Engaging with Teachers to Encourage Energy Literacy

Hilary Olson

Sabrina Ewald

TEXAS
The University of Texas at Austin

Hildebrand Dept. of Petroleum and Geosystems Engineering
and
Center for Subsurface Energy and the Environment

Higher Ed Institution Outreach

TEXAS
The University of Texas at Austin

Hildebrand Dept. of Petroleum & Geosystems Engineering

Our expertise: ***Subsurface Energy Resources***
Domains: **Research & Education**

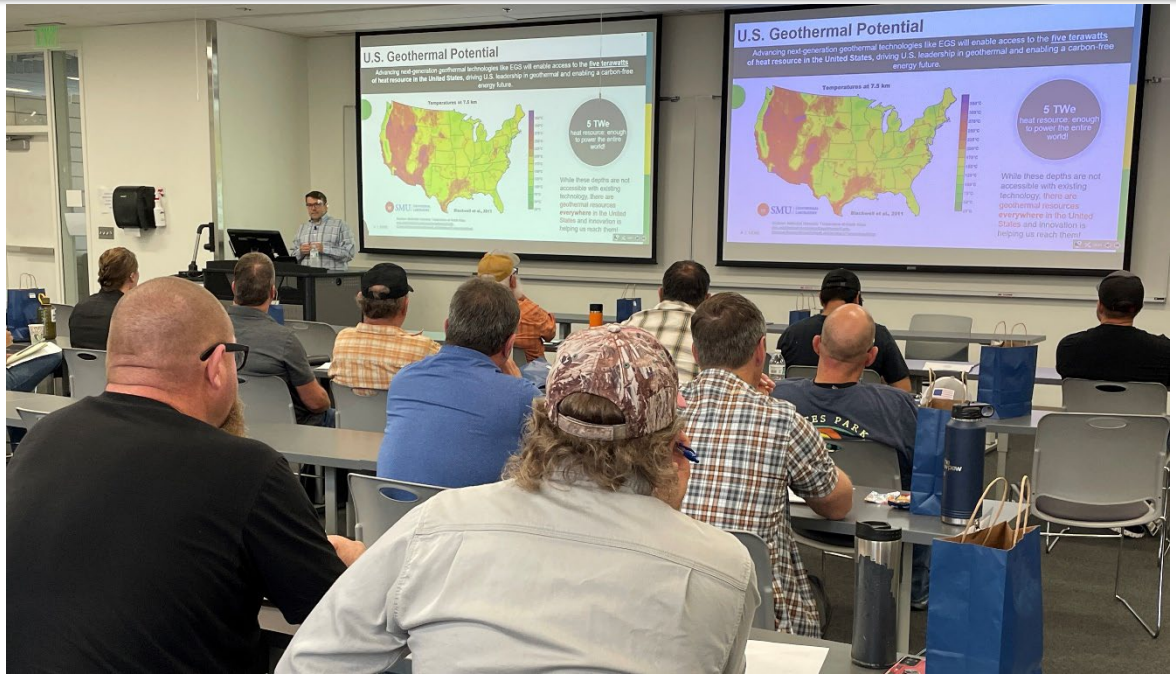
Outreach Initiative Lens:

