

AMERICAN
MADE
U.S. DEPARTMENT OF ENERGY

Community Energy Innovation Prize



APLUS Team

Impact Phase Final Report

0. Team Information

Team Name:

Team Member Name	Email Address	Organization/Business/Company	Role / Responsibilites
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1. Community Engagement and Partnerships

Our project is “Advanced Power-electronics Lab-to-job-training for Underserved/University Students (APLUS)”. We have three main goals to achieve through the whole project including **1) providing the practical hands-on lab-training for our university/underserved students; 2) bridging the gap between the students’ lab-learning and their job-searching; 3) helping students with their industry and academia career pursuit.**

The general structure and activities of our APLUS project have been shown in Fig. 1. It includes four major parts: **1) lab-to-job research/education and accessible course design; 2) clean energy career workshop/seminar; 3) makerspace lab skills training; 4) company connection & pairing.** The structure is a positive feedback loop in a way that each part can either provide the feedback to the next part and receive the feedback from the former one. For example the first part of “lab-to-job research/education” from the university side can provide the students with the proper knowledge, research and information preparation for the second part of “clean energy career workshop/seminar”. The second part will then demonstrate the accurate and precise industry recruiting needed skills/training to the students in the workshop/seminar. Then, based on the exact needed skills from the second part, we will provide the corresponding tailored “makerspace lab skills training” for students in the third part. Finally, in the fourth part, we will build the targeted and precise “company-student connection & pairing” by showing the capability of our students’ training results to the companies. Also, the fourth part will collect the valuable industry feedback and suggestions to adjust our first part of “lab-to-job research/education” for better and more precise lab-to-job training.

(1) A summary of the results from the team’s engagement and outreach efforts and strategies implemented to build trust and strengthen relationships with relevant disadvantaged communities:

The APLUS team puts every effort to get the disadvantaged communities involved into the activities. Our engagement and outreach for the underserved communities include three aspects: (a) We collaborate with the underserved student organization leaders including the **African Student Organization, Black Student Association, Society of Hispanic Professional Engineers and Society of Women Engineers.** The underserved student organization presidents are our team members which makes it highly efficient and convenient for us to broadly involve their students to our activities. **More**

than 1,000 students from the underserved student organizations have been participated in our program; (b) We collaborate with the community colleges in Texas to benefit the community college students for their career pursuit in the power and energy industry. **More than 10 Texas Community Colleges** have been involved into our program including: **Dallas College, Tarrant County College, Collin College, Remington College, Weatherford College, McLennan Community College, North Central Texas College, Trinity Valley Community College** and so on. More than 800 students from the community colleges have participated in our industrial seminars for the student-company connection of career pursuit; (c) We also collaborate with the **Texas Christian University** to benefit their underserved students in the power and energy industry career pursuit.

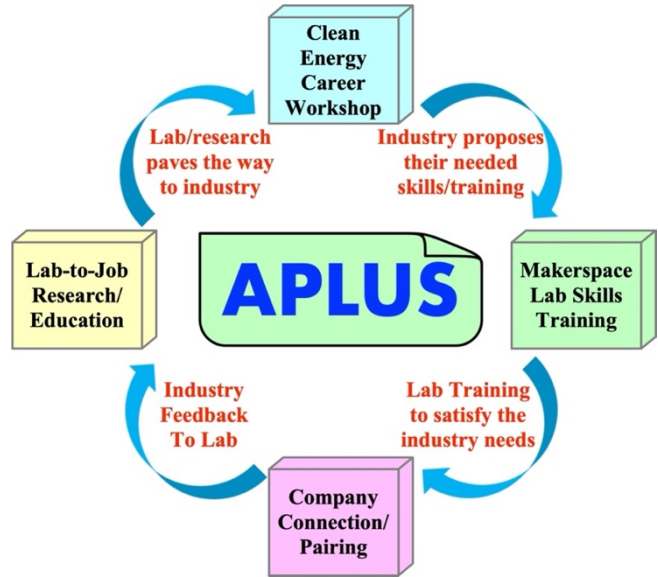


Fig. 1. The general structure and activities of the APLUS project.

(2) An identification and description of the most pressing climate and/or clean energy-related needs of the communities informed by engagement with relevant disadvantaged communities:

The most pressing clean energy-related needs from the underserved students are their internship and job-hunting needs for their future career pursuit. We have connected and talked with more than hundreds of underserved students at UTA and the local community colleges. The most commonly existing and pressing needs from their career pursuit is to find the precise skill requirements from the companies and how to get fully prepared for the intern/job interviews and get satisfied by the employers. The most pressing needs are the accurate and effective bridge and connection between the underserved students and the companies. There are lack of bridge to connect between them. APLUS aims at building this bridge to provide the hands-on training for the students to help them effectively get training for their career pursuit.

