Perspectives from the IN^2 Network: State of the Cleantech Landscape

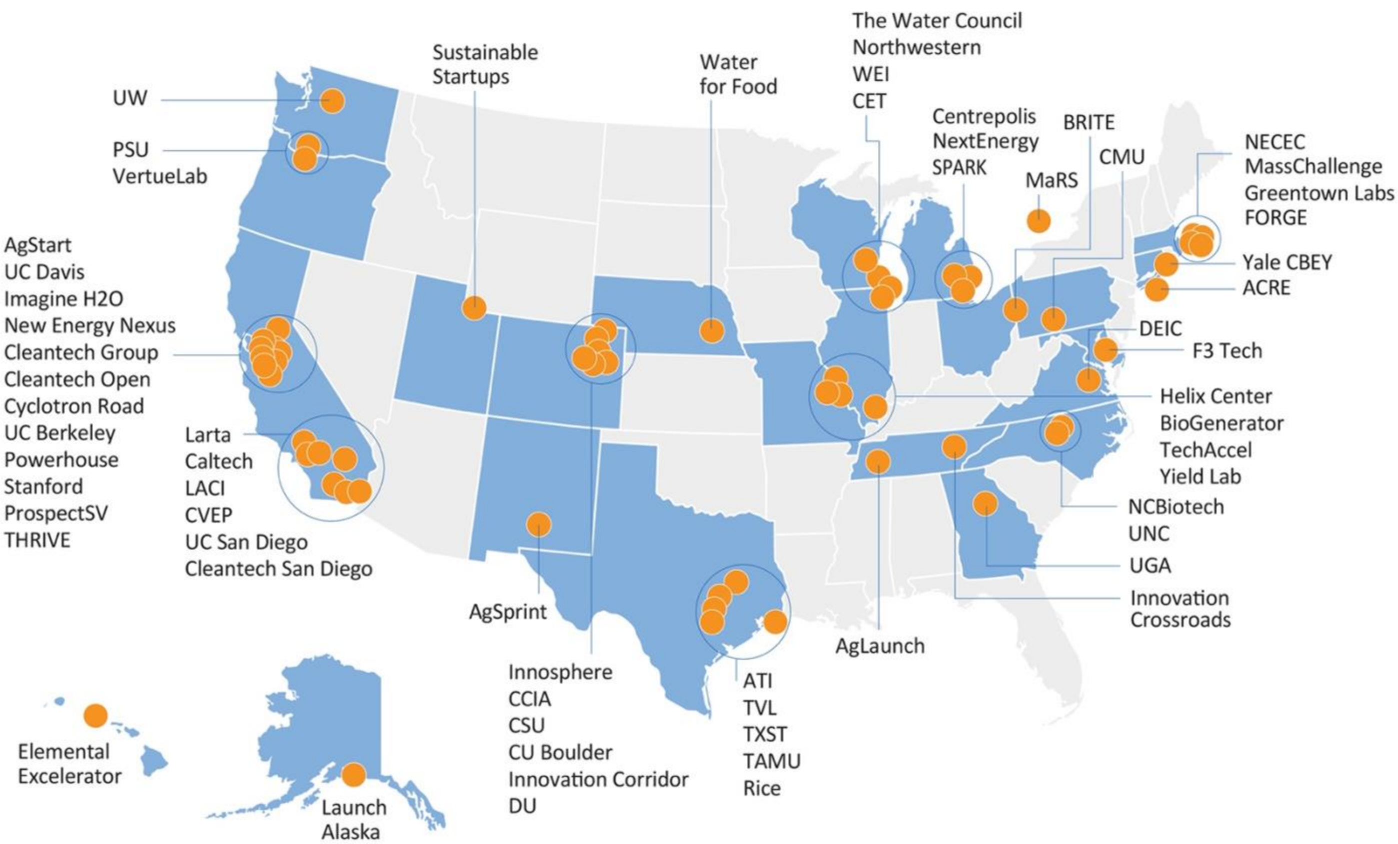
Kimberlee Ott, Karin Wadsack, Rachelle Ihly, Trish Cozart
January 2021

