

JUMP into STEM

Professor Team Webinar #4

August 16, 2023

Yeonjin Bae, ORNL
Kim Trenbath, NREL
Bill Eckman, ORNL

Today's Agenda

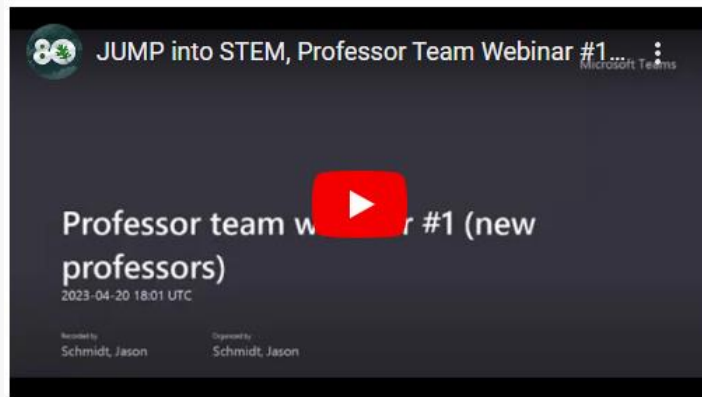



- 2023-2024 JUMP into STEM Program updates
 - First-day class material
 - Student Webinar
 - Industry partner visit
 - 2022-2023 internship
 - Evaluation criteria, Rules document, and Submission template
- Website resources
- Q&A

Professor Team Webinar




- Professor team webinar #1 for new professor team members
 - Recordings and the slide deck are available here
 - <https://jumpintostem.org/professors/>



Professor Team Webinar #1 

Professor Team Webinar #2 

Professor Team Webinar #3 


2023-2024 JUMP into STEM Program Updates


First-day Class Material



- Three-page introductory slide deck
 - Introduction and benefits
 - Direct links to the challenges
 - Direct link to the student webinar





JUMP INTO STEM







• Turn this semester into an opportunity to explore building science!

• Student competition through the U.S. Department of Energy designed to provide hands-on experience solving the industry's most pressing issues







JUMP INTO STEM







JUMPintoSTEM.org/students

- Challenges open now through Nov. 10:
 - You and Me, Carbon Free!
 - Keepin' It Cool (or Hot)
 - That's a Wrap!
- Final Competition will be held at ORNL
- Winners are offered a paid summer internship at ORNL, NREL, or PNNL



JUMP INTO STEM






JUMP into STEM Student Webinar

📅 August 28 at 3 p.m. ET

📺 Register via Zoom





JUMPintoSTEM.org/students



The 2023-24 JUMP into STEM competition is now live!

What innovative solutions for this year's building science challenges will you and your team uncover for a chance to earn a paid internship at ORNL, NREL, or PNNL?

Register for the upcoming student webinar to learn how you can get involved!



Student Webinars



- Two student webinars will be provided
- **Student Webinar #1**
 - Registration required.
 - <https://nrel.zoomgov.com/meeting/register/vJltc-6tpjgiGT11PkHqnBx-mCjD9HFGGeXA>
 - August 28, 2023, 1:00 PM in MT (3:00 PM ET)
- **Student Webinar #2**
 - Will be scheduled in October.



Industry Partner Visit Pilot



- **A new benefit** for competition winners and Industry Partners
- **Two days of direct engagement** between JUMP into STEM interns and select 2022-2023 JUMP into STEM Gold or Platinum Sponsor(s).
 - Internship project presentations
 - An extended tour of Clayton's Appalachia production facility in Andersonville, TN
 - Networking sessions



Join the discussion. Unveil innovation. Make connections. Promote tech-to-market.

INDUSTRY PARTNER VISIT OPPORTUNITY

SUMMER 2024 PROGRAM

Following a summer 2023 pilot, JUMP into STEM is continuing the Industry Partner Visit benefit for competition winners and up to three Industry Partners. This two-day event allows select 2023-2024 JUMP into STEM Gold or Platinum Sponsors to bring competition winners to their facility for direct engagement.

Focused on illustrating the role and capabilities of industry in technology commercialization, the Industry Partner Visit will include in-person tours, networking sessions, and unique engagements specific to the Industry Partner, all completed concurrently with the winner's 10-week national laboratory internship. The JUMP into STEM management team will work with the Industry Partners to organize and plan the visit.

