

# Private finance investment opportunities in climate-smart agriculture technologies

## Executive summary

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Commercial Agriculture for Smallholders and Agribusiness

The CASA programme is a flagship programme of the UK Foreign, Commonwealth and Development Office (FCDO) and is intended to increase global investment in agribusinesses which trade with smallholders in equitable commercial relationships, increasing smallholders' incomes and climate resilience.

The programme aims to help agribusinesses to scale up and trade in larger commercial markets. As part of its work CASA generate new evidence and analysis that supports a stronger, fairer and greener agribusiness sector.

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This is the executive summary of the 'Private finance investment opportunities in climate-smart agriculture technologies' report.

To view the full report, please visit: <https://www.casaprogramme.com/wp-content/uploads/2021/10/Private-finance-investment-opportunities-in-climate-smart-agriculture-technologies.pdf>

## Private finance investment opportunities in climate-smart agriculture technologies

This investor-focused study analyses the role of private finance in climate-smart agriculture (CSA) technology innovation and deployment in Africa and Asia. It **focuses in on the perspectives of investors**, identifies technologies and areas that demonstrate commercial viability and investment potential, profiles existing investments in CSA technologies, **explores the motives and incentives that may attract investors to financing CSA technology companies**, and provides a more nuanced understanding of the barriers and bottlenecks that exist for mobilizing greater investment for CSA technology. The findings are based on evidence from 28 interviews with investors and other CSA technology stakeholders, and a review of more than 100 relevant reports and publications.

Most investors tend to approach climate challenges from the perspective of environmental, social, and corporate governance (ESG) screening, looking first at risk, and building from a 'do no harm' perspective, rather than seeking to identify solution-oriented technology investments. Less than 1% of private climate finance is currently directed towards CSA, with enterprises struggling to find appropriately costed investment capital. Increasing private financial flows to emerging and developing economies needs to be supported by **proactively connecting available capital with investable opportunities and encouraging new market structures and business models**.

“Bridging the climate finance gap requires the identification of climate-smart investment opportunities”

### Technologies demonstrating commercial investment potential

This report profiles eight technologies identified by interviewees as showing promise for growth, investment viability, and relevance in emerging markets in Africa and Asia for smallholders and agribusinesses.



**Solar-powered micro drip irrigation systems**, which are able to help farmers in arid and drought-affected areas to sustainably increase yields and crop resilience, with minimal use of scarce water resources and no ongoing energy costs. **Pay-as-you-go models for such systems are flourishing**, helping to overcome the capital expenditure costs for some farmers, with companies such as SunCulture recently securing \$11m in (concessional) loans, and Azanga raising \$13.5m in Series B equity investments from both private and impact investors.



**Biocontrol products and precision applicators** enable farmers to minimize the inputs they use for crop protection in their responses to increasing plant health threats driven by climate change. As market and consumer demand for more environmentally friendly food increases, **investors have identified biocontrol products and precision applicators as key technologies in the transition to nature-positive agricultural production**.



**Solar-powered cold storage solutions** help to prevent food wastage and spoilage, particularly in increasingly humid conditions and extreme temperatures, as well as helping to **ensure that produce can be sold at an optimal time in prime condition, maximizing income for farmers and returns for investors**. Innovative business models in this area are leveraging stored produce as collateral for brokering access to affordable credit for farmers, simultaneously addressing both a key demand-side constraint as well as diversifying revenue streams.



**Digital platforms** that bundle together climate-smart advisory services with other complementary products and services are **helping to minimize transaction and marketing costs for companies** and providing a more integrated and holistic offering to farmers. Building on existing trusted relationships, successful platform technologies enable farmers to access stress-tolerant inputs and climate information services alongside financial products and services.



**Smart irrigation** involves the coupling of sensors, control instruments, and irrigation machinery with computer models and meteorological information for real-time farm management. Business models that reduce the investment risks to end-users are **demonstrating commercial viability when targeting horticulture users and innovative payment models, with no upfront costs**.



**Biodigesters** make use of crop and livestock waste to produce biogas and rich organic inputs for crop farming. Emerging business models involve bundling financial services with product sales. For example, one manufacturer has partnered with a financial technology (fintech) company to enable livestock farmers to purchase equipment on long-term low-cost credit, and is generating additional income from retailing both the biogas and biomass outputs from its product.