Founded by: WELLS FARGO | NREL

Acknowledgements

We would like to thank all the Channel Partners who contributed their valuable time to provide data, participate in phone interviews, and reach out to their portfolio companies for data. Without you, this paper would have not been possible. We also want to extend a special thank you to the eight leads that collected data and interviews with partners in their regions: Cleantech Open, Innosphere, Larta Institute, Launch Alaska, New Energy Nexus, Northeast Clean Energy Council (NECEC), Wilton E. Scott Institute for Energy Innovation at Carnegie Mellon University, and Jon Brumley Texas Ventures Lab at the University of Texas Austin. In addition, we want to thank the partners who participated in in-depth interviews: Wilton E. Scott Institute for Energy Innovation at Carnegie Mellon University, Caltech Rocketfund, Elemental Excelerator, The Yield Lab, AeroShield, CoverCress, UbiQD, and Yotta Energy. Lastly, we'd like to thank Cleantech Group for their efforts in creating and distributing a diversity survey to the network. These efforts will enable a benchmark against which this network will measure future success.

Partners:



- ACRE | New York, NY
- AgLaunch | Memphis, TN
- AgSprint | Las Cruces, NM
- AgStart | Woodland, CA
- Ann Arbor SPARK | Ann Arbor, MI
- BioGenerator | St. Louis, MO
- BRITE Energy Innovators | Warren, OH
- Caltech, FLOW Program | Pasadena, CA
- Carnegie Mellon University | Pittsburgh, PA
- Centrepolis Accelerator | Southfield, MI
- Clean Energy Trust (CET) | Chicago, IL
- Cleantech Group | San Francisco, CA
- Cleantech Open | Los Angeles, CA
- Coachella Valley Economic Partnership | Palm Springs, CA
- Colorado Cleantech Industries Association (CCIA) | Golden, CO
- Colorado State University Energy Institute, Powerhouse | Fort Collins, CO
- Cyclotron Road | Berkeley, CA
- Daugherty Water for Food Global Institute at the University of Nebraska | Lincoln, NE
- Dominion Energy Innovation Center | Ashland, VA
- Elemental Excelerator | Honolulu, HI
- F3 Tech Accelerator | Easton, MD
- FORGE | Somerville, MA
- Greentown Labs | Sommerville, MA
- Helix Center | St. Louis, MO
- Imagine H2O, Inc. | San Francisco, CA
- Innosphere | Fort Collins, CO
- Innovation Corridor Foundation | Denver, CO
- Innovation Crossroads | Oak Ridge, TN
- Larta Institute | Los Angeles, CA
- Launch Alaska | Anchorage, AK
- Los Angeles Cleantech Incubator | Los Angeles, CA
- MaRS Discovery District | Toronto, CA
- Mass Challenge | Boston, MA
- MIT Energy Club | Boston, MA
- New Energy Nexus | San Francisco, CA
- NextEnergy Center | Detroit, MI
- North Carolina Biotechnology Center (NCBiotech) | RTP, NC
- Northeast Clean Energy Council (NECEC) Institute | Boston, MA
- Northwestern University | Evanston, IL
- Portland State University Business Accelerator | Portland, OR
- Powerhouse | Oakland, CA
- Prospect SV | San Jose, CA
- Rice University | Houston, TX
- Stanford, TomKat Center for Sustainable Energy | Stanford, CA
- Sustainable Startups | Salt Lake City, UT
- TechAccel | St. Louis, MO
- THRIVE | Los Gatos, CA
- Texas A&M Engineering Experiment Station Clean Energy Incubator (TAMCEI) | College Station, TX
- Texas State University | San Marcos, TX
- The Water Council | Milwaukee, WI
- The Yield Lab | St. Louis, MO
- University of California, Berkeley | Berkeley, CA
- University of California, Davis Energy and Efficiency Institute (EEI) | Davis, CA
- University of California, San Diego | San Diego, CA
- University of Colorado Boulder | Boulder, CO
- University of Denver | Denver, CO
- University of Georgia, Innovation Gateway | Athens, GA
- University of North Carolina, Institute for the Environment | Chapel Hill, NC
- University of Texas at Austin, Austin Technology Incubator (ATI) | Austin, TX
- University of Texas at Austin, Texas Venture Labs | Austin, TX
- University of Washington | Seattle, WA
- University of Wisconsin-Madison, Wisconsin Energy Institute | Madison, WI
- VertueLab | Portland, OR
- Yale Center for Business and the Environment | New Haven, CT

Table of Contents

Research Motivation

The need for high impact cleantech innovations is more pressing than ever. In order to support the transition to a low-carbon economy, the cleantech ecosystem needs to accelerate and de-risk new technologies. Where are the companies[1] launching these new technologies located, what resources are available to enable this transition, and who will fund them?