For summer 2024, we are looking for up to three Industry Partners (2023-2024 Gold or Platinum Sponsors) to engage with national lab student interns. Contact us today to learn more!

ABOUT THE COMPETITION

JUMP into STEM is a nationwide competition for undergraduate and graduate students at U.S. academic institutions that aims to inspire the next generation of building scientists. With diversity at the forefront of the program, JUMP into STEM emphasizes the inclusion of an interdisciplinary mix of majors (e.g., computer science, mathematics, economics, policy, engineering) and students underrepresented in the building science field.



Learn more at www.jumpintostem.org.

LEVELS OF SPONSORSHIP

- **Platinum:** \$20,000+
Gold benefits plus opportunity to name a winning internship slot on behalf of your organization (i.e., Company XYZ Internship Winner)
- **Gold:** \$10,000-\$19,999
Silver benefits, plus invitation to participate as a judge during the competition, PLUS eligibility in the JUMP into STEM Industry Partner Visit program
- **Silver:** \$5,000-\$9,999
Bronze benefits plus invitation to Final Competition
- **Bronze:** \$3,500-\$4,999
Organizational logo on JUMP into STEM website and communications materials, including the Final Competition program and results articles distributed to 40,000+ recipients

POINT OF CONTACT

Bill Eckman, Oak Ridge National Laboratory
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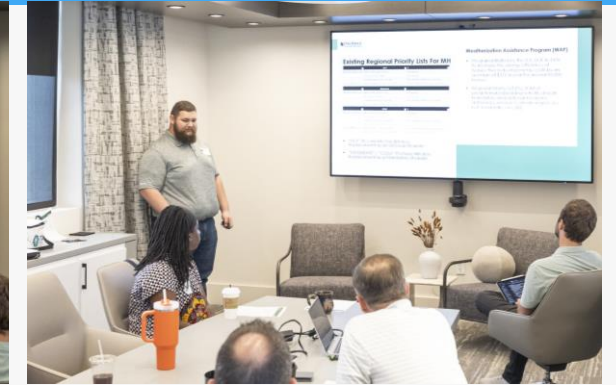
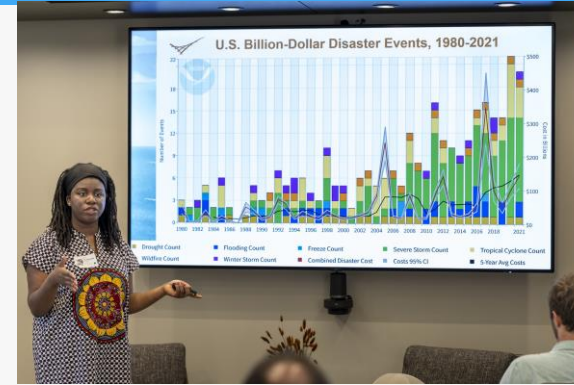
OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY
BUILDING TECHNOLOGIES OFFICE



TRANSFORMING ENERGY



Industry Partner Visit Pilot (cont.) *jump*into STEM

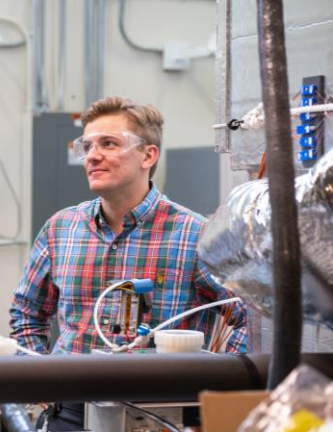


To see more pictures of industry partner visit, please visit <https://jumpintostem.org/gallery/>


FY 22-23 internship



Student Internship Quotes



"I think one of the most valuable things I gained from JUMP into STEM is incredible connections with future collaborators. As I wrap up my PhD this semester, my goal is to become a professor at an R1 university within the next year or two. A large part of my career will be to develop new collaborative research projects – and the most successful projects involve universities, companies, AND national labs. Not only do I have a connection with many senior researchers who can be a great resource in the future, but the post-docs and other interns I have worked with will also be impactful scientists (and future senior researchers) -- at the national labs, in industry, or in academia – who I can reach out to for partnering on future projects." - **Andrew Fix, Purdue University, NREL intern**



