

BATTERY OF ALLENGE REQUEST FOR PROPOSAL



BATTERY WORKFORCE CHALLENGE IS MANAGED BY ARGONNE NATIONAL LABORATORY FOR THE U.S. DEPARTMENT OF ENERGY

A EXECUTIVE SUMMARY

Item	Description			
Request for Proposals Issue Date	March 22nd, 2023			
Submission Deadline for Proposals	May 18th, 2023*			
Required Submission Documents	1. Primary Proposal (requirements in section E-2) with the following name convention:			
	University Initials_Battery Workforce Challenge Proposal – YYYY.MM.DD.pdf			
	2. Engineering support letter (requirements in section E-2) with the following name			
	convention: University Initials_Support Letter 1.pdf			
Means of Submission	An electronic PDF version of the Proposal and University Support Letters must be submitted to			
	the Battery Workforce Challenge website.			
Anticipated Teams Accepted	Up to 11 teams			
Eligibility	Four-year universities located in the continental United States that are accredited by the			
	Accreditation Board for Engineering Technology (ABET). Four-year universities located in Canada that are accredited by the Canadian Engineering Accreditation Board (CEAB).			
Multiple Submissions and University	A university or vocational institution may collaborate between multiple campuses as one			
Collaborations	"team," however, proposals will only be accepted from one accredited university.			
Non-Disclosure/IP Agreement	All participating universities will be required to agree to and adhere to the terms			
	defined in non-disclosure (NDA) and intellectual property (IP) agreements from			
	competition-level sponsors.			
	Other competition-level sponsors who donate products which require sharing confidential data			
	with the universities may also require separate NDA and/or IP agreements.			
Target Team Notification Date	June 30 th , 2023			
Target Launch Date (Virtual)	September 14 th , 2023			
Target Kick Off Workshop Date (In person)	Week of September 25th, 2023			

*Due to Finals and Graduation dates, the target deadline may be challenging for some teams. Contact <u>battchallenge@anl.gov</u> to request special accommodations.

TABLE OF CONTENTS

A EXECUTIVE SUMMARY	II 1 1 2 3 6 10 10
C COMPETITION SUPPORT FOR ACCEPTED TEAMS	11
C-1 Cash Contributions	11
C-2 In-Kind Contributions	12
D UNIVERSITY COMMITMENTS FOR ACCEPTED TEAMS	13 13 14 14 15 15
E PROPOSAL PROCESS AND REQUIREMENTS	16
E-1 Proposal Process Overview	16
E-2 Proposal Formatting Requirements	17
E-3 Required Proposal Content	17
E-4 Addendum: Support Letters.	22

B ABOUT THE **C**OMPETITION

B-1 Introduction

Addressing climate change is one of the most significant challenges of our generation. The U.S. Department of Energy has set a bold target of net zero emissions by 2050 to tackle our nation's climate crisis. To achieve this goal, we must develop and deploy a skilled workforce prepared to advance our nation toward electrification, decarbonization, and other climate change actions.

Argonne National Laboratory is pleased to announce Battery Workforce Challenge, which includes a collegiate engineering competition, vocational training and youth education in science, technology, engineering, and math (STEM) as well as career & technical education. The program seeks to foster a diverse talent pipeline of trained engineers, workers and technicians who can help charge North America's battery industry forward and to advance domestic battery technology leadership. The challenge will be sponsored by the U.S. Department of Energy, Stellantis and other government and industry partners, and will be executed by Argonne.

A core part of the Battery Workforce Challenge (BattChallenge) is a new student competition series that invites universities and vocational schools from across North America to design, build, test, and integrate an advanced EV battery pack into a production Stellantis vehicle. Kicking off in Fall 2023, the three-year competition will provide an immersive hands-on learning experience for students to gain valuable engineering, manufacturing, and battery testing skills that transcend the classroom environment. Selected universities will develop mutually beneficial and reciprocal partnerships with community colleges, trade schools, apprenticeship schools or other vocational partners to solve complex battery design and manufacturing challenges which help to prepare a diverse workforce for future battery engineering and manufacturing careers.

Teams will follow real-world industry milestones focused on battery design, simulation, controls development, testing, and vehicle integration and demonstration. Participants will also learn valuable project management, communications, teamwork, and problem-solving skills that will provide them an unparalleled educational experience and prepare them for future careers throughout the battery industry.

The competition portion of the Battery Workforce Challenge builds upon a 35-year history of Advanced Vehicle Technology Competitions (AVTCs) managed by Argonne National Laboratory for the U.S. Department of Energy, in partnership with the automotive industry. These competitions exemplify the power of government/industry partnerships in addressing our nation's toughest energy and mobility challenges and provide invaluable knowledge and skills to promising young minds that better prepare them to enter the workforce. More than 30,000 students from 95 unique educational institutions have participated in these competitions, seeding the industry with engineers who have helped redefine the automobile over the last three decades.

AVTCs are North America's premier collegiate engineering competitions, providing an unparalleled, hands-on educational experience that transforms the traditional classroom environment into a hub for automotive and battery innovation. By engaging university students in advanced technology research, the competitions also support national efforts to encourage students to pursue STEM careers and enable the U.S. to develop the workforce needed to be competitive in the global marketplace.

B-2 Vision

The transition to electric mobility has spurred demand for a domestic EV battery workforce with the knowledge and hands-on experience needed to fill in-demand positions throughout the battery supply chain. The Battery Workforce Challenge seeks to develop the next generation of the battery workforce who will support this demand. Projections indicate that consistent investment in the next 15 years in e-mobility would translate to the creation of net + 2 million jobs in the United States (2035 Report), yet only 6% of all 24-year-old Americans hold undergraduate degrees in STEM disciplines. For underrepresented minority students, the percentage hovers at 2-3% (Pathwaytoscience.org; NSF). Battery Workforce Challenge will support training, education, and experiential learning throughout the STEM pipeline to develop the next generation of battery engineers that will advance North America's battery industry into the future.

Broadening participation in the U.S. STEM enterprise will lead to the expansion of STEM capabilities throughout the U.S. workforce and enhance the innovative capacity of the Science & Engineering enterprise in the United States (NSB 2020; NSF). The Battery Workforce Challenge holds Diversity, Equity & Inclusion (DEI) as a top priority and will integrate initiatives throughout all aspects of this program to ensure that a diverse group of students have an opportunity to bring their skills and creativity to contribute to the program.

The Li-Bridge Skills Gap survey shows that more than 200k new jobs along the battery supply chain will be required to support the US demand for Li Batteries by 2030, a growth of 10 times the current workforce (Li-Bridge Compendium, August 2022). High amongst the priorities to strengthen the US battery supply chain is an investment in workforce training and an update to applied educational curriculum to upskill/reskill in emerging clean energy technologies. The Battery Workforce Challenge includes an ongoing three-year student competition that provides an immersive hands-on learning experience for university and vocational students to gain critical battery design and development skillsets and build knowledge and technical understanding well beyond the traditional engineering and manufacturing curriculum.

B-3 Technical Scope

The Battery Workforce Challenge invites up to 11 North American universities to partner with vocational institutions to design, build, test and integrate an advanced EV battery pack into a production Stellantis vehicle. The competition provides participants with hands-on, real-world experience, in battery design and development by utilizing engineering standards, methodologies, and industry practices for high voltage batteries. Students will also learn valuable project management, teamwork, component sourcing and problem-solving skills that will ready them for future careers throughout the battery industry.