The Wells Fargo Innovation Incubator (IN^2) is a technology incubator funded by the Wells Fargo Foundation and administered by the National Renewable Energy Laboratory (NREL). IN^2 involves and fosters a network of more than 60 cleantech accelerators, incubators, funds, and university programs across the United States, referred to as channel partners in the program.[2] These partners provide support to more than 6,000 cleantech startups ranging in stage from bench scale to commercially ready (descriptions of these terms are in the Appendix, Table 1).

The NREL and Wells Fargo Innovation Incubator (IN^2) partners provide a range of support services to more than 6,000 cleantech companies across the United States.

The term 'cleantech' is used here as an umbrella concept that includes any company or organization advancing the clean energy economy by aiding the transition to a low-carbon future. NREL's cleantech network includes companies ranging from solar power to agricultural solutions (a full list of technology focus areas can be found in the Appendix, Table 2). Startups require various types of services and support to enable their transitions to profitable and sustainable companies, and as such, partners offer services including, but not limited to, business and/or technology incubation, funding (dilutive and non-dilutive), and exposure through mechanisms like pitch competitions.

The goal of this white paper is to establish an understanding of the current cleantech landscape through the lens of this network by assessing who the network is supporting, geographic trends across the United States within cleantech, and the influence of universities and national labs on entrepreneurship. A gap analysis follows, which highlights needs in the ecosystem. Key findings and recommendations related to ecosystem function are also presented based on robust data analysis and in-depth interviews.

Background & Methods

In 2019, IN^2 convened its network partners to share knowledge and best practices. During a breakout session focused on the pipeline of cleantech innovation, two major themes emerged:

- There is a perceived focus on startup maturations and scaling. Some network partners reported not seeing many early-stage startups.
- Because of this perceived focus on maturation, there was a concern that there might not be a healthy pipeline of companies accessing incubator or accelerator programs, depending on location.

[1] Company and startup are used interchangeably throughout this paper. Startup is defined as "a temporary organization designed to look for a business model that is repeatable and scalable." (Areito 2018)
[2] One Channel Partner, MaRS Discovery District, is located in Toronto, Ontario, in Canada.

To further explore these ideas, IN[2] appointed eight leads from within the network: Cleantech Open, Innosphere, Larta Institute, Launch Alaska, New Energy Nexus, Northeast Clean Energy Council (NECEC), Wilton E. Scott Institute for Energy Innovation at Carnegie Mellon University, and Jon Brumley Texas Ventures Lab at the University of Texas Austin, to interview the other partners in their regions and collect data on their portfolio companies. Each partner was asked to provide the information shown in Table 1 about their cleantech portfolio companies. (Only data for U.S.-based companies prior to January 1, 2020 were requested.) Partners were asked to report up to 100 companies or two years of participant company data – whichever came first. Forty-nine partners provided data for this paper, resulting in data about 1,363 unique cleantech companies spanning 45 states. [3]

Table 1: Cleantech portfolio company data requested of network partners.

Data Collected on Each Company	Optional Data Reported	Additional Data Sourced from Pitchbook
Company name	Website	Amount and type(s) of funding raised
Technology focus area*	Amount and type(s) of funding raised	Revenue
Stage of technology*	Revenue	Number of employees
Year entered and exited program	Number of employees	Year founded
Company name (if changed)	Customer(s) (name or type)	
Location while in program and current location		
Company origination *(university, national lab, independently generated, or other)*		
Licensed IP		
Company status *(active, closed, unknown)*		
Company exit		

*Definitions of stages and technology focus are located in the Appendix.

[3] Data provided by partners do not represent the entirety of the companies they support. Partners support not only cleantech companies, but also other verticals within the U.S. and across the globe, totaling more than 6,000 companies.

