

# THE ABCs

## OF CLIMATE INVESTING

—  
How Families Can Unlock the Trillions  
Needed for Climate Solutions

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## INTRODUCTION

Over the past year, a spate of positive climate stories has cropped up in the news cycle. For some, it's been a rare silver lining to the Covid-19 pandemic, as hikes in annual greenhouse gas (GHG) emissions were brought to a halt amid the economic downturn<sup>1</sup>. Just this past September, numerous prominent institutions — from academia to regulatory bodies — recognized the climate crisis as an issue falling into their purview: Harvard committed to divesting from fossil fuels<sup>2</sup>, the SEC pushed companies to disclose climate-related risks to their investors<sup>3</sup>, and the Pope joined other Christian leaders in calling for climate action<sup>4</sup>.

For the first time in a while, it has felt like the right people are listening and acting — and that we're back on track to tackle the climate crisis.

But despite this momentum, there remains a sizable gap in funding for climate solutions. Current investments are only providing 20% of the trillions of dollars needed annually to limit global warming to 1.5° C and prevent the worst impacts of climate change.<sup>5,6</sup> And this chasm isn't just an abstract number — it translates into material consequences, such as the displacement of over 20 million refugees each year due to severe weather events.<sup>7</sup>

Many families recognize that climate change is one of the existential global challenges of this generation and work actively to lower their own carbon footprints and support green policies. Now, some are also exploring how they can use their investment portfolios to bulwark against the climate crisis. They — along with other forward-thinking advisors, foundations, and corporations — have the power to harness trillions of dollars of investable assets<sup>8</sup> and use their investments to turn the tide on the climate crisis.

**This primer shows how your investments can help mitigate the intensity of climate change, protect vulnerable communities from its effects, and build financial resiliency to looming climate-related risks.** To help you take the first step, we provide frameworks to assess your climate goals and investment strategies, a review of investable climate solutions, and an example climate portfolio. We conclude with recommended steps to take action, including how CapShift can help you build climate-smart portfolios that integrate with donor advised fund providers, financial advisors, philanthropic consultants, family offices, and other institutions.

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*This primer is intended to be a guide for climate investing, not a comprehensive examination of climate science, technological innovations, policy, grant-making, data collection, or corporate behavior. We include additional reading on these topics in the Appendix.*

# TABLE OF CONTENTS

<b>Introduction</b>	<b>i</b>
<b>The Climate Crisis and the Funding Chasm</b>	<b>1</b>
The Encroaching Tides of Climate Change	2
Why Invest in Climate Solutions Now?	2
<b>Find Your North Star: Common Climate Investing Goals</b>	<b>3</b>
Mitigation	3
Resiliency	4
Hand in Hand: Gender and Climate Change	5
Alpha	6
<b>Select All That Apply: Overlapping Climate Investing Goals</b>	<b>7</b>
<b>Ways and Means: Climate Investing Strategies</b>	<b>8</b>
Align	8
Build	9
Catalyze	10
<b>Mix and Match: A Sample Climate-focused Portfolio</b>	<b>11</b>
<b>Ebb and Grow: Steps to Build a Climate-focused Portfolio</b>	<b>13</b>
<b>Appendix</b>	<b>A-1</b>
Appendix I: Further Resources on Climate-focused Investing	A-1
Appendix II: Climate Alpha in Public Markets	A-2
Appendix III: CapShift Climate Mitigation Solutions Map	A-3
Appendix IV: Climate Investing by Asset Class	A-4
<b>Works Cited and Notes</b>	<b>A-5</b>

## THE CLIMATE CRISIS AND THE FUNDING CHASM

Globally, we have crossed 1° C of average warming over prehistoric levels, and baked-in emissions are expected to bring us to 1.5° C. Current warming has already contributed to more frequent and severe extreme weather events around the world. And the effects of climate change are exacerbating — and creating new — global development challenges, including those related to hunger relief, health, clean water, and stable ecosystems.<sup>9</sup>



*Shown above: Forest fire in California<sup>10</sup>, Drought in French Guinea<sup>11</sup>, Flooding in India<sup>12</sup>, and Smoke-filled sky in San Francisco<sup>13</sup>.*

To prevent the worst of the climate crisis, nations have coalesced around the target of limiting net warming to below 1.5°–2.0° C. **However, if we proceed on our current trajectory — one expected to result in 3° C of warming — the effects are hard to imagine: catastrophic droughts and floods, mass extinctions, tens of millions of climate refugees, and regions becoming entirely uninhabitable.**<sup>14, 15</sup> Because of its potential for such wide-scale disruption and destruction, many families consider the climate crisis to be the defining issue of our time.

There may also be unforeseen systemic risks that are hard to estimate. For example, while average atmospheric greenhouse gas (GHG) concentrations and global temperatures have increased linearly so far<sup>16</sup>, feedback loops — such as reduced snow cover or the release of trapped methane<sup>17</sup> — could greatly accelerate warming.<sup>18</sup> And, as long as emissions are increasing, we raise the probability of reaching a tipping point of runaway warming we cannot easily recover from.<sup>19</sup> These risks underscore the urgency for climate solutions — from reducing emissions to building resiliency in communities.

# The Encroaching Tides of Climate Change

The threats of a volatile climate are manifold, but the vast majority fall into the following four categories:



**Extreme heat threatens the health and livelihoods of the vulnerable.** Continued warming will increase the prevalence of heat-related illnesses and deaths, cause disease vectors to shift to new geographies, and create more regions where it will be too hot to work outdoors.<sup>20</sup>



**Harsher droughts are poised to disrupt food and water systems.** Agriculture yields could drop by 35% by the end of the century while global food demand doubles, raising the volatility of staple food prices. Water scarcity in stressed regions will worsen, hurting crop yields and driving local conflict.<sup>21</sup>



**Stronger floods, storms, and sea level rise will destroy homes and infrastructure, threatening the displacement of up to 1.2 billion climate refugees by 2050.**<sup>22</sup> In the past three decades, the number of people put at risk by rising sea levels has increased by more than 60% to 260 million — 90% of whom live in poor countries and small island nations.<sup>23</sup>



**Stronger forest fires, melting glaciers, and warming oceans threaten our natural capital.** The current species extinction rate is expected to accelerate<sup>24</sup>, and the natural systems that maintain our supply of freshwater, fish stocks, and precious habitats will be increasingly disrupted.<sup>25</sup>

## WHY INVEST IN CLIMATE SOLUTIONS NOW?

- 1 INVESTMENT GAP:** Climate solutions require immense financial investment, and we are significantly underinvesting.<sup>26</sup> For example, upgrading energy systems to limit warming to below 2° C will require annual investments of up to \$1.6 - \$3.8 trillion through 2050<sup>27</sup> while the cost of climate adaptation in developing countries could rise to \$500 billion annually by 2050.<sup>28</sup> Current investment in clean technologies and climate solutions is estimated at \$632 billion annually and will need to grow ~7x larger in the coming decade.<sup>29, 30</sup>
- 2 NEED FOR PRIVATE CAPITAL:** Private capital is particularly suitable for solutions that are not typically funded by traditional public and development sector finance: high risk technology, distributed project finance, private real asset upgrades, and community investing.<sup>31</sup>
- 3 NEED FOR CATALYTIC CAPITAL:** Patient capital with high risk tolerance and long investment horizons is critical to develop transformational solutions. Keeping warming below 2° C requires continued investment in nascent climate solutions; in contrast, 87% of venture cleantech investments went to late-stage projects in recent years.<sup>32</sup> Families with intergenerational timelines, high risk tolerance, and a commitment to climate outcomes can fill this critical gap.