"Through the JUMP into STEM (JiS) internship program, I gained knowledge and experience working and being in a National Laboratory experience. Something that was completely unfamiliar to me beforehand. I enjoyed getting to work with my mentors and learn from them. Having facilities like a National Lab and mentor helps fuel research because you have full support. Whether you need a person to back your ideas up or a place to accomplish it at, it's all there. I would tell other students to just go for it, you don't know what you can accomplish till you try it! Lastly, this JiS opportunity provided both skills and resources that will help guide me to my future endeavors." – **Parker Vice, University of Louisiana at Lafayette, PNNL intern**



Student Internship Quotes (cont.)



“The most valuable thing I could take away from my experience at Oak Ridge National Lab is the connections that I have made along the way; mentors and colleagues who can share a fresh perspective on aspects of a project. My career goal is to turn architecture into a form of ministry through world missions, and I truly believe that there are valuable things to be learned about building technologies and industry practices that I have yet to consider; plus, new technologies are always in development that could improve my workflow, design, and implementation.” – **Gabe Hoggard, University of Louisiana at Lafayette, ORNL intern**



“Participating in a JUMP into STEM internship really opened my eyes to how many options there are out there for building scientists and for anyone interested in getting involved in sustainability efforts, both by introducing me to people I never would have otherwise met, and exposing me to ideas and problems I didn't know existed. The everyday conversations you have working in a lab with some of the smartest people in the country (and possibly beyond that) are honestly enlightening - it's pushed me to think in different ways that I hadn't considered before.” – **Julia Ehlers, University of Nebraska, NREL intern**



2023-2024 Challenge Topics!



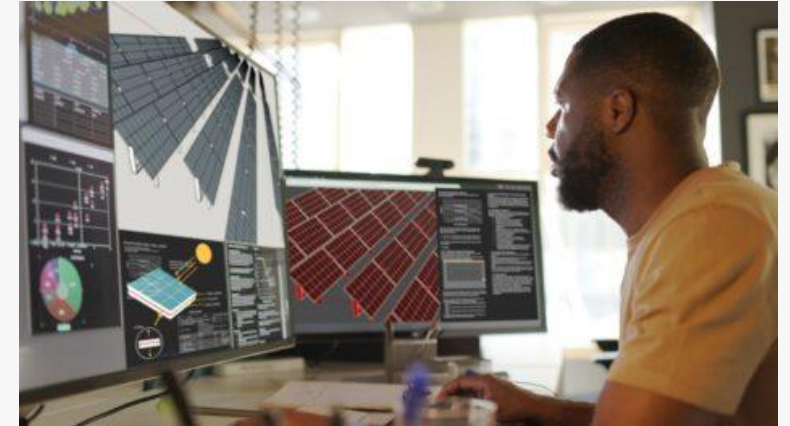
- 2023-2024 Challenge launched on **August 1. 2023**
- The three challenge topics are:



Keepin' it Cool (or Hot)



That's a Wrap!



You and Me, Carbon Free!

2023-2024 Important Dates



August 1

Challenges open.

November 10

Challenges close. Internship Applications due.

November 17

Recommendations for intern applications due.

December 4

Challenge winners announced. Finalists invited to final competition.

December 8

Finalists accept or regret invitation.

January 25–26

Final Competition hosted by ORNL

Idea Submission



Project Team Background

- 2-page max (Single-spaced)
- Project name, team name, and collegiate institution(s)
- Team's mission statement
- Short bio for each team member
- Diversity statement
 - minimum 1 paragraph, 5–7 sentences

Plagiarism will not be tolerated. The quality of writing will be considered, so review by peers is strongly encouraged.

