

# POWERING AGRICULTURE:

AN ENERGY GRAND CHALLENGE  
FOR DEVELOPMENT



## ACCESS TO FINANCING FOR EARLY-STAGE INNOVATORS IN THE CLEAN ENERGY- AGRICULTURE NEXUS



# CONTENTS

---

## OVERVIEW 1

### 1. INTRODUCTION 2

### 2. STUDY METHOD 5

### 3. FINDINGS 8

3.1 Insights from the Interviews 8

3.2 Barriers to Access 9

### 4. ACCESSING FINANCING 11

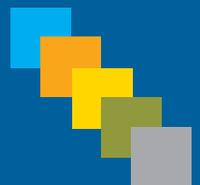
4.1 Equity Financing 12

4.2 Debt Financing 20

4.3 Non-Dilutive Financing 26

### 5. SUMMARY AND RECOMMENDATIONS 28

## REFERENCES 32



# OVERVIEW

---

Donor funding can support innovation and the development of new technologies to solve critical social and environmental problems. In 2012, five public and private sector entities – the U.S. Agency for International Development (USAID), the Swedish International Development Cooperation Agency (Sida), the German Federal Ministry for Economic Cooperation and Development (BMZ), Duke Energy, and the Overseas Private Investment Corporation (OPIC) – partnered to launch Powering Agriculture: An Energy Grand Challenge for Development to solve key problems in the clean energy-agriculture nexus. With the program concluded, the partners are evaluating the impacts and the progress of their 24 innovators – organizations that design, pilot, and deploy clean energy solutions at different points along the agricultural production cycle in developing countries – and reflecting on lessons learned.

Many early-stage innovators (ESIs) find it challenging to raise additional capital once donor funding has been depleted. This inability to access funding is a key obstacle constraining their ability to scale and grow in the clean energy-agriculture nexus. This challenge can be further broken down into availability (is market capital available to ESIs in the agriculture and clean energy sectors?) and access (what is preventing ESIs from accessing this capital?).

*This paper seeks to answer two questions:*

1. **What is preventing ESIs from accessing private capital and follow-up funding?**
2. **What kind of support would prepare companies to obtain capital?**

A literature review and interviews with key stakeholders were used to examine the availability of financing beyond donor funding in the clean energy-agriculture nexus, with the specific goals of identifying the barriers ESIs face in securing funding and understanding the direct impact of those barriers on ESIs' development. The paper concludes by providing recommendations on overcoming those barriers through future program design and technical assistance support.

# 1. INTRODUCTION

The availability of finance, and access to it, are key factors in organizations' development, growth, sustainability, and successful scaling. The role of finance takes on greater importance when considering that most organizations, especially those developing physical technologies (e.g., appliances and hardware), require external financing at some stage.<sup>1</sup> The relationship between access to finance and the sustainability of organizations has been studied extensively. Researchers have found that a lack of finance is particularly painful to smaller organizations and new enterprises, which have disproportionately high failure and bankruptcy rates associated with undercapitalization.<sup>2</sup> Additionally, the availability of and access to finance for ESIs in the clean energy-agriculture nexus is further narrowed by the relatively small markets these companies are serving.

Science and technology-based (S&T) ESIs are defined as “inventors, innovators, and entrepreneurs working to solve grand challenges and create lasting impact. ESIs include university students inventing new things and forming companies around those inventions, researchers from academia and government transitioning from lab to market, and entrepreneurs in emerging economies who are either operating in emerging markets or are looking to supply solutions to more developed economies.”<sup>3</sup>

While ESIs may exhibit characteristics similar to those of small- and medium-sized enterprises (SMEs) (e.g., team size and management hierarchy), there are unique differences that separate them. While academicians have worked extensively to agree on a definition for SMEs,<sup>a</sup> the same rigor has not been applied to defining ESIs. It may thus be reasonable to think of an ESI in terms of a less-developed micro SME, which the European Commission has defined as an “enterprise which employs fewer than ten



In this study, ESIs are defined as inventors, innovators, and entrepreneurs working to solve challenges and create lasting impact. They can be an early-stage micro enterprise or a spin-out of an established company, and can encompass researchers from academia and government in addition to businesses.

<sup>a</sup> Defined as in the European Commission recommendation of May 6, 2003 concerning the definition of Micro-, Small-, and Medium-Sized Enterprises as “enterprises which employ fewer than 250 persons and have an annual turnover not exceeding 50 million euros, and/or an annual balance sheet total not exceeding 43 million euros. Furthermore, within the SME category, a small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet does not exceed 10 million euros.”<sup>4</sup>

persons and whose annual turnover and/or annual balance sheet total does not exceed two million euros.”<sup>4</sup> In addition, an S&T-based ESI is typically developing an innovation in a technology offering, product, service, or business model, while SMEs are not necessarily taking on this level of risk.

A subcategory and relative gray area involves cases where existing enterprises (SMEs or larger) are innovating within their current models or deploying new technologies into new markets (e.g., developing economies). Oftentimes, organizations innovating in this manner will create separate entities (e.g., spin-outs) or silo these projects into their own business units by essentially creating de facto (internal) ESIs. Challenges such as product-market fit, need for capital, and customer adoption mirror the challenges faced by traditionally-defined ESIs and thus have been included in this study.

During the 2008 financial crisis, organizations of all sizes were negatively affected by the global liquidity and credit emergency. This prompted examinations of the consequences of a lack of available financing. Consistent with prior research, “post-crisis analysis attributed many of the company failures in the wake of the 2008 crisis to a lack of available credit in financial markets,”<sup>5</sup> and a general lack of access to capital in both credit and equity markets as a whole. These failures highlight the sensitive financial position under which smaller enterprises operate and stress the need to identify barriers that inhibit their access to finance.

It is important to distinguish between the financing companies use for ongoing operational purposes (also known as operational capital), and financing that is external to the organization, such as end-user financing, which is extended through a third party and not represented on a firm’s balance sheet. While there is great interest within the donor community in better understanding the role of end-user financing, this study focuses on the funding ESIs require for operational purposes. Identifying barriers and obstacles that constrain organizations’ ability to access operational capital and providing guidance on support opportunities in overcoming those barriers form the basis for this paper.



Powering Agriculture clean energy expert Dr. Carolina Barreto (bottom right) with EarthSpark employees on a monitoring and evaluation site visit in Les Anglais, Haiti in May 2016. Photo courtesy of Powering Agriculture.



## Situation Analysis: Lasting Effects of the 2008 Financial Crisis on Today's ESIs

The height of the 2008 financial crisis is often dated to September 15, 2008, the day when Lehman Brothers, a U.S.-based investment bank, declared the largest public bankruptcy in history.<sup>6</sup> The crisis set in motion a series of market contractions where both credit (lending) and equity (investment) dried up for businesses globally. The crisis is of particular note for this research, as small and emerging companies were disproportionately affected in the resulting tightening period.<sup>7</sup>

More than a decade later, many of the effects from the crisis have become a mere footnote in history as global markets as a whole have returned to (and in many cases surpassed) pre-crisis levels.<sup>8</sup> That said, there remain several key insights attributed to the crisis that are relevant to ESIs today and that influence both the availability of capital to ESIs and their ability to access those funds.

One lesson came in cases where credit sources dried up entirely, or when already established lines of credit (loans) were recalled by banks, forcing companies to repay or refinance at less preferential terms in full at the time of call. This left many ESIs and micro SMEs unable to finance future and ongoing operations, and in some cases, forced them into failure. This tightening continues to plague ESIs today as investors are cautious about extending financing for fear that macro market events beyond the ESIs' control could disproportionately affect the success of the venture.

Second, financial tightening was more pronounced in the Euro zone and other non-dollar denominated economies as a worldwide flight-to-dollar occurred when global banking systems began showing signs of weakness and vulnerabilities.<sup>9</sup> This created lingering problems for ESIs, as many are working in developing and emerging markets. The lasting implication of the 2008 crisis for ESIs today is that while financial markets continue to serve this demographic, there remains caution, knowing how historical macro events in global markets adversely expose ESIs' and micro SMEs' unique vulnerabilities.

Third, a general risk aversion still lingers among commercial banks as a result of the 2008 crisis. Post-2008, banks are more proactive in trying to understand the economic stability of the market in which the firm is operating, as these macro factors directly influence transaction and capital costs. This is a significant barrier for ESIs working in unstable geopolitical environments, as it drives up the cost of capital and essentially punishes the ESI for working in that environment.

## 2. STUDY METHOD

---

*This paper seeks to answer two questions:*

1. **What is preventing ESIs from accessing private capital and follow-up funding?**
2. **What kind of support would prepare companies to obtain capital?**

To explore these questions, the study team conducted semi-structured interviews with three types of stakeholders: eleven ESIs, five investors, and four program stakeholders (including donors) for selected Grand Challenge programs.

Interviewees were selected based on the following:

**Early-stage innovators.** ESIs were identified and selected from two donor-funded programs, Powering Agriculture: An Energy Grand Challenge for Development, and Securing Water for Food: A Grand Challenge for Development, which ran concurrently with the research timelines of this study. Included were companies of diverse size, demographics (e.g., gender diversity and ethnic background of founders and team), and duration of operations.

**Investors.** Investors were identified and selected based on the alignment of their investment thesis with the ESI profiles being examined. Specifically, investors with a track record of investing in developing economies which matched the geography of the ESIs interviewed for this study, were given priority.

**Program stakeholders.** The other stakeholders identified included donor agencies and enabling organizations, with experience working directly with ESIs on matters of capital access and/or expert knowledge of local financial markets relevant to the ESIs profiled in this research.



### Grand Challenges: A Closer Look

**Powering Agriculture: An Energy Grand Challenge for Development** supported the development and deployment of clean energy innovations that increase productivity and stimulate low-carbon economic growth in the agriculture sectors of developing countries to help end extreme poverty and extreme hunger.

## Grand Challenges: A Closer Look



**Securing Water for Food: A Grand Challenge for Development** helped farmers grow more food using less water, enhance water storage, and improve the use of saline water and soil to produce food by ensuring that the entrepreneurs and scientists behind the new approaches were getting the support they needed to apply and expand their solutions around the world.