B-3.1 Technical Goals & Competition Objectives

Teams (combined university and vocational institutions) will be tasked to use industry standards and best practices throughout the challenge. Teams will follow industry design and development processes focused on battery design, simulation, controls development, testing, vehicle integration, and performance demonstration throughout the three-year competition. Teams will be given maximum pack envelope, mounting locations and key header connectors to integrate their pack into a production vehicle. Teams will also be provided cells to deliver their functioning battery pack based on their own designs and component sourcing. Pack designs must include but are not limited to the following:

- Wiring
- Busbars
- Battery management system (monitoring voltage, current, temperature, cell balancing, and control of battery disconnect unit)
- Structural integrity
- Thermal management
- Battery disconnect unit (contactors, fuses, etc.)
- Housing

Teams will be expected to meet key metrics at each milestone identified over the three-year competition. A structured design review and safety approval process will be conducted after each identified milestone. Teams will also perform battery pack testing and cycling to evaluate various characteristics, such as:

- Pack communication
- Thermal management
- State-of-charge (SOC)
- State-of-health (SOH) performance
- Pack degradation
- Charging functionality

B-3.2 Vehicle Platform

Each team will receive a Stellantis production level battery electric vehicle. Teams will be expected to install their custom battery pack solution without any vehicle modifications. Teams can expect vehicle delivery by the end of Year 2 of the competition.

B-3.3 Potential Areas of Opportunity for Innovation

In addition to the required deliverables and milestones within the competition, there are additional areas that teams may be interested in attempting to integrate into their activities or battery pack (dependent on the vehicle capabilities). Some examples of areas to explore are listed below. While not required, these are real life challenges and areas of innovation being explored within the industry.

- Design and validation of a novel prototype thermal system
- Charging considerations such as onboard charging, bidirectional, DC fast charging, etc.
- Wireless BMS technology
- Design for sustainability/serviceability
 - Pack design which considers serviceability can increase the ease / likelihood of pack repair and pack longevity (sustainability).
- Battery recyclability, 2nd life usage and end-of-life disassembly

B-4 Competition Timing and Structure

B-4.1 Anticipated Annual Activities

The Battery Workforce Challenge will follow a three-year timeline with distinct milestones established for each competition year. Table 1 summarizes the anticipated activities for each competition year.

Year	Anticipated Activities
Year 1	Pack-level requirements, component-sizing, architecture, packaging design strategy, etc.
	Project management outline
	Safety analysis (ex: DFMEA, ground isolation strategy)
	Test plan creation (ex: DVP&R)
	Pack Design (cell layout, electrical interconnections, thermal strategy, etc.)
	Vocational collaboration plan definition and implementation
	Cell characterization and testing
	Pack virtual analysis and correlation to cell test data
	Pack performance forecast based on simulation
	BMS requirements and functional diagram development
	State of charge and state of health strategy design
	Cell balancing strategy development
	BMS architecture design (voltage, temperature, etc. monitoring and control)
	BMS proof of concept
	Battery pack disconnect unit design and prototyping (contactors, pre-charge circuit, current sensing, etc.)
	Professional design reviews (pack design, BMS proof of concept and functional diagram, virtual analysis and pack forecast,
	DFMEA and DVP&R, etc.)

TABLE 1: ANTICIPATED ACTIVITIES FOR THREE-YEAR COMPETITION

Year	Anticipated Activities
	Revisions and improvements to Year 1 designs (pack, BMS, pack power interface, SOC/SOH, etc.)
Year 2	Finalize CAD models for pack design
	Safety analysis refresh and verification
	Pack-level build
	Vocational integration activities
	Battery pack bench testing and commissioning
	BMS software development, including SOC/SOH, base software, CAN communication layer, etc.
	Thermal system characterization
	DFMEA and DVP&R updates and results
	Professional design reviews (pack level and BMS testing/validation results, thermal management, safety, correlation of pack test
	results to pack forecast, etc.)
	Revisions and improvements to Year 2 designs (pack, BMS, pack power interface, SOC/SOH, etc.)
	Safety analysis refresh and validation
	Vocational integration activities
	BMS algorithm testing and validation on-vehicle
Year 3	Vehicle-level pack integration, testing, and validation
	Validation of CAD models to physical pack design
	Safety and Road readiness checkout and sign off
	Thermal system testing and validation
	Battery pack power interface testing and validation
	Pack performance characterization and evaluation on-vehicle
	DFMEA and DVP&R updates and results
	End-of-year vehicle/battery demonstration and testing
	Professional design reviews (pack testing/validation results, SOC/SOH algorithms, thermal management, safety, etc.)

B-4.2 Training and Workshops

Teams can expect up to two training workshops per competition year in which in-person participation is required. Additionally, teams can expect an in-person end-of-the-academic-year competition. Table 2 provides additional details on these annual events as well as expected participation from university students and faculty. At least one faculty member must accompany student team members to official workshops and annual competitions to provide technical advising and serve as the official university representative. Online tools will be used to supplement in-person training and events to minimize the time students and faculty are away from campus. Virtual training opportunities will be offered throughout each semester.

Stellantis and other sponsors provide travel allotments to the participating teams, but often, teams find they need to supplement their funding with roughly 20-30% additional funding from the university or local/team sponsors.

The Faculty Advisor is required to work with the university administration and faculty to make arrangements that ensure students who travel to competition events are not penalized for their absence from campus/class.

TABLE 2: YEAR 1 BATTERY WORKFORCE CHALLENGE EVENTS AND EXPECTED UNIVERSITY PARTICIPATION

Event	Description	Expected Participation	Dates/Location
Kick-off and Fall	Information sessions on BattChallenge rules, activities,	1 faculty advisor	Week of September 25th
Workshop	deliverables, points, etc. Training sessions on a variety of	5-9 students	Location TBD
	topics. Networking and recruiting opportunities with		
	BattChallenge sponsors.		
Winter	Training sessions on a variety of topics. Networking and	1 faculty advisor	Dates and location TBD
Workshop	recruiting opportunities with BattChallenge sponsors.	5-9 students	(Target Feb 2024)
	Potentially, judged presentations covering one or more topics		
	relevant to BattChallenge activities		
Year-end	Judged presentations (evaluated by competition sponsors).	1 faculty advisor	Dates and location TBD
Competition	Networking and recruiting opportunities with BattChallenge	6-10 students	(Target May 2024)
	sponsors. Final Awards Ceremony		

Additional training content areas

Throughout the duration of the challenge, organizers and sponsors will provide additional training on relevant topics to support the teams in meeting the milestone deliverables. These trainings will vary in format and will combine in-person and virtual learning experiences. Some of the areas identified for training are listed below. Curriculums will be refined to maximize the learning experience and to set the teams up for success.

- Battery energy storage and power
- Basics of cell technology and assembly
- BMS Control
- Mechanical robustness, 3D modeling, finite element analysis
- High and Low Voltage Electrical Engineering
- Battery safety
- Automotive specific design considerations (shock/vibration, electro-magnetic compliance, on-board diagnostics, climate considerations...)
- Manufacturing, assembly, recycling
- Diversity, Equity, and Inclusion

B-4.3 Competition Events, Deliverables, Scoring, and Prizes

The Battery Workforce Challenge will utilize various activities to evaluate team understanding of battery design, BMS design, and vehicle integration processes. These activities range from mid-year written deliverables, professionally judged presentations, remote or in-person testing events, and the year-end competition. Team vehicles and components will also be evaluated in a variety of test scenarios to compare performance in areas such as vehicle range, pack energy density, power capability, charging time, etc.

