation because of an innovative public-public environmental finance partnership. The partnership brings together environmental entrepreneurs from the Bay Area Air Quality Management District (BAAQMD) and bankers from Nor-Cal Financial Development Corporation (NorCal FDC) and the California Infrastructure and Economic Development Bank (IBank). The partnership blends their expertise and local relationships to attract entrepreneurs, evaluate technology impacts, and successfully match ventures and lenders. It is this blending of know-how and trust networks that creates the partnership's "secret sauce" and successful technology acceleration.

Annually this electric ferry will avoid roughly 2,000 tons of carbon dioxide emissions and support eight standing jobs. Its construction period provided work for fifty-five people and created the template for a fleet of commercial vessels that, over the next five years, can increase the impact 10x. Because it is part of plans to develop renewable hydrogen production and fueling infrastructure at seaports, the SWITCH e-ferry is also positioned to be a catalyst for development of a hydrogen economy for maritime transportation.

Snapshot of the Deal

- Hydrogen fuel cell ferry in passenger commuter service
- Guarantee of \$2.5M for commercial loan of \$5M
- Creates work for 63 people in construction and operation
- Avoids 2,000 tpy of GHG and reduces diesel particulates for seaport communities
- Creates flagship for fleet with 10x impact potential



Water-Go-Round Characteristics

- Length: 70 feet
- Max Passengers: 84
- Electric Motor: twin 300-kW
- Top speed: 22 knots
- Fuel Cell Size: 360 kW
- Battery: 100 kWh
- Fuel Tank: 264 kg, 250 bar
- Time to Refuel: 4 – 8 hours
- Hull Build: Bay Ship & Yacht
- Full Build: All-American Marine
- First Operation: early 2021

Climate Tech Finance Case Study: Gridscape Solutions and Municipal Microgrids

With the need for a more resilient, distributed grid, microgrids have been emphasized as a key solution. Traditional microgrid developments require customized designs specific to a site. Gridscape Solutions applies value engineering principles to develop a modular approach, offering “microgrids as a service” that can lead to lower cost and scalability.

What is Gridscape? Gridscape is the largest developer of small to mid-sized renewable energy microgrid products and technology in California. They are focused on deploying state-of-the-art microgrids aimed at reducing overall energy costs for a site and providing clean emergency backup power during Public Safety Power Shutoffs (PSPS) or other power disruption events. The Gridscape microgrid system is a software-driven, product-centric system, integrated with solar PV, battery storage and EV charging stations and has been proven in over 15 recent microgrid installations in California municipal and commercial facilities. Gridscape offers a “Microgrid-in-a-box”—all the necessary hardware and software come pre-assembled in an outdoor-rated enclosure, making it possible to install a larger number of microgrids in California in the near term.

How did Climate Tech Finance help Gridscape accelerate? Gridscape is designing and deploying small microgrids at municipal and commercial facilities in cities in California. Because these microgrids are ultimately transferred for customer ownership or third-party financing, Gridscape sought working capital to purchase equipment and services during construction and commissioning of these microgrids. Gridscape looked to a bank loan as part of its project financing strategy but found that the newness of the technology and deal structures made commercial lenders wary of involvement, despite a track record of successful projects. Climate Tech Finance worked with Gridscape and River City Bank to come up with a strategy to de-risk the technology venture that included providing a 90 percent loan guarantee in partnership with California’s Small Business Loan Guarantee program. With this support, Gridscape and River City Bank were able to agree on terms for a line of credit that supports commercialization of urban microgrids for energy savings, grid resilience and disaster readiness.

How does Climate Tech Finance create value? The core value of Climate Tech Finance is to support innovative climate projects by offering loan guarantees to commercial lenders when they fund emerging tech ventures that reduce short- and long-term greenhouse gases. The goal of this de-risking insurance is to expand access to capital for climate tech entrepreneurs and to speed commercialization of their product. Climate Tech Finance is able to provide this risk mitigation because of an innovative partnership of environmental entrepreneurs from the Bay Area Air Quality Management District (BAAQMD) and bankers from Nor-Cal Financial Development Corporation (NorCal FDC) and the California Infrastructure and Economic Development Bank (IBank). The partnership blends their expertise and local relationships to attract entrepreneurs, evaluate technology impacts, and successfully match ventures and lenders.

What is the impact of this project? Annually these microgrid projects will avoid roughly 2,200 tons of carbon dioxide emissions. Depending on the size of the microgrid project, installations can save between \$7K to \$30K a year in energy cost to their customers. Gridscape is projecting growth of over one hundred installations by 2023, providing wider grid resiliency using energy storage systems and working to eliminate the need for fossil-based back-up power systems such as diesel generators.

Snapshot of the Deal

- Solar+battery-enabled microgrids with integrated energy management software
- Guarantee of 90% of loan value
- Supports work for 25+ people in construction and operation
- Avoids 2,200 tpy of GHG and reduces diesel particulates
- Creates grid resilience with dispatchable on-site clean energy production and backup power



Microgrid Characteristics

On- and Off-Grid Modes
EnergyScope Software Controller

DC and AC EV Chargers
Cashless ePay Kiosk

Modular & Scalable System from
120kWh to 3MWh battery system