Project Challenge Submission

- 5-page max (Single-spaced)
- **Background**
 - Investigate the background of the Challenge and consider related stakeholders
- **Problem statement:**
 - Focus on a specific aspect of the problem
 - Identify stakeholder(s)
- **Solution**
 - Technical solution + one or more of the following components
 - Economic, policy, commercialization, codes and standards, and/or other
- **Technology-to-market plan**
 - Cost/benefit and market adoption barrier analysis
- **Market adoption barrier analysis**
 - Identify at least one key market adoption barrier for implementation

Challenge Evaluation Criteria



Solution (40%)

- Solution
- Feasibility
- Novelty
- Impact

Market Readiness (30%)

- Market characterization
- Technology-to-market
- Overcoming adoption barriers

Team Diversity and Understanding Stakeholders (20%)

- Diversity statement and project team background
- Understanding stakeholders

Submission (10%)

- Submission requirements

Final Competition Evaluation Criteria *jump* into STEM

Solution (30%)

- Solution
- Feasibility
- Novelty
- Impact

Market Readiness (25%)

- Market characterization
- Technology-to-market
- Overcoming adoption barriers

Team Diversity and Understanding Stakeholders (20%)

- Multidisciplinary team approach
- Understanding stakeholders

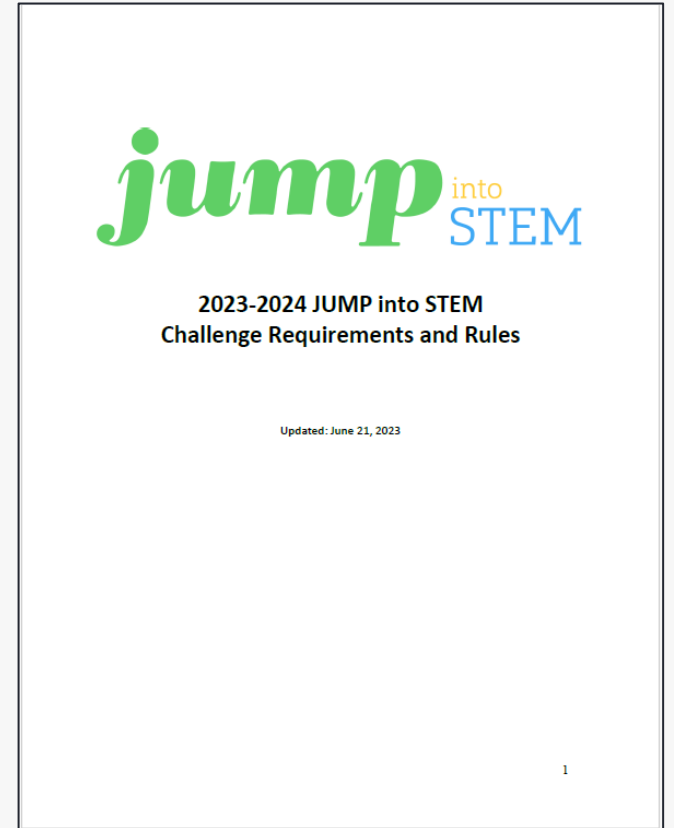
Presentation (25%)

- Effective delivery of ideas
- Presentation preparation
- Question & Answers

Rules Document



- Summary of important dates
- Tasks overview
- Submission paper instructions
- Challenge evaluation criteria
- Final competition presentation instructions
- Final competition evaluation criteria
- Internship application instructions



