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Philanthropy's Full Force

Mission investments to catalyze climate solutions

Prepared for the David and Lucile Packard Foundation,
the John D. and Catherine T. MacArthur Foundation,
and the ClimateWorks Foundation

Redstone Strategy Group is a leading advisor to private foundations and non-profits worldwide. We help clients identify their highest-return investments, track and learn from results, and continually improve their efforts to solve urgent social problems. Our approach combines substantial experience across all sectors of philanthropy with deep appreciation of our clients' knowledge and expertise. This allows us to collaborate effectively with clients as they improve their ability to achieve social good and learn from their results.

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Mission investments
can work with
grants to catalyze a
transition to a low-
carbon economy
and abate carbon on
a global scale

Executive summary

Today, many foundations are asking how they can use mission investments alongside grant portfolios to accelerate climate solutions. Answering this question requires putting investment opportunities in the context of a broader theory of change to address climate change – a single investment is no more likely to produce major social and financial returns absent a thoughtful strategy than will a single grant. Further, individual investors will have their own strategies, risk tolerances, favored instruments, and geographic preferences. The challenge is therefore not to identify the best opportunities in the abstract, but to explore where mission investments can work with grants, government investment and policy, and private capital to transition the globe to a low-carbon economy and abate as much carbon as possible.

Within this context, we scanned the landscape, examined potential investment areas, and looked at a set of key factors – abatement potential; scalability; leverage and additionality; and viability – to identify priority areas. We interviewed over 50 experts, analyzed abatement cost curves, assessed capital gaps, and reviewed existing research and literature. The result is a structured look at potential investment sectors. That said, assigning specific scores is more art than science, there are likely compelling ideas we missed, and there are definitely challenges with the areas we highlight. Our goal was not to produce an academic paper but rather to start a productive conversation.

We highlight four initial approaches that we believe merit further exploration. This report describes our methodology for selection and provides a brief overview of each opportunity:

- Stop deforestation and peat loss in Indonesia
- Roll out distributed generation in India
- Commercialize advances in cleantech
- Scale energy efficiency through new business models

We also identified additional areas that show promise depending on a foundation's particular interests or strategy: scale successful models in China, build carbon market infrastructure, advance cutting-edge vehicle technology and new mobility, and explore business models for non-carbon pollutants (e.g., waste, biodigestion, and methane).

We close the paper with initial thoughts on options for philanthropy to operationalize mission investments as part of the broader campaign against climate change. Across the wide field of climate mission investments, there is significant potential to increase coordination on strategy and catalytic opportunities. Within sectors, how best to operationalize investments depends on the specific opportunity being pursued.

Mission investments can accelerate grant strategies

The multitude of factors shaping climate change outcomes—ranging from government policy to technology to new business models—calls for a diversity of interventions. Mission investments can enhance the ability of grants, government policy and investment, and private capital to accelerate climate change mitigation by scaling businesses and organizations that achieve social outcomes.

The specific role of a given mission investment will depend on the overarching strategy and what the context demands of the investment's purpose, form (e.g., equity, debt, loan guarantee), risk level, and more. That said, there are a few common theories of change for how mission investments can play crucial roles in holistic philanthropic strategies. Mission investments can close capital gaps by taking on initial business or technology risk, prove a model so other concessionary investors replicate it, spur leadership through stronger policy, regulation, or certification, and operate at scale from the start.

The power of mission investments

An example from conservation

Conserving natural streams and restoring degraded ones at an accelerated pace and scale is crucial to a future with clean, healthy water. Yet, philanthropy lacks the resources necessary to fund restoration stream by stream – new investment is vital. The Kresge, Gordon and Betty Moore and Packard Foundations responded by investing in The Freshwater Trust to develop a market for water quality credits and implement credit-producing restoration projects in the US. The Trust generates water quality credits through natural infrastructure projects, such as planting trees to filter and cool water. This mission investment has opened new revenue sources for restoring rivers in the Pacific Northwest, like in Medford, Oregon where credits have funded the restoration of hundreds of acres of streamside forest. It also, in tandem with advocacy grants, helped construct the regulatory framework to support water quality markets nationwide.¹

Close capital gaps by taking on initial business or technology risk

Markets are ideal for scaling profitable ideas rapidly. However, many investors are naturally conservative and generally prefer known investments (even if they are risky) to unknown technologies, business models, or markets. When faced with these unknowns, investors generally charge risk premiums that new ventures cannot afford and/or demand repayment faster than social innovations can produce. The result is a capital gap where investors wait for someone else to absorb the initial risk.

Philanthropy's opportunity in these situations is to invest in cases where early successes demonstrate to the broader market the quality of the investment or viability of the technology. If the underlying business fundamentals are strong, the hurdle rate

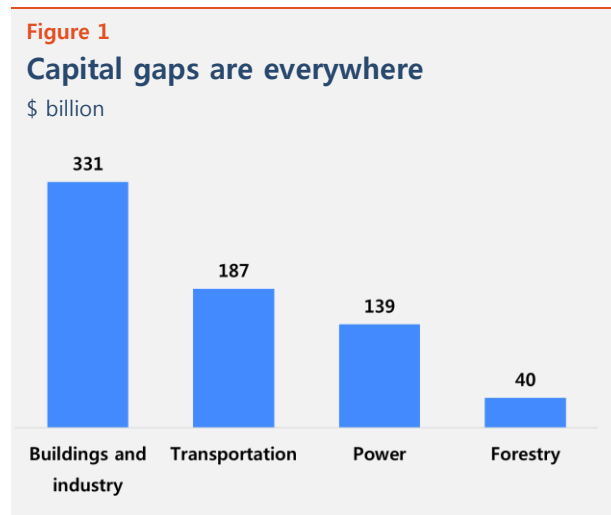
¹ *The Evolution of Mission Investments at the Packard Foundation*, the David and Lucile Packard Foundation and Redstone Strategy Group, 2015. <https://www.packard.org/what-were-learning/resource/mission-investments-at-the-packard-foundation/>.

Every sector has a major capital gap, so philanthropic capital needs to be deployed carefully

required of future investments—by a foundation or by other actors replicating or building on the model—should decrease, and non-concessionary funding should increase. Once concessionary investments drive down the cost of capital to the point of full commercial viability, commercial investors can scale the idea.