All participants were recruited via email. Of the 26 individuals contacted, 20 were interviewed by telephone between May and July 2019. Each interview used a semi-scripted guide to cover a defined series of topics (Table 1). Each interview lasted approximately 60 minutes.

Table 1 STAKEHOLDER INTERVIEW TOPICS

STAKEHOLDER GROUP	KEY INTERVIEW QUESTIONS
<b>Early-Stage Innovators</b> 	<ul style="list-style-type: none"> <li>• In general, how easy or difficult has it been to access the money you need to build/grow your business?</li> <li>• What types of financing have you pursued and for what purposes?</li> <li>• What process did you use to pursue/secure financing?</li> <li>• What has made it difficult to access finance?</li> <li>• What have been the most significant barriers to your development?</li> <li>• In helping your company to obtain financing, what types of external support could help you/ be beneficial?</li> </ul>
<b>Investors</b> 	<ul style="list-style-type: none"> <li>• What types of capital do you offer? Why have you chosen that structure?</li> <li>• How many investments are you currently making (in a specific area)?</li> <li>• What are you seeing in your investment pipelines?</li> <li>• Do you view the current financing available as sufficient for deal flow? Too much money/ too little money available?</li> <li>• What do your investment timelines look like?</li> <li>• What does your due diligence process look like?</li> <li>• What are the primary criteria you use in evaluating potential investments?</li> <li>• In general, what challenges do you have in placing capital?</li> <li>• What do companies need to do in order to be better prepared to access financing?</li> </ul>
<b>Program Stakeholders</b> 	<ul style="list-style-type: none"> <li>• What is your general perception of the availability of finance for innovators?</li> <li>• Does your institution provide financing directly (e.g., equity, credit financing, and loan guarantees)? If so, what form of financing do you provide?</li> <li>• Describe experiences you have had with innovators in your portfolios/programs related to obtaining finance.</li> <li>• In general, what challenges have you observed related to innovators obtaining financing?</li> <li>• In helping companies obtain financing, what types of external technical assistance or support would be most beneficial?</li> </ul>

The interviewer took detailed notes to capture responses. At the completion of each interview, the interviewer summarized impressions and reactions and identified emerging themes. The study authors then analyzed the interview notes to identify insights into each of the research questions.

The remainder of this paper starts with a summary of cross-cutting themes and major barriers to finance identified from the interviews. This is followed by an in-depth description of the types of financing available to ESIs, blending data collected through desk research with reflections from the interviews. The final section presents a summary of key findings and recommendations.



End users with Powering Agriculture innovator Claro Energy's solar trolley system. Photo courtesy of Claro Energy.

# 3. FINDINGS

---



## 3.1 Insights from the Interviews

There were gaps and discrepancies in how innovators approach financing in donor-funded programs, their overall knowledge and familiarity with access to finance, their awareness of its availability (specifically in local markets), and support received when participating in donor-funded programs. Four cross-cutting themes emerged from the interviews:

**Many ESIs have limited expertise in how to access capital.** In general, innovators did not have prior experience in accessing capital or going through a formal fundraising process. This created a time barrier for innovators, as they had a steep learning curve in understanding the steps involved and best practices for success. There are also examples where innovators procrastinated in seeking follow-on funding (assuming they could complete the process in a shorter time than was realistic), and in doing so, caused their companies financial distress and delays in market-facing activities. Without exception, innovators who were successful in receiving follow-on funding stated that they would have begun the process sooner and/or would have taken a different approach to the process.

**Many ESIs lack knowledge of financial markets.** At the most basic level, this was evidenced by inconsistencies in the language used when classifying financing (e.g., mischaracterizing non-dilutive grant funding as investment and speaking of donors as investors). At a higher level, innovators did not exhibit an awareness of the drivers financiers use in making funding decisions, and there was a disconnect between risk-return requirements. One innovator who had been successful in raising capital reflected that “not having a CFO and experienced financial advisors made the fundraising process more difficult than it needed to be.” Another innovator described this by stating, “if you want to build a company that is appealing to investors, you should build a financial team that understands investors.”

**Many ESIs are not aware of the types of financing available in various markets.** This was particularly noticeable in how innovators spoke of developing markets (e.g., East Africa), where they assumed that local banks have no interest in lending to them and/or that commercial banks were “too difficult to deal with.” Neither of these positions is supported by existing literature or from interviews with experts whose core role is to facilitate these transactions. One expert noted, “there is more capital available today than at any other point in history... the challenge is that companies (ESIs) do not know how to look for it, nor how to prepare themselves administratively to access it.”

**Many ESIs receive inconsistent investment support.** Innovators were asked about the program support they received in accessing additional funds; their responses were mixed. In general, innovators had one of three experiences. They 1) received investment support from program portfolio managers in

such tasks as developing investor materials, investor discovery, due-diligence preparedness, and investor referrals, 2) asked for investor support in specific areas (e.g., legal), but didn't receive as it was unavailable or beyond the program's resources (e.g., funding for third party legal counsel), and 3) received no investment support as they were unaware it was within the scope of program technical assistance and thus never asked. One innovator stated that "investor introductions were helpful in breaking down barriers in the getting-to-know-you process," whereas another innovator indicated that "support with investor discovery would have been extremely beneficial, but we didn't know it was something we could ask for."



## 3.2 Barriers to Access

The interviews identified four types of barriers that can prevent ESIs from accessing finance:

**Investor fatigue.** Early investors in emerging clean energy and agriculture markets have not been able to generate as much return as they initially expected. This has led to investor fatigue, where investors are now hesitant to invest in new deals, some of which may be direct competitors to existing portfolio companies in which they have already invested. At the same time, these investors maintain a market-facing presence, which makes them appear more active than they actually are. Investors who have not made investments in either the region (geography) or industry (technology level) feel as though the market is saturated, and that they do not want to compete with those who may have established pipelines for deal flow.

**Investment readiness.** A consistently identified theme was a lack of investment readiness on behalf of ESI founders and the inability of ESIs to administer themselves in a way that positions them for investment. Investors spoke of "the high emphasis placed on the founder's business acumen" and the need for founders "to instill confidence (in investors) that they are capable of leading a high-growth organization." A lack of investment readiness and overall lack of business experience on behalf of founders was consistently identified as a barrier for investors when evaluating financing opportunities for ESIs.

**Lack of investor network.** As an extension of investment readiness, ESIs spoke about the difficulties they experience in establishing investor networks and relationships with financiers. The problem is two-fold, in which founders do not know where to readily find investors, and if they do find them, they often lack the capacity to have appropriate conversations about their future capital needs. For many of the ESIs, investor access was outside their established networking channels.

**Misalignment of profit motives.** The ability of a firm to raise equity capital or obtain credit is ultimately a function of its ability to instill confidence in the market that the firm can generate revenue, and eventually, a profit. Having a strong profit motive within the firm and being able to convey it to financiers aligns the interests of the firm with those who provide financing. The primary focus for many of the ESIs interviewed for this study was not generating profit, but rather achieving the milestones tied to the donor funding they received. One investor summarized this tension nicely, stating that "donor-funded

outcomes are not market aligned with creating businesses, as founders doing pilots on donor funds do not focus on commercial outcomes soon enough, but rather focus on meeting the impact objectives of donors.” The investor went on to explain that “this dynamic can leave companies in a difficult situation when they graduate from donor programs, as the only story they can then tell investors is one of how they achieved program milestones, and not (oftentimes) a story which clearly justifies a market case for their technology or solution.”



Powering Agriculture innovator SunDanzer’s East-West facing panels create a flatter PV curve. Photo courtesy of SunDanzer.

# 4. ACCESSING FINANCING

As ESIs look for capital to meet their financing needs, they are presented with several paths that can be widely categorized as equity, debt, and non-dilutive financing. Within each of these broad categories there are subcategories of particular importance for ESIs, “as their success and sustainability is often determined by an ability to match appropriate funding to a specific stage of development,”<sup>10</sup> which maps to commonly encountered development milestones (Table 2).

This section describes the primary pathways for funding and macro and micro trends in relation to the global clean energy-agriculture nexus. As relevant, it also contains some key insights shared by ESIs, investors, and other stakeholders during the interviews.

Table 2 OVERVIEW OF CAPITAL STAGES AND INNOVATOR DEVELOPMENT MILESTONES<sup>b</sup>

MILESTONES	PRE-REVENUE STAGE COMPANY			REVENUE STAGE COMPANY			
<b>TECHNOLOGY STAGE</b>	Idea	Prototype	Pilot	Revenue generating; early manufacturing runs	Recurring revenue; mass manufacturing	Profitable; new product development	
<b>MARKET STAGE</b>	Market opportunity identified; customer discovery ongoing		Validate product market fit			Market validation and scale	
<b>TEAM STAGE</b>	Initial founder or co-founders	First hires		Organizational structure defined; vertical growth		Executive leadership growth; values and culture solidified	
<b>CAPITAL STAGE</b>	Founding capital	Seed-stage capital		Series A	Series B	Series C	
<b>EXTERNAL FUNDING TYPES</b>  <i>Blue = Mixed</i> <i>Orange = Equity</i> <i>Purple = Other</i> <i>Yellow = Debt</i>	Friends and family (personal debt or equity)						
			Angel capital (convertable debt or equity)				
				Venture capital (equity)			
				Strategic corporate investors			
						Private equity »	
					Revenue-based financing		
						Commercial debt	
	Non-dilutive capital grants »						

<sup>b</sup> This table is a visual representation of the milestones companies typically achieve as they progress through various types of financing. The milestones are fluid, but this is typically the order in which they are achieved in relation to one another. This is not representative of every company's pathway; some may only use debt, some might be able to rely on grants exclusively, while others may raise every type of capital available. Entrepreneurs' actual experience will depend on their ability to accomplish the business, market, and team milestones with or without external funding. With technology innovation, typically more, riskier funding is required to complete the prototype, run the pilot, and set up manufacturing processes. As a result, technology companies are most likely to raise funds from equity investors.<sup>11</sup>

## 4.1 Equity Financing

Generally speaking, equity capital is capital invested into a firm without a specified repayment date and by which the funder (investor) investing the capital is purchasing a claim to the business in the form of ownership. Firms seek equity financing in two situations.<sup>1</sup> The first occurs when an enterprise anticipates or experiences distress in meeting its current financial obligations. For example, a firm may find itself in a scenario in which it needs to pay its employees or external vendors for services rendered but has neither cash nor other financial means (credit) available to meet this obligation. A second situation would be a firm seeking equity financing to redress an imbalance between cash inflows and cash outflows. For instance, a firm launching a new product to market might find that their advertising and marketing spending outpaces product sales. In order to maintain an adequate marketing presence while the product gains an early market share, an equity investment may be required so as not to stall the product launch.