Submission Template



[Team logo here, optional]	[Team logo here, optional]	[Team logo here, optional]
<p style="text-align: center;">JUMP Into STEM Submission Template</p> <p>Template Instructions:</p> <ul style="list-style-type: none">- Fill in all sections unless marked as optional.- Replace italic text with your own content.- Read through the Student Team Submission Requirements document to make sure you are meeting all submission requirements.- Check that your submission conforms to the page limits.- Remove this page from the document and save your submission as a PDF with the file name JUMP_[SHORT COLLEGIATE INSTITUTION NAME]_SUBMISSION_[SUBMISSION DATE (YYYY-MM-DD)].[EXTENSION] (e.g., JUMP_ORNL_SUBMISSION_2023-06-25.pdf) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"><p>Avoid Plagiarism. If a team includes the work of others without citation, the submission will be disqualified. Plagiarism includes but is not limited to copying and pasting the work of others and paraphrasing published works without citation. Photos and images also require citation. Please consider appropriate style guidelines to avoid plagiarism such as APA, Chicago, MLA, and others.</p></div>	<p>Project Team Background <i>(up to two pages, single-spaced)</i></p> <p style="text-align: center;">Project Name</p> <p style="text-align: center;">Team Name Collegiate Institution(s)</p> <p>Team Mission Statement: <i>Include mission statement here.</i></p> <p>Team Member Biographies: <i>Include a short biography for each team member with information, such as major, level (freshman, sophomore, junior, senior, graduate), and other relevant background information (experience with building science, future career goals, and formative experiences that shaped each individual's contribution to the Challenge).</i></p> <p>Diversity Statement: <i>(minimum one paragraph, five – seven sentences)</i> <i>One of JUMP into STEM's key objectives is to encourage diversity of thought and background in students entering the building science industry. There is a diversity gap in STEM, meaning that certain groups are underrepresented or have been historically excluded from STEM fields. These groups include, but are not limited to, those based on race, ethnicity, and gender—and this gap needs to be addressed. Diversity of thought can be achieved through teams consisting of students from different majors and minors. If there are barriers to entry present that affect the racial, ethnic, and/or gender breakdown of your team, please elaborate. The diversity statement is your opportunity to describe your team's diversity of background and thought, both generally and as applicable to your chosen Challenge.</i></p>	<p>Project Challenge Submission <i>(up to five pages, single-spaced)</i></p> <p>I. Background</p> <p><i>Discuss the background of the Challenge and consider related stakeholders. Stakeholders are those who are affected by the problem, a part of the supply chain, or manufacturing of the technology product(s), as well as those who may have decision-making power and are able to provide solutions (technical or nontechnical solutions, such as policies). For example, you could include stakeholders who have previously experienced environmental pollution or a high energy burden.</i></p> <p>II. Problem Statement</p> <p><i>(one – two paragraphs)</i> <i>Focus on a specific aspect of the problem and the stakeholder groups affected by or involved in the problem. The stakeholder groups can be from a specific location, socioeconomic status, age, or demographic (e.g., people living in subsidized housing).</i></p> <p>III. Solution</p> <p><i>Describe your solution and how it addresses or solves the specific problem from your problem statement. The solution must be technical and also include one or more of the following components, as appropriate: economic, policy, commercialization, codes and standards.</i></p> <p><i>Address the requirements for your selected Challenge as written in the challenge description. Include graphs, figures, and photos. Discuss the feasibility of your solution and how it will impact your stakeholders.</i></p> <p>IV. Technology-to-Market Plan</p> <p><i>A technology-to-market plan describes how the team envisions bringing its idea from concept to installation on real buildings, or integrated into the design of real buildings, and includes a cost/benefit and market adoption barrier analysis.</i></p> <ul style="list-style-type: none">• <i>The cost/benefit analysis does not need to be exhaustive and should include comparing the solution to current or existing technologies or practices. Benefits, such as building energy reductions and improved occupant health or productivity, should be evaluated.</i>• <i>The plan should also discuss which key stakeholder(s) should be involved to commercialize the technology and then sell and install the technologies with your target market(s).</i>• <i>The plan should also identify at least one key market adoption barrier for implementation and specifically address how the proposed solution will overcome that barrier. Barriers should align with key stakeholder(s) identified by your team. Include how your solution will create value, economic or otherwise, to drive industry adoption.</i>

How to Navigate the Website

<https://jumpintostem.org/>

Challenges



- Background
- Technical Overview
- The Challenge
- Requirements
- Evaluation Criteria

Keepin' it Cool (or Hot)

08/01/2023

This challenge focuses on developing an innovative solution for thermal energy storage for buildings to optimize energy utilization, enhance sustainability, and increase resilience. The solutions could involve (but are not limited to) integration of materials, systems, and controls for the storage and release of energy.

Background

Climate change is an immediate global concern, evident from the melting ice caps, sea-level rise, increasing frequency of extreme weather events, and shifts in ecosystems and wildlife patterns.¹ This change is driven by the excessive release of greenhouse gases into the atmosphere, particularly from burning fossil fuels, which absorb most of the outgoing infrared radiation (i.e., heat) from Earth's surface and emit in the atmosphere and contribute to global warming.² To combat climate change, it is crucial to reduce fossil fuel usage and transition to clean, renewable energy sources.³ Electrification and decarbonization aim to replace fossil fuel-based systems for power generation, heating, and transportation with electric alternatives powered by renewable energy, such as solar, wind, and hydro.⁴ However, the intermittent nature of renewable energy poses challenges for the electric power grid in maintaining a stable supply and demand balance.⁵ Energy storage technologies balance energy supply and demand by enabling storage of surplus energy during periods with high renewable generation, which can be dispatched later during times with low renewable generation, while also reducing peak demand through load shifting to off-peak periods.⁶ Energy storage systems can also enhance resilience by providing a backup energy source during emergencies for essential services like heating, cooling, and powering critical infrastructure.⁷