In addition to providing data about their cohorts of companies, participating partners were interviewed by leads via phone or email to determine their organizational type, technology area of focus and whether those area(s) have changed, services offered and whether those service(s) have changed, number of companies supported, and number and types of opportunities provided to portfolio companies.

Once interviews and data were collected from each partner, leads provided the data to IN^2. The data was reviewed for consistency and completeness, then aggregated. Company names and locations were then used to pull additional data from Pitchbook, which was combined with the master data spreadsheet for a comprehensive analysis. While not all cleantech programs nor startups are represented with these data, these data provide a fairly recent snapshot[4] into the cleantech ecosystem.

Data analysis was conducted in the following four main areas:

- Landscape of the network (size, stage, technology focus, etc.)
- Geographic trends
- Influence of universities and national labs
- Demographics and diversity.

In addition to these data collected, IN^2 conducted in-depth interviews with network partners and startups. These interviews served to augment the data and help inform a more robust understanding of the cleantech landscape. To form a baseline of understanding on diversity and inclusion in cleantech, IN^2 partnered with the Cleantech Group to conduct interviews and a survey. Surveys were sent to cleantech startups and network partners.

Existing Research on the Cleantech Ecosystem

Many reports have analyzed the cleantech ecosystem, focusing on the amount of public and private capital found in the sector over time, and how cleantech companies perform in comparison to other startup types such as biotech and software. Reports focusing on capital have assessed the amount of public versus private capital infused over time, internal rate of return to private investors, and the number of deals across various financing stages.

Cleantech company performance has been captured by the number of exits (mergers, acquisitions, and initial public offerings (IPO)), by revenue, and occasionally, by number of employees and company age. There are a number of conflating factors that make it difficult to analyze cleantech companies relative to other startup sectors from a historical perspective. During 2008-2013, the cleantech sector was flooded with capital from both public and private sources (commonly referred to the Cleantech 1.0 era). Due to a multitude of factors, private investors lost over half of their $25 billion investment (Gaddy et al. 2016). After this collapse, the cleantech sector generally became synonymous with risky or undesirable investments due to much longer commercialization cycles, amount of capital required, and the challenges associated with commercializing hardware.

Additionally, this era was a unique mix of *(i)* misaligned expectations from investors on return size and time to return, *(ii)* an economic transition during the United States' second largest economic recovery,

[4] The startup data collected are companies that were competitive or mature enough to participate in an accelerator or incubator program in the network and therefore are only a subset of the entire ecosystem.

and *(iii)* a globalizing energy marketplace. For example, Surana, Doblinger and Anadon (2020) evaluated more than 600 cleantech startups over a period from 2008 to 2012, looking at factors such as startup company lifetime, patenting activity, and partnering with universities, agencies, and other national labs. The authors assert that startup companies survive longer and produce more patents when the startup partners with a government agency or laboratory rather than a university. However, the survival lifetime of startups can largely depend on the amount of available capital, both public and private, to support and sustain companies. Gaddy et al. (2016) reported that from 2006 to 2011, venture capital (VC) firms spent $25 billion funding cleantech startups, reaching peak investment around 2008 followed by a sharp fall-off. The bust period resulted in numerous cleantech companies closing, filing for bankruptcy, or falling prey to unfavorable acquisitions. Therefore, it is a difficult task to truly assess the survival rate and performance of cleantech companies during this time as it can be conflated with the amount of available capital influencing startup performance metrics and survival rates.

A broad approach was taken by Surana, Williams, Krawczyk (2020) surveying more than 6,000 cleantech companies within the United States. Notably, this study determined that particular states specialize in one technology category across the development pipeline, including research and development (R&D), company formation, and deployment. The authors found that cleantech companies are healthier if they partner with the state by accessing state-supported incubators or accelerators and state R&D funding. However, little is known regarding the extent to which companies move across the United States to other states to access a variety of innovation support resources. In this work, the dynamic between access of nationwide innovation support programs by companies in our dataset was investigated.

