Final Technical Report for DOE/EERE

Project Title:	Cleantech UP Competition
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Award Number:	DE-EE0007963
Working Partners:	
Cost-Sharing Partners:	Rice Alliance, Smart Cities Conference *(See EERE 335 Detailed Budget Justification, dated 3/5/18)*
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Signature

November 30, 2018

Date

Project Objectives:

VentureWell had three main project objectives:

- Accelerate Student Companies (Accelerate): VentureWell reviewed and delivered the commercialization training created for the National Cleantech University Prize Competition. VentureWell orchestrated, managed and supported the national competition (e.g., programming, logistics, marketing, surveys).

- Evaluate Access to Entrepreneurship Training (Access): VentureWell collaborated with collegiate competition organizers to support recruitment and visibility of competition opportunities. VentureWell evaluated the use and determined the appropriate implementation of the massive online open course (MOOC).

- Build Alignment of Ecosystem Resources (Align): VentureWell created a sustainable, multiyear competition that develops, implements, and shares best practices to foster student cleantech entrepreneurship aligned with VentureWell's mission and strategies to support young innovators.

Background:

The Cleantech UP Competition built on the success of the U.S. Department of Energy's National Clean Energy Business Plan Competitions (NCEBPC) in inspiring more graduate and undergraduate students to pursue entrepreneurship, innovation, and commercialization of clean energy technologies. The competition addresses remaining challenges for students to pursue cleantech education, entrepreneurship, and careers, including: limited access to energy-industry-tailored education and entrepreneurial training; limited coordination of regional and national resources for students; uneven support between competitions and regions; limited cooperation and best-practice sharing; and inconsistent collection of feedback and learning between student participants. During the first year of the grant, in 2016, Cleantech UP competition was managed by Spark Clean Energy; in partnership with DOE and members of the cleantech and energy ecosystems, VentureWell implemented the National Cleantech University Prize (UP) Competition during 2017 and 2018.

Universities and cleantech/energy incubators and accelerators affiliated with the project acted as the primary pipeline builders and implementers of the eight regional Cleantech UP Collegiate Competitions, and offered regional Cleantech UP competition organizers access to a pool of applicants, teams, and technologies. VentureWell provided marketing and outreach support designed to augment applications to regional competitions in support of national events and programming. Coinciding with these activities, VentureWell held monthly virtual meetings and an annual in-person meeting with the Collegiate Competitions organizers to explore ways to streamline the competition application process, collect data on student teams, and share best practices.

VentureWell held a training each year following the eight regional collegiate competitions with up to 24 teams who were invited to attend the trainings in person. Selected in conjunction with the regional competitions and DOE, participants were usually the first, second, and third place teams

from each of the collegiate competitions. Annual trainings were hosted at partner sites, such as incubators in the Incubatenergy network or regional competition facilities. The trainings were specifically tailored to the needs of the student teams and focused on optimizing team dynamics and talent.

VentureWell's annual cycle culminated in a national competition for the Cleantech UP National Prize in 2017 and again in 2018. The competition included the top 24 student teams, leaders of university organizations, Cleantech UP program participants, and students from around the country. The competition showcased the success of student entrepreneurs, included guidance (or instruction) from national leaders in the energy and cleantech movement, and fostered a national conversation and exchange of ideas amongst students and participants.

Significant Accomplishments during Grant Period:

Year 1 [timeframe: December 19, 2016 – October 31, 2017]

Task 1: Accelerate

The primary focus of the Accelerate theme is to design and deliver a National Cleantech UP Competition that includes a meaningful educational component that will help students form more viable clean energy ventures.

VentureWell hosted the National Cleantech UP Competition on June 26-27, 2017 in Austin, TX in conjunction with the Smart Cities Connect Conference.

VentureWell collaborated with DOE and the 8 regional competition organizers to identify and deliver a best-in-class training that could be useful to all student teams. The first day of the event included first-round judging of pitches and a structured networking session with mentors that provided advice about venture development in cleantech. VentureWell delivered the student training on the second day of the 2017 Cleantech UP, which focused on the ways that teams could use the left side of the business model canvas to identify their next key milestones. The lead instructor was Kerry Rupp, a Venture Capital Managing Partner at True Wealth Ventures in Austin, TX.