Follow-on projects in an area ripe for mission investing should require less concessionary capital than the first project, and potentially, depending on the investment type and structure, none at all. That way, philanthropy can be confident it is improving the underlying business case of an investment and not just subsidizing an uneconomic idea. Potential examples include securitizing the first energy efficiency fund, or commercializing a new energy technology.

In climate mission investing, capital gaps exist across sectors (Figure 1²). As a result, the size of the capital gap is not a basis upon which to differentiate between opportunities at the sector level. The more relevant considerations are which capital gaps philanthropy can help solve within each sector, where market size offers a more tractable gap to fill, and which gaps are linked to the most critical climate challenges.



Prove a model so other concessionary investors replicate it

A mission investment may be replicable even if later projects will still require some concessionary investment from socially-minded investors, governments, or development banks. Even though the idea never reaches full commercial viability, it could still scale sufficiently to accomplish a strategic goal in a limited market.

For example, The Rockefeller Foundation’s *Smart Power for Rural Development* program in India aims to electrify 1,000 villages over three years. It is lowering upfront capital costs so investors can realize the returns they need to enter the market. Villagers then pay market rates for electricity that they would not have access to otherwise.³

² *The Green Investment Report - the Ways and Means to Unlock Private Finance for Green Growth*, World Economic Forum and Green Growth Action Alliance, 2013, http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf.

³ “Smart Power for Rural Development: Overview,” The Rockefeller Foundation, 2016, <https://www.rockefellerfoundation.org/report/smart-power-for-rural-development-overview/>.

Spur leadership through stronger policy, regulation, or certification

Markets are not just creatures of their regulatory context – they actively shape it. All levels of government make policy and regulations cognizant of how markets will react, be that a nation's economic policy considering its effects on the stock market or a city subsidizing business investment to attract jobs. The same is true of certification schemes that seek to influence what products are offered and how they are produced through consumer education.



One key theory of change for mission investments then, is to build political support for a broader transition to a low-carbon economy and strengthen the policy, regulatory, or certification context, leading to direct emissions reductions and creating potential leadership opportunities. For example, investments that increase renewable development, such as next generation technologies, could accelerate the adoption of higher renewable targets – policymakers need to know a target is realistic. More broadly, building leadership on climate in countries like the US could allow the current and future administrations to take stronger positions in global climate discussions regarding what is both possible and realistic. In some cases, the leadership opportunities may be as important as the emissions reductions themselves.

Similarly, investments that help close capital gaps in underserved regions could convince voters or their representatives of the broader benefits of transitioning to a greener economy. Investments in communities bordering forest conservation areas, for example, could increase support for protecting those forests.

Operate at scale from the start

Finally, some opportunities for mission investments might be globally significant without needing to consider potential future market, concessionary investor, or government actions. A deal to stop deforestation in Indonesia is one such opportunity. The mission investments that lead to a deal would still need to be strategic in how they leverage government and stakeholder support. However, closing such a deal could abate up to one gigaton of annualized CO₂ emissions without a broader strategy for scalability.

One promising
role for mission
investments is to
build political
support and enable
a stronger policy
environment

Key factors can help identify opportunities

To identify opportunities, we applied a set of standard factors, drawing on over 50 expert interviews, cost curves analyses, capital gap assessments, and desk research.⁴ We began with the McKinsey greenhouse gas abatement cost curves. These estimate the potential abatement and costs of over 150 different interventions in each of over 20 geographies. For ease of analysis, we grouped these into about 25 investment areas based on the ClimateWorks Foundation's portfolios and a few initial coarse filters (Appendix Table 1).⁵ Specifically, we filtered out opportunities that philanthropy was extremely unlikely to pursue productively based on expert interviews. We further restricted developed-world opportunities to the US since US-based foundations can navigate legalities and conduct due diligence on US investments more efficiently, and technology and business models can spread reasonably easily within the developed world. Most of the investments applicable in the US would be similarly applicable in other developed countries if foundations have expertise there.

We scored these opportunities against four factors: abatement, scalability, leverage and additionality, and viability. Scoring opportunities on different factors was more art than science. In some cases, distinctions between opportunities were clear. For example, philanthropy is more likely to provide additionality by investing in distributed generation in India where companies have struggled to close deals than by investing in more fuel efficient hybrid vehicles where companies face much lower capital costs. In other cases, the subtleties were debatable: the viability of halting deforestation in Indonesia versus the viability of catalyzing green investment in China is less clear. We used interviews to fill data gaps within the model where possible.

A key conclusion from this effort is that there are often tradeoffs across factors. For example, viability and additionality tend to be inversely correlated. If a project is viable, there are likely to be existing actors that diminish philanthropy's added value. Likewise, high additionality tends to be indicative of high risk, such that a project is less likely to be viable. The goal, therefore is not for a given project to score perfectly on all factors. Rather, philanthropy can target areas that are on the efficient frontier. A reduction in one of the factors should result in an equivalent increase in another.

Lastly, foundations vary in their programmatic priorities, appetite for risk, leverage thresholds, etc. Ultimately, different foundations may give more weight to one

There are tradeoffs across the four factors. Different foundations will make different choices

⁴ Interviewees spanned a variety of disciplines, including philanthropic leaders, program officers, fund managers, financial advisors, and sector-specific experts.

⁵ Categories align with ClimateWorks Foundation portfolios. **Land Use** focuses on commodity production, community rights, policy, and transparency and communications. **Energy Efficiency** focuses on energy efficiency policies, implementation, systems integration, and finance. **Clean Power** focuses on transforming the power sector through reduced coal usage, increased low-carbon supply, and new clean power business models. **Non-CO2 Forcers** focuses on reducing F-gases, dirty diesel, methane leakage, marine emissions, brick kilns, and more. Lastly, **Oil** focuses on clean transportation, including fuel-efficiency, next-generation vehicles, and urban design and public transportation.