(3) A summary of lessons learned from engagement with the relevant disadvantaged communities and how these lessons informed project implementation:

The lessons we learned from the engagement with the underserved communities mainly include (a) the difficulty to distribute our activities and program to the broader range of the underserved students and colleges. Some administrative departments of the underserved organizations and schools are hesitant to put too much effort on the collaboration or partnership. As for this lesson, we adjusted our engagement plan by clearly defining and clarifying the attribution of responsibility for each side of the partners. Also, we strengthened our communication with the involved underserved community administrative departments to release their burden for participation; (b) the provided hands-on training are not generalized enough to satisfy all the backgrounds of skill levels for the underserved student communities. We adjusted our APLUS training plan by designing a progressive and targeted hands-on training plan for different skill levels of the underserved students including the undergraduates, graduates, community college students and so on.

(4) A summary of how implemented activities have effectively met the identified community's climate and/or clean energy needs:

Our activities mainly include four aspects as shown in Fig. 1. (a) We organized **more than 10 times of the lab-to-job research/education workshops** at UTA. We designed one energy related industry practice

course and one online power and energy related course for the underserved students. **More than 1,000 of the underserved students** have participated in the workshops to gain the clean energy-related hands-on training skills; (2) We invited the **leaders/directors/managers/engineers from more than 20 premier companies in the power and energy industries** to provide the industrial seminars for the underserved students to introduce their company information, business, intern/job opportunities and hiring requirements. The companies include MathWorks, Oncor, MP Materials, General Electric, Schneider Electric, General Electrodynamics Corporation, HDR, Mouser, Texas Instruments, Rivian, UL Solutions, Megger, Vistra Corp and so on; (3) We organized the hands-on lab training for the underserved students based on the second step of industrial companies' provided hiring skills in the format of research/practical projects. **More than 20-30 research projects have been delivered to train the students with the desired hiring skills;** (4) **Based on the first three steps of the activities, we are able to build the precise and targeted student-company connections with the potential interns and jobs for more than hundred of students. Also, APLUS project news has been reported and published by City Government Website, University Website, University LinkedIn and Department LinkedIn. The corresponding quantitative APLUS activities and impact results for underserved students has been shown in Table I.**

(5) A summary of the engagements with organizations connected to climate and/or clean energy, community members, and other relevant stakeholders:

(a) We have actively connected and collaborated with the organizations for better and more effective contribution to the underserved students career pursuit. Since the University of Texas at Arlington is the Minority Serving Institution (MSI) and there are more than 14% of the African students (>6000), 25% of the Hispanic students (>12000), we actively participated with the underserved student organizations including the African Student Organization, Black Student Association and Society of Hispanic Professional Engineers to involve their administrative staff for collaboration. The activity implementation efficiency has been significantly improved with the help of the underserved student organization leaders. (b) Also, we actively connected with the local community colleges via the corresponding administrative staff and had deeper communication with them to involve their students to participate in APLUS activities. (c) The Department of Electrical Engineering and the College of Engineering at the University of Texas at Arlington have strong relationship and sufficient alumni resources with the local power and energy companies. APLUS fully utilized this strong connection to actively collaborate with the local power and energy companies for students' career pursuit and job-hunting connection.

Table I: APLUS Activities and Impact for Underserved Students.

Activities	Number of Activities	Number of Involved Students
Lab-to-job research/education workshops	>10	>1000
Energy related industry practice course design and online course design	2	>1000
Industrial seminars for career pursuit	>20	>1000
Hands-on lab training projects	20-30	>500
Student-company connections	>100	>100
News report/release of APLUS project	4 news reports/releases	City Government Website; University Website; University LinkedIn; Department LinkedIn

(6) A summary of the successes and/or failures of any efforts toward building relationships and building trust with disadvantaged communities and how these can improve implementing future efforts:

(a) Success: the most important success for APLUS project is that we figured out the real need of the underserved students' intern/job hunting demands. And furthermore, we researched that even though North Texas is intensive in power and energy industry, the gap between the underserved students and the companies are still existing and urgently require the effective connection. (b) Failure: our hands-on training program included the undergraduate, master and community college students but did not cover the doctoral underserved students group. This requires more high technical level program design. We are putting the effort on this track to involve more doctoral underserved students to participate in the future.