## FIND YOUR NORTH STAR: COMMON CLIMATE INVESTING GOALS

Working with dozens of families already engaged in climate investing, we have found that there are three common goals to climate investing, which also have significant overlaps.

	MITIGATION	RESILIENCY	ALPHA
<b>DESCRIPTION</b>	Slow the pace of climate change by reducing emission sources and creating emission sinks.	Help communities adapt to a changing climate and build resilience to its effects.	Reduce risk and enhance financial return for an investment portfolio.
<b>METRIC</b>	Emissions reduced	Vulnerable people protected	Long-term financial return and reduced volatility
<b>TYPICAL DRIVER</b>	Impact and financial returns	Impact	Financial returns
<b>APPROACHES</b>	<ul style="list-style-type: none"> <li>• Proven solutions</li> <li>• Emerging solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Community solutions</li> <li>• Resilient infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Risk mitigation</li> <li>• Upside capture</li> </ul>
<b>COMMON THEMES</b>	Renewables, Transport, Manufacturing, Energy efficiency	Climate justice, Agriculture, Access to water, Gender equity	Low-carbon portfolios, Low-carbon transition

### 1 MITIGATION



Reduce, prevent, or remove heat-trapping emissions in the atmosphere, addressing the root cause of warming.

Many climate-focused investors see their primary goal as slowing the advance of climate change by mitigating the emission and atmospheric concentrations of greenhouse gases. The correct approach is up for debate: some investors prefer to focus on proven solutions that have already demonstrated

climate benefits, while others prefer to target emerging solutions that require risk-tolerant capital to grow. A common success metric is the *volume of greenhouse gases reduced in the atmosphere by decreasing emissions and creating carbon sinks*.

## PROVEN SOLUTIONS

Slow the pace of climate change by reducing emission sources and creating emission sinks.

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**EXAMPLES** Renewable energy generation, energy efficiency, electric vehicles, and biofuels<sup>33</sup>

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**WHAT SUCCESS LOOKS LIKE** Scale the deployment of solutions as quickly as possible.

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**INVESTMENT EXAMPLE** Real asset fund that invests in a portfolio of income-producing renewable energy power facilities that sell long-term electricity contracts to large, creditworthy purchasers.

## EMERGING SOLUTIONS

Support promising solutions that require further technical innovation or require support from many different stakeholders to scale.<sup>34</sup>

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**EXAMPLES** Animal agriculture, residential energy efficiency, food waste, cement production, steel production, and cross-border forest conservation

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**WHAT SUCCESS LOOKS LIKE** Develop improved technologies that can mitigate emissions at a significantly lower cost. Support public-private partnerships, new financing structures, and business-model innovation.

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**INVESTMENT EXAMPLE** Venture capital fund that invests in entrepreneurs developing plant, fungi, fermented, and cultivated replacements to animal products.

## 2 RESILIENCY



Help vulnerable communities and economic systems adapt to the impacts of climate change, reducing potential risks and damage.

Another major objective is to reduce the damage caused by climate change by fostering resiliency and adaptation. Solutions that advance this goal often address the climate crisis and community challenges concurrently — in areas like housing, nutritious food, clean water, equity, and income opportunities.

<sup>35</sup> A common success metric is the *number of people and communities protected from climate-related damage*.<sup>36</sup>

## COMMUNITY SOLUTIONS

Improve the lives of the poor and help build their resilience to an increasingly volatile climate.<sup>37</sup>

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<b>EXAMPLES</b>	Drought-proof and water-efficient small-scale agriculture, distributed water purification, distributed green water infrastructure, off-grid renewable energy, and flood- and storm-resistant affordable housing
<b>WHAT SUCCESS LOOKS LIKE</b>	Low-income communities have access to basic services at lower costs, greater income-generation opportunities, and protection from climate change effects.
<b>INVESTMENT EXAMPLE</b>	Debt fund that provides blended capital to emerging market institutions that help people access safe water and sanitation services through affordable financing such as small loans. <sup>38</sup>

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## RESILIENT INFRASTRUCTURE

Strengthen large-scale food, water, energy, and supply chain systems to be more resilient to climate extremes.<sup>39</sup>

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<b>EXAMPLES</b>	Smart electric grids, flood-resistant water infrastructure, controlled environment agriculture, risk modeling and weather forecasting, supply chain analytics, natural and built storm surge buffers, and desalination technology
<b>WHAT SUCCESS LOOKS LIKE</b>	Macro risks to the economy and infrastructure have been reduced and benefit all members of society.
<b>INVESTMENT EXAMPLE</b>	Venture capital fund that invests growth equity in companies that provide technologies, products, and services to build resilience, including investments in supply chain analytics, weather modeling, precision agriculture, distributed energy, and disaster response. <sup>40</sup>

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## Hand in Hand: Gender and Climate Change

Women and girls are more likely to suffer the adverse consequences of climate change. An analysis of 130 peer-reviewed studies finds that the health risks tied to climate change — such as death and injury from extreme weather, food insecurity, mental illness, and poor reproductive and maternal health — are disproportionately experienced by women and girls.<sup>41</sup> On the other hand, gender equity can drastically improve the mitigation of emissions. By modeling the impact of providing universal education and family planning resources to women and girls, Project Drawdown found that increased access to and the improved quality of voluntary reproductive healthcare, family planning resources, and 12–13 years of schooling could reduce emissions by as much as 85 gigatons from 2020-2050.<sup>42</sup>



Boost investment returns and reduce volatility by mitigating climate-related risks and investing in climate opportunities.

Finally, some investors may look to climate investing as a means to outperform financially. There are two prevalent ways to do so: investing in low-carbon solutions and mitigating climate-related risks. Commitments by major corporations and national governments to reach “net-zero” emissions have created growing demand for emissions-reduction solutions such as clean energy, low-carbon industrial processes, and carbon sinks.<sup>43</sup> On the other hand, assets impacted by climate change can pose a financial risk. Understanding the financial risks and opportunities tied to climate change can help investors outperform while also contributing to climate change mitigation. A common success metric is *reduced volatility and stronger investment returns relative to the portfolio benchmark*.<sup>44</sup>

**RISK MITIGATION**

Decrease exposure to assets susceptible to a loss in value due to climate change.

**EXAMPLES**

Portfolios with low carbon intensity, fossil-fuel-free private portfolios

**WHAT SUCCESS LOOKS LIKE**

Portfolios with decreased downside risk.