In addition to studies analyzing the success or failures in the cleantech ecosystem, a fair amount of work has assessed the demographics of its entrepreneurial and investment labor pool. A number of studies since 2015 have observed that cleantech VC and startups predominantly employ white men. A study (Schultz 2015) conducted on diversity in VC firms (representing 552 senior VCs across sectors) found that 92 percent of senior leadership positions at top-tier VC firms were male and 78 percent were white; 1.3 percent were Hispanic and less than 1 percent were Black. Similarly, a study (Gompers 2017) found that from 1990 to 2016, women represented less than 10 percent of startup entrepreneur and VC labor, Hispanics represented about 2 percent, and African Americans represented less than 1 percent. This was despite the fact that all three of these groups have strong representation in educational programs that lead to careers in this sector and in other highly compensated professions. Research comparing firm diversity to firm financial performance has established that more diverse firms, on both a gender and ethnicity basis, are more likely to achieve above-industry-average returns than non-diverse firms (Hunt 2015). In fact, the least-diverse firms were statistically more likely to achieve below-industry-average returns.

This work builds on these previous ecosystem-wide studies and demographic analyses, shedding additional light on the state of the current cleantech landscape and the people building it. The particular focus of this paper is on the geographic, demographic, and other characteristics of the ecosystem, and the influences of key players such as universities and national laboratories on company and ecosystem health.

Landscape Analysis: Partners and the Companies they Serve

IN² Network Partners: A Range of Services Provided

As stated above, the IN² program supports more than 60 network partners in 24 states across the United States. Partners were classified into one of four types: university, accelerator/incubator, fund, and economic development organization. Each organization also provided details on types of support services it offered: business incubation, technology incubation, fund, or pitch event. There was a good variation of partner types, as seen in Figure 1, with 40 percent classified as accelerators/incubators, 38 percent as universities, 12 percent as funds, and 10 percent as economic development organizations.

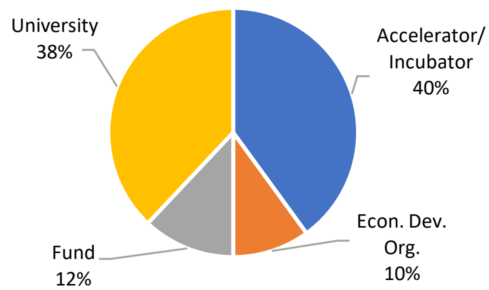


Figure 1: Network partner organization classification.

Services offered by partners primarily fell into business or technology incubation services, at 64 percent and 22 percent, respectively. Other services provided by partners include investment funds (8 percent) and pitch events (6 percent). While these partners are diverse in the services they provide and their locations, they do not represent the entire cleantech ecosystem. For the purpose of this paper, the term "ecosystem" will refer to the network partners and the companies they support. Figure 2 shows the distribution of partners across the United States (above) and the companies they provided data for (below).