Teams will garner points in each of the annual activities; the team with the most points will win that year's competition. An overall winner will be crowned for each year of the competition and scores reset to zero after the conclusion of each year. Approximately \$100,000 in cash prizes will be awarded to teams across several different categories. Awards will be presented at the awards ceremony during the annual competition finale.

Additionally, sponsors will provide awards for individuals that promote the vocational and university collaboration in this battery competition such as:

- DEI in Battery Technology Award
- Battery in Manufacturing Award
- Communications and Outreach Award

B-4.4 Target Competition Launch

Prior to the Kick-Off Workshop the week of September 25th, there will be a virtual Launch Workshop on September 14, 2023. The Launch Workshop will address organizational and administrative requirements and

recommendations for the competition. The Kick-Off Workshop will cover technical requirements, recommendations, and introduce the universities to the additional details not covered in this RFP.

B-5 Team Structure

To maximize the impact to the emerging needs of the workforce, vocational institutions will be integrated into the competition to help develop the talent needed for the battery industry. Competition teams will consist of university and vocational school participants who will act as one team collaborating within the scope of battery pack design, build, test, integration, and validation.

The vocational element is required within the competition. As such, vocational students will join the team to supplement the undergraduate student activities. The establishment of this collaboration will be developed during Year 1 of the competition. For the proposal, universities are required to provide a draft vocational plan. This plan can include leveraging existing partnerships, proposing new partnerships, or identifying areas and activities where an unidentified vocational partner would be needed for successful execution of the challenge. Once universities have been selected and notified, they will be required to further develop this collaboration plan and select one vocational collaborator as part of a Year 1 competition deliverable.

Universities submitting a proposal need to include a description of their vision for achieving this strong vocational collaboration. While the collaboration is not to be finalized until the second semester of Year 1, applicants should expound on the potential schools they would target for collaboration and why that collaboration would be mutually beneficial. The university and vocational collaborators will be considered equal partners within the team selected for Battery Workforce Challenge. Figure 1 provides the minimum required team structure for the partnership along with some recommended example roles.



Figure 1: Recommended Structure for Team

To ensure success in Battery Workforce Challenge, teams will be given some discretion to assign roles based on the organizational structure that meets their team's needs. The collaboration within the team between the University and Vocational school will vary across each team depending on the needs and opportunities identified by the university within their proposal and in the 1st year of the competition. While universities and vocational institutions are responsible for building and developing the competition team at their discretion, the team must include the following roles.

B-5.1 Core University Personnel

Table 3 summarizes the required core university personnel required for the Battery Workforce Challenge. See section C-1.2 for additional details on funding provided by BattChallenge.

Role	Battery Workforce Challenge - Provided Funding	University Matching Funding
Faculty Advisor	\$0 per year	University is expected to fund faculty and provide support defined in the RFP
GRA (Project Manager)	\$15,000 per year	The university must supplement this funding as needed to ensure
GRA (Engineering Manager)	\$15,000 per year	these two GRAs are fully funded, full-time GRAs
University Team Choice	\$4,500 per year	Recommended to match
University Vocational Liaison	\$4,500 per year	Recommended to match

TABLE 3: CORE PERSONNEL FOR UNIVERSITY PARTICIPANTS

B-5.1.1 University Faculty Advisor

Each university is required to provide at least one Faculty Advisor from the College of Engineering to support their team. This Faculty Advisor will be the main contact for the competition organizers and will have the responsibility and authority for the program and participating students.

The university can select a faculty member from any department within the College of Engineering, but the Faculty Advisor should have some prior exposure to or experience in battery design and vehicle integration.

Additional faculty are strongly recommended to provide the team with a broad range of expertise related to battery design, building, testing, and integration. Additional faculty can also provide mentoring and guidance in areas including but not limited to Communications, Project Management, Fundraising/Sponsorship Development, Technical Writing and Presentations, Diversity, Equity & Inclusion, etc. This mentoring may be provided by additional faculty advisors, university administrators or other staff, as well as local industry sponsors or Subject Matter Experts. Teams are encouraged to develop a diverse group of mentors to encourage, support and retain all students entering the space. Diversity in leadership is a key enabler to demonstrate that career opportunities are available and an option for everyone.

B-5.1.2 University Team Leaders (GRAs)

While primarily an undergraduate engineering and vocational manufacturing/testing project, a minimum of two graduate students will be required to serve as Team Leaders. These positions will be funded by competition sponsors and are expected to provide technical expertise, project management and leadership continuity for the undergraduate team.

The competition intends to provide each team \$30,000 USD/annually to partially fund two graduate students (GRA). One of the GRAs will act as Project Manager and the second as Engineering Manager. These graduate students must have a relevant engineering undergraduate degree or currently be enrolled in an engineering graduate program, must have strong technical and leadership skills, and be capable of providing continuity to the team over multiple years.

These positions are critical to enabling the continuation of leadership and expertise required for the team to be successful over the multi-year competition. GRA rates vary by university, and in some cases, the anticipated \$15,000 USD annual funding per GRA may not cover a university's costs associated with each of the two full-time GRAs. Any additional costs to ensure that the competition funded GRAs are full-time must be supplemented by the university and outlined in the proposal it submits and in the annual Good Faith Agreements. Additional details about GRA funding will be provided after the teams are selected.

Engineering Manager (GRA)

This graduate student will work very closely with the Lead Faculty Advisor to plan, execute, and manage all technical elements of competition deliverables and requirements. The Engineering Manager (EM) will lead the undergraduate team members in the technical execution of the competition. This role is expected to provide technical continuity to the team throughout the 3 years of the competition and provide leadership and coordination of activities in support of the Project Manager to meet deadlines and project goals. Undergraduate students will look up to the EM for guidance on how to successfully execute their role within the engineering deliverables of the competition. The EM will use their educational background to guide the design cycle of the battery and coordinate team members to undertake different areas of focus needed in the battery pack such as BMS, thermal, mechanical, etc.

Project Manager (GRA)

This graduate student will manage the planning of the project deliverables and activities. This includes responsibility for developing the overall project timeline and work items, tracking and executing all project-level activities, knowledge transfer, recruiting and retention activities, and managing all local sponsorship and fundraising activities. The Project Manager (PM) will need strong technical and managerial skills and will work very closely with the Lead Faculty Advisor to plan, implement, and manage all competition deliverables, milestones, and finances to optimize the project execution in alignment with the proposed project plan. The PM will not only develop the overall project timeline and work plan but is also responsible for tracking and executing all project-level activities.

B-5.1.3 University Undergraduate Students

Participating universities are encouraged to build a strong interdisciplinary program to support the battery design and engineering activities, recruiting students from a variety of disciplines such as:

- Mechanical Engineering
- Electrical and Computer Engineering
- Computer Science
- Materials Engineering and Materials Science
- Electrochemical Engineering or Electrochemistry

The team should primarily consist of undergraduate engineering students to execute competition tasks. Assignment of specific students to the defined roles will occur during Year 1 of the competition. Success within the competition will require students with proficiencies related to the different milestones throughout the competition. These include, but are not limited to BMS hardware and software development, mechanical and structural engineering, thermal system engineering, etc. With exception of BattScholars, the undergraduate students will be volunteer participants.