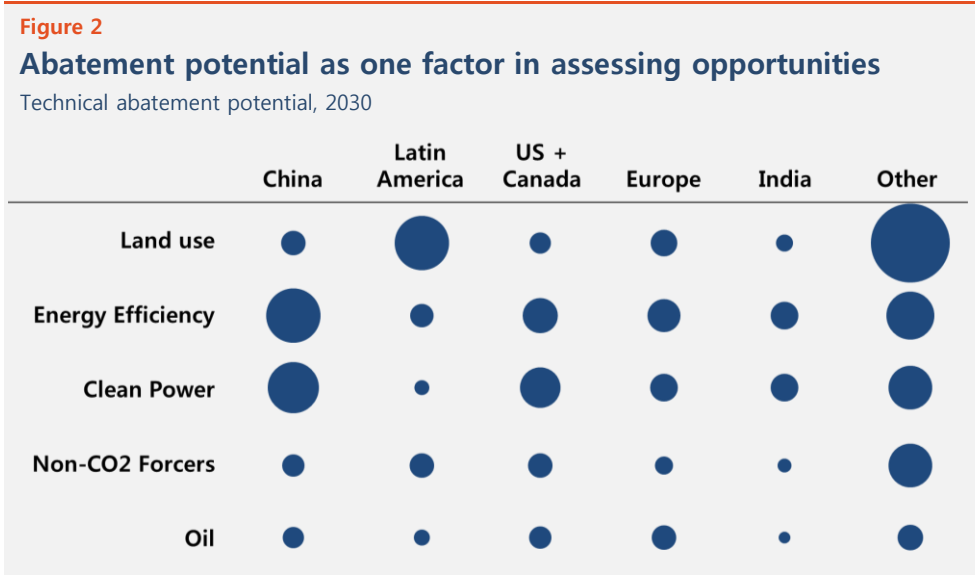
The indirect benefits of an investment can be as important as the direct emissions reductions

criterion over another. Our goal here is not to highlight the single best opportunity with an academic level of rigor, but rather to point to ones that are compelling for different reasons.

Abatement potential

Ultimately, tackling climate change means abating enough greenhouse gases to prevent global temperatures from rising more than two degrees Celsius. We considered the full scale of abatement potential (accomplished through both direct and indirect means) and highlighted non-abatement co-benefits where relevant.

We used McKinsey cost curves to estimate abatement potential. These examine over 150 different interventions in over 20 geographies to estimate the potential abatement (using 2030 tons) and societal cost of each. We took the most recent cost curves and broke them down by the ClimateWorks Foundation’s portfolio typology, intervention type, and focus geographies. This analysis emphasized the abatement potential in energy efficiency and clean power in China, the US, and Europe, and land use in Latin America and Southeast Asia (Figure 2).



We also used the cost curves to identify opportunities with negative social costs to explore how mission investments could unlock those benefits. Opportunities that result in long-term savings to society (e.g., high efficiency appliances) are more likely to offer viable business models than costlier opportunities (e.g., rolling out carbon capture and sequestration). Of course, sometimes the social benefits are external to the investment. For example, many building owners do not benefit from energy efficiency investments since tenants pay the utility bills. We attempted to distinguish the more promising situations in which societal cost could be captured.

We included indirect climate change benefits of a mission investment because they can be just as important as the direct tons. Many interviewees discussed the strategic importance of investments that benefit specific constituencies or provide ammunition

for stronger subnational, national, or global policies. Successful businesses, pilot projects, and technology advances that demonstrate what is possible provide great fodder for any governments looking to advance a low-carbon agenda. Investments could also strengthen actors that provide a foundation for future abatement opportunities, such as incubators that foster long-term innovation. For all these indirect climate change benefits, the key is to have a clear theory of how the initial investment will lead to those tons, and what additional factors are needed to succeed.

We also recognize that foundations target climate change for different reasons, and that many will seek co-benefits from their investments outside of climate abatement. We did not score co-benefits since foundations value them differently. However, we did highlight them where relevant, so foundations interested in co-benefits such as ecosystem conservation, energy access, public health, job creation, and more can see how investments could support those goals as well.

Scalability

Ideally, investments will lead to globally-significant abatement with only minimal further philanthropic investment. Even if further concessionary investments are needed though, investments should have a plausible path to abate more carbon or shift the political dynamic beyond whatever abatement the particular deal offers. Purchasing land directly to prevent deforestation is an example of a non-scalable investment – any one purchase does not increase the likelihood of further progress.

We found that most scalable opportunities operated on one of the four theories of change described in the first section of the paper:

- Close capital gaps by taking on initial business or technology risk
- Prove a model so other concessionary investors replicate it
- Spur leadership through stronger policy, regulation, or certification
- Operate at scale from the start

Leverage and additionality

Mission investments ideally will shift the trajectory of a project or sector or offer additional leverage. At the most basic level, additionality enables a project to happen that would not otherwise be realized. A mission investment that succeeds in allowing a promising company to survive rather than shut down offers additionality. A mission investment in a company that venture capitalists are fighting to fund does not.

Additionality is especially promising in smaller or nascent market segments. The market for distributed generation is a fraction of the market of solar—but that can enable mission investments to exert greater influence in shaping the sector. Philanthropy can also better prime the pump for capital in newer markets, like high altitude wind energy, easier than developed ones, like auto efficiency.

Leveraging other funds is another form of additionality. Philanthropy may not be able to close a funding gap on its own, but it may be able to do so with a well-targeted \$50 million mission investment that prompts a \$500 million investment from government funding sources. In contrast, low-additionality mission investments could crowd out other funds such that they undermine the investment's longer term goal.

Viability

Ultimately, foundations want their investments to provide both social and financial returns. Our assessment suggested three major barriers to viability, one at each stage of an investment strategy.

Before even making a mission investment, philanthropy needs to source a strong pipeline of opportunities. This often requires significant grant resources to build a sector's infrastructure (e.g., transparent information, supply chains, etc.), develop financeable models, and create the policy or regulatory context the investment would need to succeed. When there is a strong pipeline, investors then need to select the best ideas, often described as the need to "pick winners." While selecting grantees is always difficult, in mission investing the bar is much higher – professional corporate, private equity, and venture capital investors are actively looking for the best deals, too. Philanthropy needs to avoid deals that commercial investors passed over simply because the deals do not pass muster. This challenge is greatest when investing in early stage companies where information is lower and risks are higher.

Next, philanthropy needs to navigate the regulatory and competitive context of an investment area. As a result, domestic deals tend to be more viable than deals outside a philanthropy's home country, and deals in developed countries tend to be more viable than in developing countries. Philanthropy may have particular difficulty investing in India and China. Finding mechanisms to invest in distributed solar in India has proven challenging, and China's accounting and transparency standards make it notoriously difficult for foreign investors to protect their capital. That said, foundations could partner with commercial investors who specialize in crafting deals in these countries, especially in light of India's and China's abatement potentials.