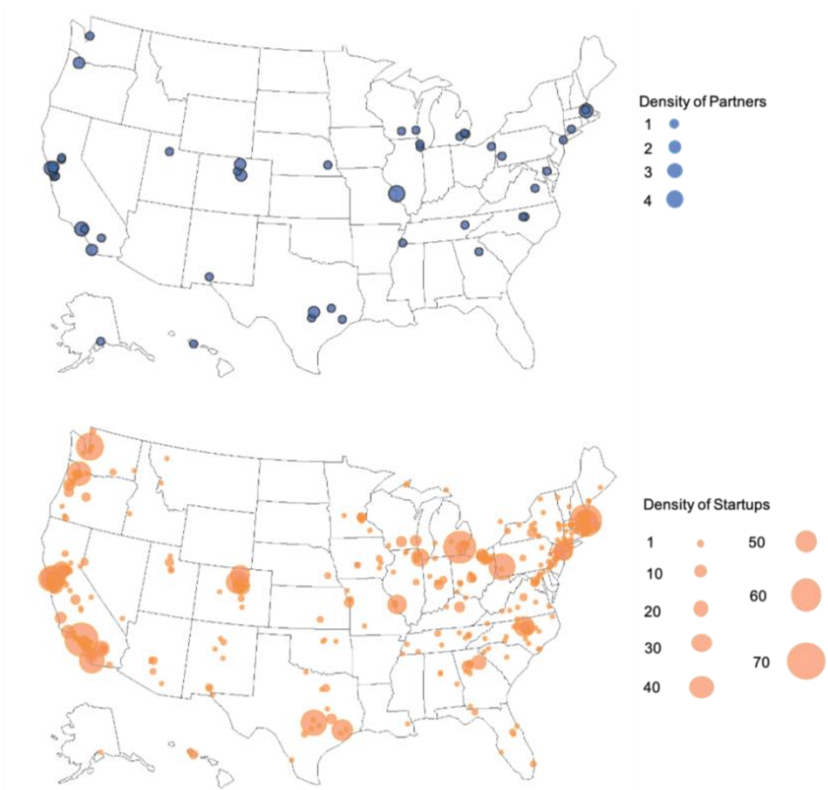


Figure 2: Maps of IN² Channel Partner organizations (top) and the 1,363 cleantech startup companies represented in this report (bottom). Not all Channel Partners provided portfolio data for this report.

Table 3: Perspectives and strategies based on interviews of select startups in the dataset.

Gap Analysis: Company Perspective	Suggested Strategies
Company location impacted ability to fundraise to some extent. Less capital access in states outside of CA.	• Startups consider remote headquarters in locations with large concentrations of investors • Investors consider diversifying portfolios with respect to geography. Investment firms consider HQ locations across the country, perhaps close to a university or a national laboratory
Success was enabled by accessing varied types of support from incubators/accelerators or universities including networking, programming, cohort learnings, mentorship, exposure, and credibility. **There are a lot of resources and programs available for startups, but understanding the correct ones at the correct point in time is crucial.**	• Startups identify and access the right resource at the right time, largely determined by stage and technology • Startups perform a cost/benefit analysis prior to accepting resource support
Access to lab and office space can be cost-prohibitive to a company's success.	• Startups may want to explore incubator or accelerator programs and other resources such as contract manufacturing or prototype development that can reduce cost of lab space
There is a lack of awareness for startup-specific business services, such as human resources, public relations, etc.	• Vendors that provide assistance to startups (human resources, marketing, hiring, etc.) may partner with local accelerators, incubators, universities, or funds to enhance their accessibility to startups
Environmental impact is difficult to measure and inconsistent across startups.	• Ecosystem stakeholders may creatively explore ways to measure and validate environmental and climate impacts of startups
Certain grants are structured in ways that prohibit funds to be used on equipment or lab space or time. Some startups need understanding of how to write successful proposals with appropriate cost allocation.	• Accelerator or incubator organizations may benefit from creating educational programs around public funding and restrictions on hardware and equipment acquisition, and from creating programing to solve this problem with shared lab space and/or equipment
Taking extra risk with a hardware startup is tough.	• Investors may want to target companies that are in programs (or have accessed multiple partner services) aimed at de-risking hardware technologies through technology incubation or other services

Factors Driving Success

A number of interviewees of this white paper commented on the difficulty of measuring startup progress along the path to maturity or "success" in a meaningful way, as well as for the sector as a whole.

From the data analysis and the in-depth interviews performed, it is possible to make some observations about the path to success. Some of these are intuitive:

- With respect to company size: all of the companies in the dataset with more than 100 employees were beyond bench scale. While some companies stay small forever, a larger number of employees is an indicator of maturity and advancement in company stage.
- There was a positive relationship in the dataset between companies that had licensed intellectual property and those that were still active: only 8 percent of the companies that were known to be closed or whose status was unknown had licensed IP (24 out of 285), compared to 38 percent of still-active companies (484 out of 1,273).
- Finally, companies in interviews reported that it is easier to raise funds during later stages. This is supported through analysis of data from the IN^2 data collection and from PitchBook reporting deal count and size; the proportion of deals is higher at commercial stage than at prototype, which is higher than bench scale. The average number of deals per company was also highest at commercial stage and lowest at bench scale.

While these data-based observations confirm expectations about a startup's maturity, the project's in-depth interviews yielded other more nuanced observations about measuring success and the milestones that companies target at different stages of development. Success is defined in many different ways, and the end goal of different cleantech actors, from investors to startups, varies widely. As mentioned above, at the later stages, company performance is often measured through different types of 'exits,' (IPO, demonstrated profit, mergers and acquisitions, and capture of market share); distinct, earlier-stage milestones also exist. The project identified indicators of success that might be applied throughout a startup's trajectory, summarized in Table 4.

Table 4: Indicators of company maturity by stage as drawn from data analysis and interviews.