**Bio-coatings** make use of organic inputs for the natural coating of fruits and vegetables, which can lengthen their shelf-life. Bio-coatings can be particularly useful in preserving fresh goods under climate-related stresses, such as increased heat or humidity. **Companies with operations in Africa and Asia have shown interest in working with exporters to use these products in their supply chains**. This reflects the influence of both regulations and changing consumer preferences.



**Solar-powered processing** equipment enables perishable products to be stored and eaten out of season, reducing pressure on other commodities, and the need to import products, and maximizing the value of the goods by making it possible to sell them when there is a supply shortage. Solar dryers can also achieve this, enabling lower-grade produce that cannot be sold fresh to still have value once processed. **These technologies have relatively short payback timeframes, and are already demonstrating scale and growth in India.**

## Key findings

<b>Finance</b>	<ul style="list-style-type: none"><li>• There is a real need for more early-stage venture capital and angel investing</li><li>• Investors need reliable data systems to engage more in nature- and climate-positive business outcomes</li></ul>
<b>Challenges</b>	<ul style="list-style-type: none"><li>• A need for growth-stage technical assistance for CSA technology businesses</li><li>• A lack of affordable finance serving the needs of smallholders and agri-businesses</li></ul>
<b>Business models</b>	<ul style="list-style-type: none"><li>• Bundling with complementary products and services while addressing demand-side constraints for farmers is performing particularly well</li><li>• Pivoting from retailing hardware to service provision in low-income settings</li></ul>

## Recommendations

<b>For investors</b>	<b>For enablers</b>	<b>For donors</b>
<ul style="list-style-type: none"><li>• Increase early-stage financing</li><li>• Improve climate risk assessment systems</li><li>• Seek business models which address the issue of financial access for end-users</li><li>• Work with enablers to identify investment-ready CSA technologies</li></ul>	<ul style="list-style-type: none"><li>• Focus support on growth-stage businesses, not just ideation</li><li>• Target concessional finance at last-mile distributors</li><li>• Co-develop clear nature and biodiversity markets and investment guidelines</li></ul>	<ul style="list-style-type: none"><li>• Invest in additional research to demonstrate the viability of impact-focused commercial investment models</li><li>• Raise awareness of innovative CSA technologies</li><li>• Target demand-side constraints to unlock market potential</li></ul>

## How CASA is responding

The Commercial Agriculture for Smallholders and Agribusiness Programme (CASA) is building on work it has done since its inception, in terms of supporting agribusinesses with climate-responsive technical assistance and relevant research for policymakers and investors, CASA has been more intentionally embedding climate change and nature-positive agriculture at the heart of its strategy.

A series of four '4x4' information videos and a number of regional investor forums are planned following COP26, exploring the following: the investment case for climate adaptation in agriculture; commitments to net-zero greenhouse gas (GHG) emissions by 2050; technology-enabled nature-based solutions; and mobilizing private capital towards reaching the \$100bn per year climate finance goal.

The research presented here has identified unmet information needs among investors on the range of CSA technologies that exist, viable business models for operating sustainably in

low-income contexts, the need for improved guidance on climate risk assessments, and help in verifying nature and climate benefits. CASA's research agenda will address these information gaps, while its technical assistance facility will support agribusinesses to identify and appraise CSA technology options, and the policy research component will explore how to improve the enabling environment for climate-responsive investments in agriculture.

## Detailed findings

### Investment interest in technologies for avoiding losses and minimizing waste

Technologies for avoiding post-harvest waste and minimizing spoilage targeted at value chain agribusinesses are currently more attractive to investors than production-level technologies targeted at farmers. **Waste reduction technologies enhance market and production efficiencies and maximize profitability.** These CSA technology solutions range from improved logistics management to rapid processing of lower-grade goods, renewable-powered cold storage, and bio-coatings for the preservation of fresh produce.

### Awareness of CSA technologies

A number of investors interviewed for this research were only aware of solar-powered irrigation as a CSA technology. Highlighting other innovative types of CSA technologies could open up new investment opportunities in the sector.