1. Advance Education outside of the university setting
2. Contribute to Energy Literacy across the spectrum

Higher Ed Institution Outreach

Example: TOPCORP

Professional Development for Oil & Gas Field Inspectors



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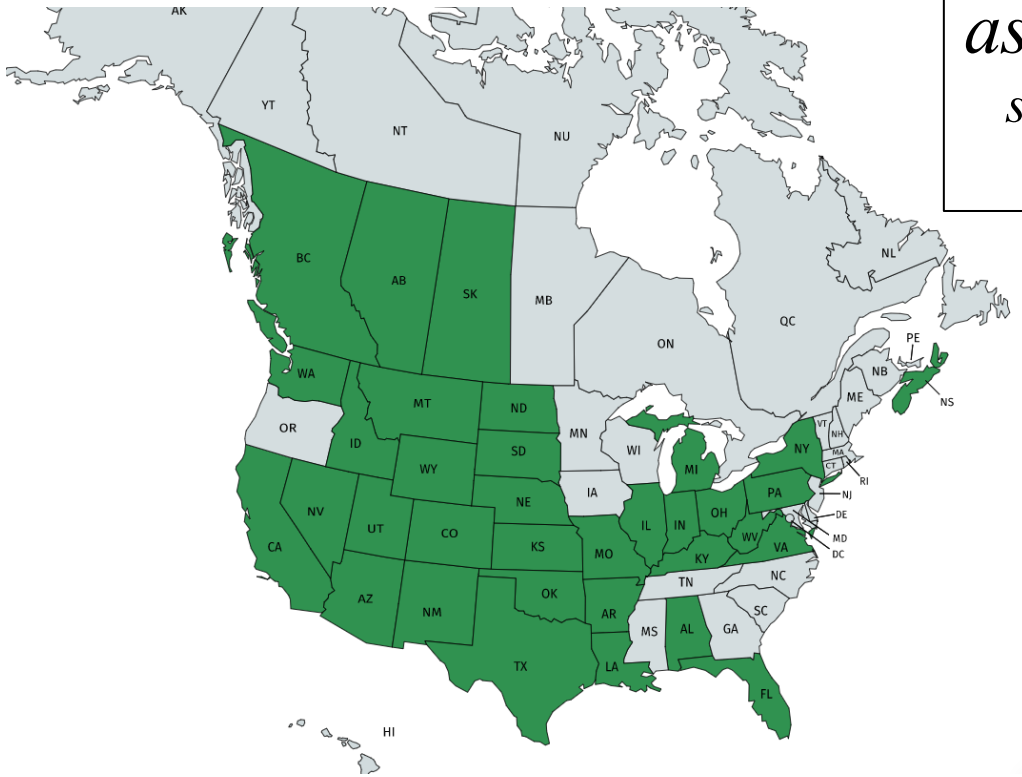
Example:

TOPCORP

Professional Development for Oil & Gas Field Inspectors

**Needs assessment stakeholder goals*



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PennState

SCHOOL OF MINES 1874 COLORADO
COLORADO SCHOOL OF MINES
@150 | 1874-2024

Participants from 37 govt/regulatory agencies totaling

~60,000

person-hours of training

Higher Ed Institution Outreach

Choose Energy

K-12 Teacher Outreach Initiative

Choose an energy career and tackle the earth's complex resource challenges and lead the way to a sustainable and equitable energy future.

Teachers are the great multiplier

Energy Educators Rejuvenating Their Energy Curriculum

- Courses being taught contain content related to subsurface energy resources.
- Approximately half (4 classes) of teachers' schedule is teaching one of these courses.

Teachers as Energy Ambassadors

- Teachers have approximately 130 students in their classes each year.

What do K-12 teachers need?

Classroom resources

- relevant
- correlated to standards
- easy to integrate into their existing curriculum

Continuing education hours

Professional Development meets these needs


CERTIFICATE
OF COMPLETION

THE FOLLOWING CERTIFICATE IS PROVIDED TO

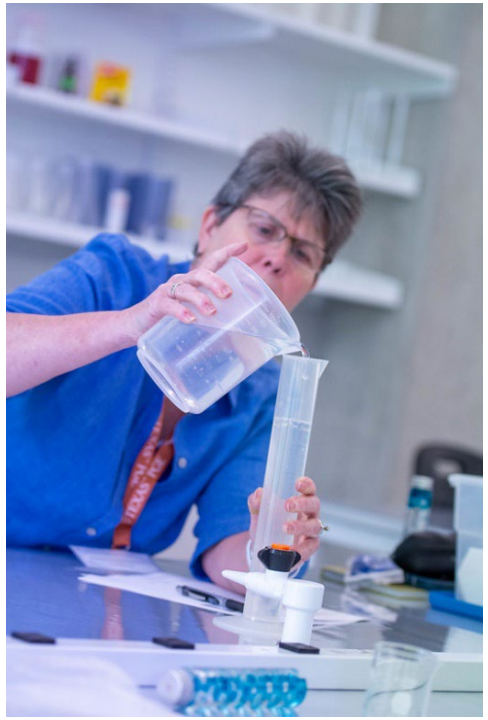
Jane Smith

This certificate awards **3 CPE hours** to **Sabrina Ewald** for their completion of the asynchronous professional development session - *Put It Back Design Challenge*.

Sabrina Ewald
Program Manager

Dr. Hilary Olson
Program Director

Teachers can help inspire and create the next generation of leaders in subsurface energy engineering.