Finally, a mission investment needs to offer a return on that investment. It is difficult to imagine foundations attracting further capital into an area if they lose a significant portion of their own capital exploring it. At a high level, this project estimated the potential for returns based on the existence of a market and underlying market dynamics. For example, many experts we interviewed were skeptical of investing in non-carbon pollutants like refrigerants or methane since there is no market for trading any saved emissions, and therefore no way to convert savings into cash flows.

At the level of a specific deal or investment strategy, estimating return on investment requires detailed, resource-intensive due diligence just as a commercial investment would. The estimated return on investment would not only depend on this due diligence, but also the investors' tradeoffs between financial and social returns. For example, an investor in India might accept more financial risk and lower returns to expand energy access in the poorest, least developed states.

Four areas merit further exploration

We identified the following areas as potential targets for climate mission investing based on the four factors discussed above (Figure 3). These are not listed in order of priority. Rather, foundations considering these approaches should prioritize them in relation to their own program goals, risk tolerance, and return timeframe.

Stop deforestation and peat loss in Indonesia

Conserving Indonesia's forests and peat could reduce annual emissions by as much as one gigaton. The opportunity is large enough that success across Indonesia would not require further scaling to be a globally significant victory. While the potential greenhouse gas savings may be of limited interest to the government of Indonesia on its own, fires to clear forests for palm oil production have created a regional health crisis. 500,000 Indonesians are now being treated for respiratory disease and President Joko Widodo has taken initial steps in response.⁶ The resulting political crisis is opening a unique window of opportunity to transform Indonesian agriculture and prevent the 600 million tons of greenhouse gases these fires have released already from continuing to grow.⁷

The theory of change is that mission investments could help catalyze strategically deployed finance packages that leverage support from development finance institutions, development ministries, and donor governments.⁸ These finance packages re-align the incentives of key actors to discourage deforestation, including the government, smallholder farmers (a key political constituency and often a direct contributor to deforestation), and multi-national corporations. These concessionary investors could catalyze a larger capital stack, leveraging commercial finance to create funds totaling in the multiple billions of dollars for economic development and smallholder farmer livelihoods. For example, a fund could offer concessionary loans to farmers so they can improve productivity while meeting deforestation targets. In turn, yield improvements and price premiums for sustainability-certified palm oil can repay the loans.

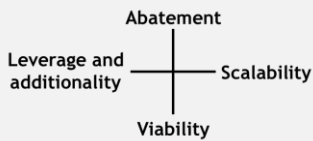
Such finance packages, alongside grants aimed at policy reform, could result in broad improvements in forestry and agricultural policy. Grants would be able to support jurisdictional incentives for sustainability, leverage support for a national government mandate, and empower companies to reduce deforestation, all of which are critical for achieving mass abatement. To succeed though, the finance packages need to be

⁶ "Toxic Smoke Chokes Indonesia," *Popular Science*, 2015, <http://www.popsci.com/indonesias-raging-fires-are-an-environmental-and-public-health-disaster>.

⁷ "Indonesia forest fires could become worst on record," *Jakarta Post*, 2015, <http://www.thejakartapost.com/news/2015/10/02/indonesia-forest-fires-could-become-worst-record-nasa.html>.

⁸ Redstone Strategy Group is engaged in this effort.

Figure 3
Areas to explore



Deforestation and peat loss in Indonesia



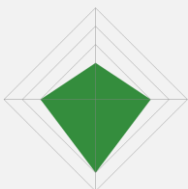
Distributed generation in India



Commercialize cleantech



Energy Efficiency



sufficiently interesting to the national or jurisdictional governments to cause them to see the advantages of pursuing development goals sustainably.

Roll out distributed generation in India

Distributed generation produces renewable energy close to consumers, helping to displace fossil fuels from a centralized grid. For on-grid communities, distributed generation could allow the grid to reduce its reliance on dirty energy. For off-grid communities, distributed generation can abate carbon by replacing diesel and by reducing communities' demands to expand the largely coal-powered grid. Distributed generation also offers significant development benefits—potentially bringing power to the 300 million people in India that still lack electricity.

To succeed, an investment strategy would need to demonstrate the business model's viability, scale across Indian states with highly variable market and policy contexts, and channel foreign philanthropic investment into a country with capital controls (likely through intermediaries). Finally, the abatement potential of distributed generation is more difficult to measure.⁹

The small size of India's distributed generation market means that philanthropy can exert greater leverage and impact per dollar. Entrepreneurs currently struggle to obtain investment. They face high costs of capital and banks are hesitant to support unproven models. Just as concessionary capital helped prime the pump for commercial investments in solar lanterns, mission investments can scale distributed generation by building market infrastructure and identifying commercially viable models that attract other investors. Even if some models cannot fully scale through non-concessionary capital markets as they require ongoing subsidy, mission investors may be able to scale via replication, leveraging public finance from development banks and / or the Indian government.

Mission investments also could enhance the impact of grants targeting energy access as a primary goal. In coordination with its program-related investment mission investments, The Rockefeller Foundation, for example, is offering grants for technical assistance to energy companies to operate mini-grids. Building out a distributed generation market with mission investments could develop local technical expertise such that long-term subsidies become unnecessary.