Other non-engineering undergraduates may be included within the team to supplement activities beyond the engineering aspects of the competition. Teams will likely find students from other disciplines to be valuable assets to the planning and execution of their Battery Workforce Challenge programs such as Communications, Business, Engineering Management, and Diversity, Equity & Inclusion. Although not required, the emphasis on these areas imitates a real-world automotive battery industry environment and gives Battery Workforce Challenge graduates the skills to enter the field fully prepared for a successful career immediately upon graduation. The university may select and define what these additional resources will contribute to the team within their proposal. These roles may also adapt from the proposal to the needs of the competition during the first year.

University BattScholar: Team Choice

In addition to the funded GRAs, each competition team will have an undergraduate scholar supported at a rate of \$2,250 per semester (or \$1,500 per quarter) and should be selected based on merit and need. The scholar can change from semester to semester or year to year throughout the competition, but this student should be identified by year 1 Kick Off. It is up to the discretion of the university as to which role within the undergraduate participants this scholarship is awarded to. Deliverables will be determined based on the role of the selected BattScholar.

University BattScholar: Vocational Liaison

To ensure successful collaboration with vocational partners, a vocational liaison will be another scholar position within the undergraduate team members. This role will help coordinate joint activities and ensure the two institutions operate as equal partners at the student level. The scholar will also be supported at a rate of \$2,250 per semester (or \$1,500 per quarter) and should be selected based on merit and need. The scholar can change from semester to semester or year to year throughout the competition, but this student should be identified by Year 1 Kick Off. Liaisons will be required to lead communication between university students and vocational students, support Year 1 Vocational Collaboration Plan and other pre-competition reports, and participate in end of year competition presentations.

B-5.2 Core Vocational School Participants

Table 4 provides a summary of the required vocational team members and the funding supplied to and expected from the vocational partner.

Role	Battery Workforce Challenge- Provided Funding	Vocational Matching Funding
Faculty Advisor	\$0 per year	Vocational institution is expected to fund faculty and provide support defined in the year 1 plan
Vocational Team Leader and University Liaison	\$4,500 per year	Recommended to match
Vocational Team Choice	\$4,500 per year	Recommended to match

TABLE 4: CORE PERSONNEL FOR VOCATIONAL PARTICIPANTS

B-5.2.1 Vocational School Faculty Advisor

During Year 1 of the competition, selected universities will choose a vocational activity and partnering institution to complement the already participating university team members. These vocational institutions will also need to commit to at least one faculty advisor with experience relative to the selected collaborative activities or to battery manufacturing and testing.

The requirements defined for the university faculty advisor may also apply to the vocational faculty advisor, such as being the point of contact and traveling with students to events. The vocational plan submitted in the proposal should include what vocational faculty support the university anticipates that it would need to achieve the proposed collaborative work. Vocational faculty requirements will be provided during Year 1 of the competition.

B-5.2.2 Vocational School Team Leaders

Participating vocational schools will receive funding to support two BattScholar positions.

Vocational School BattScholar: Vocational Team Leader and University Liaison

To ensure successful collaboration with university partners, a BattScholar will be named to serve as the vocational team leader and liaison between the vocational and collegiate institutions. This role will help coordinate joint activities with the university vocational liaison and ensure the two institutions operate as equal partners at the student level and have responsibilities in keeping the team to the overall project timeline. Liaisons will be required to lead communication between both schools, support development of the Year 1 Vocational Collaboration Plan and may be tasked with drafting other pre-competition reports and end of year competition presentations. Some additional responsibilities to be delegated to this leadership role may include tracking and executing all project-level activities, knowledge transfer, recruiting and retention activities, and managing local sponsorship and fundraising activities. The scholar will also be supported at a rate of \$2,250 per semester (or \$1,500 per quarter) and should be selected based on merit and need. The scholar can change from semester to semester or year to year throughout the competition and is to be defined during Year 1 once the partnership is established.

BattScholar: Vocational Teams Choice

Each competition team will have a vocational scholar supported at a rate of \$2,250 per semester (or \$1,500 per quarter) and should be selected based on merit and need. The scholar can change from semester to

semester or year to year throughout the competition and is to be defined once the collaborative team is formed. It is up to the discretion of the vocational partner as to which role within the vocational participants this scholarship is awarded to. Deliverables will be determined based on the role of the selected BattScholar.

B-6 Safety

Safety is paramount for Battery Workforce Challenge and no modifications are allowed on the vehicle. The student designed battery pack and non-modified vehicle must meet competition safety standards and technical requirements and will be subject to a safety inspection before the competition event. Failing to pass inspection will prohibit teams from participating in the competition event during that year. The competition will emphasize a system level safety approach, and teams will be required to complete various industry-standard system safety analyses. There will be high voltage and safety training support provided by the competition and teams will be required to complete safety activities each year.

Teams will be responsible to identify proper facilities and safety protocols to build and test their HV battery packs throughout the competition. Teams must also employ adequate lab safety protocol in all workspaces, fabrication areas, and garage areas. Participating schools must develop and submit facility safety plans that define processes and procedures for safe operations in team facilities. These plans must have defined training and certification procedures (approved by the university administration) for all equipment that will be used or worked on during the project, including (but not limited to) high-voltage electrical safety, machine shop, welding, and vehicle hoist operation equipment. Participants must have a working knowledge of the proper use of appropriate personal protective equipment whenever they perform work on Battery Workforce Challenge battery packs and vehicles at the schools and at all Battery Workforce Challenge events.

Schools will also be required to provide students with the following training through internal resources or experienced third-party training resources. The challenge will include some training in these areas, but the university needs to develop a methodology for training students and ensuring that their team knows what they are authorized to do at the level they are trained.

- General garage space safety training will be required to enable student access to garage space
- Three levels of dedicated high voltage safety training for students to progress through as needed:
 - Level 1 for general high voltage awareness & how to work safely with high voltage components
 Students with this training would <u>not</u> be permitted to work hands-on with high-voltage components
 - Level 2 for non-exposed high voltage work
 - Students with this training would be permitted to work hands-on with non-exposed high voltage components
 - Level 3 for exposed high voltage work
 - Students with this training would be permitted to assemble and work with exposed high voltage components

B-7 Student Focus

Battery Workforce Challenge will provide an unparalleled experience in battery system design and integration, with students taking part in a transformative hands-on effort to design a new battery system from the cell up, integrate it in a production vehicle, and validate the system operation in vehicle testing environments. Student teams participating in Battery Workforce Challenge will take part in an experience designed to build the engineering and manufacturing leaders needed to accelerate our nation's transition to clean energy technology and electric vehicles. Multidisciplinary student teams will receive mentorship from industry experts on all aspects of battery system design, manufacturing, integration, and vehicle validation, taking engineering concepts beyond the classroom and applying them to create novel battery system prototypes in a real-life production vehicle.

Students in community, trade, or apprenticeship schools will collaborate to integrate vocational activities into the competition. These activities are intended to provide hands-on learning related to manufacturing, testing and other relevant roles identified in gap assessments of the battery industry. Other vocational collaborative opportunities can include outreach to local under-served high school students within the career and technical education program to usher in the next generation of battery manufacturing and engineering students. This

collaboration will broaden the impact of the competition beyond the engineering needs of the EV and battery industry workforces.