One innovator illustrated the second scenario stating, “we could have grown much faster if we had been able to secure more investment.” Seeking equity finance is a common occurrence for ESIs launching products. In this innovator’s case, the company was spending to produce its product to meet growing market demand, but customer repayments were not being returned to the firm quickly enough. Therefore, the company could not leverage sufficient revenue from market operations to invest in sales and marketing growth.

Equity financing has two primary subcategories: internal financing and external financing.<sup>12</sup> The primary difference between the two is the source of funding. Internally financed equity (internal equity) is sourced from the firm’s current owners (or the enterprise’s own balance sheet), whereas externally financed equity (external equity) is sourced from external channels.

**Internal equity.** Internal equity is commonly referred to as “friends and family investment,” where rather than sourcing funds from the open market, owners draw equity from their own resources or their personal relationships. Internal equity can also come from inside the enterprise, such as when retained sales earnings and profit from operations are reinvested into the firm. Internal equity represents a significant funding source for ESIs in all sectors, and is often the only form of financing available to early-stage start-ups due to the risk aversion that characterizes external funders such as banks.<sup>12</sup>

**External equity.** External equity is investment that originates outside the firm, often a third party. In general, when it is said that a company is raising equity or receiving an investment, it is in reference to external equity. The primary sources of external equity are venture capitalists and angel investors (the latter are also known as “business angels,” or simply “angels”).

**Venture capital funds.** Venture capitalists (VCs) are “financial intermediaries who raise funds from investors (limited partners) and then redeploy those funds by investing in high-risk, informationally opaque firms often at a mid- to late-stage in their growth trajectory.”<sup>13</sup> Venture capital funds (VCFs) are “professionally managed pools of equity which have an expected return horizon of five to seven years.”<sup>10</sup>

The early history of VCFs can be traced back to 1946, when the first fund of record was established by the American Research and Development Corporation to spawn innovation among returning military personnel. The initial fund investment came from nine institutional investors, including the Massachusetts Institute of Technology (MIT), the University of Pennsylvania, and the Rice Institute.<sup>14</sup> Modern sources of capital for VCFs can include high-net worth individuals, pension funds, family offices, corporations, and endowments, to name a few. What was once a niche area of finance initially created out of need to encourage innovation in the post-World War II era has since grown exponentially across the globe. Data compiled by KPMG demonstrates this growth: 2018 was a record year for global venture capital activity, with \$254 billion of capital raised between the Americas, Asia, and Europe.<sup>15</sup>

While macro data suggest ample venture capital and robust ongoing investment activity, neither scenario directly translates into increased financing opportunities for ESIs, especially those operating in emerging markets. Since 2015, VCs have continued to prefer larger, later-stage deals. While record dollars were invested through venture capital channels in 2018, the number of venture capital deals funded around the globe reached a six-year low in that year.<sup>16</sup> This has led to significant constraints in VC funding as an option for ESIs looking to raise early-stage rounds in amounts less than \$1 million. The declining trend of VC participation in early-stage rounds becomes further exaggerated if ESIs are located outside the U.S., where even sharper declines in the number of deals funded have been observed.<sup>c</sup> According to KPMG, these important preconditions for receiving venture capital are often lacking in ESIs.

Many investors described a common misconception on the part of ESIs: believing that completing basic pilots or technology demonstrations means they are prepared for financial backing. But ESIs have yet to demonstrate concrete plans for actual scale and profitability beyond the initial pilot. One investor spoke of how innovators “always believe they are further along in the development lifecycle than they truly are.” Several investors mentioned how ESIs do not administer themselves the way they should in order to be positioned for investment due to the fact the early founders often lack business expertise. The most commonly cited examples included accountancy problems (companies having multiple ledgers), legal structure (registered inappropriately for investor participation), and unclear use of funds (how the investment would be deployed if they were to receive it).



*The increasing competition for fewer overall deals has translated to a need for all companies (regardless of deal size or stage) to provide investors with a stronger business case to conduct longer and more detailed proofs-of-concept and validate more certain paths to profitability in order to be considered (VC) investment ready.*

—KPMG<sup>16</sup>

<sup>c</sup> Global median deal size of \$1 million at a pre-money valuation of \$6.7 million.<sup>16</sup>

As the market has shifted away from smaller deal sizes, VCs are gravitating towards fewer-but-larger deals and pursuing so-called mega deals (investments over \$50 million).<sup>d</sup> This can be partially attributed to the profit motives of successful VCF managers, who have a personal incentive to launch larger follow-on funds after having generated returns from earlier capital.<sup>e</sup> Once a fund manager has successfully deployed capital and has that capital returned through a successful exit or liquidity event (thus generating a positive return for the fund and repaying investors) it is customary for that manager to pursue raising additional larger funds to redeploy.

An example of this shift in the clean energy-agriculture nexus is the Generation Investment Management Company's Sustainable Solutions Fund III, co-founded by former U.S. Vice President Al Gore. The Fund had raised \$1 billion as of May 2019, and now seeks investment deals of \$50 to \$100 million over the next three to five years.<sup>19</sup> This is a significant increase over Gore's earlier generation fund, which raised a total of \$300 million.<sup>20</sup> While the ability of firms like Generation Investment Management Company to raise ever-larger fund sizes is a vote of confidence for the impact investing industry in general, these VC mega funds do not necessarily represent a funding opportunity for ESIs as they are not funding early-stage deals at investment levels relevant to ESIs' needs.

**VC investment activity: global agriculture sector.** The global nature of agriculture makes giving an account of the total investment activity across the sector challenging. That said, industry analysts who specialize in this area present VC data that aligns closely with trends seen in the larger sector agnostic VC market. A 2018 report<sup>21</sup> by Finistere Ventures predicted that the total 2018 VC investment in agriculture technologies will outpace record 2017 totals of \$1.9 billion globally.<sup>f</sup> In contrast to the larger VC market, the median deal size in early-stage rounds<sup>g</sup> actually declined to \$2.5 million (2017) from \$4.95 million a year earlier (2016). In 2017, over 25 percent of all VC deals were seed-stage investments under \$1 million.

Much like the larger VC market, geography is an additional factor for agriculture ESIs to evaluate, as only ten percent of all VC dollars invested in the sector in 2017 found their way to countries outside the U.S., Canada, Europe, and Israel. Highlighting the role of geography, one agriculture investor spoke of how geography impacts internal decisionmaking, stating, "regional understanding and expertise is important in being able to make investments and do the due diligence." A second investor spoke of the

**5%** While seed-stage investments represented only five percent of total VC deals in 2017, there is measurable VC activity for early-stage deals in the agriculture sector.

<sup>d</sup> Rounds closed at more than \$100 million.<sup>17</sup>

<sup>e</sup> VC managers are traditionally compensated through a combination of fund management expenses (e.g., two percent of assets under management) and then bonus commissions for successful exits. The higher the assets under management, the higher the management fees associated with that fund and the larger the potential commissions can be when successfully exiting a deal.<sup>18</sup>

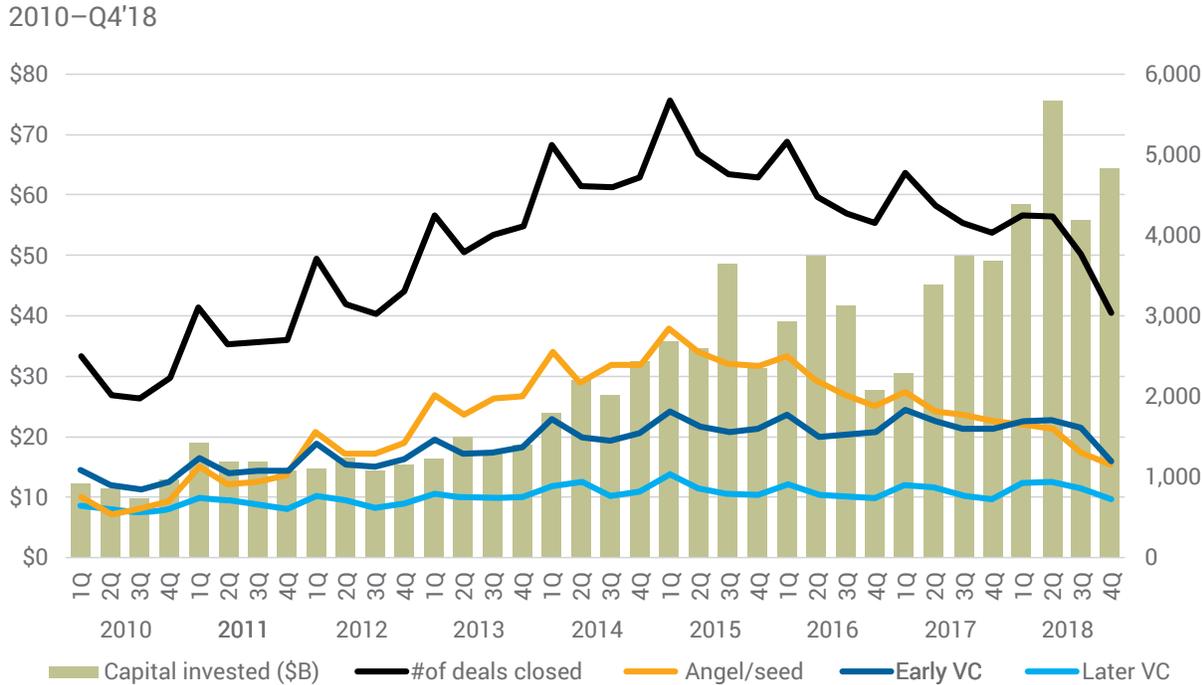
<sup>f</sup> Full-year 2018 data were not available at the time of publication, Oct. 31, 2018.<sup>21</sup>

<sup>g</sup> Defined as Series A or B rounds less than \$2 million.<sup>21</sup>

transaction costs of investing in diverse geographies, stating, “the cost for us to send a junior associate to a new market to gather data, conduct initial market research, bring that research back to present to our investment committee, then send our principal to finalize a deal, makes it nearly impossible for us to find attractive investments in markets where we are not already active... when further considering the monitoring and evaluating required to track the investment, even good deals quickly become unreasonable.” The cost of ensuring that fund managers understand local nuance swells management costs for these funds and makes it more difficult for deals to be financially competitive.