Commercialize advances in cleantech

Breakthrough cleantech is essential to achieving a two degree pathway by 2050, but it struggles to overcome critical capital gaps as it moves from the lab bench to venture capital investment and commercial viability. Governments typically fund basic science research in the discovery phase, with \$6.6 billion from the US government alone in

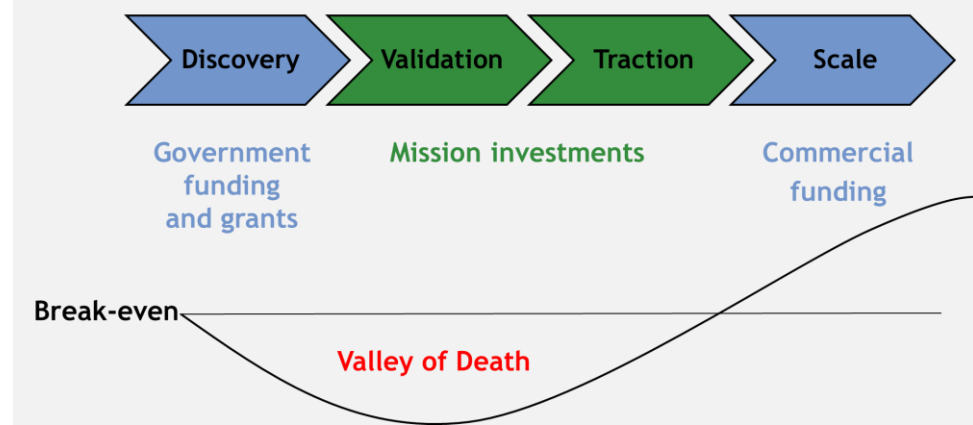
⁹ Julie McCarthy, "What It's Like to Live Without Electricity," *NPR*, 2015, <http://www.npr.org/sections/goatsandsoda/2015/02/17/386876116/whats-it-like-to-live-without-electricity-ask-an-indian-villager>.

Mission
investments could
shape the emerging
market for
distributed
generation in India

2015.¹⁰ Private capital, including venture capital, funds the scaling of proven, later-stage opportunities, with \$19.8 billion in commercial capital in 2014.¹¹ However, startups struggle to obtain funding in the in-between validation and efficiency stages since cleantech investments are more volatile and require longer-term exits than traditional venture capital investors are willing to accept (Figure 4). The result is that promising technologies often cannot access capital markets (an extreme version of the cost of capital being too high), and solutions are never deployed.

Figure 4

Investments should target the valley of death



Targeted mission investments could bridge this gap and ensure promising new technologies make it from the discovery stage, through the validation and traction stages, to scale with venture capital, commercial viability, and deployment. Such a strategy would rely on two main conditions to succeed: minimize the need to pick winners in a crowded field, and ensure a strong pipeline of ideas coming out of early, discovery-stage research.

There are at least three ways philanthropy can operationalize this strategy and minimize the need to pick winners in a competitive investment field. First, philanthropy can partner with seasoned fund managers. For example, traditional fund managers could refer deals that do not match their investors' risk profiles. Or, interested foundations can join together with prominent cleantech investors who seek greater and riskier investments. Second, philanthropy can identify a specific opportunity that would accelerate their existing strategies, as opposed to seeking investments in cleantech broadly (e.g., biodigesters in conjunction with an agricultural methane strategy). Finally, philanthropy can look to accelerators and incubators specifically focused on bridging the valley of death, like Cyclotron Road (a

¹⁰ *Government-Wide Funding for Clean Energy Technology*, Office of Management and Budget, 2015, https://www.whitehouse.gov/sites/default/files/omb/budget/fy2016/assets/fact_sheets/government-wide-funding-for-clean-energy-technology.pdf.

¹¹ "Global Trends in Clean Energy Investment," *Bloomberg New Energy Finance*, 2015, <http://about.bnef.com/press-releases/rebound-clean-energy-investment-2014-beats-expectations/>.

Energy efficiency
can be profitable
– the key is to
standardize,
aggregate, and
replicate it

partnership between Lawrence Berkeley National Laboratory, the US Department of Energy, and a consortium of state, private, and philanthropic funders).

An integrated strategy for mission investing and grants is essential for success here by providing a pipeline of ideas and furthering specific goals. Philanthropy already rightly advocates for more government research and development funding since governments will always fund basic research at a level philanthropy cannot match. This could be expanded, and the promise of mission investments to off-take promising technology has been a successful argument world-wide. Successful investments could further particular climate strategies, as well. For example, investments that generate new efficiency technologies help advocates calling for higher efficiency requirements since they make higher goals achievable. Similarly, new clean power technology furthers the case for renewable portfolio standards.

Scale energy efficiency through new business models

Commercial and residential energy efficiency boasts 2.7 gigatons of abatement potential globally. However, there is a \$330 billion annual capital gap globally that needs to be filled in energy efficiency to limit climate change to a two degrees Celsius rise.¹² Energy efficiency yields long-term savings, but high transaction costs and split incentives slow efforts to monetize these benefits. If investments can demonstrate the commercial viability of tackling these challenges, the key condition for this idea's success, entrepreneurs could crowd in and scale the results. We focused our exploration of this opportunity in the US given the base of philanthropy there and the significant abatement potential – 0.5 gigatons.



The key is to standardize, aggregate, and replicate investments. One US-based approach is to operate at scale from the start by partnering with large property holders. The US government's General Services Administration owns or leases ten percent of domestic office space, while dozens of real estate investment trusts hold over 10 million square feet in buildings each.^{13,14}

¹² *The Green Investment Report - the Ways and Means to Unlock Private Finance for Green Growth*, World Economic Forum and Green Growth Action Alliance, 2013, http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf.

¹³ "About Us," SL Green Realty Corp, 2015, <http://slgreen.com/about/>.

¹⁴ Brian Patrick, "The Best and Worst U.S. Cities for Renting Office Space," *Entrepreneur*, 2013, <http://www.entrepreneur.com/article/227319>.

Philanthropy also can invest in new financing tools to help consumers overcome upfront capital costs, or to develop new approaches to reduce energy demand. For example, the analytics company C3 Energy claims to unlock \$300 in annual savings per meter through big data and machine learning.¹⁵ Finally, mission investments could replicate proven energy efficiency interventions in the developing world. Success in any of these areas could scale by driving down the cost of capital to entrepreneurs who want to replicate the successful business models.

Mission investments that result in new financing tools and decreased transaction costs will enhance the impact of energy efficiency grants. For example, the ClimateWorks Foundation’s existing efforts to disseminate best practices in energy efficiency and advance integrated energy management systems could help create better models to promote. Cost reductions may enable grants to better target hard-to-reach populations and also offer greater leverage in advocating for favorable policies to scale energy efficiency.