The competition will emphasize skills and expertise needed to successfully create a working prototype battery pack while providing the foundational experience necessary for hitting the ground running with our industry partners in the development of electrified vehicles and their batteries.

B-8 Additional Emphases

Recommended roles defined in the Team Structure of Figure 1 and related activities are further described in this section. The Team may opt to select any of these recommended roles for the Teams choice BattScholar positions. Those scholarships may also be used for support of any member of the technical team that the university and vocational institution identify as qualified based on need and merit.

Technical Leads

To ensure success in execution of the challenge, technical leads will be helpful in specializing in areas of emphasis needed to achieve a battery pack solution. The Technical Leads can be focused on any aspect of the battery pack challenge. They should have sufficient understanding in their subject through relevant course work and interest in the function of the subject they act as technical lead for. Some examples of potential areas of specialization are: BMS, Low Voltage, High Voltage, Thermal, Charging, etc.

Communications/PR

The team will be responsible for several marketing and communications efforts to promote the team locally. This includes marketing, communications, and outreach activities such as youth outreach, campus and community events, as well as managing the team's social media accounts and any other multimedia support.

The team will need to identify an undergraduate or graduate student(s) to fulfil these activities. The student(s) may be from any major, but we encourage the team to try to secure a student seeking a public relations, communications, or marketing degree. As the team structure shows in Figure 1, it is recommended that the team define a communications and marketing coordinator to lead in these activities during Year 1 of the competition.

<u>DEI</u>

Research has shown that diversity can benefit STEM because new innovations are created through the ingenuity and intelligence of diverse groups of talented individuals working together to problem solve and achieve shared goals (UC Davis). Teams are strongly encouraged to assemble a diverse group of faculty, students, and university staff that represent the diversity of North America to participate in this competition. Women, persons with disabilities, and underrepresented minority groups—blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives—are vastly underrepresented in the STEM fields that drive the energy sector and we encourage teams to make strides toward the inclusion of these groups within the program.

Recruiting

The team will need to actively recruit students to participate in the competition. Over the course of the 3 years, some students may stop participating due to graduation or other reasons. As such it is recommended that a volunteer recruiting coordinator be included on the team to help engage new students into participating and to help build a diverse, equitable, and inclusive team. The outreach should be extended to engaging vocational students into participation at the partnering vocational institution as well. As the team structure shows in Figure 1, it is recommended that the team define a recruiting coordinator to lead in these activities during Year 1 of the competition.

C COMPETITION SUPPORT FOR ACCEPTED TEAMS

C-1 Cash Contributions

Participating teams will receive cash support from competition sponsors. The following contributions will be provided to all participating teams.

C-1.1 Seed money

Universities will be provided \$30K USD in seed money at the start of Year 1 (Fall 2023). Vocational partners will receive \$20K USD in seed money once the partnership is established in the Spring of 2024. Seed money can be allocated at the recipient's discretion for BattChallenge GRAs, paid student or faculty time, or facility/equipment costs.

C-1.2 Student Funding

Universities will receive funding for two graduate students, each funded at \$15K USD/year (\$30K total). Each team will also be eligible for scholarships for four students (BattScholars) each year of the competition. These will cover 2 university students and 2 vocational students at \$2.25k per semester (or \$1.5k per quarter) each. Recipients will be selected based on need and merit. It is recommended that institutions match the scholarship amount to further support the BattScholars. The roles for these scholarships are outlined in section B-5.1. See section D-2 for details on matching university support.

C-1.3 Outreach grants

Additional microgrants (up to \$1K/university and \$1K/vocational school per year) will be available to each team to enable the execution of DEI in STEM recruiting activities, outreach events and other communication activities that help to increase visibility of the program on campus, in the community and with key stakeholders, especially those that increase engagement with underrepresented groups. More information will be provided during the Kick-off meeting.

C-1.4 Travel support

Universities and vocational partners will receive travel support to attend the workshops and end of year competition.

C-1.5 Prize money

Approximately \$100K in cash prizes will be awarded to teams across several categories and will be presented at the awards ceremony at the annual competition finale. Individual awards will also be granted annually in categories that support vocational, communications and DEI achievements.

C-1.6 Faculty funding

No funding will be provided from the competition for faculty support of the competition. The university and vocational partner will be responsible for funding of the required faculty advisors and any additional faculty support.

C-2 In-Kind Contributions

Participating teams will receive the following in-kind support from competition sponsors.

C-2.1 Production Vehicle and Components

Stellantis will donate and deliver one competition vehicle to each selected team and will arrange and cover all costs associated with shipping vehicles to competition events. In addition, teams will receive the following hardware donations:

- Battery cells to each university with spares. Reserve cells will be held and stored by the cell supplier.
- Connectors and electrical interfaces needed to mate to the vehicle
- Vehicle level service tools and equipment (software and hardware)

C-2.2 Technical Data

Teams will receive technical data for the donated vehicle and components including:

• High-level battery pack performance information (i.e., specifications)

- Battery pack envelope will be provided as well as chassis mounting locations to ensure successful pack integration
- Vehicle Performance Data: High Voltage component requirements of battery pack (operating voltage limits, current limits, temperature limits, total battery energy)
- Schematics / Diagrams
 - Thermal and electrical system interface specifications
 - Vehicle interface documentation
 - Inverter, DC/DC, Thermal (Heating & Cooling), Current Profile, etc.
 - o Communications interface document
 - CAN bus architecture & CAN cybersecurity interface
- Cell level specifications: dimensions, operating ranges (Voltage, Current, Temperature, Power), aging characteristics, safety data

C-2.3 Subject Matter Experts

Stellantis and other sponsors will provide subject matter experts to support participating students throughout the competition.

C-2.4 Other Support

Participating universities will also receive other in-kind contributions from sponsors to be announced at the Kick-Off workshop in September 2023. Contributions <u>may</u> include:

- Rapid prototyping controller hardware for BMS development
- Hardware-in-the-loop (HIL) simulators
 - Used for BMS development (HIL is the vehicle and/or battery plant)
 - Battery-in-the-Loop setup for full vehicle and interface simulation
- Vehicle CAN Diagnostic Hardware and Software
 - Teams will need a way to interface and log data with the vehicle CAN bus, including a hardware interface and software support
- Tools and toolboxes (such as HV tools)
- Modeling, Simulation, and Analysis Software
 - Modeling and Simulation software to compliment the controls development for a team developed BMS
 - o Analysis software for thermal & electrical modeling
- Level 2 EVSE or DC fast charger

D UNIVERSITY COMMITMENTS FOR ACCEPTED TEAMS

D-1 Eligibility Requirements for Participating Universities

Four-year universities located in the continental United States that are accredited by the Accreditation Board for Engineering Technology (ABET) are eligible to submit applications. Universities located in Canada that are accredited by the Canadian Engineering Accreditation Board (CEAB) are also eligible to apply.

Up to 11 North American universities will be selected for the three-year competition.

D-2 Matching Cash Support

University participants are required to provide cash support to complement the support provided by the competition.

Matching GRA Support

Accepted universities will be required to supplement the competition-provided GRA funding for the Project Manager and Engineering Manager to ensure those two students are fully funded GRAs. See section C-1.2 for details on GRA funding.

Additional Seed Money

The university is highly encouraged to match the competition-provided seed money. Matching seed money is not a hard requirement; however, this will be a competitive element considered during the team selection process.