**VC investment activity: CleanTech (clean energy).** Similar to aggregating global VC activity in agriculture, CleanTech (the overarching industry category encompassing clean energy) faces a similar challenge in discerning a single source for agreed-upon information due to the global fragmentation of the sector’s investor markets. One approach is to examine current VC trends and compare them to historical levels in an effort to glean insights relevant to the current landscape.

Figure 1 GLOBAL VENTURE FINANCING BY STAGE <sup>16</sup>



The CleanTech gold rush began in 2006 when VCs in Silicon Valley started accelerating their pace of investments in the sector, combining to fund \$1.75 billion in deals that year.<sup>22</sup> This was an exponential rise compared to the mere hundreds of millions invested in prior years.<sup>22</sup> The promise of CleanTech becoming the “next big thing” gained even more momentum with the 2006 release of Al Gore’s movie *An Inconvenient Truth*<sup>23</sup> and well-known VC John Doerr’s now-famous TED talk,<sup>24</sup> which brought the subject of climate change to the forefront of social consciousness. An MIT study calculated that of the \$25 billion of combined VC funding that had been invested in CleanTech between 2006 and 2011, half had been lost by the start of 2012.<sup>25</sup> Steep financial losses in company valuations, combined with the very

public failures (bankruptcies) of one-time industry darlings like Solyndra,<sup>26</sup> left VC investors with little appetite for CleanTech investments. In 2013, investors funded a meager \$2 billion of total CleanTech deals, essentially resetting the industry to 2006 levels.<sup>25</sup>

Since 2013, global VC funding of CleanTech ventures has rebounded, most notably jumping 127 percent over 2017 levels to reach a high of \$9.2 billion in 2018, a level not seen since the boom year of 2010.<sup>26</sup> Similar to trends seen across all VC markets, and further cemented by the recent memories of heavy historical losses in the sector, VCs are choosing to invest in later-stage deals with more mature companies that are nearly or already profitable.<sup>27</sup> Further limiting access to VC funding are investors' preferences for less capital-intensive, shorter pathway to market (five years or less) technologies. Specific VC trends in CleanTech, much like macro trends in the broad VC market, have created a gap in VC funds available to ESIs trying to bring technologies to market that are neither readily profitable nor easily commercialized.

One investor shared how his company's fund is part of the macro shift in abandoning early-stage deals. In basic terms, the fund was one of the earlier investors in emerging CleanTech markets and "has not seen returns materialize anywhere near to what the early promises were in the industry." As a result, the fund "is keeping capital on the sideline to see what comes of the market and if (when) returns materialize."

**Micro VC funds.** A subset of traditional VC funds, micro VC funds or micro VCs are smaller venture funds that primarily invest in seed-stage emerging growth companies. These funds are often smaller than \$50 million and typically invest between \$25,000 and \$500,000.<sup>29</sup> Micro VCs operate much like traditional VC funds in that they use a limited partner structure to invest third-party money on behalf of investors, conduct significant due diligence when evaluating investment opportunities, and have a defined investment thesis agreed upon internally. The popularity of these funds is illustrated by CB Insights, which estimated that 136 micro VCs were actively investing in 2014,<sup>30</sup> whereas a subsequent 2015 report identified 236 micro VCs.<sup>31</sup> The number has since grown.

Micro VCs fill an ever-widening funding gap left by traditional VCs. Another advantage they bring to ESIs is that a percentage of these funds focus on impact investment (e.g., "investment made into companies, organizations, and funds with the intention to generate a measurable, beneficial social or environmental impact alongside a financial return. In effect, impact investors are working to provide capital to address social and/or environmental issues").<sup>32</sup> Micro VCs, particularly those focused on impact, are an attractive potential investor for ESIs, and represent a significant funding opportunity.

While micro VCs may appear to be a perfect match for ESIs seeking funding, there are drawbacks to these funds. One drawback is that compared to traditional VCs, micro VCs have limited investment capacity and therefore have narrow and specific investment theses and strategies. This is simply a function of having a smaller fund size to invest from the outset.<sup>33</sup> Counterintuitively, this becomes a challenge for ESIs that both do well and do poorly following an investment. In cases where companies

are doing well, it may not be possible for micro VCs to invest additional dollars into the company's next round of fundraising because the fund's exposure to that single company could too heavily outweigh other investments in its portfolio and create exposure risk for the fund. The flip side is in cases where a company is doing poorly and needs some sort of bridge financing to reach its next milestone. This, too, could create overexposure issues and not be a scenario that a micro VC could entertain.

A second drawback is that the overall investment portfolio of micro VCs has a generally higher risk profile and lower liquidity than that of traditional VCs. This comes from the willingness of micro VCs to invest in earlier-stage companies, which inherently carry more risk and may be further from a future exit or liquidity event. The illiquid nature of the underlying micro VC portfolio leads to a third drawback in which a micro VC may run out of investment funds sooner than a traditional VC and needs to raise funds to keep the firm in business. This is not a good scenario for a firm that received investment and is now seeking follow-on funding, as its early investors (micro VCs) may not be able to champion the next deal as they are preoccupied with staying solvent.

The opposite of this commonly held belief was brought to light by several investors, one of whom stated that "ESIs in development sectors have a higher burden to meet to be investable as the company must show the potential to generate market returns while also meeting impact objectives." Another investor shared that "gathering impact data through monitoring and evaluation takes time, for example, three years, for it to show meaningful trends, and thus creates longer re-investment time horizons." The investor made particular note of this dynamic in agriculture, where crop cycles have their own limitations due to the dependency on the seasonal nature of the business.

One innovator spoke of the frustrations he faced when approaching impact micro VCs in that "they (fund managers) didn't seem to care at all about our social impact but kept referring back to our (lack of) business model and scalability." These insights further cement the fundamental need to provide investors with a strong business case, detailed proofs-of-concept, and to validate more certain paths to profitability in order to be considered investment ready, no matter which funder the ESI is approaching for finance.

**X** It is a commonly held belief that micro VCs are willing to accept below-market returns or willing to hold companies to a less onerous economic burden if in fact they are creating impact. No examples of this were found in the research.

**Angel investors.** Angel investors (angels) are defined as high-net worth individuals who provide financial backing for small start-ups and entrepreneurs. While the definition of high-net worth differs from country to country, in the U.S. angels are synonymous with accredited investors, which the Securities and Exchange Commission defines as "any natural person whose individual net worth, or joint net worth with that person's spouse, exceeds \$1 million (excluding the value of their primary residence), or, any natural person who had an individual income in excess of \$200,000 (or joint income with that person's

spouse in excess of \$300,000) in each of the two most recent years and has a reasonable expectation of reaching the same income level in the current year.”<sup>34</sup> Angels amass their wealth through a variety of sources, often times having been successful entrepreneurs themselves, heirs to significant familial inheritances, or executives recently retired from industry, to name a few.<sup>35</sup> Unlike VCs, angels use their own funds to invest as opposed to the pooled funds of others. Therefore, the economics and decisionmaking processes and strategies are much more variable than those of professionally managed funds with dedicated pools of capital.

In 2017, the Angel Capital Association commissioned the largest angel survey to date,<sup>36</sup> presenting the results as an overview of the profile, background, and investment behavior of angels in the U.S. The survey profiles active angels as: primarily male (78 percent versus 22 percent female), white (Caucasian) (87 percent), ages 60 to 70 (62 percent), prior chief executive officers of their own ventures (55 percent), and who source prospective deal opportunities from angel investment groups of which they are either members or with whom they are aligned through informal networks (89 percent). The vast diversity of angels (e.g., geography, investment preference, gender, prior industry experience, and individual net worth) makes neatly categorizing them a challenge. Therefore, choosing to recognize angels as a broad and diverse class of individuals may yield the best understanding of their behavior and preferences.

A 2006 publication from the *Journal of Small Business Strategy* surveyed U.S.-based angels to rank their top 25 investment criteria when making investment decisions (Table 3).<sup>37</sup> The survey found that angels place an overwhelming emphasis on the role of the entrepreneur and the leadership of the enterprise when making investment decisions. This dynamic could present challenges for ESIs, as many founders in this study do not have advanced business experience (e.g., academicians), and do not have a history of leading companies to market. Due to the emphasis angels place on the role of the entrepreneur, an opportunity to support ESIs in becoming more investable lies in providing trainings and business capacity building for their founders and leadership.

**Table 3 JOURNAL OF SMALL BUSINESS STRATEGY  
ANGEL INVESTMENT CRITERIA<sup>37</sup>**

SELECTED INVESTMENT CRITERIA	RANK
Trustworthiness of the entrepreneur	1
Management team	2
Enthusiasm of the entrepreneur	3
Exit potential (liquidity)	4
Revenue potential	5
Domain expertise of the entrepreneur	6
Growth potential of the market	7
Return on investment (ROI)	8
Barrier for entry for competitors	9
Product’s overall competitiveness	10

While there is no global consensus on the exact scale and reach of angel investment activity, a 2018 report by the Center for Venture Research at the University of New Hampshire estimates U.S. angel investment remained consistent at roughly \$24 billion across more than 64,000 startups on a year-over-year basis.<sup>30</sup> The same study showed an average deal size in 2018 of \$349,620 at a valuation of

\$2.9 million – a decrease of nine percent in valuation over 2017. During the same period, the overall number of active angel investors increased by 16 percent, while total deals funded increased only 7.4 percent. A subsequent 2017 Halo report<sup>39</sup> by the Angel Resource Institute confirmed similar trends in the previous year. These trends translate into angel investors funding a higher number of overall deals but doing so at a lower per-deal size and at a lower valuation (more preferential to investors). These investments are in line with the early-stage financing needs of ESIs, albeit at a slight cost in valuation depending on specific investor demands. As a result, angel investors are a viable source of financing for ESIs when there are promising indicators of business model validation and future profitability.