Additional opportunities

Beyond the four areas identified above, we explored a few additional sectors that showed promise in terms of their abatement potential, scalability, viability, and/or leverage and additionality. They merited exploration based on their strength in a particular factor or fit with current philanthropic strategies, even if they were not strictly the highest-rated opportunities. Pending the resolution of remaining questions or context changes, they could offer significant opportunities (Figure 5).¹⁶

Scale successful models in China

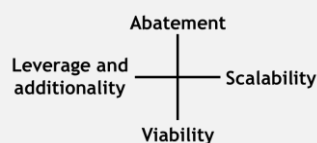
China remains the largest source of carbon emissions in the world at 7.9 gigatons annually and 4.8 gigatons in clean power and energy efficiency. In the long term, tackling global climate change will require abating carbon there. However, it is not clear whether mission investments can play a catalytic role in achieving that abatement in the next few years given the difficulty most philanthropies would have investing there and the high costs of abatement.

In the meantime, there are likely some opportunities for philanthropies to deploy non-concessionary capital in China on green projects, even if they do not provide significant additionality. Several investors interviewed are pursuing deals in large scale methane reduction, agricultural waste, and water treatment that may be attractive to foundations hoping to invest in green projects. In addition, research and advocacy-based grant strategies could help make conditions in China more amenable to progress on climate, including through mission investments.

¹⁵ “About Us,” C3 Energy, 2015, <https://c3energy.com/about-us/>.

¹⁶ The figure uses ratings for “Models of new mobility” for clean transportation, and “Fuel from biodigestion / waste in the US” for business models for non-carbon pollutants.

Figure 5
Additional opportunities



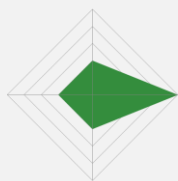
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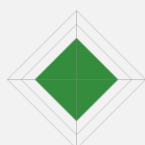
US carbon market infrastructure



Clean transportation



Business models for non-carbon pollutants



Build carbon market infrastructure in the US

Unfortunately, the prospects for a mandatory global carbon market remain dim. In its absence, advocates for tackling climate change are rightly focused on creating mandatory national or sub-national markets, as well as investing in various fragmented or voluntary markets that offer some abatement benefits and start to show how a larger mandatory market could work. For US-based philanthropies, this means working in the US, but the same principles hold in most developed countries.

Mission investments in markets, projects, and funds in these voluntary markets could, in theory, prove their economic feasibility and attract commercial capital. This is particularly true if a foundation is interested in a more niche voluntary market and has a theory of change for how working in that niche market would lead to abatement at scale. Currently though, the supply of carbon credits exceeds demand for them in most markets around the world. Increasing supply in those markets is unlikely to further abatement until there is legislated demand to buy credits. Further, many offsets may not need additional capital investments at this point.¹⁷

Foundations committed to carbon markets can consider future mission investments as part of an integrated strategy to use grants to advocate for legislated carbon markets in their home countries. In the US, this effort could build on renewed interest in climate change and trading under President Obama's new Clean Power Plan.¹⁸ Grants today could also help build the infrastructure required to ensure that, once in place, carbon markets function smoothly. If successful, they could then use follow-on mission investments to arm advocates with examples of successful projects and develop the early infrastructure a larger market would need to succeed.

Advance cutting-edge vehicle technology and new mobility

Mission investments in electric vehicles and fuel efficiency could advance the shift to clean transportation. Improvements in supply chain efficiencies may attract additional investments from major auto manufacturers. Similarly, mission investments may target new business models in mobility that move away from private vehicle ownership, helping advance the goals of grant-funded initiatives. Finally, investors we spoke to saw opportunity in the currently high-risk field of energy storage. Foundations could unlock major abatement by helping bring good battery innovations to market.



¹⁷ Allie Goldstein and Gloria Gonzalez, *Turning Over a New Leaf State of the Forest Carbon Markets*, 2014, http://www.forest-trends.org/documents/files/doc_4770.pdf.

¹⁸ Will Oremus, "Obama's Climate Plan is Basically Cap and Trade," *Slate*, 2015, http://www.slate.com/blogs/moneybox/2015/08/04/clean_power_plan_obama_s_climate_plan_is_cap_and_trade_after_all.html.

Explore business models for non-carbon pollutants (e.g., methane)

Philanthropy could invest in major sources of short-lived, non-carbon pollutants, such as agricultural methane, methane leaks, and refrigerants. In all of these cases, the lack of a market for the saved gases or carbon offsets makes it difficult to find financially viable investments. However, the underlying business cases could prove viable in different circumstances. For example, biodigesters appear to provide positive cash flows in some developing-world contexts even absent a carbon price.¹⁹ The Environmental Defense Fund is working with major oil companies to develop technology to identify methane leaks and therefore decrease the cost of large-scale leak repairs reduce business opposition to regulation.



¹⁹ Nathanael Johnson, “Why aren’t more farmers turning poop into power?” *Grist*, 2015, <http://grist.org/business-technology/why-arent-more-farmers-turning-poop-into-power/>.

Coordination between major philanthropies could provide a foundation for more effective investments

Field-wide success will take leadership

Foundations are not just asking where climate mission investments could do the most good. They are also asking what the field will need to succeed, and how to operationalize investments. In this section, we briefly outline a few options to consider, at the level of both field-wide initiatives and opportunity-specific strategies.

Coordination across the field could be strengthened

Mission investments in climate are relatively new phenomena. The field's infrastructure is therefore less developed than in areas that have benefited from decades of investment (e.g., land conservation, community development, affordable housing). Many useful forums allow philanthropies to discuss mission investments broadly. However, there is only minimal coordination.

Increased coordination between major philanthropies could build the field's capacity in at least three ways. Coordination could provide philanthropies a forum to educate each other and pursue impact-first strategies that seek catalytic opportunities to fight climate change. It also could provide the basis for developing integrated strategies that combine mission investments with existing grant making and policy plays. Finally, foundations could band together in a coordinated recruitment effort to encourage more foundations to deploy mission investments as part of an integrated strategy.

In addition, small-to-medium philanthropies and family offices likely would benefit from increased coordination as well. These investors typically lack mission investing capacity and have less ability to engage in large-scale, integrated strategies. As such, there may be a role for a forum to simplify administration and to support investors as they seek fund managers that promise social returns alongside financial ones.

Operationalizing investments in specific areas is strategy-dependent

A high degree of coordination likely is needed to pursue any specific investment strategy. However, how best to pursue an investment varies greatly – a pooled fund investing in energy efficiency startups would have little relevance to pursuing a major land use deal in Indonesia. Below are initial thoughts on how philanthropies could pursue the four opportunities highlighted in the previous section.