**INVESTMENT EXAMPLE**

There are many ways to reduce the carbon exposure of public portfolios.<sup>45</sup> In most regions, low carbon intensity strategies performed in-line with or slightly better than the benchmark, due to increasing interest in carbon investing, greater firm efficiency, and increasing carbon taxes.<sup>46</sup>

**UPSIDE CAPTURE**

Increase exposure to assets positioned to outperform with the transition to a low-carbon economy.

**EXAMPLES**

Electric vehicle infrastructure, renewable energy generation, energy efficiency technology, carbon credit generation

**WHAT SUCCESS LOOKS LIKE**

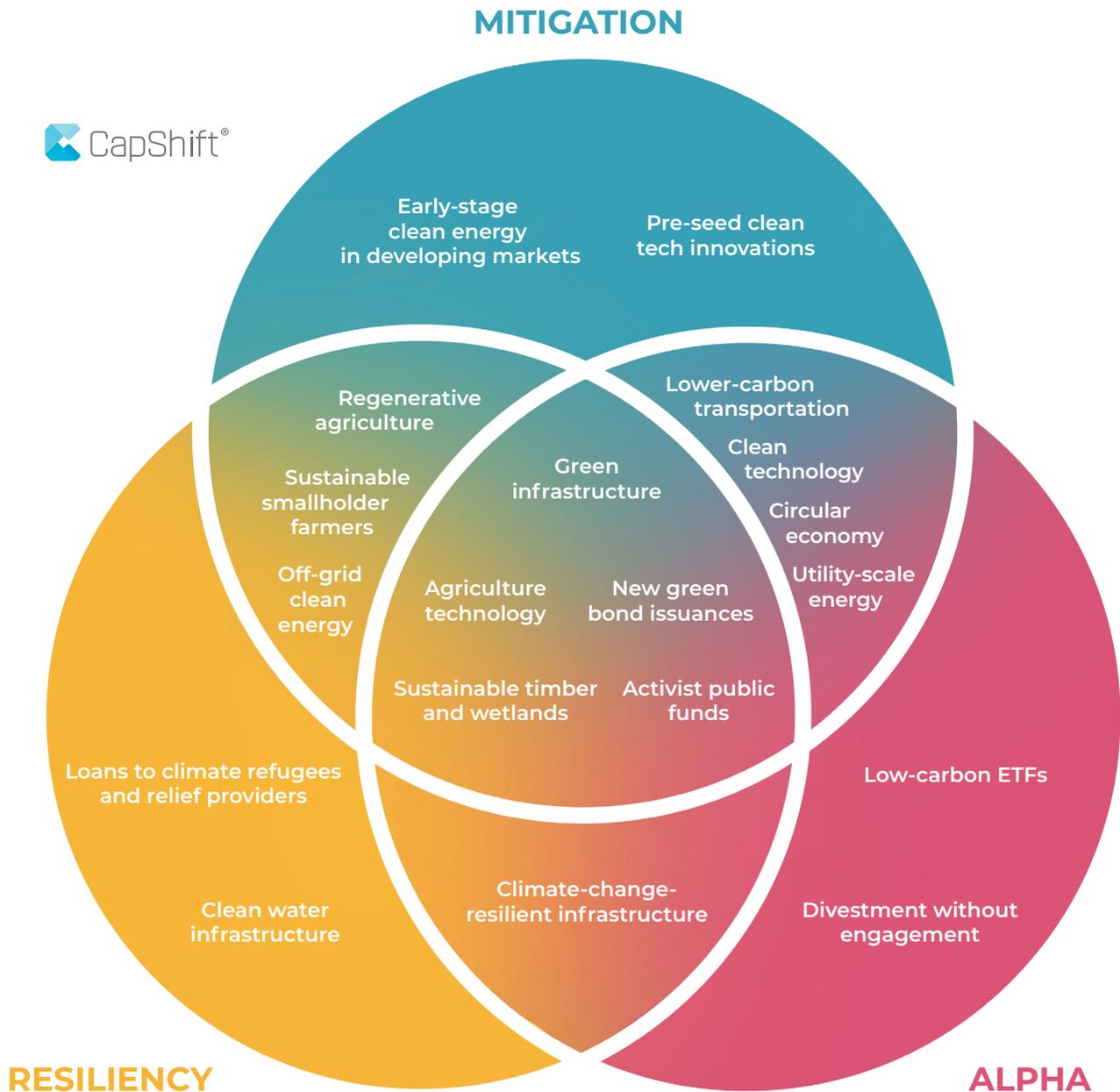
Strong returns generated by macro trends.

**INVESTMENT EXAMPLE**

Real asset fund that invests in electric vehicle charging, among other opportunities. EV registrations increased 41% in 2020 amid a pandemic-related drop in global car sales of 16%.<sup>47</sup> The global electric vehicle market is expected to grow at 40.7% annually from 2020 to 2027.<sup>48</sup>

## SELECT ALL THAT APPLY: OVERLAPPING CLIMATE INVESTING GOALS

These three goals identified — Mitigation, Resiliency, and Alpha — are not mutually exclusive, and investors can choose to combine and blend them within their investment portfolio. This approach allows investors to identify and invest in the asset classes and strategies that most closely align with their climate objectives.



Individual sectors — and even specific investment opportunities — may fulfill multiple goals. One example is agriculture. Accounting for almost a quarter of global emissions,<sup>49</sup> the sector can limit its contributions to global warming with mitigation strategies. Adverse effects such as desertification and drought require agricultural innovation that helps communities adapt and build resiliency.<sup>50</sup> Finally, the plant-based food market has attracted significant venture investment/deal flow in recent years.<sup>51</sup>

## WAYS AND MEANS: CLIMATE INVESTING STRATEGIES

Once initial goals are set, investors can bring climate considerations into their portfolios using three common investment strategies: **Align**, **Build**, and **Catalyze**.<sup>52</sup> Think of these strategies as building blocks — most investors begin by incorporating easily accessible liquid investment strategies that align with their values. As they look to increase their focus and impact, they may help build up existing solutions through investments in private markets. Finally, to catalyze outsized impact, investors may direct their capital to innovative and higher-risk opportunities that market-rate capital will not back.

### ALIGN

### BUILD

### CATALYZE

#### DESCRIPTION

Divest or realign public portfolios to avoid climate-related risks and engage companies to improve climate practices.

Invest in private equity, debt, or project finance to scale deployment of profitable solutions.

Support trailblazing ideas with patient capital by accepting a higher risk, lower return, or a longer lock-up period.

#### INVESTMENT CHARACTERISTICS

- Divest from assets with large carbon footprints
- Invest in companies that have adopted best climate practices
- Arbitrage climate risk

- Provide equity to build companies scaling better climate solutions
- Provide debt or project finance to scale proven climate solutions

- Accept a higher risk, lower return, or longer lockup to fund outcomes that market-rate capital cannot
- Enhance additionality by investing in solutions neglected by the market

#### FINANCIAL RETURN TARGET

Market-rate<sup>53</sup>

Market-rate

Impact-first

#### LIQUIDITY

Liquid

Illiquid and Semi-liquid

Illiquid

### ALIGN

For many investors interested in climate investing, a common starting strategy is to align their current portfolio with their climate values. Investors can activate their public portfolios for climate impact by pursuing strategies that mitigate climate risk or help drive climate solutions. These strategies can include divesting from fossil fuel companies, investing in projects and funds driving climate solutions,

and engaging with portfolio companies to improve environmental performance that drives growth or mitigates risk. Align strategies also typically reduce exposure to the profits of fossil fuel companies and increase exposure to climate solutions, which can therefore reduce risk and drive financial outperformance.<sup>54</sup>



### DIVEST

Divestment from fossil fuel companies is the form of climate-focused investing with the weakest link to climate impact. Without other measures in place, divestment alone is not a strong tool to advance climate goals. Investors should instead couple divestment with advocacy campaigns and shareholder engagement, which can drive significant climate outcomes.