Hands-on Activities

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HOW we engage with teachers to encourage energy literacy

Choose Energy

MISSION
Teach K-12 STEM educators about subsurface energy resources.

Connect with K-12 STEM Educators:

1. **Summer teacher workshop**
2. **Online energy classroom resources**
3. **Educator Outreach Events**

HOW we engage with teachers to encourage energy literacy

Choose Energy

1. Summer teacher workshop

***Energy Science and Technology Institute* (ESTI)**

2. Online energy classroom resources

3. Educator Outreach Events

Who teaches the workshop?

The five-day summer workshop is led by numerous faculty from the Hildebrand Department of Petroleum and Geosystems Engineering.

Dr. Wen Song

Dr. Zoya Heidari

Dr. Larry Lake

How do we select participants?

High School Subjects Taught
Aquatic Science
Biology (on-level, honors, AP, IB)
Chemistry (on-level, honors, AP, IB, OnRamps)
*Environmental Science (on-level, AP, IB)
*Earth and Space Science (on-level, OnRamps)
Integrated Physics and Chemistry
Physics (on-level, honors, AP, IB, OnRamps)
*Career and Technical Education Courses (engineering, robotics, computer science, etc.)
Math (algebra, geometry, etc.)

We prioritize educators who teach these courses.

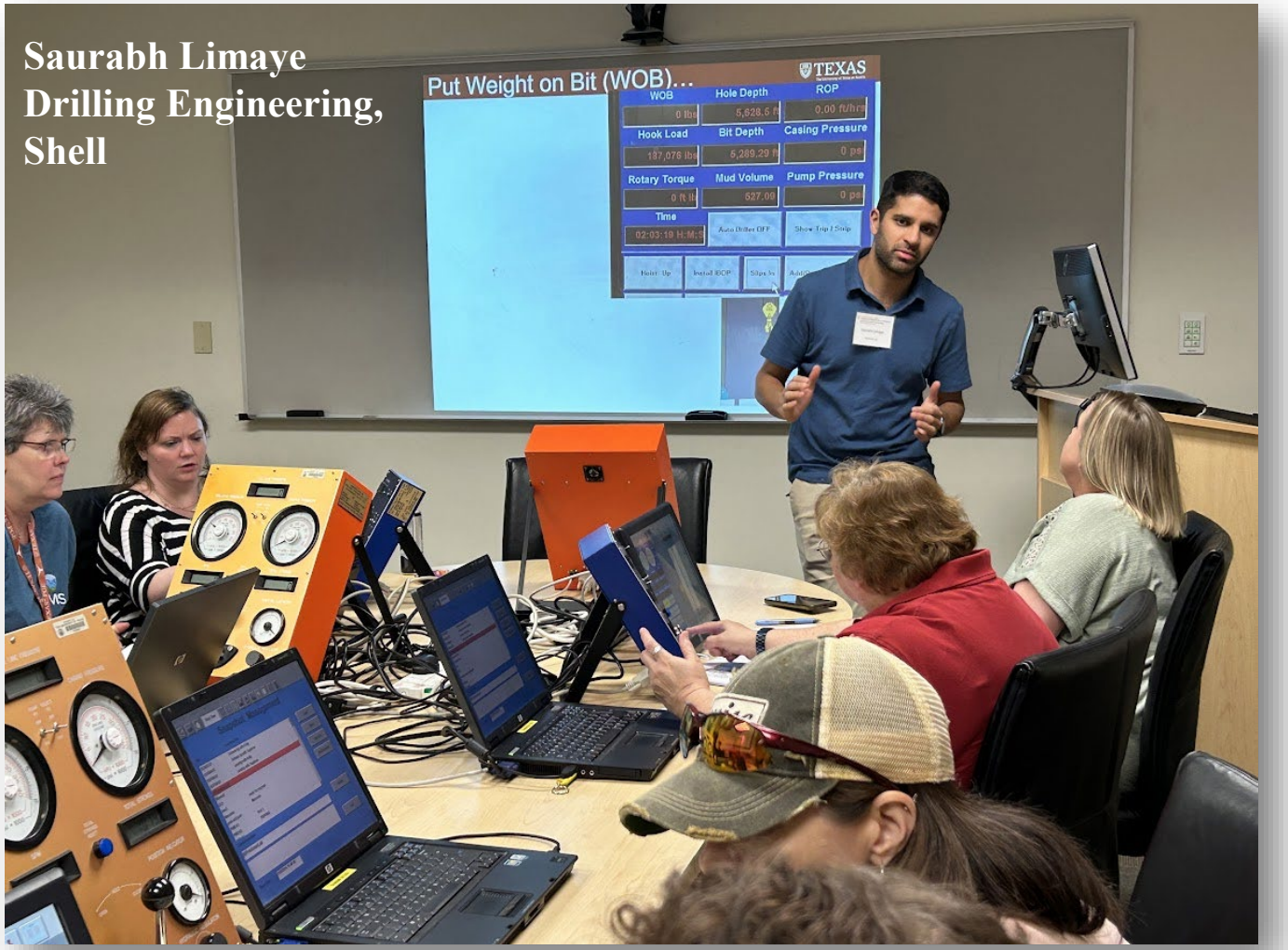
How have we leveraged other outreach assets?