2. Fostering Community-Based Clean Energy Transitions

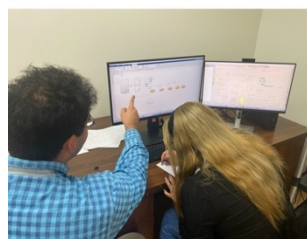
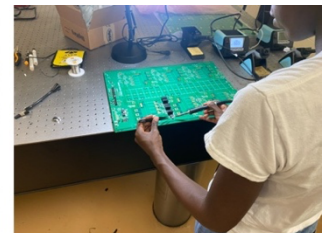
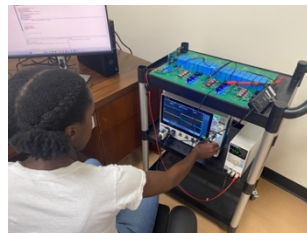
(1) An identification of the stakeholders, resources and activities that contribute to the development or advancement of a community-based clean energy transition within the relevant disadvantaged communities and/or region:

(a) For the stakeholders, resources, our connections include **underserved student organizations** of the African Student Organization, Black Student Association, Society of Hispanic Professional Engineers, and Society of Women Engineers, **more than 20 premier power and energy companies**, **more than 10 community colleges**. (b) For the activities, as shown in Fig. 1 and Table I, we organized more than 10 lab-to-job research/education workshops, more than 20 industrial seminars for career pursuit, more than 20 hands-on lab training projects and more than 100 student-company connections. More than thousand of students have been involved and participated in the APLUS activities for their career pursuit.

(2) A summary of connections made between the identified stakeholders, resources, and activities that contribute to the development or



(a)



(b)

Fig. 2. APLUS (a) and (b) research/education seminar and (c) lab training for the underserved students.

advancement of a community-based clean energy transition within the relevant disadvantaged communities and/or region:

(a) For the stakeholders, resources, our connections include **4 underserved student organizations** of the African Student Organization, Black Student Association, Society of Hispanic Professional Engineers, and Society of Women Engineers, **more than 20 premier power and energy companies, more than 10 community colleges.** (b) For the activities, as shown in Fig. 1 and Table I, we organized more than 10 lab-to-job research/education workshops, more than 20 industrial seminars for career pursuit, more than 20 hands-on lab training projects and more than 100 student-company connections. More than thousand of students have been involved and participated in the APLUS activities for their career pursuit. Also, Fig. 2 shows the APLUS activities of research/education seminar and lab training for the underserved students.

(3) A summary of the barriers and/or challenges to identifying and building connections between stakeholders, resources, and activities in collaboration:

(a) The stakeholders from the company side are not active enough to participate in the APLUS activities due to their normal duty and responsibility to their primary business targets. (b) The stakeholders from the local community colleges showed limited interest in the deep participation into the APLUS training project due to the lack of unified management and natural conflict of affiliation. (c) The distance between different community colleges and the hands-on training locations increased the difficulty for the students to commute and get access.

(4) An identification of tangible next steps that support the development or advancement of a community-based clean energy transition in collaboration with and supported by relevant disadvantaged communities and/or region:

(a) APLUS team will design more feasible and company-side-friendly career pursuit plans to release the burden for the companies. Deeper communications will also be strengthened with the companies to encourage them to participate for the benefit of more student job-hunting opportunities; (b) APLUS will expand our targeted underserved communities from the North Texas area to the whole Texas state and beyond at least from the community college students perspective. Our designed 4-step hands-on training method in Fig. 1 can be applied for more influential impact; (3) APLUS will put more effort to make the students have more access to the activities without being blocked by the commute.

3. Program Implementation and Results

(1) A description of how the team has utilized the CONCEPT and PROGRESS phase prize awards to carry out project activities that are in line with the prize goals:

(a) 25% of the funding is utilized for the lab-to-job research/education workshops; (b) 10% of the funding is utilized for the energy related industry practice course design and online course design; (c) 25% of the funding is utilized for the industrial seminars for underserved students career pursuit; (d) 20% of the funding is utilized for the hands-on lab training projects; (e) 20% of the funding is utilized for the student-company connection.

(2) A summary of team members and/or staff's involvement in carrying out associated project activities:

Prof. Liwei Zhou is responsible for the whole program management and supervision. Zhengwei Dong is mainly responsible for organizing the lab-to-job research/education workshops. Mofoluwatele Olagbami is mainly helping Prof. Zhou to design the energy related industry practice course and online course. Kenzaria Atkins is mainly focused on organizing the hands-on lab training projects. Sofia Gutierrez is responsible for the coordination of student-company connections.

(3) A summary of any resources and capabilities the team utilized to implement project activities that were relevant and effective in advancing a community-based clean energy transition within the relevant disadvantaged communities and/or region:

(a) Prof. Zhou is affiliated with the Department of Electrical Engineering at the University of Texas at Arlington. Prof. Zhou has rich research and development experience in the power and energy area. His research lab has been focused on the clean energy research project. The lab resources for research and hands-on training are sufficient to support the APLUS project. (b) Department of Electrical Engineering at the University of Texas has strong power and energy research and faculty group. They have good connections with the local power and energy industry and companies. (c) 60% of the team members are from the underserved student communities and are the leaders of the underserved student organizations. This brings the strong connection with the underserved student communities for the highly efficient activities notification and distribution with more influence and impact. (d) The University of Texas at Arlington is located in the core area of North Texas. The location is highly intensive in the power and energy industry. This brings more convenience for the implementation of student-company connection and pairing.