Stage of company	Measures of maturity and path to success
Bench Scale	• non-dilutive and early-stage funding • ability to raise private funding • participation in business or technology incubation programs • IP development (or licensing of other IP)
Prototype	• types and volumes of funds raised • third-party-validated proof of concept • partnerships with universities or national laboratories • partnerships with industry or utilities
Commercially Ready	• number of employees • types and amount of funds raised • licensing of IP or product deployment • merger or acquisition • volume of revenue (profitability) • completed demonstration/pilots

These factors might be used to develop useful measures of progress or success, whether for individual startups, technology sectors, or the ecosystem as a whole. Further work, either as a follow-up to this study, or performed more broadly across the ecosystem, can help inform this assessment and allow for a better understanding of how to accelerate the transition to a low-carbon economy that is at the heart of the cleantech sector.

To build upon this research, it would be ideal to interview and collect metrics on cleantech startups to determine one or more unitless success metrics that could be applied to different company stages or types. These data could help identify what resources are needed at different points in the path to success. These data could also serve as a baseline to compare against periodically by collecting and analyzing the cleantech landscape. In addition to this work, studying cleantech across the globe could provide additional insights into the health of the ecosystem. In order to more accurately apply broader lessons learned in accelerating cleantech, conducting a similar analysis on a different industry may provide further insights into how cleantech differs from or is like other industries.

Key Findings & Recommendations

Based on the key findings from the data analysis for this paper, the broader research, and the in-depth interviews performed, a number of recommendations can be made, summarized in Table 5.

Table 5: Key findings and recommendations on perspectives of the cleantech landscape in the U.S. based on data and interviews.

Key Findings	Recommendations
There's a healthy mixture of startups across all technology stages and types.	Cleantech incubators, accelerators, and university programs are encouraged to continue supporting companies across all stages and technology types. These programs could consider expanding into other support services for various stages of companies, opening new types of technology support, or utilizing tech support available at national laboratories or universities.
A significant proportion of companies in the dataset originated from universities. National laboratories were the source of very little company origination in this dataset but provide a variety of other support services to startups such as entrepreneurial training, incubation programs, and other partnership agreements.	Startups may consider forging or strengthening relationships with universities or national laboratories in their regions, specifically with these institutions' incubator programs or technology transfer offices.
Cleantech incubators and accelerator organizations primarily provide business incubation services as opposed to technology incubation or others.	Incubator/accelerator and other support organizations may want to creatively explore services beyond business incubation. Additionally, the broader cleantech ecosystem could improve awareness of organizations specializing in various service types.

Key Findings continued	Recommendations continued
Startup companies access network support across the country (more than one-third of innovation support was accessed from out-of-state programs). Different programs offer services that are appropriate at different points in a company's trajectory.	Startups need to understand when and how to access these services in order to make best use of what's being offered. Incubator, accelerator, and university programs can help startups identify whether accessing services out of state will aid in speeding their path to market. Further study can help identify metrics for success at different stages and identify gaps in available resources.
There is a predominance of white and male employees in the cleantech sector.	Strong STEM education and entrepreneurship training programs for diverse groups, and specialized support for diversity in the earliest-stage companies, could have a large impact on integrating diverse individuals into cleantech.

References

Areito, Andy (Partner, The Venture City). 2018. "What is a startup and how is it different from other companies (new and old)?" *Medium.* December 13, 2018. https://medium.com/theventurecity/what-is-a-startup-and-how-is-it-different-from-other-companies-new-and-old-428875c27c29.

Cambridge Associates. 2018. "Cambridge Associates Clean Tech Company Performance Statistics." December 31, 2018. Available in quarterly benchmark reports downloadable at www.cambridgeassociates.com/private-investment-benchmarks/.

Gaddy, Benjamin, Varun Sivaram, Timothy Jones, and Libby Wayman. 2016. "Venture Capital and Cleantech: The Wrong Model for Energy Innovation." Available at SSRN: https://ssrn.com/abstract=2788919 or http://dx.doi.org/10.2139/ssrn.2788919

Garfield, David, Kate Moore, and Richard Adams. 2019. *New Approaches to Energy Hardware Innovation and Incubation.* (White Paper. Golden, CO: National Renewable Energy Laboratory (NREL). NREL/MP-6A70-73438. https://www.nrel.gov/docs/fy19osti/73438.pdf.