We leverage and customize hands-on activities and labs, discussion sessions, breakout sessions, and online coursework from other programs such as TOPCORP.

Carbon Storage Design Project

Field inspectors learning about stratigraphy and reading well logs. (UT Austin TOPCORP Workshop 2024)

How do we involve sponsorship partners?



Drilling Simulator Activity

Sponsorship partners bring different perspectives (industry, regulatory) and career insights.

Drilling Mud Activity

What is the format of the workshop?

The first 3 of the 5 days are spent in UT Austin classrooms and labs to showcase a variety of energy themes, such as the global energy marketplace, petroleum engineering, water-energy connection, energy portfolio mix, geothermal energy, and carbon storage.

Hydraulic Fracturing Simulation with Jell-O

Reservoir Engineering Activities

How do we connect the classroom to the real work done in energy?

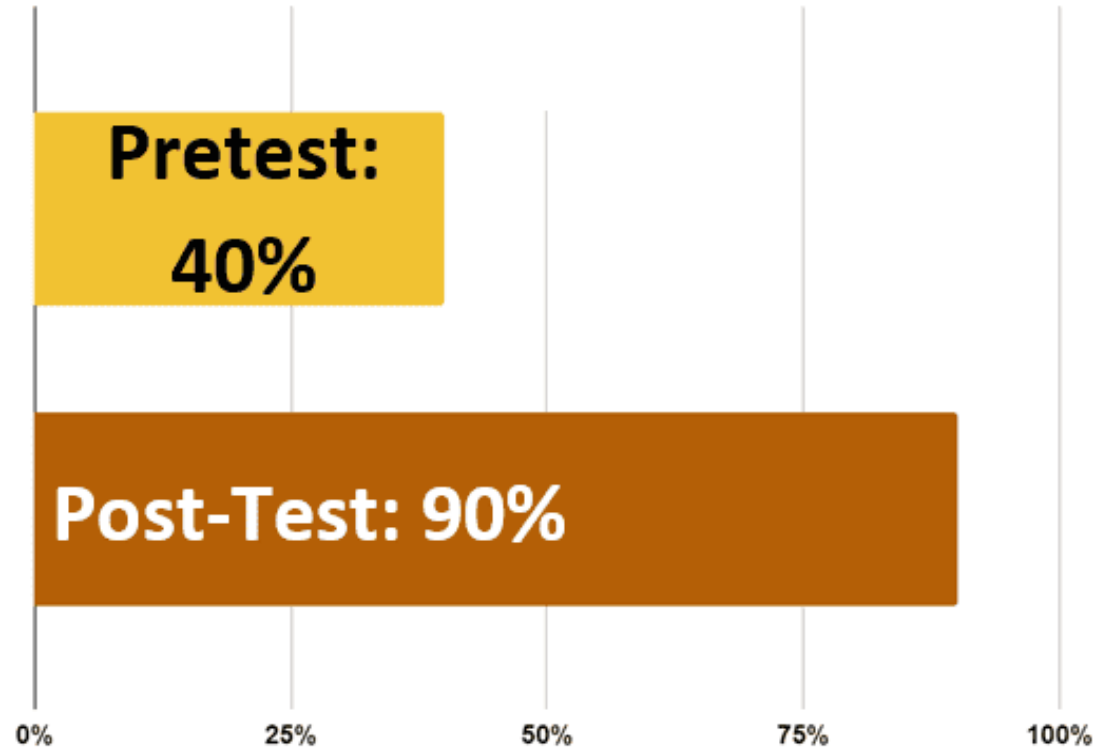
The final 2 days are spent in Houston and Galveston: ConocoPhillips industry visit to learn more about prospective careers in the energy industry.