- **Stop deforestation and peat loss in Indonesia:** A team could design and close a deal that stops deforestation and peat loss in part through a major finance package or several smaller, regional packages. Much like in the private sector, a deal team is responsible for designing and negotiating commitments from all stakeholders. Later, more specialized finance consultants may be necessary to design the technical specifications of the finance package.

Tackling climate
change will require
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muster

- **Roll out distributed generation in India:** Initial grant-funded exploratory work could build the sector's infrastructure and answer key strategic questions. Next, grants and concessionary investments could build and flow through an intermediary (or set of intermediaries) in India responsible for deploying capital and legal compliance.
- **Commercialize advances in cleantech:** The main challenge is avoiding the need to pick winners. Options for doing so include partnering with seasoned fund managers, identifying very specific theses in conjunction with program strategies, and investing in accelerators and incubators that offer exposure to a wide variety of ideas all facing the valley of death.
- **Scale energy efficiency through new business models:** A coordinated grant-funded campaign could, at a higher level, disseminate best practices in energy efficiency and advance integrated energy management systems. At the level of specific investments, an intermediary with finance, deal-making, and sector-specific experience could provide the needed deal-flow development and due diligence.

* * *

This paper describes how mission investments could enhance climate strategies, a few factors for identifying areas ripe for mission investment, four areas that appear to score highly on those factors, and how to implement those strategies.

Tackling climate change will require every tool philanthropy can muster – not just grants, but a full range of mission investments, too. Exploring integrated strategies in some initial focus areas described here could allow investments to reinforce grants, close capital gaps, and more.

Appendix

Scoring of potential opportunities

Our task was to look across the universe of potential climate investments and suggest a few that merit further exploration. We began with the McKinsey cost curves, which estimate the potential abatement and costs of over 150 different interventions in each of over 20 geographies. We then grouped similar interventions (e.g., low and high penetration wind, heavy duty vehicle policy bundles) and grouped geographies together (e.g., the US and Canada) based on the ClimateWorks Foundation's portfolios. We also called out opportunities where the cost curves did not adequately capture them (e.g., carbon markets).

After grouping opportunities, we applied two coarse filters so we could focus our efforts on the opportunities plausibly suited to mission investments. The first was a qualitative judgment based on expert interviews to filter out opportunities that philanthropy was extremely unlikely to pursue productively (e.g., nuclear power in China, aviation, land and soil restoration). These were unlikely to meet minimum thresholds for many of the factors we would consider in setting priorities.

The second filter was to restrict developed-world opportunities to the US. In all sectors except for land use, US abatement potential is similar to or greater than in Europe, Japan, Australia, and other developed countries. In addition, US foundations can navigate legalities and conduct due diligence on US investments much easier than European investments. That said, technology and business models can spread reasonably easily within the developed world, so promising opportunities in the US are potentially promising outside of the US, too.

Finally, we examined each of the ~25 remaining opportunities on the four factors described in this paper: abatement potential, scalability, leverage and additionality, and viability. We first identified sub-factors within each factor to capture different reasons why an opportunity might be attractive. Then, we scored each opportunity on each sub-factor on a 1-3 scale using the rubric included at the end of the appendix and weighted each to create a single factor score for each opportunity. Scalability was the exception – we used the highest rating across all sub-factors since only one path to scale is required. We then averaged the factor scores such that each was weighted equally at 25 percent within a total score (Table 1).

As mentioned, scoring opportunities was more art than science. We created a total score with some trepidation as we do not want to convey false precision. Investors will make different tradeoffs between factors, an opportunity need not score well on all factors to be compelling, and the field will learn more as it does more projects. Our goal therefore was not to suggest a level of rigor that the underlying data did not support, but rather to make transparent the assumptions that go into setting priorities. Table 1 shows the summary scores, and the rest of this appendix discusses the scoring process in detail and the rubric used to assign specific scores.

Table 1. Opportunity summary scores

Opportunity	Description	Score (0-10)
Forestry in Indonesia	Reduce deforestation and peat loss from agriculture	7
Commercialize cleantech	Invest in hydro, wind, and solar power clean technologies	7
Building and consumer appliance energy efficiency business models in the US	Invest in building envelopes, appliances, electronics, and HVACs	6
Distributed generation in India	Develop on and off-grid solar	6
Agronomy in the US	Improve crop and pasture practices	6
Industrial energy efficiency business models in the US	Invest in demand reduction, procedural changes and improved maintenance, and waste heat recovery in the US	5
Agronomy in India	Improve livestock and rice management	5
Carbon markets outside the US	Increase market demand and penetration	5
Models of new mobility	Support a modal shift in freight and public transport	5
Agronomy in Brazil and Mexico	Improve grass, crop, and pasture management	5
Next generation biofuels	Invest in bioethanol	5
Forestry in Brazil and Mexico	Reduce deforestation from pastureland conversion and slash and burn agriculture	5
Technology advances in heavy duty vehicle fuel efficiency	Improve heavy duty vehicles	5
Scale business models in China	Improve business models in energy efficiency and clean power	5
Technology advances in light duty vehicle fuel efficiency	Improve light duty vehicles	5
Forestry in the US	Improve forest management and reduce deforestation	5
Large-scale renewables development in the US	Invest in geothermal, large solar, wind penetration, and offshore wind energy in the US	5
Fuel from biodigestion/waste in the US	Expand power from biomass and methane	4
Large-scale renewables development in India	Invest in geothermal, large solar, onshore wind, and offshore wind	4
Methane from oil and gas in the US	Invest in top gas recycling, venting prevention during pipeline maintenance, and reduced flaring	4
Developing refrigerant markets	Invest in refrigerant recovery and leak repair of refrigeration equipment	4
Carbon markets in the US	Increase market demand and penetration	4
Agronomy in China	Improve grassland and livestock management	4

Factor and sub-factor descriptions

We rated each potential opportunity on four factors: abatement, scalability, leverage and additionality, and viability (Table 2). To do so, we examined a few sub-factors within each, described below. We rated each opportunity on a consistent rubric (Table 3).

Abatement

Abatement potential refers to the feasible volume of emissions that a given opportunity could eliminate if it were to scale.