To ensure that teams' needs were met and outcomes could be tracked, VentureWell collected and maintained some participant data. Student teams participating in the National Cleantech UP competition in Austin submitted contact information and materials related to publicizing their ventures via the event registration portal.

A total of 21 teams participated at the 2017 National Cleantech UP Competition:

Team Name	Universities	Regional Competition
Solstice Energy Solutions	Stanford University	UC Berkeley Cleantech UP
Flux Technologies	UC Berkeley	UC Berkeley Cleantech UP
Noble Thermodynamic Systems	UC Berkeley	UC Berkeley Cleantech UP
RVS Rubber Solutions	Case Western Reserve University	Clean Energy Trust Cleantech UP
BluSolar	Millikin University	Clean Energy Trust Cleantech UP
Wattcoin Labs	University of Wisconsin-Madison	Clean Energy Trust Cleantech UP
	Illinois Institute of Technology	
	University of Pennsylvania	
Teratonix	Carnegie Mellon University	Allegheny Cleantech UP
RE-Empower	University of Maryland	Allegheny Cleantech UP
MPEL-Evtech	University of Maryland	Allegheny Cleantech UP
Infinite Cooling	MIT	MIT Clean Energy Prize
Joro	MIT	MIT Clean Energy Prize
TCPoly	Georgia Institute of Technology	Rice Business Plan Competition
Resthetics	University of Houston	Rice Business Plan Competition
Grox Industries	University of Arkansas	Rice Business Plan Competition
Revolution Outboards	Princeton University	Rutgers LaunchR
Xtream Energy Technologies	Rutgers University	Rutgers LaunchR
ElectroMetro	Rutgers University	Rutgers LaunchR
Vescence	University of Houston	First Look Out West: CalTech Cleantech UP
South 8 Technologies, Inc.	University of California-San Diego	First Look Out West: CalTech Cleantech UP
Thor ORE	University of Central Florida	MegaWatt Ventures
SkyNano Technologies	Vanderbilt University	MegaWatt Ventures
WEAV3D	Georgia Tech	MegaWatt Ventures

Competition winners

First place: Infinite Cooling, saving power plants both water and money through capturing water vapor from cooling towers.

Second place: Grox Industries, enhancing energy efficiency with graphene-based polymers and surface coatings.

Third place: WEAV3D, developing strong lightweight carbon composites to make vehicles more fuel efficient and safer.

To support early-stage ventures, VentureWell developed a list of trusted partners with whom teams could make warm connections. These partners included: TechConnect, True Wealth Ventures, CleanTX, Austin Energy, 3Day Startup, Houston Angel Network, Austin Technology Incubator, Shell Technology Ventures, Congruent Ventures, Smart Austin, Pecan Street, Chevron Ventures, Next Energy, Clean Energy Trust, NREL, and Capital Factor, among others. They supported the Cleantech University Prize as either mentors, judges, and/or sponsors. In total, 25 judges and 26 mentors participated during the 2-day event.

VentureWell conducted and collected a review of the 2017 competition, and shared the results with DOE on July 17, 2017. The review consisted of post-competition surveys administered to 5 groups of participants: judges, mentors, audience members, regional event organizers, and participating teams who competed in the regional and national events.

Key take-aways were:

1) Refine the value proposition of the competition. Teams coming from different regions and at different stages of development felt that more clarity about the specific value of a DOE-affiliated competition would have been helpful. Because they either came from cash-strapped startups or were students with summer jobs, they wanted more information about what to expect prior to committing a full 2 days to the experience.

2) Mentoring is highly valued. Though the cash prize was the highest-ranked incentive for participation, access to mentorship and structured networking were ranked as close seconds. Both mentors and students requested more of this in the future.

3) Money matters. Competing teams who did not win one of the 3 prizes felt less motivated to stay for training and viewing pitches on Day 2 if they didn't make it to the final round. Suggestions included alternatives to an all-or-nothing approach, such as smaller side-prizes or breaking prizes into categories instead of a strict "first, second, third" format.

Task 2: Access

The theme of Access focused on the potential for increasing visibility of the Cleantech UP regional and national competitions and exploring ways to expand participation, and to make recommendations to the best use of the MOOC developed by a previous DOE grantee.