Supplemental Travel Funding

Teams will likely find they need to supplement the travel funding provided by competition-level sponsors by roughly 20-30%. It is not required that universities match travel funding for their students, however, this will be a competitive element considered during the team selection process.

Supplemental Scholarship Funds

Universities are encouraged to match or supplement scholarships awarded to selected undergraduate team members. This is not a hard requirement; however, this will be a competitive element considered during the team selection process.

Overhead Fees / Indirect Charges

If overhead or other fees must be assessed by the university, a description of the fees must be provided, and the university must present a plan in the proposal for how they will secure additional resources to make up the cost difference.

D-3 Administrative Support

Teams will require the support and guidance of university administration and support staff to plan and execute their activities throughout the three-year competition. In their proposals, universities must specify the administrative services that will be provided at no cost to the competition team.

Some examples may include:

- University staff to support the team with accounting, procurement, invoice processing, and travel coordination
- College of Engineering's Development staff to support the team's local fundraising and sponsorship efforts
- University or College of Engineering's Communications staff to support local media relations and team news coverage
- University DEI staff to support the team's diversity, equity, and inclusion initiatives and outreach efforts
- University staff to establish and support the vocational partnership administrative needs
- The team should engage its university's Communications department who can provide the student(s)/team with leadership and mentoring throughout the three-year program. If a proposing university is unable to fill this role with a student due to the lack of interest it must lean on the College of Engineering's Communications Office (or other area of the university) to support these efforts.

D-4 Student Participation

Although universities will not be required to offer participating students course credit for their participation, it is highly encouraged that this competition is integrated into the curriculum at a minimum of one course per year, to reinforce experiential learning to theoretical classroom education. Open-ended projects like this Battery Workforce Challenge require a significant amount of time from students for teams to be successful. For engineering students, there typically isn't a lot of time outside of coursework to have available to dedicate to such a project, likely preventing many students from participating. However, providing students with course credit for this project-based learning experience (i.e. a Capstone course) would help students find the time needed to complete challenge-specific tasks that enhance the knowledge they are acquiring in lectures with real-world exercises in battery system design and integration in the development of electrified vehicles. Alternatively, students may also be organized as a student club or university-supported program.

As the challenge progresses, materials developed for the trainings, workshops, and competitions should be leveraged to support new student members that join the competition. This is an opportunity for selected

universities and vocational schools to integrate Battery Workforce Challenge content into their curriculums using the materials developed for and within the challenge. This will also allow students that join the challenge in Year 2 and 3 to benefit from the learning of their peers earlier in the competition.

D-5 Faculty Support

A minimum of one dedicated faculty advisor is required with expertise in one of the following disciplines:

- Mechanical Engineering
- Electrical and Computer Engineering
- Computer Science
- Materials Engineering and Materials Science
- Electrochemical Engineering or Electrochemistry

The faculty advisor is essential to provide technical expertise as well as consistent and regular guidance and leadership for the team (see B-B-5.1.1 for additional details). The faculty advisor is expected to ensure students follow university safety guidelines and engineering best practices to ensure the safety and well-being of their students. Given the commitment required for faculty to support this competition, the faculty advisor must also have at least one of the following accommodations from the university:

- Receive faculty release time for one course from their teaching load annually
- Receive one month of paid summer salary support.

A minimum of one faculty advisor is also expected to travel to all competition-sponsored workshops and events to provide guidance to the team, ensure their students' safety, and serve as the official university representative. If unavailable, a replacement with relevant experience must be selected to perform the obligations of the faculty advisor during travel. Table 2 provides the estimated time frame for those events for Year 1.

Universities will be required to document their faculty support commitment in their proposals. Additional faculty support is an enabler for team success. Once accepted, a university will be required to show documentation of faculty support in their annual Good Faith Agreement.

D-6 Facilities

Teams are required to provide several facilities on campus (at no cost to their team) to ensure their success in the program. Some of these may be located at the university while others within a vocational partners' facilities. Teams will need to identify a plan to enable both university students and vocational students to overcome transportation-related barriers to actively participate in competition activities at all facilities. Additionally, if any of these facilities are not available, the proposal should describe how the team will be able to compete with alternative facilities or planned facilities that will become available in time for the competition related activities.

Consideration must be taken if there is a need to move cells or sub-components or subsystems that contain cells (including the full battery pack). The Department of Transportation has regulations defined for moving lithium-based cells, packs and sub-components containing cells.

Required for Start of the Competition

To be eligible to submit a proposal, schools need to have the following facilities by Fall 2023.

- Dedicated team offices and work areas for use by the team
- Controlled-access high voltage work area to enable energized subsystem testing in a secure and safe environment
- Dedicated secured storage of vehicle parts to protect team and sponsor interests
- Dedicated computer lab with simulation and CAD capabilities
 - Must include a mechanism for secure storage and access of digital information provided by Stellantis and other sponsors, as required by competition non-disclosure agreement(s)

• Abundant access to a machine shop with fabrication capabilities to facilitate battery pack design and integration

Required for Success During the Competition

To satisfy some of the milestones, these facilities will be needed at different stages of the competition. They are not required to be available currently, but the proposal should identify plans to acquire or use outside resources to accomplish related tasks.

- Dedicated garage space with a vehicle hoist (lift capacity 8,000lbs) capable of housing at most a fullsized cargo van vehicle by time of vehicle delivery by Spring 2025/Year 2.
- Infrastructure capable of supporting at least a 6 kW Level 2 EVSE (208/240V) installation in garage space to enable battery charging
 - Installation near garage space is OK, but recommendation is within the space itself
 - Equipment capable of charging and discharging cells in a controlled environment by Spring 2024
- Equipment capable of charging and discharging a full EV battery pack
 - A full EV off the shelf or custom battery pack cycler may be cost and participation prohibitive. Other methods such as a combination of power supplies and electrical loads, or any other controlled method for transferring energy to and from the battery pack with voltage, current and temperature measurement may be used instead.
- Abundant access to a closed-course facility for vehicle testing and a method to transport the vehicle to this facility
 - This test area does not need to be dedicated to vehicle testing but can be a repurposed facility (a closed parking lot, runway, etc.). Proposals should detail the facility itself, limits to the testing teams can conduct, availability of the facility (cost, scheduling requirements, etc.), and availability of trailering equipment to transport the vehicle to this facility (vehicles cannot be towed). Note, Stellantis will cover the cost to ship team vehicles to competition events where the vehicle is needed. However, the team needs a method to safely transport their vehicle to local events and closed-course vehicle testing after Stellantis has approved road readiness of the final integrated pack and vehicle.

Additional Facility Recommendations

These are facilities that will help greatly in competing but are not required during the course of the competition

- A dedicated battery lab is highly recommended cell and full EV battery cyclers, thermal chambers, chillers, etc.
- Universities may also benefit from a battery simulator, electronics lab, grid simulator, etc.
- DC fast charger

D-7 Confidentiality

To execute the required tasks of the Battery Workforce Challenge, teams will be receiving and working with confidential information from competition sponsors. It is paramount to the success of the program that this information is handled appropriately by every individual. Universities, and in some cases individuals, will be required to sign NDAs prior to the receipt of confidential information. Organizers will establish the official file storage repository and confidential file transfer system in advance.