Gompers, Paul and Sophie Wang. 2017. *Diversity in Innovation.* (Working Paper. Cambridge, MA: Harvard Business School). Working Paper 17-067. https://www.hbs.edu/faculty/Publication%20Files/17-067_b5578676-e44c-40aa-a9d8-9e72c287afe8.pdf

Hunt, Vivian, Dennis Layton, and Sara Prince. 2015. "Why diversity matters." McKinsey and Company. January 2015. https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Organization/Our%20Insights/Why%20diversity%20matters/Why%20diversity%20matters.pdf

Schultz, Peter. 2015. "Introducing the Information's Future List." *The Information.* Oct. 6, 2015. https://www.theinformation.com/articles/introducing-the-informations-future-list.

Surana, Kavita, Claudia Doblinger, and Laura Diaz Anadon. 2020. "Collaboration Between Start-Ups and Federal Agencies: A Surprising Solution for Energy Innovation." *Information Technology and Innovation Foundation*. August 2020. https://itif.org/publications/2020/08/24/collaboration-between-start-ups-and-federal-agencies-surprising-solution

Surana, Kavita, Ellen Williams, Wojciech Krawczyk, Michael Montgomery, Jon O'Neill, Zachary Thomas, and Ying (Amber) Zhang. 2020. "Regional clean energy innovation: Regional factors for accelerating the development and deployment of climate mitigation technologies." *Energy Futures Initiative and University of Maryland Global Sustainability Initiative.* February 2020. https://cgs.umd.edu/sites/default/files/202002/Final_Regional%20Innovation%20Report_2.20.20.pdf

Appendix: Supplementary Information

Table A-1: Portfolio company stage definitions.

Stage	Technology Development
Bench Scale	▪ Technology Readiness Level (TRL) 1-5 ▪ Conceptual stage with physical proof that the concept may work ▪ Development plans for prototyping and testing ▪ 3-5 years to market
Prototype	▪ TRL 6-7 ▪ Prototype available for testing and validation ▪ Plans available for development to final product ▪ Less than 2 years to market
Commercially Ready	▪ TRL 8-9+ ▪ Production models available in limited quantity ▪ Less than 18 months to market

Table A-2: Technology focus area with definitions based on Cambridge Associates (Source: Cambridge Associates).

Group	Subsector	Definition
Renewable Power	**Solar Power**	Technologies and processes that directly convert solar radiation into electricity or hot water
	Wind Power	Technologies and processes that convert kinetic energy from the wind into electricity
	Other Power Generation	Technologies and processes that generate electricity from other renewable inputs, fuel cells, or waste capture
	Biofuels and Biomaterials	Technologies and processes that produce fuels and materials from non-fossil fuel, biomass-based sources
Renewable Power Development	**Renewable Power Development**	Processes that allow for the financing, installation, management, operation, or ownership of renewable power generation projects
Energy Optimization	**Energy Efficiency and Management**	Technologies and processes that allow for more control over energy use and reduce energy consumption
	Lighting	Technologies and processes that reduce energy use through more efficient lights and lighting systems
	Smart Grid	Technologies and processes that work to optimize electricity transmission and distribution from the point of origin to the end consumer
	Sustainable Mobility	Technologies that contribute to the increased efficiency and electrification of transport
	Energy Storage	Technologies and processes that increase the efficiency of or reduce the cost, weight or environmental problems associated with devices that store energy for use at a later time
Resource Solutions	**Waste and Recycling**	Technologies and processes that repurpose old materials into new products and reduce or eliminate the quantity and impact of undesired materials
	Water and Wastewater	Technologies and processes that lead to the more efficient purification, recycling, and management of water and wastewater
	Advanced Materials	Technologies and processes that use biochemicals and substances to improve resource efficiency or serve as substitutes for more polluting materials
	Environmental Services and Agricultural Solutions	Technologies and processes that protect and allow for the restoration of natural ecosystems or contribute to more sustainable agriculture practices and techniques
	Emissions Markets and Controls	Technologies and processes that reduce, measure, or control the release of greenhouse gases into the atmosphere