VentureWell served as a pipeline for Cleantech UP Regional Competitions. VentureWell promoted the regional competitions via a variety of marketing campaigns, including website, social media, email and newsletters. In addition to leveraging VentureWell's own website and

brand, VentureWell began managing the Cleantech UP website. VentureWell's marketing team refreshed website content and updated the new logos.

The original scope of the original 2015-2018 Cleantech UP grant included development of a massive online open course (MOOC). The managers of the 2015-2016 Cleantech UP National Competition contracted EdX and MIT Energy Ventures faculty to create a MOOC. The goal of creating the MOOC was to expand knowledge of venture creation in cleantech and to prepare teams from under-resourced institutions to compete effectively; however, management of the grant and renegotiation of scope in late 2016 occurred prior to launch of the MOOC. VentureWell evaluated the MOOC and provided a summary of its findings and recommended uses to DOE. Several marketing updates on the MOOC website were made, but it required additional technical, content, and operational management to launch successfully.

Task 3: Align

The theme of alignment focuses on 3 areas: gaining external stakeholder guidance, creating opportunities to share best practices among collegiate organizers, and tracking student team successes.

During the National Competition, VentureWell convened the organizers of the collegiate competitions. The goal was to create a documentation of best practice, but facilitation of the conversation yielded the need for organizers to share both their victories (or progress), and their ongoing frustrations (or challenges). As a result, the best-practices document and list of potential topics for ongoing dialogue was created by VentureWell. It was disseminated to regional organizers and uploaded to a common online space that the regional organizers could collectively access.

VentureWell staff coordinated monthly calls between DOE, Regional Competition Organizers, and National Competition organizers. To build momentum for 2018, VentureWell staff communicated with regional organizers to think about student success stories that could be used to market Cleantech UP during the following year. In addition, VentureWell collected program participant information for the first track (2017), and tracked year to year.

Specific activities included ongoing website management; two profile articles about the top two winners featured on the website blog; social media posts across Twitter, Instagram, Snapchat, Facebook, and LinkedIn; and social media posts shared from Regional Competitions with good news.

VentureWell identified and secured interest from at least seven candidate advisory board members for the National Cleantech University Prize. Each individual was able to offer significant value to the Cleantech University Prize. The backgrounds of these board members included venture capital, innovation management, and cleantech entrepreneurship. This list was shared with DOE- EERE representatives for feedback and utilization in October 2017.

Year 2 [timeframe: November 1, 2017 – August 31, 2018]

Task 4: Accelerate

The primary focus of the Accelerate theme is to design and deliver a National Cleantech UP Competition that includes a meaningful educational component that will help students form more viable clean energy ventures.

VentureWell successfully co-hosted the National Competition in partnership with the Rice Business Plan Competition (RBPC/Rice Alliance), which was held on June 27th and 28th 2018 at Rice University in Houston, TX.

Throughout 2017 and 2018, VentureWell continued to participate in regional competition monthly calls, which helped to form the content for the National Competition and training components. During the third quarter of the Federal fiscal year (FFY Q3), VentureWell executed the sub-contract with Rice University for the logistics and implementation of the 2018 competition. Subsequently VentureWell staff worked closely with RBPC staff to create the agenda for the National Competition and training.

The National Cleantech UP Competition had two components: training sessions, and the finalist judging and awards event. Over the course of the two days, 23 teams pitched their innovations, received training and mentoring, and connected with each other to share resources and experiences as fellow startup founders.

Team	University	Regional Competition	DoD Prize Eligible
NUMiX Materials	Northwestern	Rice Business Plan Competition	
Ateios	UC San Diego	Rice Business Plan Competition	*
Polar Panel	Univ. of Houston	Rice Business Plan Competition	
SurgePower Materials	Texas State University	Rice Business Plan Competition	*
Aerospec Technologies	Northwestern	Clean Energy Trust Cleantech UP	
Beltech	University of Chicago	Clean Energy Trust Cleantech UP	*
Aelios Technologies	University of Minnesota	Clean Energy Trust Cleantech UP	*
Lithio Storage	Tufts University	MIT Clean Energy Prize	*
Fiat Flux	MIT	MIT Clean Energy Prize	
EctoTherm	MIT	MIT Clean Energy Prize	