E PROPOSAL PROCESS AND REQUIREMENTS

E-1 Proposal Process Overview

Universities wishing to apply for the Battery Workforce Challenge must submit a proposal with letters of support. Section E-3 details the required content for the proposal while Section E-4 outlines the required letters of support. An electronic PDF version of the University Proposal and Support Letters must be submitted through the Battery Workforce Challenge website no later than 4:00 p.m. Eastern Standard Time (US) on **May 18th, 2023**. The PDF version of the proposal must be able to be viewed and printed correctly; the organizers take no responsibility for errors in the proposal or its PDF form and will make no efforts to correct such errors. Any proposal that contains PDF errors rendering the document unreadable will be returned to the school and will not be reviewed.

IMPORTANT: Submissions not conforming to all the requirements of this solicitation may result in rejection of the proposal. Argonne National Laboratory is not responsible for any costs associated with the preparation or submission of a proposal. Argonne National Laboratory assumes no liability for disclosure or use of any proposals for any purpose. Argonne National Laboratory reserves the right to select or reject any or all proposals. Argonne National Laboratory reserves the RFP as it may consider appropriate to meet the goals of the Battery Workforce Challenge. Any potential funding associated with selection for the Battery Workforce Challenge is subject to availability of funding from the Government and/or potential Sponsors.

Notification of Acceptance or Rejection

Universities submitting a proposal will be notified whether they have been accepted into the competition by June 30th, 2023. Every attempt will be made to notify the university before the start of Fall Semester. The Dean of Engineering and Lead Faculty Advisor of accepted schools will receive an official acceptance letter. Organizers will also contact the Lead Faculty Advisor of each accepted school to review the program timeline and other details.

Selected universities will also receive an invitation to the **virtual** Launch Workshop and the public announcement of the participating teams in the competition, tentatively planned for September 14th,2023. Public discussion (including media coverage) about the selected schools or about the competition will be strictly embargoed until specific details are provided by the organizers. Teams selected must adhere to the restrictions outlined in the Embargo Document that will be provided to chosen schools.

E-2 Proposal Formatting Requirements

Page Range (excluding Title Page, Table of Contents, and Appendices)

o **15-20**

Font Requirements

• 11pt Arial or similar

File type for submission

o PDF

File Naming Convention(s)

- Primary Proposal: University Initials_Battery Workforce Challenge Proposal YYYY.MM.DD.pdf
- Support Letter: University Initials_Support Letter.pdf

Any additional supporting documents should follow: University Initials_Description.pdf

E-3 Required Proposal Content

The following are the sections to be contained in a team submission, in this order:

E-3.1 Executive Summary

In one page or less, submit your best pitch for why your team should receive an invitation to participate in Battery Workforce Challenge. Include the overall rationale for your school's participation.

E-3.2 Eligibility Requirements

Communicate the university's accreditation status. To be eligible to apply, U.S. universities must be ABET accredited and Canadian universities must be CEAB accredited. See section D-1 for details on these requirements.

E-3.3 University Cash Support Commitments

Outline the cash support committed by the university. Reference section for matching cash support, D-2. Proposals must summarize the cash support provided by the university in a table (see Table for a template).

TABLE 5: TEMPLATE FOR SUMMARIZING UNIVERSITY-PROVIDED CASH SUPPORT				
Support	Amount	Funding Source	Funding Time Frame	
Required GRA support				
Example: Additional GRA support				
Example: Matching seed money				
Example: Supplemental travel funding				
Example: Supplemental scholarship funding				
Example: STEM outreach support funding				

Required Cash Support

Confirm that the university will provide matching GRA support to ensure the Engineering Manager and Project Manager will be full-time GRAs (see sections B-5.1, C-1.2, and D-2 for details and requirements). Clearly articulate what university entity will provide this support (engineering department, college of engineering, office of sponsored research, etc.). Any support committed in the proposal should be backed by a letter of support from the university administration (see section E-4).

Note: This requirement must be met to be eligible for the challenge.

Additional Cash Support

Detail any additional cash support the university will provide in support of the team, such as:

- Seed money
- Supplemental travel funding
- Supplemental scholarship funds to match BattScholar funding

Proposals must clearly articulate how much support will be provided, over what time period, and what university entity is providing the support (engineering department, college of engineering, university level, office of sponsored research, etc.). Any support committed in the proposal should be backed by a letter of support from the university administration (see section E-4).

Note: Universities are **not** required to provide this support to be eligible for the challenge. However, additional cash support will be regarded as a competitive element for the team selection process.

Overhead Fees / Indirect Charges

Clearly articulate if any overhead fees or indirect costs will be assessed on competition-provided funding. If overhead is assessed, how will the university secure additional resources to make up the cost difference?

E-3.4 University Administrative Support

Provide details on the planned administrative support that will be offered from the university (see section D-3 for details). Examples include:

- Local fundraising and sponsorship efforts
- Communications and public relations
- Diversity, Equity & Inclusion
- STEM / Career & Technical Education outreach •
- Establishing and supporting the vocational school partnership

Any support committed in the proposal should be backed by a letter of support from the university administration (see section E-4).

E-3.5 Student Recruiting and Team Structure

Propose an approach for recruiting students and organizing the team (see sections B-5 and D-4 for requirements):

Recruitment & Retention

- Propose a plan for recruiting and retaining a diverse team of individuals
 - o What university departments will the team recruit students from and why?
 - What tactics will the team use for recruiting students?
 - How will the university leverage existing student organizations and/or affinity groups to recruit students?
 - How will the university ensure an equitable environment for all students where everyone feels like they can bring their authentic selves to the table and thrive within the program?

Team Structure

- At a *high level*, describe how the team will be structured (student club, senior design project, research project, etc.)
 - What mechanisms, if any, will be available to participating students to earn course credit (and with what departments)?
- How will the team utilize the funded positions described in section B-5 and how will unpaid undergraduate team members complement these roles?
- How will the team enable and support the involvement of undergraduate students in the competition?
- How will Battery Workforce Challenge materials be integrated into university curriculum (if at all)?

Note: Per section D-4, universities are not required to provide a mechanism for course credit and are not required to integrate Battery Workforce Challenge materials into the university curriculum. These are, however, encouraged elements and this may be a competitive element of the application process.

E-3.6 Faculty Support

Identify the lead faculty advisor supporting the project and provide the details outlined below. If lead faculty advisor cannot be defined in the proposal, provide plan to identify and on-board the faculty advisor in preparation of the launch meeting on September 14th, 2023.

- Provide basic biographical details for the faculty advisor.
- What battery-related expertise does the faculty have that qualifies them to lead the team?
- Is the faculty engaged with any research projects or associated with any research groups that may be beneficially synergistic with the Battery Workforce Challenge?
- What research commitments does the faculty have that may compete with Battery Workforce Challenge?
- What is the faculty's expected teaching load for at least the 2023-2024 academic year?
- What is the tenure status of the lead faculty advisor?
- What accommodation will the faculty receive from the university administration? (See section D-5 for details and requirements)
 - This accommodation should be backed by a letter of support from the university administration (see section E-4).
- If any other faculty members or research staff will support the team, provide background details on those individuals. How and to what extent will these supplemental faculty members be involved with the team?

E-3.7 Facilities & HV Safety

Describe the facilities that will support the team and outline how they meet the minimum requirements to apply for the competition (refer to section D-6).

Team Office and Work Area

Describe the office space and work area that will be made available to the team. Provide pictures in the appendices if possible. To be eligible to submit a proposal, the facilities must be available by Fall 2023.