Source: Gettyimages

Thermal energy storage (TES) technologies store energy in the form of heat or cooling for later use. Based on the application or purpose, TES can be categorized as building-scale, district-level, or grid-scale TES. Building-scale TES involves the use of storage systems, such as water tanks or phase change materials, to store and release thermal energy within individual buildings, providing energy management and load-shifting capabilities for heating, cooling, and other thermal applications.⁸ District-level TES involves the storage and distribution of thermal energy for heating and cooling purposes across multiple buildings or facilities.⁹ Grid-scale TES technologies are integrated into the electrical grid infrastructure for electricity generation, typically at the utility or regional level.¹⁰

Depending on the mechanism used to store and release thermal energy, building-scale TES systems can be categorized as sensible heat, latent heat, and thermochemical storage. Sensible heat storage involves storing and releasing energy by changing the temperature of the storage medium, such as water or rocks. Latent heat storage utilizes phase change materials that absorb and release heat during the transition between solid and liquid states. Thermochemical storage involves the storage and release of heat via chemical bonds in reversible chemical reactions.^{6,11}

The use of TES in buildings has a long history. Ancient civilizations utilized natural sources of heat and cold, including sunlight, ambient air, the sky and ground, and the evaporation of water, and stored energy using rocks, water, and the ground, as well as in building mass and phase change materials. Early TES systems in buildings included water-based storage tanks and ice storage systems, where storage of excess energy in the form of heated or chilled water or ice could be utilized later for heating, cooling, or other energy needs.^{11,12}

Over time, technological advancements led to the development of more sophisticated TES solutions for buildings.¹³ Advanced



The Challenge

This challenge asks student teams to develop an innovative solution for thermal energy storage for buildings to optimize energy utilization, enhance sustainability, and increase resilience. Furthermore, the cost for implementing TES should be affordable or recoverable from the benefits provided by the TES. The solutions could involve (but are not limited to) integration of materials, systems, and controls for the storage and release of energy. Teams should first develop a focused problem statement for a specific stakeholder group and then develop a technical solution or process.

Suggestions for student teams include (but are not limited to) the following:

- Create innovative building type and climate specific design strategies and practices aimed at integrating TES in buildings.
- Develop TES solutions utilizing building materials, structure, and/or building's heating, cooling or water heating systems, and potentially, recovering waste heat in buildings.
- Present solutions with advanced controls, or innovative business models, for utilizing TES that can maximize the benefits of TES (e.g., reducing energy cost, shedding electric demand during peak periods, and/or utilizing more available renewable power) with acceptable cost to consumers.

Student submissions should:

- Describe the scope and context of the chosen problem.
- Identify affected stakeholders, making sure to research stakeholder backgrounds and understand the stakeholders' needs, especially regarding the problem.
- Develop a technical solution to the chosen problem for the targeted stakeholder group. The solution may also include policy and economic solutions, codes and standards, or other aspects critical to identified stakeholder barriers. However, a technical solution must be proposed.
- Discuss appropriate and expected impacts and benefits of the proposed solution. This should include an analysis of TES performance, expected benefits (e.g., electricity demand reduction, energy cost savings, and carbon emission reduction), a cost/benefit analysis, and a market adoption analysis.
- Discuss limitations and challenges of the proposed solution (e.g., technical, policy-related, code-compliance, etc.).
- Develop a commercialization plan that describes how the team envisions bringing its idea to scale in the market, outreach mechanisms, stakeholder engagement, and other relevant details.

[Downloadable Challenge Description](#)

[Additional Challenge Resources](#)

[Submission Template](#)

How to Submit Online



- Each Challenge will have its own page
- Submit at the bottom of the relevant Challenge page
- Be sure to coordinate either in person or virtually as a team when performing this step

Submit an idea

[SHOW THE SUBMISSION FORM](#)

Ready to submit an idea? Note that we require information from each team member.