At the institutional level, research finds that increasing oil and gas divestment pledges by non-financial organizations and non-governmental organizations (NGOs) is associated with lower new capital flows to domestic oil and gas companies.<sup>55</sup>



### INVEST

Fund climate solutions through bond issuances for green infrastructure, clean energy, or climate adaptation.

Green bond issuance hit a record high of \$290 billion in 2020 (a 246% increase from 2016) and is on track to hit \$500 billion in 2021, providing funding for renewable energy, green buildings, sustainable water, and clean transportation.<sup>56</sup>



### ENGAGE

Invest with fund managers who have a proven track record of engaging companies to improve their environmental practices.

There has been a new wave of impact hedge funds that have taken large positions in fossil fuel or carbon intensive companies, such as Exxon, and undertaken activist campaigns to adopt a climate-friendly board and strategy.



## BUILD

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A common next step for investors is to focus on developing, building, and deploying climate solutions directly — generally focusing on market-rate, private investments. A Build strategy often balances the objective of generating Alpha with the goal of supporting Mitigation and/or Resiliency. This investment strategy supports climate solutions that offer the potential to generate strong risk-adjusted returns while filling key capital gaps across private markets.<sup>57</sup>

Build strategies lost popularity after billions of dollars of investments in “Cleantech 1.0” in the late 2000s yielded weak financial returns.<sup>58</sup> However, a new wave of climate-focused private funds and strategies

have raised hundreds of billions of dollars over the past few years, showing a renewed appetite.<sup>59</sup> These span asset classes, including venture capital, private equity, project finance, sustainable forestry, sustainable agriculture, and green real estate. In addition, the past year has also seen a wave of public market SPAC mergers providing capital to build out electric vehicle, novel battery, and other novel technologies that are expected to address a trillion-dollar market opportunity for climate solutions.<sup>60</sup>

Many investors see investing in Build solutions as the best chance to generate both outsized returns and impact. Depending on the capital need of the fund and the underlying solution, the additional impact created by individual investors will vary significantly across the Build category.

## CATALYZE

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The most impactful strategy that investors can adopt is to catalyze high-impact climate solutions that otherwise would not be supported by return-maximizing investors.<sup>61</sup> A Catalyze approach puts Mitigation and/or Resiliency squarely as the primary goal, with the potential to reduce risk or generate strong returns as a limited secondary factor. These investments tend to feature higher risks or lower returns than the market can bear. These private debt, equity, and nonprofit investments are generally suited for charitable capital, with a focus on creating additionality.

Opportunities designed to Catalyze are often structured to attract “impact-first” charitable dollars, often through program related investments or recoverable grants. Program related investments and recoverable grants are two examples of alternative structures for contributing charitable dollars to opportunities that are potentially returns-generating, allowing charitable asset holders to multiply the impact achievable with the same set of charitable dollars. Private foundations and donor advised funds are common vehicles for funding these opportunities.<sup>62</sup> Examples include:



### VENTURE

Climate funds designed to invest equity in transformational climate technologies that are too early or risky for conventional venture capital to fund.



### DEBT

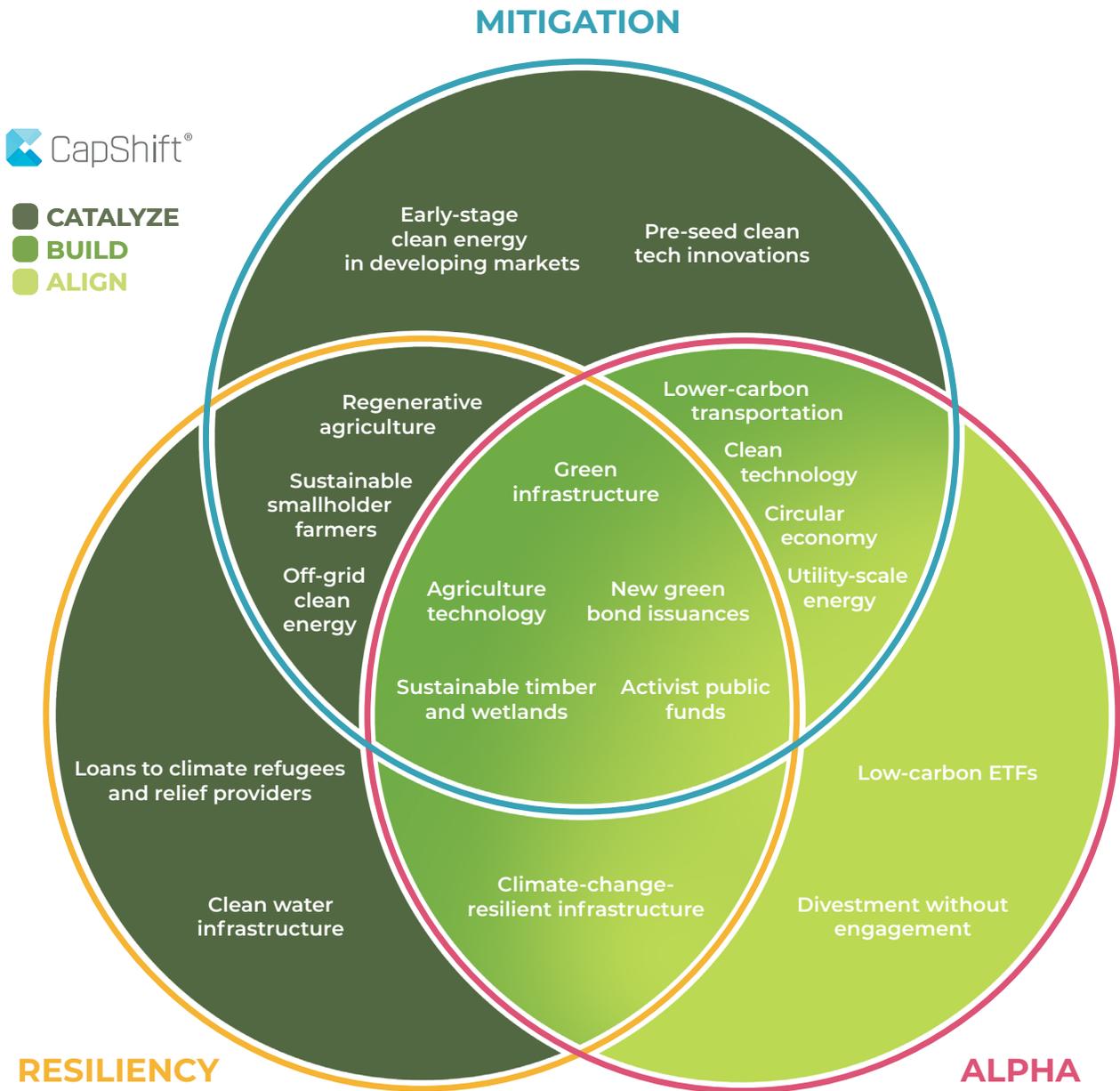
Low-interest loans that help farmers adopt sustainable and regenerative farming practices to better enhance soils and sequester carbon.