(4) A summary of the key takeaways from the specific peer learning activities the team has participated in throughout the prize and how the key takeaways contributed to and/or impacted the team's project:

The APLUS team has actively participated in the CEI organized events and learned a lot from the peers. APLUS learned from the peers that the key point to build strong connections with the local companies mainly depends on the mutual benefit. This means how can you benefit the companies largely determines whether the companies are willing to collaborate with you. Thus, we improved our program by adding more specialized activities for better training our students to satisfy the companies' hiring requirements.

(5) A summary of how the team's project effectively supported capacity building, innovation, entrepreneurship, or economic development related to community-based clean energy transitions for the relevant disadvantaged communities and/or region:

APLUS team designed more than 20 research projects for the underserved students to benefit their career pursuit in the clean energy industry. These research projects are highly related to the cutting edge technologies of electric vehicles, renewable energy and transportation electrification. Some of the students are leveraging the innovative results of the research project to compete for the MathWorks Global Sustainability and Renewable Energy Challenge with the possibility to commercialize the technology for the clean energy career.

(6) Appropriate metrics and specific, measurable, actionable, relevant, and time-bound goals that demonstrate the team has met one or more of the goals of this prize:

As shown in Table I, (a) We organized **more than 10 times of the lab-to-job research/education workshops** at UTA. We designed one energy related industry practice course and one online power and energy related course for the underserved students. **More than 1,000 of the underserved students** have participated in the workshops to gain the clean energy-related hands-on training skills; (2) We invited the **leaders/directors/managers/engineers from more than 20 premier companies in the power and energy industries** to provide the industrial seminars for the underserved students to introduce their company information, business, intern/job opportunities and hiring requirements. The companies include MathWorks, Oncor, MP Materials, General Electric, Schneider Electric, General Electrodynamics Corporation, HDR, Mouser, Texas Instruments, Rivian, UL Solutions, Megger, Vistra Corp and so on; (3) We organized the hands-on lab training for the underserved students based on the second step of industrial companies' provided hiring skills in the format of research/practical projects. **More than 20-30 research projects have been delivered to train the students with the desired hiring skills;** (4) **Based on the first three steps of the activities, we are able to build the precise and targeted student-company connections with the potential interns and jobs for more than hundreds of students. Also, APLUS project news has been reported and published by City Government Website, University Website, University LinkedIn and Department LinkedIn.**

4. Projected Impacts and Sustainability Plan

(1) An ambitious and achievable vision for a just and equitable community-based clean energy transition and how the team seeks to achieve that vision:

For the future vision of ALUS project, our plan is as follows. (a) Broaden our impact and beneficiary to the whole Texas area of the underserved students in the community colleges and minority serving institutions. We will generalize our APLUS four-step plan and make it more practical for different areas of the local conditions in the aspects of industry, college distributions and characteristics; (b) Broaden our covered scope of underserved students from undergraduate, master, community college to high skill level of doctoral underserved students. We will collaborate with more experienced faculty to design more specialized and highly skilled training program to satisfy the doctoral underserved student community; (c) Enhance the APLUS targets from purely helping the students with their intern/job-hunting to students entrepreneurship. Design the corresponding entrepreneurship and leadership related course in the power and energy industry by collaborating with the faculty in the College of Business.

(2) A description of what the team could achieve with ongoing funding in support of a just and equitable community-based clean energy transition in the relevant disadvantaged communities and/or region:

The just and equitable community-based clean energy transition is always the major goal of APLUS project. All the APLUS activities in Table I are designed by firstly checking the equity and inclusion of the activity procedures. If there are bias among the whole process of the activities, the implementation of the activities will be immediately terminated and adjusted accordingly to make sure the equity and inclusion are ensured through the whole time duration.

(3) A description of strategies the team will employ to secure ongoing funding to build upon the proposed activities to ensure sustainability of the team's project:

APLUS team will leverage the results and progress of the project to gain more funding for a sustainable development. Since APLUS team has built strong connections with the power and energy companies for the mutual benefit of career pursuit and hiring process, APLUS will seek for funding support from the connected companies. One of the collaborative company, MathWorks, has approved to provide funding support of around \$40,000 to support Prof. Zhou for the clean energy related course design to benefit both the underserved students and the MathWork community.

(4) A description of anticipated results from the team's post-prize efforts that will lead to a just and equitable community-based clean energy transition:

APLUS will put every effort on the equitable clean energy transition after the prize funding demonstration period including the inviting more companies to provide the online industrial seminars for the underserved student communities, organizing lab training for the underserved students who have difficulty in securing an intern or job for career pursuit. The anticipated results would be less inequitable job-hunting competitions among the underserved students and more industry opportunities to be shared among all the students without bias.