Three innovators interviewed for this study had secured financing from angel investors. This funding was critical in bridging the gap for these companies from grant funding to self-sustainability or larger rounds of outside capital. In all three cases, the companies described having clear evidence of product-market fit, which helped them in convincing the investors of the opportunity to scale the business model.

**Equity: summary of availability and access.** Equity investment is a viable source of follow-on funding for ESIs in the clean energy-agriculture nexus. However, macro trends in the broad investor landscape have exposed areas where ESIs will be challenged to raise capital. The shift in VC markets, where investors are channeling capital towards larger deals and towards later-stage companies, does not generally present ESIs with viable funding options from VC investors. No data were found that indicated this trend would be reversed at any point soon. However (and in some ways because of this gap) there are subsets of equity investors (angels and micro VC funds) that are actively investing in ESIs. In the case of micro VC funds, not only are they participating in funding deals, but there is also a growth in overall number of these funds in the market. As a result, ESIs have more diversity of choice and greater opportunity than before in finding an equity investment partner whose investment thesis aligns with the work in which the ESI is engaged.

While there is ample availability of equity investment in the broad market, there is a heightened need for companies to provide investors with a strong business case and detailed proofs-of-concept and to validate more certain paths to profitability in order to be considered investment ready and to access available capital in the market. This is true for companies of all sizes, but it is particularly applicable to ESIs, which typically have a higher risk profile and may not have the experience in management and leadership of a more established firm. Access to investment capital remains dependent on the individual firm and that firm's ability to execute on business practices. ESIs that can demonstrate a solid business case, are structured with the correct legal considerations, have leadership that investors deem competent, and have capital deployment plans should not be discouraged from raising investment rounds in the current environment.

## 4.2 Debt Financing

Debt financing is a “financing method involving an interest-bearing instrument, usually a loan, the payment of which is only indirectly related to the sales and profits of the venture. Debt financing, or asset-backed financing, typically requires a portion of assets owned by the organization to be used as collateral to protect the lender in cases of loss.”<sup>10</sup>

Debt financing can be attractive to organizations at all stages of development<sup>40</sup> as it allows the organization’s owners to protect their equity in the business, limit their personal financial exposure in the event of failure, and create tax efficiencies while simultaneously meeting the financing needs of the firm.<sup>h</sup> In certain cases, debt financing can be easier to obtain than equity financing. To raise equity, firms need to show significant growth and scale opportunities that are attractive to investors, whereas debt can be acquired if the firm is simply able to demonstrate its ability to repay the loan over time, independent of any growth expectations.

When collateral is available, commercial banking institutions can be willing lenders to ESIs, as these banks view ESIs as a lucrative business unit due to the opportunity to create a long-term partnership that can positively impact both the firm and the banking institution over time. In this regard, commercial banks are the largest source of short-term (less than three years in duration) credit financing to innovators.<sup>10</sup> However, the challenge for ESIs in obtaining debt financing is that in order to be considered creditworthy or lendable, they must have tangible assets that can be used as collateral to secure the debt financing they are seeking. This makes many ESIs ineligible, as balance sheet assets are often limited to intangible assets like goodwill, brand recognition, or intellectual property, none of which can be easily valued or liquidated in cases of insolvency.

Many innovators have encountered the challenges of lacking the necessary collateral or a track record to obtain debt financing. ESIs described the ways they attempted to overcome this barrier; the most common was to seek additional donor support. In several instances, donor support was extended as a first-loss guarantee, where losses are first attributed to the guarantor and only then to the lender. One ESI described this process as “instrumental in securing debt financing,” allowing it to “establish (subsidized) market relations with financial institutions” to which it could later return for future debt needs. Another ESI secured donor support in the form of additional grants, which effectively served as working capital (the capital of a business that is used in its day-to-day trading operations) and postponed the need to obtain credit.

Program stakeholders who are experts in financial markets (one of which works exclusively in sub-Saharan Africa) spoke of a secondary pathway for ESIs (specifically in the global clean energy-agriculture nexus) to obtain credit. In this case, development finance institutions (DFIs, government-backed institutions that invest in private sector projects in low- and middle-income countries to promote

---

<sup>h</sup> Depending on the specific tax code and jurisdiction of the firm’s registry, “interest expense” can be deducted against gross revenue to limit tax liability. Further, certain jurisdictions allow “interest expense” to be carried-forward and applied against future years’ revenue if the current tax year’s revenue does not exceed levels that can absorb the entirety of interest paid in that fiscal year, thus preserving the benefit for future use when a firm would have a higher tax liability.<sup>10</sup>

job creation and sustainable economic growth, and to contribute to the United Nations Sustainable Development Goals), alongside aid agencies and development banks,<sup>41</sup> were approached for credit. When granted, this credit was extended to ESIs at below-market (subsidized) interest rates and came with a preferential duration (the time period allowed for repayment). Program stakeholders also noted that DFIs had a “faster (approval) process for getting money out the door” compared to local lenders, which has led to a fast-buck mentality on behalf of the ESIs. Program stakeholders reflected that DFI credit behavior, in certain circumstances, has unintentionally created barriers which disincentivize commercial lenders from extending credit and participating in transactions knowing that DFIs can provide preferential terms in similar deals. In instances where localized banks are unable to provide funding (or can provide funding, but at less preferential terms), innovators have become dependent upon DFIs and the subsidies they provide.

While from the ESIs’ perspective it is prudent to accept credit that is both easier to obtain (transaction cost/time) and at a lower cost of capital (interest rate), one opportunity for improving credit pathways in general may be to lessen ESIs’ dependence on DFIs by removing or reducing subsidies, which would encourage ESIs to approach commercial lenders early in their development, build relationships with them, and base financial models on more true market costs of capital. If successful, this could better open localized commercial debt channels that ESIs could access.

**Debt financing activity: global agriculture sector.** A 2018 report from the Council of Smallholder Agricultural Finance (CSAF)<sup>42</sup> provides insight into the state of debt financing in the global agriculture sector. The report’s authors found that lending from CSAF members has more than doubled in the past five years as members have increased their portfolios and new members have been added. Significant portions of the \$716 million of total lending went to sub-Saharan African enterprises, which captured 33 percent of all credit volume in 2017, a 24 percent increase. The second-highest growth rate in lending was in South and East Asia, which saw an 18 percent increase.

While the report did not specifically distinguish ESIs from SMEs, there are several trends CSAF identified that can be inferred as relevant to ESIs. New loan origination (new borrowers) and loan amounts below \$500,000 (both characteristics of ESI needs) continued to show a decrease from prior years. While the macro trend lines favor existing borrowers at larger loan amounts, 23 percent of all loans were in amounts less than \$250,000 and a total of 44 percent of all active lending was below \$500,000. The primary use of all funding (63 percent) was for the purposes of trade financing. The lending activity presented by CSAF, in terms of deal size and volume, indicate viable financing opportunities for agriculture-focused ESIs that meet creditworthiness requirements of creditors.

**Trade credit.** Trade credit is “a form of debt financing which allows an organization to delay payment for goods or services after they have been delivered or provided as a result of an agreement between the supplier and the firm.”<sup>43</sup> The primary benefit for ESIs in using trade credit is that it removes uncertainty from their cash management strategies. For example, an ESI producing finished goods for sale needs

to procure raw materials and other inputs to assemble before its end product is ready for market. At the same time, most firms cannot sell their end product before they have finished producing it. This creates a gap in working capital, as the firm is essentially operating on the premise that customers will purchase the goods produced in a future market transaction. In this case, a supplier could extend a delay in payment (e.g., 30 days) for the raw materials supplied to the firm. This simple trade credit agreement would allow the firm to produce the final good, sell it to customers, receive payment for the transaction, and then repay the supplier without affecting its own internal working capital (for up to 30 days in this example).

While there are infinite combinations at varying degrees of complexity for how trade credit can be structured, it essentially all works in the same way, with the motive being that a firm (and its trade partners) is able to level out ebbs and flows in working capital accounts while continuing to trade in an open-market environment. Trade credit directly agreed to between a supplier and a firm, without a financial intermediary involved, can be of particular importance to ESIs in developing economies where traditional banks are either unable to provide trade credit or have terms (e.g., high interest rates) that would hinder the transaction too heavily.



Trade credit is “one of the most important forms of external financing available to ESIs, with an estimated one-third of all debt extended to ESIs coming in the form of short-term trade credit.”<sup>43</sup>



Chilled milk being transported for sale. Photo courtesy of Powering Agriculture.



## Crowdfunding: A Closer Look

Crowdfunding, “the practice of funding a project or venture by raising many small amounts of money from a large number of people, typically via the Internet,”<sup>i</sup> is emerging as an alternative form of financing for all businesses, including ESIs. This is becoming of particular note in European markets, where crowdfunding platforms have put in place stringent screening processes to scrutinize ventures before allowing them to list on their platforms.

In addition, individual transaction values are higher in developed European markets than those in other markets. For comparison, the U.S. crowdfunding market recorded total transaction values of \$718 million in 2019,<sup>46</sup> whereas Germany recorded just under six percent of that in total.<sup>47</sup> However, when examined at a per-transaction level, German crowdfunders had an average per-transaction value of \$8,388, which eclipses their American counterparts by nearly 50 percent (\$5,729).<sup>46</sup>

It is important to note that not all crowdfunding platforms operate in the same way or for the same purpose. For example, reward-based and donation-based crowdfunding is funding given to an entity without expectation of repayment, whereas debt-based and equity-based funders expect repayment with specified interest, or repayment through a future liquidity event as a claim on ownership, respectively.

**Debt-based crowdfunding.** Also known as peer-to-peer lending or P2P lending, debt-based crowdfunding is a subset of crowdfunding, in which individuals lend money to businesses or other individuals with the expectation that it will be repaid with interest added.<sup>47</sup> While all formats of crowdfunding may present an opportunity for ESIs to achieve a financing goal, debt-based crowdfunding may be of particular interest. Similar to crowdfunding in general, growth in debt-based crowdfunding suggests it is emerging as an alternative form of financing for ESIs.



Debt-based crowdfunding may be of particular interest to ESIs, as it aims to fill a financing gap prior to when an entity would be able to approach a traditional lender or credit institution.