### BLENDED FINANCE

Funds designed to leverage flexible capital to attract larger debt investors to deploy renewable energy (Mitigation) or green infrastructure (Resiliency) projects in low-income communities that are often overlooked by traditional developers and financing.

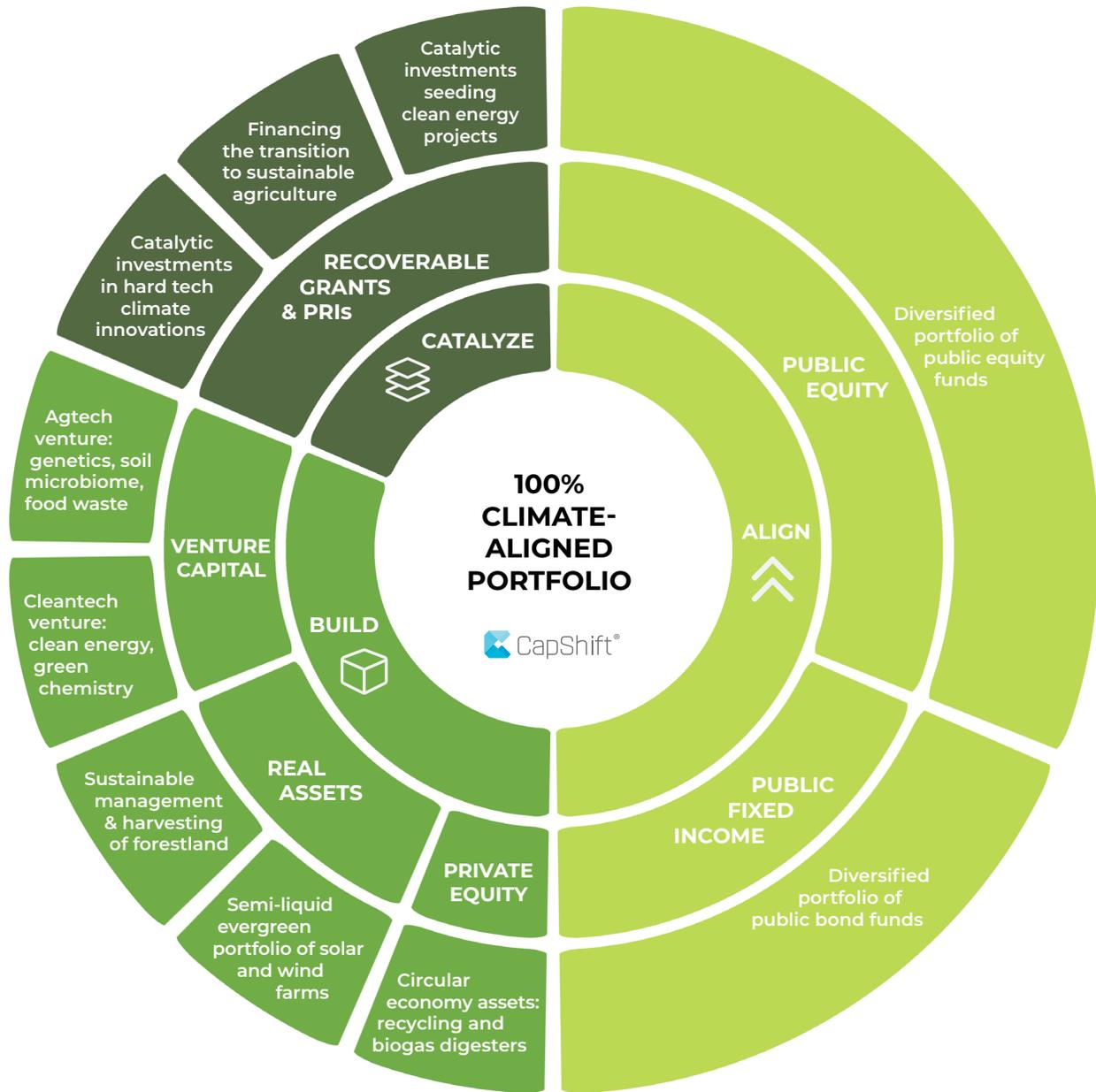
Below, we also show how the Align-Build-Catalyze framework interacts with the three overlapping goals vis-à-vis climate-focused investing.



## MIX AND MATCH: A SAMPLE CLIMATE-FOCUSED PORTFOLIO

Many investors have already successfully built a 100% climate-aligned investment portfolio that spans multiple asset classes and strategies. On the following page, we provide a sample climate portfolio with a 50-50 public-private split and a portion of the private sleeve in catalytic, impact-first investments. This example portfolio is suitable for charitable asset owners seeking to drive impact out of the portfolio; other asset owners may add more diversification to the portfolio.

A diversified portfolio is a common strategy for reducing the overall risk or volatility of a portfolio by investing in different types of assets. While many investors approach climate investing with only one type of asset in mind, climate impact can be achieved through investments in all asset classes. Appendix IV shows how each asset class can cover multiple goals and strategies.