### Biodiversity and nature-positive investing

Issues of biodiversity, nature, and ecosystem conservation are more central to most impact investors' and development finance institutions' (DFIs') investment portfolios and strategies than those of private equity investors. There are emerging areas of interest in CSA technologies for nature-positive production. Biocontrol products and precision pesticide application technologies in particular were **identified as growth areas by some investors, recognizing the reputational and ecological risks associated with over-use of chemical control products.**

One of the key constraints to greater integration of biodiversity, nature and ecosystem conservation in investment decision-making is the ability to monitor and verify changes that are directly attributable to specific investments and technologies. Investors noted that there were rarely reliable baselines to work from, and that the costs of establishing monitoring, reporting and verification (MRV) systems to understand the positive or negative impacts of technology use or related activities resulting from investments was prohibitive, particularly in already low-margin settings.

### Availability of private climate finance for CSA technology

Commercial finance and investment for CSA in Africa and Asia remains very limited, representing just 0.085% of the available debt and equity climate finance available. A significant finance gap exists for scaling companies which have not yet reached a sufficient level of maturity and profitability to attract private equity investment. This creates a major bottleneck in the pipeline of investable opportunities for larger private equity investments **There is a real need for more early-stage venture capital and angel investing** to support innovative CSA technology companies to grow.

### An increasing impact focus in commercial finance

The lines between impact investing and commercial investing are increasingly blurred as more capital markets recognize their role in the climate emergency and as regulators drive non-financial reporting. There is a growing trend for private finance investors to move towards an impact focus in their portfolio and investment strategies, while also remaining commercially driven. This has the potential to open up new funding opportunities for some innovative CSA technology providers.

## Understanding and responding to climate risk

All types of investors are increasingly incorporating considerations of climate change risk in their investment and lending portfolios, but the degree of integration is very uneven. **There is a business case for CSA technologies which have a clear link back to business resilience and the bottom line**, and that demonstrate the (medium-term) commercial opportunities from enhancing adaptive capacity through innovative technologies.

## India is a frontrunner frontier market for CSA technology investment

**CSA technologies and companies in India are able to scale faster and with fewer barriers** than those in other countries, as the country can be treated as a single market with common regulations, currency, market dynamics and financing. This is aided by very high usage of mobile phones and familiarity with digital services compared to most other markets, which provides a solid platform for digitally driven CSA technology services. India is a market where future transformative technologies could be identified, tried and tested, before transferring to other emerging markets.

## Need for growth-stage technical assistance for CSA technology businesses

While there are a multitude of incubators and accelerators available for ideation-stage innovative technology businesses, there are very few which help small enterprises to mature and develop beyond the initial prototype stage. This has left a technical capacity gap to take those enterprises to the next level and become investment-ready.

## End-user finance and skills development

Affordable, appropriate, and transparent finance for smallholders and agribusinesses needs to be made available in order to unlock the potential of CSA technologies across Asia and Africa. Affordable finance combined with farmer advisory services presents the greatest potential for maximizing the impact and returns of CSA technologies.

If the demand from smallholders for CSA products and services could be stimulated – including through improved access to finance – there would be much less need for supply-side interventions to attract capital flows and financing. One private equity investor noted:

*“Businesses can grow when farmers can access finance. We are here ready to invest when they do.”*

**“Affordable finance combined with farmer advisory services presents the greatest potential for maximizing the impact and returns of CSA”**

## Innovative business models pave the way for scale and profitability

The research identified a number of promising business models that enable some innovative CSA technology enterprises to expand their reach to smallholder farmers while moving towards commercial viability. Businesses which are able to diversify their revenue streams and those that are able to ‘bundle’ with complementary products and services while addressing the underlying demand-side constraints for farmers – principally access to affordable credit – are performing particularly well. Some companies are pivoting from hardware provision to service provision in low-income settings. Similarly, subscription-based models are being explored through digital advisory services, as well as other production-level services, such as spraying, irrigating and storage.