SpotLess	Penn State University	Allegheny Cleantech UP (CMU)	*
Ecotone Renewables	Carnegie Mellon University	Allegheny Cleantech UP (CMU)	
Boundary Laboratories (BoundLab)	Case Western Reserve University	Allegheny Cleantech UP (CMU)	
gridfruit	Carnegie Mellon University	Allegheny Cleantech UP (CMU)	*
Zencharge	Drexel University	Allegheny Cleantech UP (CMU)	
Omnitricity	Carnegie Mellon University	Allegheny Cleantech UP (CMU)	
ExperiML	Carnegie Mellon University	Allegheny Cleantech UP (CMU)	*
Hearth labs	Princeton	Rutgers University (LaunchR)	*
CarbonSul	Columbia	Rutgers University (LaunchR)	
SHIO	U of Delaware	Rutgers University (LaunchR)	*
VerdiLife	University of Iowa	MegaWatt Ventures	
HYPower Solutions	North Carolina State University	MegaWatt Ventures	
ETC Solar	California Institute of Technology	First Look Out West at CalTech: FLOW	*

Utilizing feedback from the prior year's surveys, the training was broken into 3 rotating sessions on Day 1:

1. **Pitch Training:** Coordinated by RBPC, twenty volunteer mentors supported teams as mock-judge panels. The practice pitches, Q&A, and constructive advice helped competing semi-finalists to give the most effective pitches on the following day.
2. **Preparation for Due Diligence:** Facilitated by Laura Sampath of VentureWell, the intensive session included a pre-work preparation assignment, presentation summarizing the investor due-diligence process, and 1:1 mentoring session with one of 6 volunteer mentors. During the mentoring sessions, each team was matched with a subject-specific coach who helped them with challenges such as appropriate market-sizing, IP strategy, financial projections, founder vesting, HR, etc.
3. **Identifying Non-Dilutive Resources:** Facilitated by Janine Elliott of VentureWell, the interactive session introduced teams to different categories of resources, such as: SBIR/STTR grants, Accelerators/Incubators, and Competitions. Using a peer-mentoring methodology, teams shared questions and advice, supported by additional information shared by the facilitator.

On Day 2, each of the 23 National semi-finalists pitched for the National Cleantech University Prize, and pitched for the Department of Defense prize, if applicable. Eighty judges

participated in the Cleantech UP judging panels.

Competition winners

First-place: ETC Solar, development of a manufacturing process and modified design that radically increases solar cell efficiency.

Second-place: NUMiX Materials, efficiently remediates water contaminated with a mix of heavy metals.

Third-place: Polar Panel, uses solar technology to enhance cold-chain transport on rail cars.

In addition to the Cleantech University Prize, select National semi-finalists were eligible to compete for other prizes. The Department of Energy's Building Technology Office sponsored a $35k Green Building Prize, and select teams were invited to compete for a $35k prize offered by the Office of Operational Energy at the Department of Defense.

Hearth Labs won the Green Building prize for its software that can map rooms' thermal properties in order to increase efficiency.

Beltech won the Operational Energy prize to continue its work developing safer, high-capacity solid-state batteries.

Task 5: Access

The theme of Access focused on the potential for increasing visibility of the Cleantech UP regional and national competitions and exploring ways to expand participation.

VentureWell updated the Cleantech UP home page to highlight the 2018 National Competition. Staff added the 2016 team section back on the website and moved the 2017 team information to another page. They also added all information about the National Competition event and finalist teams for 2018. Website posts at Cleantechup.org, social media from VentureWell and Rice, and a press release generated 135 registrants for the final judging and awards ceremony.

Though no formal tasks or deliverables were assigned to the MOOC, VentureWell staff took the initiative to explore avenues for dissemination of the modules within the cleantech community. An initial prospect for co-dissemination did not progress because of personnel changes at its institution. The video materials of the MOOC could cost-effectively become widely available to the public in a cost-effective way.

Task 6: Align

The theme of alignment focuses on 3 areas: gaining external stakeholder guidance, creating opportunities to share best-practice among collegiate organizers, and tracking student team successes.