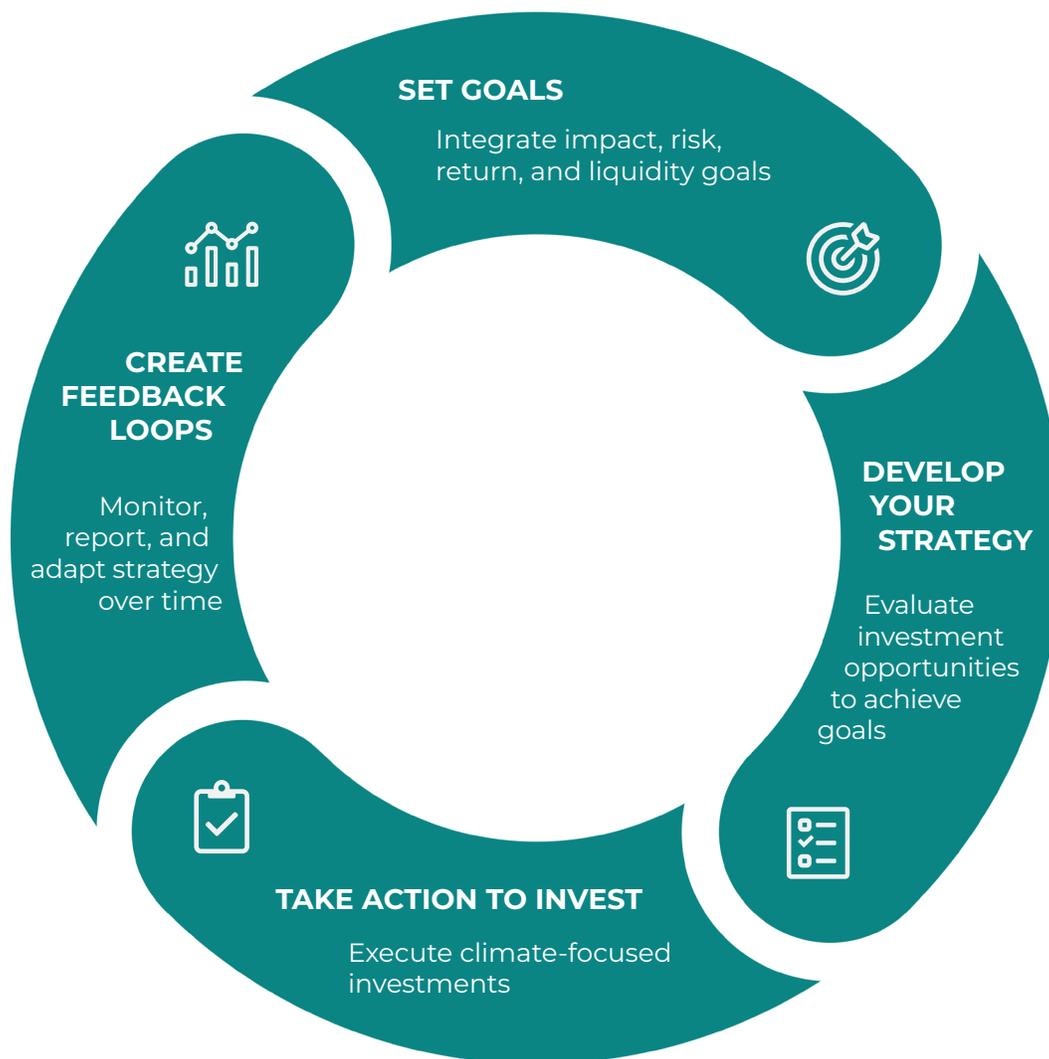


There is no right way to build a climate-focused investment portfolio. But all investors should know that there are investment funds and vehicles in nearly every asset class that allow investors to contribute to climate solutions and mitigate climate risks across their portfolio.

*Portfolio illustrative of an investor with a significant exposure to private markets and an allocation to catalytic investments. The above is meant to be demonstrative of how a family might approach building a climate-aligned portfolio; it is not a recommendation or a solicitation to invest. Investors should do their own research prior to investing and should make decisions based on their own needs and risk tolerance.*

## EBB AND GROW: STEPS TO BUILD A CLIMATE-FOCUSED PORTFOLIO

Each investor's unique circumstances shapes their blend of financial risk, return, and liquidity requirements, as well as thematic areas of focus. While investors' priorities and approaches may vary, the following steps can offer a basic roadmap for integrating climate investments into your portfolio:<sup>63</sup>



**Set goals.** Identify which goals are the most important to you (Mitigation, Resiliency, Alpha) and what metrics you may use to measure success over time.

**Develop your strategy.** Identify what pools of capital will be invested, as well as specific return, risk, liquidity, or other constraints, culminating in a budget or target amount to be allocated towards climate solutions over time. This will allow you to identify which strategies (Align, Build, Catalyze) will play a role in your portfolio, helping you develop an asset allocation framework.

**Take action to invest.** Develop processes for building a pipeline of opportunities, conducting appropriate financial and impact diligence, and making investments within a target dollar range.

**Create feedback loops.** Implement a process to periodically review reports on the financial health and impact results of the investment portfolio, as well as learnings that can help you adapt your strategy and portfolio approach over time.

## About Us



CapShift provides sourcing, diligence, reporting, and other services to help families create climate-focused portfolios, with a particular focus on investment portfolios of charitable assets. If you would like to learn more about how we integrate with donor advised fund providers, financial advisors, philanthropic consultants, foundations, and family offices, please reach out to us at [hello@capshift.com](mailto:hello@capshift.com) to begin a conversation.

*This report and included sample portfolio does not constitute an offer to sell or a solicitation of an offer to purchase any security. Any such offer or solicitation would only be made pursuant to a offering memorandum or prospectus. All investments entail a high degree of risk and no assurance can be given that the investment objective will be achieved or that investors will receive a return of their capital. Any investment opportunities highlighted in this presentation are presented for illustrative purposes only. Opportunities may not be suitable for all investors due to differences in risk tolerance, investor status, and investment time horizons, amongst other factors. Additionally, investments may not achieve stated social, environmental, or similar objectives.*

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# APPENDIX

We would like to thank the following individuals for reviewing a draft of this primer: Dwight Poler, Michael Ferrante, Bill Weil, Mark Tercek, Charles Ewald, Bruce Usher, Michele Martin, Ramsay Ravenel, and Eric Smith. We would also like to thank Max Berry, Laura Dyer, Nathan Lohrmann, and Maxwell Odena of the University of Michigan’s Erb Institute for Global Sustainable Enterprise for consulting on this primer.

Beyond investing, there are a number of complementary activities that families can take to pursue a pro-climate agenda. These include grant-making to policy, science, community, justice, and research nonprofits; joining coalitions to elevate the voice of asset owners in climate debates; and pushing corporate interests, advisors, and service providers to take more proactive positions on climate action. There is also a wealth of outstanding scholarship around climate science, policies, solutions deep dives, and investor case studies that has been written by other thought leaders. We feature a few examples below for future exploration.

## APPENDIX I: FURTHER RESOURCES ON CLIMATE-FOCUSED INVESTING

### INVESTOR CASE STUDIES

- [Edwards Mother Earth Foundation Case Study](#). A case study of a small foundation that built a 100% climate-focused portfolio.
- [Sierra Club Article: We are Facing a Planetary Crisis](#). An overview of the Sierra Club Foundation’s rationale for and approach to climate-focused investing.
- [The Road Through Paris: Building a Low-Carbon Economy with Investing & Philanthropy](#). An overview of the McKnight Foundation’s approach to climate-focused investing.
- [CREO White Paper: Pathways to Sustainable Investing](#). An examination of the typical path taken by sustainable investors, the questions many of them face, and the way that many of them successfully develop a winning strategy that generates both returns and impact.

### A FEW LEADING ORGANIZATIONS

- [Project Drawdown](#): A nonprofit that seeks to help the world reach “Drawdown”— the future point in time when levels of greenhouse gases in the atmosphere stop climbing and start to steadily decline.
- [Prime Coalition](#): A nonprofit that partners with mission-aligned investors to support extraordinary companies that combat climate change, have a high likelihood of achieving commercial success, and would otherwise have a difficult time raising adequate financial support to scale.
- [Breakthrough Energy’s Grand Challenges](#): An outline on accelerating innovation in sustainable energy and in other technologies to reduce greenhouse gas emissions from the five major sources: manufacturing (31 percent), electricity (27 percent), agriculture (19 percent), transportation (16 percent), and buildings (7 percent).