Team Member 1

Idea Name *

Name *

First Last

Email *

Phone *

Are you 18 years of age or older (or the age of majority in your state if it is over 18 years)? *

☐ Yes
☐ No

What is the name of the U.S. college or university where you are currently enrolled? *

In which state is your college or university located? *

Alabama

What is your major/discipline of study? *

What is your minor? Please state "none" if you do not have one. *

Internship consideration *

If you would like to be considered for an internship at either Oak Ridge National Laboratory or the National Renewable Energy Laboratory in Summer 2021, please review the eligibility requirements and select "yes" to acknowledge that you have begun your Zintellect application. If you decline to be considered for an internship at either Oak Ridge National Laboratory or the National Renewable Energy Laboratory in Summer 2021, please select "no."

☐ Yes
☐ No

Zintellect

Please check this box to acknowledge you understand & agree to the following statement: "I have read & understand the Terms & Conditions of the challenge." *

[Terms & Conditions](#)

☐ Agree

How many team members are in your team?

☐ Two
☐ Three
☐ Four

How did you hear about JUMP? *

Abstract *

Optional Image Upload

[Choose File](#) No file chosen

Upload a relevant image to be displayed with your abstract.

Challenge Submission *

[Choose File](#) No file chosen

Allowed file type: pdf

Diversity Statement *

[Choose File](#) No file chosen

Allowed file type: pdf

Hide my identity (Display anonymously)

☐ Yes

Consent *

☐ Please check this box to acknowledge you understand & agree to the following statement:

All team members have read & understand the [Terms & Conditions](#) of the challenge. We understand that all team members must begin their internship application OR decline to be considered for an internship BEFORE we submit our challenge solution idea in order to be eligible to compete in the JUMP into STEM competition.

Submit

Internship application



- Of the challenge-level winners and eligible teams, only the students who are **eligible** for the internship and **submit internship applications** will be invited to the final competition.
- Internship application is due on Nov. 10.
- **Recommendation** is due on Nov. 17.

A screenshot of the Zintellect website. The header includes the Zintellect logo with the tagline 'climb higher' and a navigation bar with links for 'Opportunity Catalog', 'About', 'Help', 'Login', and 'Register'. The main content area is titled '2024 JUMP into STEM Building Technologies Internship Program'. It lists the organization as 'U.S. Department of Energy (DOE)' and the reference code as 'DOE-JUMPintoSTEM-BTIP-2024'. The 'How to Apply' section includes a note about eligibility and a list of required application components. The ORISE logo is also visible.

Organization U.S. Department of Energy (DOE)

Reference Code DOE-JUMPintoSTEM-BTIP-2024

How to Apply NOTE: this opportunity is for [JUMP into STEM](#) participants only. All students enrolled in a U.S. college or university are welcome to participate in JUMP into STEM. Please see the [JUMP into STEM website](#) for details.

The internship application will require:

- Profile Information
- Educational details (e.g., dates of attendance/graduation, GPA, major(s))
- Awards and honors
- Internships or related experience
- Short answer questions on relevant goals, interests, experiences, and skills
- An updated resume (pdf)
- Contact information for one academic or professional recommender, including current email address
- Academic records - For this opportunity, an unofficial transcript or copy of academic records may be submitted showing name, school name, current/enrolled classes, and GPA (pdf)

All application components, including responses to all application essays and all required questions, must be completed and received in the system in order to be considered. **Applicant must also complete idea submission at [JUMP into STEM](#) to be considered for the opportunity.** Selections will be made by a screening committee based on challenge competition criteria and eligibility for the appointments at ORNL, NREL, and PNNL.

For questions, contact Chris Nelson at JUMP-BTIP@orise.ornl.gov.

Discussion



- Volunteers from Industry Team
 - Industry partners are willing to provide guidance and feedback
- Discussion
 - Are students interested in getting feedback from industry representatives?
 - What would be the preferred time frame?
 - Would you be able to ensure students' participation in the session?



Next Meeting



Professor Team Webinar #5 for all professor team members

- Will be scheduled on Oct. 12th 2 PM (ET)
- Last meeting of this year before the submission deadline

Reminder

- To receive full credit as a professor team member, students' submissions are supported by the professor team and this effort should result in an **actual submission**.

THANK YOU!



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Questions?



Q&A