Opportunity Title: Enabling Safe and Reliable Underground Hydrogen Storage Operations - Post-Bachelor's or Current Student
Opportunity Reference Code: NETL-PIP-2023-Goodman

Organization National Energy Technology Laboratory (NETL)

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How to Apply A complete application consists of:

- An application, including academic history, work history experiences, and honors/awards
- Description of your goals, related experience, and related skills – refer to NETL's Core Competencies and ongoing projects when applicable
- Transcripts – Click here for detailed information about acceptable transcripts
- A current resume or CV
- Two educational or professional recommendations
  You must provide contact information for at least two recommenders in your application. The first two recommendations received will be attached to your application for review by NETL. You may click the "send" (paper airplane) button to send the recommendation request email immediately after entering their information prior to submitting your application; if not, a request will automatically be sent when you submit your application. Your recommenders will receive an email with a subject line of "[Your Name] - ORISE Recommendation Request - [your email]", from Zintellect@orau.org. This email will include information on the opportunity to which you have applied, as well as a secure link to submit a recommendation for you for this application. If you ask the same person to submit a recommendation for you for multiple applications in Zintellect, they must click the unique link in each email request, but will be given the opportunity to copy over what they had previously submitted.

All documents must be in English or include an official English translation.

If you have questions about the application process, contact NETLinfo@orau.org.

After you have submitted an application in Zintellect, you may reach out to internship.program@netl.doe.gov to request to talk with the hosting researcher if you would like additional information on the project or to express particular interest. You must have a completed application in Zintellect to receive a response.

Application Tips

NETL values a combination of academic success, experience, and leadership potential as demonstrated in all aspects of your application. NETL's goal is to create, maintain, and support a diverse environment that encourages creative ideas and leadership. In the words of Lab Director Brian Anderson, "our differences make us stronger and we're united in fostering inclusivity in all aspects of our research to drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future." In your application, show us who you are!

To increase your chances of being selected for an appointment, we

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recommend:

1. Reading about NETL projects, and tailoring your responses to align with Laboratory focus areas. What parts of the project(s) are most interesting to you?
2. Spending sufficient time on your essay responses and your resume. Give yourself time to review your writing!
3. Ensuring that everything you submit is grammatically correct and clearly expressed.
   - Consider using a word processor to draft your answers and then copy and paste into the application.
   - Review and edit repeatedly until you have a strong response.
   - Ask someone whose judgement you trust to proofread it and make suggestions for improvement.
   - Efficient writing is valued over quantity of writing.
4. Submitting the application -- we can't select you if you don't submit an application!
   - To be considered for this opportunity, you must hit the "Save & Next" button after providing email addresses for your recommenders, then review the information on the Submit page. Mark if you agree to the listed terms, then click the final "Submit" button. You will receive an e-mail once the application is submitted, and the application will show it has a "Submitted" status on your Zintellect dashboard under "My Applications".
   - Your application will not be considered complete until the required recommendations have been received. You can check the status of your recommendations on your Zintellect dashboard under "My Applications". You may "Manage" your recommendations to verify or update contact information, add another recommender, and resend the recommendation request email, as needed.

Selection Decisions

Selection decisions are made directly by NETL researchers and staff looking to host an internship. Your application will be available to the hosting mentor(s) for up to 12 months after you apply. You may withdraw your application at any time. Applications may be reviewed and selected on a rolling basis or the hosting mentor(s) may choose to wait until after the application deadline before reviewing all applications simultaneously. A final decision of non-selection may not be confirmed for several months after the listed application deadline.

Application Deadline 3/31/2023 11:59:59 PM Eastern Time Zone

Description The National Energy Technology Laboratory's (NETL's) record of success has been built on understanding the future of energy and the technologies required to make that future possible. We've long touted our success in developing the technologies that took on acid rain in the 1970s and mercury in the early 2000s. More recently, NETL has a leading role in President Biden's ambitious climate goals, including a carbon emission-free

power sector by 2035 and a net-zero economy by 2050.

Program Goals

The Professional Internship Program is designed to introduce undergraduate students and recent Bachelor's graduates to the challenges of conducting energy research, and enable graduate students to further build off their studies an experience as they join the scientific community. Participants interact daily with assigned mentors who guide research and project activities during the internship, while they become integral members of project teams.

The program goals include providing the opportunity to participants to:

- Develop skills and knowledge in their field of study
- Engage with new areas of basic and applied research
- Transition classroom theory into hands-on experience
- Network with world-class scientists
- Exchange ideas and skills with the Laboratory community
- Use state-of-the-art equipment
- Contribute to answers for today's pressing scientific questions
- Collaborate with the broader scientific and technical communities

Project Details

Through the Oak Ridge Institute for Science and Education (ORISE), this posting seeks a recent Bachelor's graduate or student researcher to engage in projects with the Research Innovation Center (RIC) at the National Energy Technology Laboratory (NETL) in the area of Underground Hydrogen Storage Operations, under the mentorship of Angela Goodman. This project will be hosted at the NETL Pittsburgh, PA campus.