## OTHER DEEP DIVES

- [The Nature Conservancy: The Playbook for Climate Finance](#). An outline of five ways to drive more funding towards climate change solutions.
- [ImpactAlpha: Deploying catalytic capital to bridge financing gaps for climate action](#). An examination of catalytic capital use cases for climate impact.
- [Cambridge Associates: Summary of climate science for investors](#): A high-level overview of the current climate science and a discussion of a few economic implications.

## APPENDIX II: CLIMATE ALPHA IN PUBLIC MARKETS

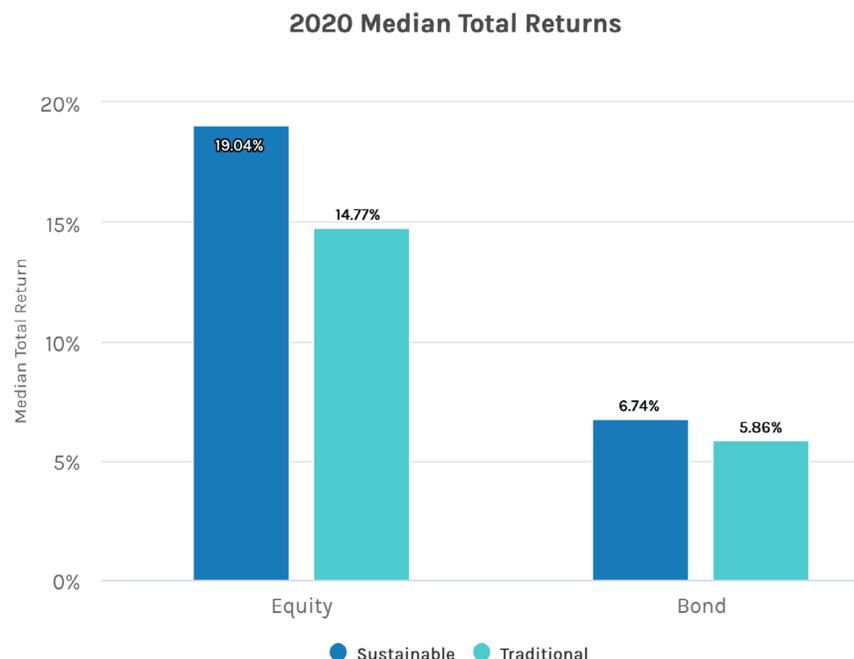
Research shows that integrating climate risks and solutions into public portfolios can be a driver of financial competitiveness.

**Risk Mitigation:** The International Monetary Fund’s [2020 Global Financial Stability Report](#) found that equity investors are not adequately pricing how the physical risks related to climate change (loss of life and property as well as disruptions to economic activity) impact financial stability.

Example: A climate-proof portfolio strategy can also help investors avoid stranded assets, which are assets that have suffered from unanticipated write-downs, devaluations, or conversion to liabilities as a result of market developments. Stranded assets are an issue in the oil and gas sector as the industry transitions to renewable assets in the wake of climate change.

**Outperformance:** Morningstar’s [2021 Sustainable Funds US Landscape Report](#) found that the returns of 69% of sustainable funds ranked in the top half of their Morningstar Category, and 37% in the top quartile returns.

In 2020, [Morgan Stanley](#) found U.S. sustainable equity funds outperformed their traditional peer funds by a median total return of 4.3 percentage points, as shown in the chart.



## APPENDIX III: CAPSHIFT CLIMATE MITIGATION<sup>64</sup> SOLUTIONS MAP

Another way to segment climate mitigation priorities is by identifying Sources (drivers of emissions to be curbed), Sinks (sequestration points to be increased), and Society (population pressure). CapShift has synthesized frameworks from Project Drawdown, Breakthrough Energy, and Prime Coalition into a Solutions Map:

	CapShift®	% OF GLOBAL EMISSIONS	PROVEN SOLUTIONS	EMERGING SOLUTIONS
SOURCES	<b>ELECTRICITY</b> How we plug in	27%	<ul style="list-style-type: none"> <li>- Solar &amp; Wind</li> <li>- Battery storage</li> <li>- Efficiency/demand response</li> <li>- Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>- Hydrogen/fuel cell</li> <li>- Next gen storage</li> <li>- High efficiency transmission</li> <li>- Next gen nuclear and fusion</li> </ul>
	<b>TRANSPORT</b> How we get around	16%	<ul style="list-style-type: none"> <li>- Electric vehicles</li> <li>- Biofuels</li> <li>- Light/efficient vehicles</li> <li>- Expanded public transit</li> </ul>	<ul style="list-style-type: none"> <li>- Next gen biofuels and solar fuels</li> <li>- Advanced engines</li> <li>- Hydrogen transport</li> <li>- Smart cities</li> <li>- Aviation and shipping fuels</li> </ul>
	<b>MANUFACTURING &amp; INDUSTRY</b> How we make things	31%	<ul style="list-style-type: none"> <li>- Combined Heat &amp; Power</li> <li>- Reuse &amp; recycling</li> <li>- Industrial heat capture</li> </ul>	<ul style="list-style-type: none"> <li>- Low/negative carbon cement, steel, chemicals</li> <li>- Waste heat recovery</li> <li>- Upcycling and product reuse</li> <li>- Circular economy</li> <li>- Manufacturing of cement, steel, and chemicals</li> </ul>
	<b>BUILDINGS</b> How we live	7%	<ul style="list-style-type: none"> <li>- LED lighting</li> <li>- Smart HVAC</li> <li>- Retrofits</li> <li>- Refrigerant management</li> </ul>	<ul style="list-style-type: none"> <li>- Low carbon / timber building materials</li> <li>- Green/solar roofing</li> </ul>
SINKS	<b>FOOD &amp; AGRICULTURE</b> How we live	19%	<ul style="list-style-type: none"> <li>- Sustainable farming</li> <li>- Food waste prevention</li> </ul>	<ul style="list-style-type: none"> <li>- Regenerative and vertical farming</li> <li>- Livestock methane reduction</li> <li>- Carbon neutral fertilizer</li> <li>- Cellular agriculture</li> <li>- Alternatives to animal agriculture</li> </ul>
	<b>FORESTRY &amp; SEQUESTRATION</b> How we remove carbon	NA	<ul style="list-style-type: none"> <li>- Forest conservation</li> <li>- Reforestation</li> </ul>	<ul style="list-style-type: none"> <li>- Carbon capture &amp; storage</li> <li>- Geoengineering</li> <li>- Ocean sequestration</li> <li>- Direct air capture</li> </ul>
	<b>SOCIETAL CHANGE</b> How we mitigate population pressure	NA	<ul style="list-style-type: none"> <li>- Educate girls</li> <li>- Family planning</li> <li>- Grow incomes</li> <li>- Plant-rich diets</li> </ul>	NA