<sup>i</sup> Includes equity, debt, reward-based, and donation-based.<sup>46</sup>

One innovator interviewed has had significant success with debt-based crowdfunding and has used it to fill financing gaps in several projects. The innovator specifically described positive interactions with German-based crowdfunding platforms BetterVest<sup>48</sup> and Ecoligo,<sup>49</sup> which focus on project financing in energy efficiency markets. The company has been able to raise and repay multiple iterations of debt ranging in tranche size from several thousand euros to upwards of 50,000 euros through the platforms' crowds. In each circumstance, a viable project plan was submitted for review along with additional documents, like a comprehensive business plan and audited company financial data (e.g., balance sheet and liquidity and collateral plans). The crowdfunding platform's internal team then analyzed the information presented and determined if the project is reasonable and comprehensive. Additional criteria, like age of company (BetterVest requires no less than three years in operations), team, and technology requirements are assessed before a project can go live (be uploaded) on the public-facing platform. In many ways, this process parallels what a traditional banking institution examines as part of its internal credit committee process.

Due to the minimum standards debt funding platforms require companies to meet before they can be listed, it is important to stress that many ESIs will not pass initial screening processes due to a lack of traction, provable business model, potential to scale, creditworthiness, financial health, and other traditional decision drivers, which similarly would exempt them from approval by traditional funders (banks) outside of crowdfunding.

**Debt: summary of availability and access.** Debt financing, similar to equity, continues to be available: the volume of idle capital in the broad market is at an historical high. Table 4 on page 25 provides a summary of the two types of financing. The effects from the 2008 financial crisis have been erased in terms of dollars available and transaction values, yet the lessons from that crisis continue to weigh on present day financing decisions as banks have assumed a more risk-averse posture overall. This presents a barrier for many ESIs as they do not fit the typical profile of what a financial institution desires in a borrower. Three areas identified in this research that negatively affect debt access for many ESIs are a lack of track record (less than three years of operating history and corresponding financials), limited (if any) recurring revenue from operations, and lack of collateral or assets on the company balance sheet. While the market has introduced new financing vehicles (e.g., debt crowdfunding) with the hopes of making debt financing more easily accessible, the traditional rules of creditworthiness continue to apply.

The ESIs interviewed that approached lenders for debt financing and met the more traditional metrics required by those financial institutions (e.g., track record, recurring revenue, and collateral) did not find barriers to raising debt capital. These same ESIs struggled when they could not meet the baseline requirements set forth by banks and were quickly deemed unbankable. In cases where ESIs meet baseline requirements imposed on firms by lenders and banks, debt financing represents a funding opportunity for ESIs.

**Table 4 SUMMARY OF TRADITIONAL FORMS OF FINANCING: EQUITY VS. DEBT<sup>j</sup>**

	EQUITY	DEBT
<b>GOAL</b>	Capital provided in return for a share of ownership in the company.	Capital provided for working capital in return for the repayment of principal (the amount of the loan) and interest (a rate to which both parties agree) over time.
<b>FUNDERS</b>	Individual angels; angel investor groups; venture capital firms; corporate venture capital funds	Banks; individual lenders; development banks
<b>INVESTOR RETURN PROFILE</b>	Equity investor returns are determined by the success of the underlying company in which they invest. The greater the success of the company, the higher the rate of return to the investor. Specific return expectations vary widely from investor to investor, and are dependent on many factors, but most equity investors expect their portfolio to outperform public markets.	Debt funders require interest payments on their lent capital. The interest rate reflects the solvency and risk profile of the borrower. In general, the higher the risk profile of the borrower, the higher the interest rate that will be required.
<b>OWNERSHIP DILUTION</b>	Equity funders take ownership in the companies in which they invest. The specific percentage of ownership will vary based on the valuation of the entity.	None
<b>REPAYMENT</b>	Equity funders receive a return on their capital when a liquidity event (e.g., public offering or company acquisition) occurs.	Debt funders start receiving a return of their capital through installment payments of principal plus interest shortly after the debt is placed. In some cases, the actual payment may be deferred, but the accrual of interest will start immediately.
<b>ECONOMIC COST</b>	Equity funding carries a relatively high economic cost to the company that receives it. This is particularly true in cases where the business becomes successful and the equity ownership of the investor becomes highly valuable at the time of liquidity.	Debt funding carries a relatively low economic cost to the organization. Debt funding can be preferred over equity funding as the organization is able to conserve its equity and generate greater returns back to owners at time of liquidity.
<b>LEGAL</b>	Equity investments are structured under a share-purchase agreement and an investors rights agreement.	Debt funding is structured through a promissory note or repayment agreement between the lender and the borrower.

<sup>j</sup> This table describes basic characteristics of equity and debt investments in American and European markets. The table is based on traditional funders that early-stage innovators most commonly target. It does not necessarily capture all potential equity and debt providers that may be available in a market and their varying preferences. Alternative investment structures like venture debt or convertible notes are not captured, as their unique characteristics are a hybrid of both debt and equity structures. Table provided on behalf of VentureWell's Eteam innovator curriculum.<sup>50</sup>

### 4.3 Non-Dilutive Financing

Non-dilutive financing, or non-dilutive capital, refers to a type of business financing where the owners do not lose any equity in the company in exchange for use of the capital.<sup>51</sup> Common examples of non-dilutive capital are bank loans, philanthropic grants, governmental grants, technology development grants from governmental agencies (e.g., U.S. National Science Foundation Small Business Innovation Research programs), or royalty and licensing agreements.<sup>52</sup>

The particular non-dilutive funding most relevant to this study's ESIs were donor agency grants that seeded activities as part of the Grand Challenge programs. The role of these donor grants, and their ability to affect the development of the ESIs who received them, was a subject of each interview conducted for this research. ESIs were overwhelmingly positive about their impact and discussed in detail the financing gap that this form of capital fills, whereas investors put less emphasis on these grants overall.

Many ESIs described grant funding as extremely valuable in the early product development phase. ESIs consistently highlighted the challenges in funding research and development (R&D) through traditional market channels, as investors are not interested in funding projects due to the high levels of technology risk and failure rates of firms at a pre-proof-of-concept stage.

While there was overwhelming enthusiasm for grant funding among the ESIs interviewed, several also talked about their frustrations. The primary issue described was the inability of donors to understand the difficulties of bringing products to market and the multiple iterations required in R&D. This dynamic was particularly acute in situations where innovators were bringing hardware to market and felt more patient capital was needed for R&D due to the iterative process of developing a prototype, testing the prototype, iterating the design, alpha version, test, et cetera. One innovator described a situation in which a negative feedback loop developed during R&D, where the innovators knew their product was not market-ready but needed to present it as such to meet the milestone expectations of the donors who were monitoring their progress. This had consequences for the innovator as the product went to market and the company knew it would need additional iterations for it to be fully functional and endorsed by customers. Despite minor frustrations described by ESIs, the impact of donor-funded grants in early product R&D and initial business model validation are significantly positive.



For the majority of ESIs interviewed, grant funding was the sole source of financing available pre-proof-of-concept and the only funding available to conduct technology R&D. Beyond R&D, innovators used grant funding as runway for testing and proving business model and market demand, several of whom described this as “instrumental to their business development activities.”

Investors and ESIs have different perspectives on non-dilutive grants, mostly on their market value. Several ESIs viewed grants as investments, or in some cases revenue, neither of which is accurate. Investors, on the other hand, spoke of grants as “an obligation the innovator had to meet certain donor objectives (which may not be aligned with market outcomes).” ESIs perceived R&D as a value-adding activity to the firm, proportionate to the grant funding spent. Investors generally view R&D as a sunk cost that adds to a firm’s value only once it is successfully completed and a prototype or proof-of-concept exists.

Another difference is how ESIs perceived themselves to be investable in light of the amount of grant funding they receive. One innovator said, “we received over \$1 million in grant funding, but now investors don’t want to put in the \$250,000 we need for our next steps.” Investors spoke of no positive correlation between the amount of grant funding an ESI received and its future willingness to invest at similar levels. In fact, the opposite was mentioned, in which investors were skeptical of ESIs that had received millions in grant funding but had yet to launch a product or generate initial sales. Additionally, one investor spoke of how “ESIs can become dependent on grant funding and fail to ever launch or transition to a company that can sustain on its own revenues or market-based financing sources.” The general perception of grant funding from the investor perspective was neutral: well-managed grant spending that leads to valuable R&D and/or market outcomes was viewed as holding potential value, while grant spending that focuses on non-market outcomes (e.g., impact objectives) or creates a dependency on future grant funding is seen as having little to no value.

**Non-dilutive financing: summary of availability and access.** The availability of donor agency grants examined in this research is dependent on governmental shifts in political priorities and targeted outcomes. For innovators who meet the specific requirements of a specific call for proposals, and who can demonstrate that their intentions are in line with the priorities and values of funders, grant funding is a viable source of early-stage funding (particularly R&D) and should be considered as part of the capital mix for ESIs seeking to bring technology-based solutions to market.

# 5. SUMMARY AND RECOMMENDATIONS

This study examined sources of funding and barriers ESIs face in obtaining that funding. It examined both availability (is there market capital available to ESIs?) and access (what is preventing ESIs from accessing this capital?).

## **Availability**

Macro (economy level) results suggest there is an unprecedented surplus of available capital in global financial markets. Put another way, at no time in our history has there been more capital seeking investment opportunities in global financial markets. Availability is not a problem.

## **Access**

Micro (firm level) data and stakeholder interviews identified four primary barriers: investor fatigue, investment readiness, lack of investor network, and misalignment of profit motives. Each barrier is briefly reviewed below, along with potential recommendations.

**Investor fatigue.** Investors in emerging markets who have not been able to generate returns in line with their initial expectations are exhibiting high levels of investor fatigue in which they are hesitant to invest in new deals or may not have the capital to do so as their initial investments are still tied up in prior investments.

The recommendation for overcoming existing investor fatigue and investment stagnation is to introduce new investors to opportunities in regions and sectors where ESIs are active. Introducing new investors could be accomplished using a multistaged approach, starting with basic investor discovery (identifying investors who are not active in a region or technology, but who have overlap in their investment thesis, which makes them candidates to approach), and working to a point where direct referrals and specific investment opportunities are facilitated. A good example of this was provided by one of the program stakeholders, who spoke of introducing Asian investors to the sub-Saharan region to invest in ESIs that

could be vertically integrated into their existing portfolios. Other examples include investors willing to invest in ESIs based on geography, which would allow the investor to diversify its position in the region or further increase its exposure to a region. These examples do not, on paper, fit the profile of a typical investor an ESI would know of or target. Therefore, an opportunity is presented in which market makers – people who have a financial background and deep understanding of investor behavior – liaise between new money investors and ESIs seeking capital.