Large-scale hydrogen geologic storage research is ongoing as clean hydrogen emerges as a low-carbon fuel option for transportation, electricity generation, manufacturing applications, and other clean energy applications that could accelerate the nation’s transition to a net-zero greenhouse gas emissions economy. Geologic reservoirs, including porous media, saline aquifers, lined cavern storage, and salt caverns are being considered for their potential to safely and efficiently store bulk quantities of natural gas, hydrogen, or blends for domestic energy markets.

The goal of this project is to establish the technical criteria for pure and blended hydrogen storage in subsurface geologic reservoirs by a) identifying sources for potential H_2 resource and storage reservoir asset loss and b) identifying possible mitigations or remedies relativist to governing entities that may have regulatory primacy or authority.

The relevance of this research is to utilize the existing natural gas infrastructure to enable the early adoption of the low-carbon energy carrier, hydrogen, as a means to transition our energy grid to a carbon neutral energy economy. The selected participant's research will specifically focus on the following:

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1. Identifying and understanding existing regulatory functions and needs as they relate to characterizing, permitting, and assessing underground natural gas storage (UGS) operations within the subsurface in order to define appropriate metrics relevant to UHS.
2. Quantifying the suitability of existing UGS facilities (which includes the well and subsurface geologic system) for storing pure and blended hydrogen.
3. Characterizing operational expectations with emphasis on quantifying risk for H2 resource loss processes, UGS asset degradation, and estimating transient behavior based on geologic and operational conditions.

Stipend: Participants receive a biweekly stipend based on their educational level. Stipend payments are taxable as an educational benefit. Stipends for full-time participation start at:

- $450 per week - $620 per week for undergraduate students
- $690 per week - $770 per week for recent Bachelor's graduates
- $690 per week - $1,050 per week for graduate students

Deliverables: To document the effectiveness of the program, participants are required to submit a pre-appointment and post-appointment survey, as well as a reflection on their appointment experience when they renew or end their appointment. The reflection should summarize their project(s), additional activities, and overall experience. Details are provided as the appointment end date approaches.
Participants may also have the opportunity to contribute to manuscripts, journal articles, book chapters, conference presentations, posters, patents, and other publications as a part of their appointment. Such achievements should also be reported to ORISE; additional details are provided after an offer has been accepted.

The National Energy Technology Laboratory (NETL), part of the U.S. Department of Energy (DOE) national laboratory system, is owned and operated by the DOE. NETL supports the DOE mission to advance the energy security of the United States. This is an educational opportunity offered by NETL and administered by the Oak Ridge Institute for Science and Education. Participants in the program are not considered employees of NETL, DOE, the program administrator, or any other office or agency.

Qualifications The ideal candidate would have some, but not necessarily all, of the following skills:

- Data analysis
- Energy analysis
- Geology research
- Python coding
- Mathematics
- Chemistry

- Creative problem solving
- Strong research skills
- Teamwork and collaboration

To be eligible for this opportunity, you must:

- Have one of the following academic statuses
  - An undergraduate student[*1] in good standing at a regionally accredited college/university[*2]
  - A recent Bachelor's degree graduate[*1] who has received the Bachelor's degree from a regionally accredited college/university[*2] within the last 24 months at time of application
  - A graduate student in good standing at a regionally accredited college/university
- Have an overall GPA of 2.5/4.0 or higher
- Be at least 18 years of age at the time of application
- Provide confirmation of coverage under a health insurance plan prior to the beginning of the internship

[*1] Soon-to-be Associate's degree graduates are eligible to apply if enrolled as a student at time of application.
[*2] Students and recent Bachelor's degree graduates from accredited Community Colleges and Technical Schools are encouraged to apply.

Recent Master's graduates, recent Doctoral graduates, and current graduates students planning to complete their degree before the appointment start date are invited to apply to the Postgraduate Research Program opportunity associated with this project: https://zintellect.com/Opportunity/Details/NETL-PGRP-2023-Goodman

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Associate's Degree, Bachelor's Degree, Master's Degree, or Doctoral Degree.
- **Overall GPA:** 2.50
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **Earth and Geosciences** (21)
  - **Engineering** (27)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (48)
  - **Mathematics and Statistics** (11)
  - **Physics** (16)
  - **Science & Engineering-related** (2)
  - **Social and Behavioral Sciences** (28)
- **Age:** Must be 18 years of age

Affirmation I certify at the time of application that I meet at least one of the following

academic status eligibility criteria, at a regionally accredited academic institution:

- I am currently pursuing an undergraduate degree.
- I received a Bachelor's degree no more than 24 months before the date of application.
- I am currently pursuing a master's degree.
- I am currently pursuing a doctoral degree.