**Table 1: Summary of opportunities, constraints, and knowledge needs identified by interviewees**

Opportunities	Constraints	Knowledge needs
Net-zero motivations	Farmers' access to affordable finance	Climate risk assessment and management
Productive uses of renewable energy	Agribusiness and farmer awareness of relevant CSA technologies	Measuring biodiversity- and nature-positive impacts
Nature-based solutions	Managing and understanding risks for farmers	Identifying CSA technologies and investment opportunities
Reducing waste and post-harvest crop loss	Technical capacity of end-users	
Digital platform technologies	Business capacity constraints of agri-SMEs	
	Regulatory risks and (dis)enabling environment	

## Recommendations

To increase the scale of private climate finance, a number of actions and changes in practice are recommended for private investors, governments and concessional finance providers, to respond to the challenges and issues identified in the research.

### Governments and donors

#### Demonstrating the viability of impact-focused commercial investment models

Bringing together the expertise of pioneer investors, alongside impact investors and climate experts, could help to share positive examples of how other commercial investment vehicles can pivot towards an impact focus in their portfolios.

#### Improving climate risk management assessments

Formalized data and benchmarks to help lower the costs of establishing and running impact-focused commercial investment funds, and standardized climate risk reporting protocols, are two ways in which public and private financial institutions alike could work together to improve physical climate risk management systems (Dalberg, 2021a).

National governments could provide more detailed climate risk assessments of agro-ecological zones that are usable by financial institutions. Establishing global guidelines on how to practically consider low-likelihood, high-impact climate-driven shocks would help investors understand how best to identify investment opportunities and areas of potential maladaptive practices.

#### Raising awareness of CSA technologies

Awareness of the plurality of CSA technologies, and familiarity with their benefits and business models, was generally low among investors. Governments and climate-focused international institutions should work with communities of investors to increase their knowledge and understanding of, and familiarity with, CSA technologies relevant to smallholder contexts, and the ways in which such technologies can also improve supply chain climate resilience for many food trade businesses.

## **Identifying and measuring nature-positive investment opportunities**

Profit-driven investors looking for impact struggle to determine relevant outcomes from CSA technologies. To mobilize investment from the private sector in nature-positive and regenerative agriculture, donors can support activities to educate investors on the value propositions, business resilience and profitability benefits, and commercial opportunities of these investments, and can support the development of accessible, standardized monitoring, reporting and verification (MRV) systems and technologies.

## **Donors can invest in digital access to support CSA investment**

Countries with stronger and more affordable digital connectivity infrastructure are a fertile area for CSA technology innovation and adoption. Leveraging digital technologies is important for increasing market efficiencies, lowering transaction costs and enabling many smart technologies to operate effectively.

## **DFIs and concessional finance providers**

### **Financing the ‘missing middle’**

The public good nature of CSA technologies should be recognized. Thus, to reach the \$100bn climate finance goal, DFIs and other public finance funders should look to shoulder more risk in investing directly in early-stage CSA technology innovators. Concessionally costed finance is vital for preventing promising innovations falling into the ‘valley of death’ between incubator investors supporting start-ups and impact financiers seeking established and scaling enterprises. DFIs need to become open to lower ticket sizes, greater risk and more management costs in specialized CSA technology funds if they are to enable promising CSA technology ventures to scale.

### **Supporting the missing middle**

Public, private and philanthropic providers of technical assistance support should shift their focus away from ideation- and initial innovation-stage support to focus instead on enhancing the capacities of CSA technology enterprises to develop into investment-ready operations. This will require longer-term engagements, with technical assistance being deployed alongside capital.

### **Business model innovation**

Focusing on innovative models to enhance access to appropriate consumer credit and information services will likely have a greater effect on private finance investments in CSA technologies than any supply-side intervention. Investors should consider the potential opportunities CSA technology innovators could bring if coupled/bundled with other technologies and services, and the potential opportunities for revenue diversification and pivoting towards alternative service provision models in different contexts. Further research into successful examples of CSA technology business models as they emerge will play an important role in demonstrating such value propositions.

Risk aversion in regard to new technologies and practices is an issue that is common to farmers across the world, not just those in emerging markets. CSA technology providers need to build business models around trusted relationships and transparent trade-off considerations with farmers. This means looking to integrate CSA technologies into – or in partnership with – enterprises that already have established relationships with farmers, such as off-takers.

Support through concessional finance, subsidies and grants, as well as advisory support, is likely to be required across the board to speed up the adoption of these CSA technologies, and to accelerate their development into investment-ready ventures.



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