**Investment readiness.** A consistent theme was a lack of investment readiness on the part of ESIs. While this may be the reality, in some ways it is an unfair criticism of ESI. As many do not claim to be business or investment experts, they should not be assumed to be as such.

That said, opportunities to improve the investment acumen of ESI founders and key personnel should be considered and supported. One resource for improving investment capacity is this paper itself, in which a thorough analysis of different types of funding has been presented along with current market conditions. This paper, and supplemental resources like it, could be presented in trainings and webinars or in direct consultancy with innovators to improve their overall financial literacy. The case for improving the investment readiness of the entrepreneur is made even stronger when considering the emphasis investors place on the role of the entrepreneur when evaluating investment potential. These types of innovator interventions should not only be supported, but also given priority early in the ESI's development cycle as it can often be easier to implement best practices early rather than recreate them later (e.g., accounting practices and financial reporting).

**Lack of investor network.** As an extension of investment readiness, ESIs need to seize the opportunity to more proactively develop relationships with funders, even in the earliest stages of their development. While this is yet another activity in which ESIs need to invest resources and time, one innovator summarized the benefits of network building by saying, "it was difficult to predict the impact of certain accelerators and networking events, but it was an activity which we felt would help us in the future.

Ultimately, our first investor (and the person who helped syndicate their full investment round) was someone we met years before at an evening networking reception and stayed in touch with."



While an ESI should not build its funding strategy on fortuitous meet-ups, there are concrete actions it can take to improve its funding pathways, and networking is a part of that.

For equity relationships, ESIs should identify investors who are active in the region or sector where they are working and target those investors for initial introductions. Connecting to investors can be done in a number of ways. Networking events like conferences and informal happy hours or receptions that bring together actors with common interests are good opportunities for enlarging one's personal network. Additionally, networking services like LinkedIn can be helpful in identifying investors an ESI may not have ready access to in person. A third resource may be an innovator's colleagues who are also

pursuing capital or who have had success in raising capital in the past. Similar to how investors share information among themselves, innovators would benefit from doing the same with their peers when it comes to networking and network building.

Establishing investor relationships and maintaining those relationships by sending occasional correspondence (e.g., newsletters or updates on major milestones) will serve the ESI in several ways. First, investors tend to have strong relationships with other investors and share investment deals among themselves, oftentimes with the aim that the deal can be syndicated among a number of investors rather than a single investor taking the full risk. If an ESI is able to establish a relationship with an investor in a larger investor network, it will be able to leverage that relationship and become known to a much broader investment audience. A second benefit in establishing investor relationships is in helping the innovator better understand the investor mindset (motives), which innovators can then apply to the administration of their company. Bridging the gap between investor and innovator mindset gives innovators insight into how they can position their company to be attractive to investors at a time of a future investment need.

On the debt (credit/lending) side, ESIs should develop early relationships with local banks in the markets in which they are seeking to conduct business. This will have several positive effects. First, localized lending remains reliant on relationships and a bank's understanding of an ESI beyond its balance sheet. ESIs can easily establish bank relations with as little as opening a small transactional account with a local branch of the bank. Over time, as transactions are cleared through the account, a relationship with the bank is formed, which will help ESIs with future banking conversations. A second benefit would be the ability of ESIs to more easily obtain local currency, which was cited as a problem at times for several innovators in this study. The ease and willingness of banks to establish relationships with ESIs makes developing bank relationships almost without obstacle.

It is recommended that ESIs be encouraged to build networking relations on their own, and that those who support the development of ESIs provide assistance in enabling these relationships early in the ESI's lifecycle.

**Misalignment of profit motives.** A firm's ability to generate revenue and eventually profit is fundamental to its ability to access external finance. The challenge cited by many ESIs in this study is that their primary focus is not on generating revenues (and profit), but rather on achieving milestones tied to early donor funds received.

A specific example of this came from an investor who spoke of an ESI they were interested in investing in, but ultimately chose not to "after calculating that the firm had no viable path to achieve profit at the individual (per-household) level." The investor came to this conclusion after conducting basic market research on the household economics of the market the firm was targeting, and concluding the price for the appliance would be unaffordable if not subsidized. At the same time, the firm was a donor favorite, as it was highly successful at achieving impact objectives (in this case, the electrification of

rural households). Had the firm conducted the same market research, it may well have come to a similar conclusion: that its future as a for-profit commercial enterprise was unlikely.

The above example leads into a larger debate within the donor community as to what donors are trying to fund and why. While this paper does not attempt to influence that conversation, understanding the potential for misalignment between donor goals and accessing market finance is relevant to an ESI's ability to access finance.

In cases where the goal is to catalyze business that can deliver commercial solutions to market, forcing ESIs to embrace a market-facing profit motive early in their development will better position them for obtaining future external finance. If the goal of the donor is to deliver social impact (e.g., rural electrification), profit would be less of a concern, recognizing that the supported entity may never become completely commercial. In both cases, innovators would benefit from greater clarity in understanding what donors are funding and their corresponding expectations.

When ESIs participate in donor-funded programs aiming to achieve commercial outcomes, donors and ESIs should adopt a profit ethos that better aligns the interests of the program with the interests of financial markets. Early adoption of this mindset will greatly reduce barriers to obtaining future external financing, as ESIs will develop under the influence of market forces that have an expectation of eventual profit.

In summary, the landscape for financing for ESIs is variable, challenging, and ever-changing. It is important for ESIs, investors, and critical stakeholders like donors and technical assistance providers to understand one another's needs, goals, and capabilities. This understanding can create the opportunity for alignment on shared objectives, and enhance outcomes for ESIs seeking financing.

# REFERENCES

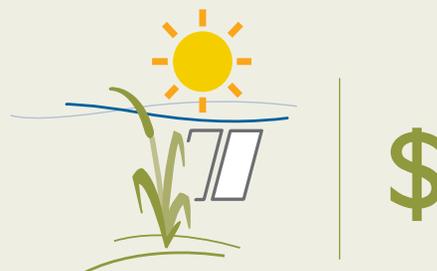
1. Charles Ou and George W. Haynes, "Acquisition of Additional Equity Capital by Small Firms – Findings from the National Survey of Small Business Finances," *Small Business Economics* 27, no. 2/3 (October 2006): 157-168, [www.jstor.org/stable/40229495](http://www.jstor.org/stable/40229495).
2. Veselin Kuntchev, Rita Ramalho, Jorge Rodriguez-Meza, and Judy Yang, "What Have We Learned from the Enterprise Surveys Regarding Access to Credit by Smes?," Policy Research Working Paper no. 6670, World Bank Group, Washington, DC, October 2013, <http://documents.worldbank.org/curated/en/785801468148496192/What-have-we-learned-from-the-enterprise-surveys-regarding-access-to-credit-by-SMEs>.
3. "Early-Stage Innovators," Our Work, VentureWell, <https://venturewell.org/early-stage-innovators/>.
4. European Union, *Commission Recommendation of 6 May 2003 Concerning the Definition of Micro, Small and Medium-Sized Enterprises*, Document number C(2003) 1422, Brussels: The Official Journal of the European Union, May 6, 2003, accessed May 22, 2019, <https://op.europa.eu/en/publication-detail/-/publication/6ca8d655-126b-4a42-ada4-e9058fa45155/language-en>.
5. Tianshu Zhao and Dylan Jones-Evans, "SMEs, Banks and the Spatial Differentiation of Access to Finance," *Journal of Economic Geography* 17, no. 4 (October 2016): 791-824, <http://dx.doi.org/10.1093/jeg/lbw029>.
6. "Lehman Brothers Declares Bankruptcy," *History*, September 15, 2008, <http://www.history.com/this-day-in-history/lehman-brothers-collapses>.
7. Organization for Economic Co-Operation and Development (OECD), *Financing SMEs and Entrepreneurs 2012 Scoreboard* (Paris: OECD Publishing, April 2012), 1-198, <https://doi.org/10.1787/9789264166769-en>.
8. TransUnion, "Financial Crisis – 10 Years Later: Consumer Credit Market on an Upward Curve," *GlobeNewswire*, August 22, 2018, <http://www.globenewswire.com/news-release/2018/08/22/1554976/0/en/Financial-Crisis-10-Years-Later-Consumer-Credit-Market-on-an-Upward-Curve.html>.
9. European Central Bank, *Survey on the Access to Finance of Small and Medium-Sized Enterprises in the Euro Area, October 2012 to March 2013* (Frankfurt: European Central Bank, April 2013), <https://www.ecb.europa.eu/stats/accesstofinancesofenterprises/pdf/accesstofinancesmallmediumsizedenterprises201304en.pdf>.
10. Robert D. Hisrich, Michael P. Peters, and Dean A. Shepherd. *Entrepreneurship*. 7th ed (Boston: McGraw-Hill/Irwin, 2008).
11. *Overview of Capital Stages and Innovator Development Milestones* (VentureWell, 2019), table 2.
12. Abdulaziz M. Abdulsaleh and Andrew C. Worthington, "Small and Medium-Sized Enterprises Financing: A Review of Literature," *International Journal of Business Management* 8, no. 14 (June 2013): 36-54, <https://doi.org/10.5539/ijbm.v8n14p36>.
13. Jonathan Potter and Alessandra Porto, eds., "Promoting Entrepreneurship in South East Europe: Policies and Tools," *OECD Papers* 6, no. 12 (August 2007): 1-135, [https://doi.org/10.1787/oecd\\_papers-v6-art39-en](https://doi.org/10.1787/oecd_papers-v6-art39-en).
14. Judy Radler Cohen, "What is Private Equity? A Brief History," *Financial Poise*, July 29, 2019, <https://www.financialpoise.com/what-is-private-equity-a-brief-history/#.Xcw20zJKjs0>.
15. Jason D. Rowley, "Q4 2018 Closes Out A Record Year For The Global VC Market," *Crunchbase News*, January 7, 2019, <https://news.crunchbase.com/news/q4-2018-closes-out-a-record-year-for-the-global-vc-market/>.
16. Johnathan Lavender, Brian Hughes, and Arik Speier, *Venture Pulse: Q4'18 Report* (KPMG International Cooperative, January 2019), <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/01/kpmg-venture-pulse-q4-2018.pdf>.
17. Dana Olsen, "This year is setting records for VC mega-deals," *PitchBook*, October 12, 2018, <https://pitchbook.com/news/articles/this-year-is-setting-records-for-vc-mega-deals>.
18. Elvis Picardo, "Two and Twenty," Investopedia, last modified February 25, 2020, [https://www.investopedia.com/terms/t/two\\_and\\_twenty.asp](https://www.investopedia.com/terms/t/two_and_twenty.asp).
19. BusinessWire, "Generation Closes \$1 Billion Sustainable Solutions Fund," *Generation Investment Management LLP*, May 21, 2019, <https://www.businesswire.com/news/home/20190521005339/en/Generation-Closes-1-Billion-Sustainable-Solutions-Fund>.
20. Eric Burg, "Al Gore's Generation Looks to Make an Impact with \$1B Sustainable Vehicle," *PitchBook*, May 21, 2019, <https://pitchbook.com/news/articles/al-gores-generation-looks-to-make-an-impact-with-1b-sustainable-vehicle>.