The scope of required deliverables was revised to be much smaller in 2018 than it was in 2017. VentureWell staff continued to join monthly calls with Regional Organizers and DOE staff in order to maintain open lines of communication, share each stakeholders' progress, and celebrate successes. To communicate successes of teams externally, VentureWell and RBPC shared announcements and other news about competition participants and winners via social media channels.

Points of Contact: During 2018, VentureWell identified Laura Sampath, VP for Programs, as the main point of contact for the remainder of this award. Kim Noble, Events Manager, oversaw the event coordination and logistics aspects for the 2018 competition. Janine Elliott, Program Officer, led the development of curriculum and program content.

Patents: Not applicable

Training and Professional Development: Not applicable

Publications/Presentations/Travel: For the Year 1 (2017) National Cleantech UP Competition, three VentureWell staff traveled to Austin for 4 days from Massachusetts, and one VentureWell consultant traveled from San Francisco to Austin for 2 days. For the Year 2 (2018) National Cleantech UP Competition, two VentureWell staff traveled to Houston for 2.5 days from Massachusetts. Presentations were a part of the scope of the training deliverables, and the best-practices meetup summary from 2017 was distributed to participating Regional Cleantech UP organizers; external publications and presentations are not applicable.

Other Required Reports: SF-425 Federal Financial Report submitted with this report.

Status by SOPO Deliverable

Task Number	Task or Subtask (if applicable) Title	Notes
TASK 1: ACCELERATE – Phase 1 (M1 – M12)		
1.1	Prepare VentureWell Training	Completed M8
1.2	Deliver VentureWell Training	Completed M10
1.3	Host 2017 National Competition	Completed M10
1.4	Data Collection on Participating Teams	Completed M10
1.5	Development of a List of Trusted Partners	Completed M10
1.6	Yearly Review of Program /assessment	Completed M12
1.7	Administer Annual Survey of National Competition	Completed M12
TASK 2: ACCESS – Phase 1 (M1 – M12)		
2.1	Evaluate E.V. MOOC	Completed M8
2.2	Evaluate and Recommend Use of Online Training	Completed M8
2.3	Serve as a Pipeline for Cleantech UP Collegiate Competitions	Started M5, Completed M10
2.4.1	Manage Cleantech UP website	M1-M24

2.4.2	Report Status of Cleantech UP website conversion from 2016	M6
TASK 3: ALIGN – Phase 1 (M1 – M12)		
3.1	Create Board of Advisors	Started M3, Completed M8
3.2	Best Practice Creation of Online Space: Meetup of Regional Organizers at National Competition	Completed M10
3.3	Best Practice Reporting and Dissemination	Completed M12
3.4	Collect & Communicate Success Stories	Completed M12
3.4	Communicate Success Stories: Host Monthly Calls with Regional Organizers	Completed M2-12
TASK 4: ACCELERATE-PHASE 2 (M13 – M24)		
4.1	Prepare VentureWell Training	Completed M20
4.2	Deliver VentureWell Training	Completed M22 in partnership with RBPC
4.3	Host 2018 National Competition	Completed M22 in partnership with RBPC
4.4	Data Collection on Participating Teams	Completed M22 in partnership with RBPC
4.5	Updated List of Trusted Partners	Ongoing- part of RBPC network
4.6	Yearly Reviews of Cleantech UP Competition	Completed M24
4.7	Administer Annual Survey of National Competition	Completed with 4.6, M24
TASK 5: ACCESS-PHASE 2 (M13 – M24) *Note: Due to changing programmatic needs of stakeholders and limited resources, items denoted with strikethrough were removed from the contract of program scope of deliverables, with approval by DOE as of March 2018*		
~~5.1~~	~~Serve as a Pipeline for Cleantech UP Collegiate Competitions~~	Revised 03/2018
5.2	Manage Cleantech UP website	M12-M24
TASK 6: ALIGN-PHASE 2 (M13 – M24)		
~~6.1~~	~~Best Practice Reporting and Dissemination~~	Revised 03/2018
~~6.2~~	~~Best Practice Reporting and Dissemination~~	Revised 03/2018
6.3	Collect and Communicate Success Stories	Completed via social media M22-M23
~~6.4~~	~~Track Program Participants Year-to-Year~~	Revised 03/2018
~~6.5~~	~~Develop Sustainability Plan~~	Revised 03/2018- Program not slated for renewal in 2019