## APPENDIX IV: CLIMATE INVESTING BY ASSET CLASS

 CapShift®	PRIMARY GOAL	MITIGATE APPROACH	RESILIENCY APPROACH	ALPHA APPROACH	EXAMPLE FUND
<b>PUBLIC EQUITY</b>	Align	Proven solutions	NA	Risk mitigation	Shareholder engagement for reduced corporate impact on climate change
<b>PUBLIC FIXED INCOME</b>	Align & Build	Proven solutions	Resilient infrastructure	Risk mitigation	Asset-backed loan to residential solar & energy storage provider
<b>PRIVATE EQUITY</b>	Build	Emerging solutions	Resilient infrastructure	Upside capture & Risk mitigation	Growth of recycling and sustainable waste management facilities
<b>REAL ASSETS</b>	Build	Proven solutions	Community solutions & Resilient infrastructure	Upside capture	Sustainably managed forests for conservation outcomes and sustainable timber harvest
<b>PRIVATE DEBT</b>	Build & Catalyze	Proven & Emerging solutions	Community solutions	Upside capture	Funding microfinance institutions that finance access to solar energy or clean water
<b>VENTURE CAPITAL</b>	Build & Catalyze	Proven & Emerging solutions	Resilient infrastructure	Upside capture	Seeding and supporting potentially transformative climate innovations
<b>PRIs AND RECOVERABLE GRANTS</b>	Catalyze	Proven & Emerging solutions	Community solutions	NA	Concessionary debt to fund transition to sustainable agriculture

## WORKS CITED AND NOTES

1. Nature. [COVID curbed carbon emissions in 2020 — but not by much](#)
2. The New York Times. [Harvard says it will not invest in fossil fuels](#)
3. The Wall Street Journal. [SEC Asks Dozens of Companies for More Climate Disclosures](#)
4. NPR. [Pope Francis And Other Christian Leaders Are Calling For Bold Climate Action](#)
5. IPCC. [SPECIAL REPORT: GLOBAL WARMING OF 1.5 °C](#)
6. Climate Policy Initiative. [Global Landscape of Climate Finance 2021](#)
7. UNHCR. [Displaced on the frontlines of the climate emergency](#)
8. Federal Reserve. [Financial Accounts of the United States](#)
9. Intergovernmental Panel on Climate Change. [Special Report on the Impacts of Global Warming of 1.5 °C](#)
10. Wikimedia Commons. [Woolsy Fire](#)
11. Wikimedia Commons. [Drought, French Guinea](#)
12. Wikimedia Commons. [Flooding in India](#)
13. Wikimedia Commons. [North Complex smoke in San Francisco](#)
14. Frontiers in Climate Science. [Underestimating the Challenges of Avoiding a Ghastly Future](#)
15. ProPublica. [New Climate Maps Show a Transformed United States](#)
16. Columbia Climate School. [The Science of Carbon Dioxide and Climate](#)
17. National Snow and Ice Data Center. [Methane and Frozen Ground](#)
18. Climate Central. [Global Warming’s Compounding Dangers](#)
19. Intergovernmental Panel on Climate Change. [Climate Change 2021: The Physical Science Basis](#)
20. Grantham Research Institute. [The missing economic risks in assessments of climate change impacts](#)
21. Columbia Climate School. [How Climate Change Will Alter Our Food](#)
22. Institute for Economics and Peace. [Ecological Threat Register 2020](#)
23. World Economic Forum. [Climate Refugees – the world’s forgotten victims](#)
24. Science.org. [Accelerating Extinction Risk from Climate Change](#)
25. Intergovernmental Panel on Climate Change. [Climate Change 2014: Impacts, Adaptation, and Vulnerability](#)
26. Stanford Social Innovation Review. [The Investment Gap that Threatens the Planet](#)
27. Climate Policy Initiative. [Global Landscape of Climate Finance 2019](#)
28. UNEP. [Adaptation Finance Gap Report](#)
29. Hewlett Foundation. [Climate Finance Strategy 2018-2023](#)
30. Climate Policy Initiative. [Global Landscape of Climate Finance 2021](#)
31. Ibid.
32. Hewlett Foundation. [Climate Finance Strategy 2018-2023](#)
33. Stanford Social Innovation Review. [The Investment Gap that Threatens the Planet](#)
34. A 2021 [International Energy Agency report](#) finds that nearly half the pathways to cut global greenhouse gas emissions to net-zero by 2050 come from technologies that are still under development in either demonstration or prototype phases.
35. UNFCCC. [What do adaptation to climate change and climate resilience mean?](#)
36. The UN Refugee Agency. [Climate change and disaster displacement](#)
37. Green Climate Fund. [Thematic brief – Adaptation](#)
38. OECD. [Making blended finance work for water and sanitation](#)
39. Brookings Institute. [The climate wolf at the door: Why and how climate resilience should be central to building back better](#)
40. Climate Finance Lab. [Climate Resilience and Adaptation Finance & Technology Transfer Facility \(CRAFT\)](#)
41. Carbon Brief. [Mapped: How climate change disproportionately affects women’s health](#)
42. Project Drawdown. [Health and Education](#)
43. Thomson Reuters Foundation. [Net-zero emissions targets adopted by one-fifth of world’s largest companies](#)
44. S&P Global. [The “Trucost” of climate investing: Managing climate risks in equity portfolios](#)

45. Morgan Stanley. [Managing Climate Change Risks with High Quality, Low Carbon Portfolios](#)
46. UBS. [Carbon investing: does a lower carbon intensity portfolio sacrifice return](#)
47. International Energy Agency. [Global EV outlook 2021](#)
48. Precedence Research. [Electric vehicle market size, growth, report 2020 to 2027](#)
49. UN FAO. [Food systems account for more than one third of global greenhouse gas emissions](#)
50. IPCC. [Special Report on Climate Change and Land: Desertification](#)
51. More than 20 faux meat startups raised about \$1.4 billion from venture investors in the first seven months of 2020. Source: [Farm Animal Investment Risk & Return](#)
52. Impact Management Project. [How investors manage impact](#)
53. Market-rate: investments which prioritize returns aligned with the amount of risk the investor is taking. For example, if the investor is taking higher risk, they are anticipating that returns will also be higher and that those risks and returns are aligned with what the market will bear.
54. Journal of Sustainable Finance & Investment. [ESG factors and risk-adjusted performance: a new quantitative model](#)
55. Journal of Economic Geography. [Does the fossil fuel divestment movement impact new oil and gas fundraising?](#)
56. Morningstar. [What are Green Bonds?](#)
57. The Stanford Social Review. [The Investment Gap that Threatens the Planet](#). Page 32, Section *Sources of Capital for Climate Solution Stages*
58. Medium. [Cleantech's Comeback](#).
59. Climate Tech VC Newsletter. [Climate tech \\$16b mid-year investment action report](#).
60. Cleantech Group. [SPACs in Cleantech: Seven Weeks into 2021, There are no Signs this 2020 Trend is Abating](#).
61. The Stanford Social Innovation Review. [The Investment Gap that Threatens the Planet](#). Page 33, Section *The Unique Position of Philanthropists*.
62. The Stanford Social Innovation Review. [Using Donor-Advised Funds to Invest in Early-Stage Entrepreneurs](#).
63. See also CREO and Cambridge Associates for roadmaps to integrating impact into an investment portfolio.
64. Framework built from CapShift analysis, synthesizing data from Project Drawdown, Breakthrough Energy, Prime Coalition, and other industry sources.