21. Arama Kukutai, Ingrid Fung, and Jennifer Place, 2018 *Agtech Investment Review* (Finistere Ventures, 2018), [https://files.pitchbook.com/website/files/pdf/Finistere\\_Ventures\\_2018\\_Agtech\\_Investment\\_Review\\_PJZ.pdf](https://files.pitchbook.com/website/files/pdf/Finistere_Ventures_2018_Agtech_Investment_Review_PJZ.pdf).
22. Juliet Eilperin, "Why the Clean Tech Boom Went Bust," *Wired*, January 20, 2012, [https://www.wired.com/2012/01/ff\\_solyndra/](https://www.wired.com/2012/01/ff_solyndra/).
23. Davis Guggenheim, dir., *An Inconvenient Truth*. 2006; Hollywood, California: Paramount.
24. John Doerr, "Salvation (and profit) in Greentech." Filmed March 2007 at TED 2007, Monterey, California. Video, 17:34. [https://www.ted.com/talks/john\\_doerr\\_salvation\\_and\\_profit\\_in\\_greentech?language=en](https://www.ted.com/talks/john_doerr_salvation_and_profit_in_greentech?language=en).
25. Benjamin Gaddy, Varun Sivaram, and Francis O'Sullivan, "Venture Capital and Cleantech: The Wrong Model for Clean Energy Innovation," MIT Energy Initiative Working Paper, Cambridge, Massachusetts, July 2016, <http://energy.mit.edu/wp-content/uploads/2016/07/MITEI-WP-2016-06.pdf>.
26. "Solyndra Scandal," *The Washington Post*, 2012, <http://www.washingtonpost.com/politics/specialreports/solyndra-scandal/?noredirect=on> (site discontinued).
27. Bloomberg New Energy Finance, "Clean Energy Investment Exceeded \$300 Billion Once Again in 2018," *BloombergNEF* (blog), January 16, 2019, <https://about.bnef.com/blog/clean-energy-investment-exceeded-300-billion-2018/>.
28. Devashree Saha, and Mark Muro, *Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects* (Washington: Brookings Metropolitan Policy Program, May 16, 2017), <https://www.brookings.edu/research/cleantech-venture-capital-continued-declines-and-narrow-geography-limit-prospects/>.
29. Trent Dykes, "What is Micro-Venture Capital?," *The Venture Alley* (blog), September 5, 2014, <https://www.theventurealley.com/2014/09/what-is-micro-venture-capital/>.
30. CB Insights, "Micro VC Rising: Analyzing Trends and the Top Investors in the Micro VC Ecosystem," CB Insights Research Briefs, June 19, 2014, <https://www.cbinsights.com/research/top-micro-venture-capital-firms/>.
31. Samir Kaji, "Small Giants: The Past, Present, and Future of Micro VCs," CB Insights Research Briefs, 2015, <https://www.cbinsights.com/research/past-present-future-micro-vc/>.
32. Abhilash Mudalaiar, Hannah Schiff, Rachel Bass, and Hannah Dithrich, 2017 *Annual Impact Investor Survey* (New York: Global Impact Investing Network, May 2017), [https://thegiin.org/assets/GIIN\\_AnnualImpactInvestorSurvey\\_2017\\_Web\\_Final.pdf](https://thegiin.org/assets/GIIN_AnnualImpactInvestorSurvey_2017_Web_Final.pdf).
33. Rob Go, "Making Sense of Micro-VC's and Super Angels – A Primer," *Rob Go* (blog), June 29, 2010, <https://robgo.org/2010/06/29/making-sense-of-micro-vcs-and-super-angels-a-primer/>.
34. "Accredited investor," *Electronic Code of Federal Regulations*, title 17 (2019): 672-673, <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=8edfd12967d69c024485029d968ee737&r=SECTION&n=17y3.0.1.1.12.0.46.176>.
35. James Chen, "Venture Capital Definition," Investopedia, last modified October 13, 2019, <https://www.investopedia.com/terms/v/venturecapital.asp>
36. Laura Huang, Andy Wu, Min J. Lee, Jiayi Bao, Marianne Hudson, and Elaine Bolle, *The American Angel* (Wharton Entrepreneurship and Angel Capital Association, November 27, 2017), <https://www.angelcapitalassociation.org/data/Documents/TAAReport11-30-17.pdf?rev=DB68>.
37. Richard Sudek, "Angel Investment Criteria," *Journal of Small Business Strategy* 17, no. 2 (Fall 2006/Winter 2007): 89-104, <https://libjournals.mtsu.edu/index.php/jsbs/article/view/68/60>.
38. Jeffrey Sohl, *The Angel Market in 2018: More Angels Investing in More Deals at Lower Valuations* (Center for Venture Research, May 9, 2019), <https://paulcollege.unh.edu/sites/default/files/resource/files/2018-analysis-report.pdf>.
39. Angel Resource Institute, Florida Atlantic University's Tech Runway, and PitchBook, 2017 *HALO Report* (Angel Resource Institute and Florida Atlantic University's Tech Runway, 2018), <https://angelresourceinstitute.org/reports/halo-report-full-version-ye-2017.pdf>.
40. Allen N. Berger and Gregory F. Udell, "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle," *Journal of Banking & Finance* 22, no. 6-8 (1998): 613-673, [https://doi.org/10.1016/S0378-4266\(98\)00038-7](https://doi.org/10.1016/S0378-4266(98)00038-7).
41. Conor M. Savoy, Paddy Carter, and Alberto Lemma, *Development Finance Institutions Come of Age* (Washington: The Center for Strategic and International Studies, October 2016), <https://www.edfi.eu/wp/wp-content/uploads/2017/10/Development-Finance-Institutions-Come-of-Age.pdf>.

42. The Council on Smallholder Agricultural Finance (CSAF), *State of the Sector 2018* (CSAF, August 2018), [https://www.csaf.org/wp-content/uploads/2018/08/CSAF\\_State\\_of\\_the\\_Sector\\_2018\\_FINAL.pdf](https://www.csaf.org/wp-content/uploads/2018/08/CSAF_State_of_the_Sector_2018_FINAL.pdf).
43. Pedro J. Garcia-Terrieu and Pedro Martinez-Solano, "Determinants of Trade Credit: A Comparative Study of European SMEs," *International Small Business Journal* 23, no. 3 (June 18, 2010): 215-233, <https://doi.org/10.1177/0266242609360603>.
44. Tim Smith, "Crowdfunding Definition," Investopedia, last modified June 26, 2019, <https://www.investopedia.com/terms/c/crowdfunding.asp>.
45. Statista, *Crowdfunding – United States: Statista Market Forecast*, 2019. Distributed by Statista. <https://www.statista.com/outlook/335/109/crowdfunding/united-states>.
46. Statista. *Crowdfunding – Germany: Statista Market Forecast*. 2019. Distributed by Statista. <https://www.statista.com/outlook/335/137/crowdfunding/germany>.
47. "Debt-Based Crowdfunding," Glossary, SyndicateRoom, <https://www.syndicateroom.com/learn/glossary/debt-based-crowdfunding>.
48. "Joining Forces to Bridge Financial Gaps," About bettervest, bettervest, <https://www.bettervest.com/en/about-bettervest/>.
49. "Crowdinvesting with ecoligo.investments," About Us, ecoligo invest, 2019, <https://www.ecoligo.investments/ueber-uns>.
50. Eteam Innovator Curriculum, *Overview of Capital Stages and Innovator Development Milestones* (VentureWell, 2019), table 4.
51. "Non-Dilutive: Everything You Need to Know," UpCounsel, <https://www.upcounsel.com/non-dilutive>.
52. Carlos Freitas, "Non-Dilutive Funding," *Hull & Knarr*, accessed July 9, 2019. <http://www.hullandknarr.com/non-dilutive-funding/>.

# POWERING AGRICULTURE:

AN ENERGY GRAND CHALLENGE FOR DEVELOPMENT



This study was completed for the Powering Agriculture: An Energy Grand Challenge for Development Partners, which comprises the United States Agency for International Development (USAID), the Swedish Government, the German Federal Ministry for Economic Cooperation and Development (BMZ), Duke Energy, and the Overseas Private Investment Corporation (OPIC).

Further information about Powering Agriculture can be found at [PoweringAg.org](http://PoweringAg.org)

This study is made possible by the support of the American People through the United States Agency for International Development (USAID.) It was prepared by Tetra Tech ES, Inc. and its subcontractor VentureWell under the Powering Agriculture Support Task Order. The contents of this study are the sole responsibility of Tetra Tech ES, Inc. and do not necessarily reflect the views of USAID or the United States Government.

This paper was written by Jeff Engell and Christina Tamer of VentureWell (subcontractor) with significant contributions and revisions by Lauren Gause of VentureWell and Arai Monteforte and Wynne Cougill of Tetra Tech ES, Inc., under the leadership and guidance of Dr. Augusta Abrahamse, Program Manager of Powering Agriculture: An Energy Grand Challenge for Development.