- How will access to this space be secured? What are the hours of access?
- When will this space be available to the team?
- Will there be any other student groups or projects operating in or adjacent to this area?

Computing Facilities

Describe the computing facilities that will be made available to the team. Provide pictures in the appendices if possible. To be eligible to submit a proposal, these facilities must be available by Fall 2023.

- Describe any dedicated computing resources available to the team.
 - Where are these resources located and are they mobile (e.g., laptops)?
 - When will these resources be available to the team?
 - How will these resources be secured and controlled?
- Describe any additional shared computing resources available to the team
- Will there be any other student groups or projects operating in this area or adjacent to this area?

Garage Facilities

Describe the garage facilities that will be made available to the team. Provide pictures if possible in the appendices. These facilities are required to participate in the competition but are not required to be available at the beginning of the program in Fall 2023.

- Does the garage facility have a vehicle lift that meets competition requirements?
 Will the team have dedicated access to this lift or is it a shared resource?
 - Describe the EV charging infrastructure available at the garage facility.
 - Does the facility have at least a 6 kW Level 2 EVSE (208/240V) available for team use? If not, when and where will level 2 EVSEs be installed?
 - Does the facility have a DC fast charger available for team use? If not, does the infrastructure exist to install a DC fast charger? Note: access to a DC fast charger is <u>not</u> required to be eligible for the challenge.
- When will these facilities be available to the team?
- How will access to this space be secured? What are the hours of access?
- How will the team maintain secure storage of parts, components, tools, and equipment?
- Will there be any other student groups or projects operating in this area or adjacent to this area?
- How will you ensure everyone is comfortable working in the garage and lab environment?

Note: The vehicle will be provided near the end of Year 2

Battery Testing Equipment/Facilities

Describe the equipment available to the team that is capable of charging and discharging cells, modules, and/or full battery packs. Provide pictures if possible in the appendices. These facilities are required to participate in the competition but are not required to be available at the beginning of the program in Fall 2023.

- Provide a description of the equipment proposed for use by the team.
- Will this equipment be dedicated or shared?
- How is this equipment accessed and controlled? What are the hours of access?
- When will this equipment be available for use by Battery Workforce Challenge students?

Will the team have any access to any additional battery laboratory facilities (examples: full EV battery cyclers, thermal chambers, chillers, battery simulators, electronics lab, grid simulator, etc.)? Note: Access to such additional advanced laboratory facilities is not required to be eligible for the challenge.

HV Safety

Explain your university's approach to safety (see section B-6 for requirements)

- Does the university have a comprehensive safety policy? How does it apply to HV safety?
- How will the university support the team in doing HV work safely (refer to section B-6).
- Will the team have access to HV subject matter experts? How will these SMEs assist teams in building robust HV safety procedures?
- How will the team meet the requirement to provide a controlled-access HV work area to enable energized subsystem testing in a secure and safe environment?

Machining / Fabrication Facilities

Describe the machine shop and fabrication facilities available to the team. Provide pictures if possible in the appendices. These facilities are required to participate in the competition but are not required to be available at the beginning of the program in Fall 2023.

- When will these facilities be available to the team?
- How is access to this space secured? What are the hours of access?
- What staff support is available to students using these facilities (for safety/oversight as well as teaching/guidance)

Vehicle Testing

Describe any areas the team plans to use for closed-course vehicle testing. Provide pictures if possible, including a birds-eye view of the test area (e.g., Google maps satellite view) in the appendices. These facilities are required to participate in the competition but are not required to be available at the beginning of the program in Fall 2023.

- When will these facilities be available to the team?
- What are the hours of access where the facility is expected to be available to the BattChallenge team?
- How much advance notice is expected before using the test area?
- How will the team transport their competition vehicle to the test area?
- What is the expected cost for using the test area?

Note: The vehicle will be provided near the end of Year 2

Other Facilities

Will the team have access to any other facilities that will be advantageous to completing BattChallenge activities? Provide details on these facilities and explain how the team plans to leverage them to improve the team's chances for success.

Location of Facilities

Using a map, illustrate the location of all facilities described in this proposal relative to campus (the center of engineering activities). Identify the area(s) that will be established as the team's base of operations for competition activities. Describe the proximity of each facility to the engineering center of campus:

- Is the facility "on campus" (walkable from campus for a typical student).
- If the facility is "off campus" (not walkable from campus for a typical student), what transportation options are available to support student travel to the facility? Is there parking available at the facility for students who choose to drive? What other steps will the university take to lower barriers for student participation (particularly undergraduate students).

E-3.8 Draft Vocational Plan

Please provide a proposal describing your vision for the team's vocational collaboration. This plan must include, but is not limited to, the following requirements:

 Identify prospective partners – this may include local community colleges, trade schools, apprenticeship schools, vocational programs, etc. What does the vocational education landscape look like in your community? At this point in submitting a proposal, it is not necessary to have an institution in mind, but your Vocational Plan should address your strategy for building up a successful team between your 4year institution and any potential vocational institution(s). Explain what potential collaborative partnerships could be integrated into the competition activities. This
may be based on existing partnerships with vocational institutions or areas identified as beneficial for
success of the team and wider impact of workforce development within the competition. These may focus
on manufacturing, testing, educational outreach, or any other areas related to battery industry. Once
universities have been selected and notified, they will be required to further develop this collaboration
plan and select one vocational collaborator as part of a Year 1 competition deliverable.

E-3.9 Additional Indicators of Success

Make your case for why we should select your university into the competition. Beyond the content already captured in other sections, what additional factors exist that indicate the team is poised for success in Battery Workforce Challenge? Some examples may include, but are not limited to:

- Prior experience in student competitions
- Existing university curriculum or faculty expertise aligned with core technical areas of the competition
- Support for DEI initiatives and STEM outreach
 - How has the university supported / championed DEI within STEM departments and student project teams?
- Strong support from external partners

Note: the items stated above are examples only and are <u>not</u> required to be eligible for the challenge

E-4 Addendum: Support Letters

E-4.1 University Administration Letter of Support

Universities are **required** to submit a letter of support confirming the commitments made in the team's proposal. The letter must be signed by the Dean of Engineering or another senior university administrator and should cover the following elements:

- University-provided GRA funding (reference section E-3.3)
- Any matched or supplemental cash funding provided by the university (reference section E-3.3)
- Administrative support (reference section E-3.4)
- Faculty support (reference section E-3.6)
- University-provided facilities (reference section E-3.7)
- A commitment to pursue mutually beneficial and reciprocal partnerships with community colleges, trade schools, apprenticeship schools or other vocational partners (reference sections B-1 & E-3.8)
- Any additional cash or in-kind support committed by the university not captured above

Support letters should clearly articulate how much support will be provided, over what time period, and what university entity is providing the support.

E-4.2 Additional Optional Letters of Support

Teams are encouraged to obtain letters of support from outside sponsors who will support the team. These support letters should detail what support will be provided, over what time period, and who is committing the support.

Teams are also encouraged to obtain a letter of support from the Diversity, Equity & Inclusion office outlining the university's support for DEI initiatives within the team.

Note: neither of these support letters is required to submit a proposal

Questions Concerning the RFP should be sent to battchallenge@anl.gov



BATTERY WORKFORCE CHALLENGE IS MANAGED BY ARGONNE NATIONAL LABORATORY FOR THE U.S. DEPARTMENT OF ENERGY