- **Total tons:** We use the McKinsey cost curves, which standardize interventions across timescales by asking how much carbon they would save per year relative to business as usual in 2030 (measured in gigatons). We also consider the longer-term and indirect abatement potential, particularly in regards to new technologies and investments that further systemic changes.
- **Return on investment:** The return on a mission investment includes both the financial return and the abatement achieved. Most investments could trade off between the two. Accurately estimating return on investment requires detailed, resource-intensive due diligence, just as a commercial investment would. As a high-level and imperfect proxy, we use the cost of abating a single ton based on the most recent McKinsey cost curve data.

Scalability

Scalable mission investments can lead to globally-significant abatement with only minimal further philanthropic investment. We assessed opportunities along four potential paths to scale. Instead of averaging the sub-factors for the total score, we took the maximum sub-factor score based on the idea that investment only needs one well-defined path to succeed.

- **Close capital gaps by taking on initial business or technology risk:** This speaks to the ability of mission investments to help close substantive gaps in a sector by reducing the risk and cost of capital future investments face. We drew upon resources like *The Green Investment Report* to estimate the size of market gaps and used qualitative interviews with investors and others to assess the likelihood of concessionary investments reducing future risk.²⁰
- **Prove a model so other concessionary investors replicate it:** We consider whether a few implementations of an intervention will lead other concessionary investors to replicate it. We drew upon interviews and desk research to assess the likelihood of successful projects attracting future capital

²⁰ *The Green Investment Report - the Ways and Means to Unlock Private Finance for Green Growth*, World Economic Forum and Green Growth Action Alliance, 2013, http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf.

from concessionary funders like development banks, foundations, or others for expansion or replication.

- **Spur leadership through stronger policy, regulation, or certification:** Mission investments can also help shape the broader political systems in a given field or more broadly. To assess potential policy impact, we researched policy drivers associated with each opportunity and considered potential theories of change for how a successful mission investment might advance policy or political support for a low-carbon future.
- **Operate at scale from the start:** Opportunities may be intrinsically at scale, already offering significant abatement independent of their ability to affect other projects or grow themselves. We estimated whether projects are inherently at scale based on the ability of a single deal or intervention to contribute to significant abatement.

Leverage and additionality

Leverage and additionality refers to the ability of a mission investment to move the needle within a sector.

- **Likelihood of happening otherwise:** This considers the counterfactual – if philanthropy chose not to invest. It favors opportunities where philanthropy is most likely to catalyze a change in events. While counterfactuals are inherently difficult to assess, we drew upon market projections to predict the trajectory of different sectors.
- **Ability to shape the sector:** Beyond the gap in funding, the availability of existing resources has implications for the potential strength of philanthropy to mold a given sector. Holding a relatively larger market share within a given sector offers additional opportunities for philanthropy to advocate for other shifts. We drew upon resources like Bloomberg New Energy Finance to estimate market size and assess the relative importance of any role philanthropy might play.
- **Ability to attract co-funding:** Some mission investments offer the opportunity to attract additional funding from other concessionary and non-concessionary investors. We looked at past government funding and market research to assess the likelihood of other partners to join in on different opportunities.

Viability

Viability speaks to the likelihood that philanthropy can successfully operationalize a given opportunity.

- **Pipeline opportunities:** Philanthropy must explicitly avoid the trap of investing in deals that commercial investors have passed over for good reason. We drew upon insights from interviewees to assess the potential pipeline

strength of different opportunities and the ability of philanthropy to select the best deals in the pipeline.

- **Ability to navigate the context:** Regulatory and competitive contexts surrounding investments have significant implications for the likelihood of success. We drew upon data sources such as the World Bank's *Ease of Doing Business* index as well as interviews with sector-specific investors to assess the difficulty of individual opportunities.

Table 2. Opportunity factor scores (0-10)

Approach	Potential abatement	Scalability	Leverage and additionality	Viability
Forestry in Indonesia	8	10	8	3
Commercialize cleantech	4	10	8	5
Building and consumer appliance energy efficiency business models in the US	3	7	7	8
Distributed generation in India	1	7	9	7
Agronomy in the US	2	7	5	8
Industrial energy efficiency business models in the US	4	7	5	7
Agronomy in India	2	7	7	7
Carbon markets outside the US	6	7	5	3
Models of new mobility	3	10	4	3
Agronomy in Brazil and Mexico	2	7	5	7
Next generation biofuels	3	10	3	3
Forestry in Brazil and Mexico	4	7	4	5
Technology advances in heavy duty vehicle fuel efficiency	6	7	3	3
Scale business models in China	6	7	4	3
Technology advances in light duty vehicle fuel efficiency	5	7	3	3
Forestry in the US	1	7	4	7
Large-scale renewables development in the US	2	7	3	7
Fuel from biodigestion/waste in the US	1	7	5	5
Large-scale renewables development in India	1	7	5	5
Methane from oil and gas in the US	1	7	6	3
Developing refrigerant markets	1	7	6	3
Carbon markets in the US	3	3	5	5
Agronomy in China	2	3	3	5

Table 3. Sub-factor scoring rubric

	Abatement		Scalability				Leverage and additionality			Viability	
Score	Potential	Return on investment	Close capital gaps	Replicability	Policy	At scale	Happen otherwise	Shape the sector	Co-funding	Navigate the context	Pipeline
3: Higher	In the top third of opportunities	Abatement generates net savings	Concessionary funds can prime the pump	Proof of concept will attract on-going concessionary funds	Likely to move political systems	Deal or project inherently at scale	Likely to catalyze a change in events	Potential for large market share enables influence	Strong likelihood of partners	Existing area of expertise for philanthropy	Strong connections to the space
2: Medium	In the middle third of opportunities	Low to moderate cost per ton of abatement	Commercial financing emerging	May expand concessionary support	Possible to spur policy improvements	Single project generates moderate abatement	Possible to shift trajectory	Moderate market share with lesser influence	Potential to bring in other investors	Limited engagement but straightforward sector	Deals are challenging but possible
1: Lower	In the lower third of opportunities	High cost per ton of abatement	Unlikely to reduce the cost of capital, or no gap exists	Unlikely to attract others to replicate	Political systems fixed or stagnating	Limited abatement for any one project	Unlikely to impact outcomes	No influence due to small market share	Unlikely to attract co-funding	Complex sector lacking philanthropic engagement	Very difficult to source investments

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