How do we connect the classroom to energy technology?

The final 2 days are spent in Houston and Galveston: Touring the Ocean Star Museum in Galveston.

Visit to the Ocean Star Museum - Galveston, TX

What is the knowledge gain of teachers who attend our summer workshop?



What is the student impact of our summer workshop?

All ESTI Teachers (2019-2025) Cumulative Impact	
1. Energy Educators Rejuvenating Their Energy Curriculum	13,600 students
2. Teachers as Energy Ambassadors	40,000 students

HOW we engage with teachers to encourage energy literacy

Choose Energy

1. Summer teacher workshop
   Energy Science and Technology Institute (ESTI)

2. **Online energy classroom resources**
   EnergyExcursions.com

3. Educator Outreach Events

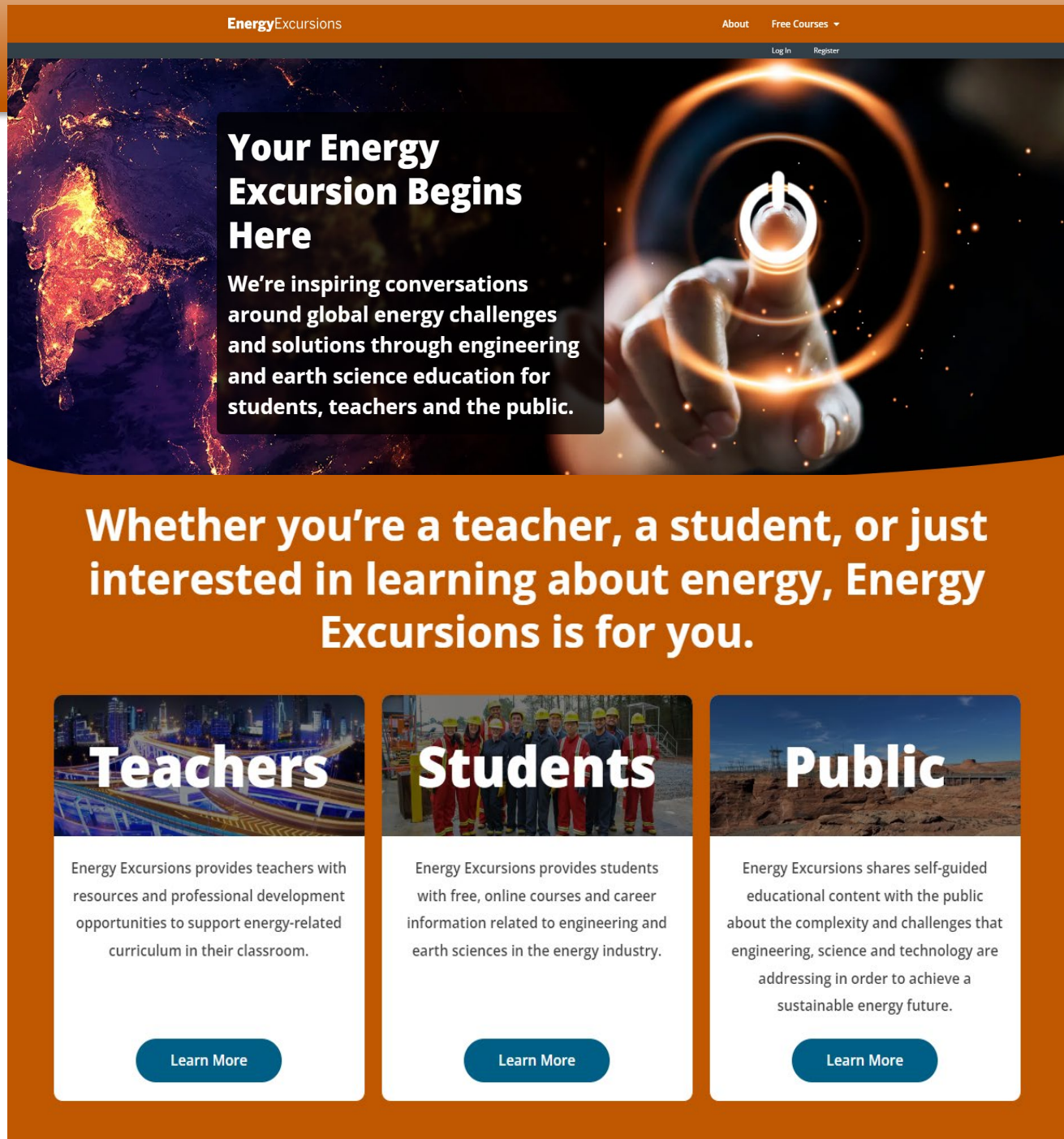
EnergyExcursions.com

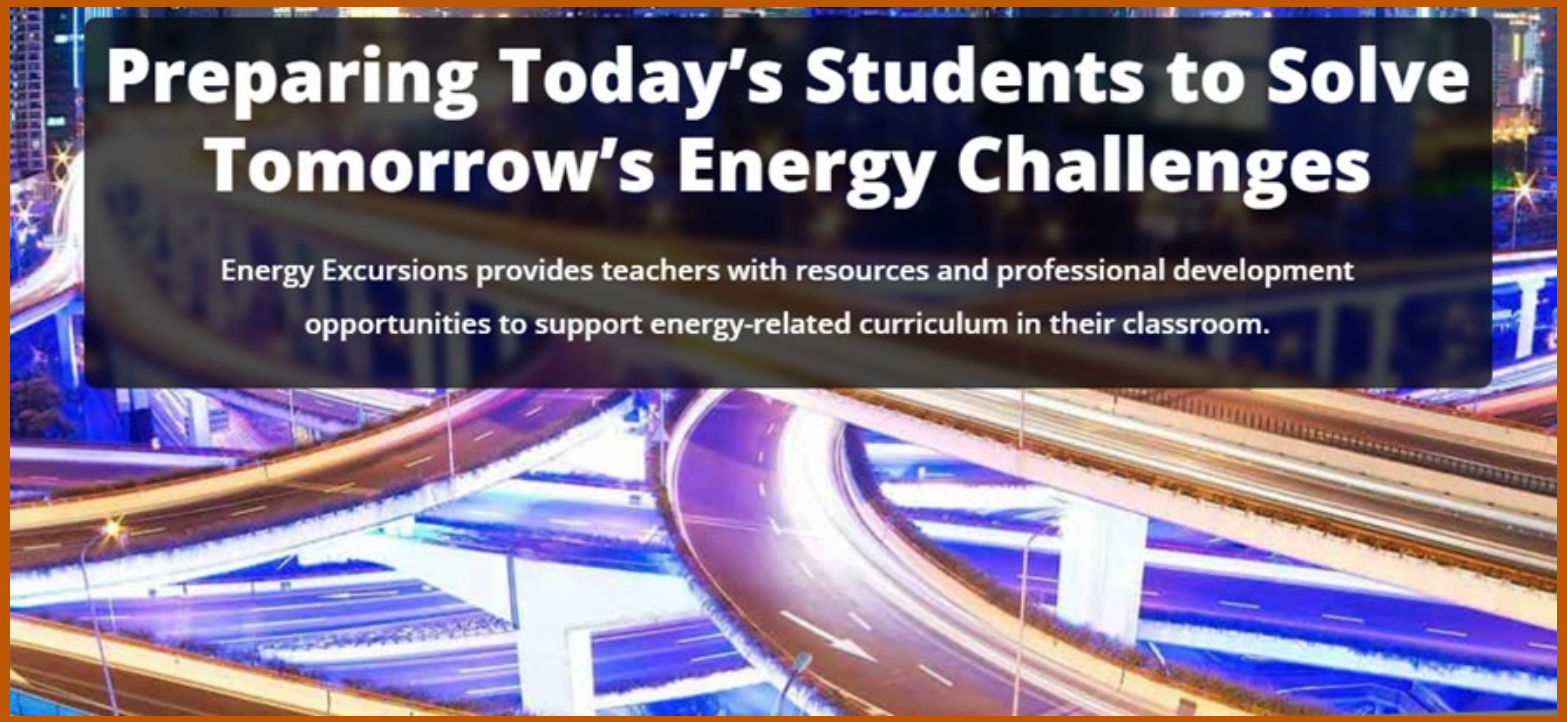
OVERVIEW

FREE online courses that provide an in-depth look at the subsurface energy industry.

All courses correlated to:

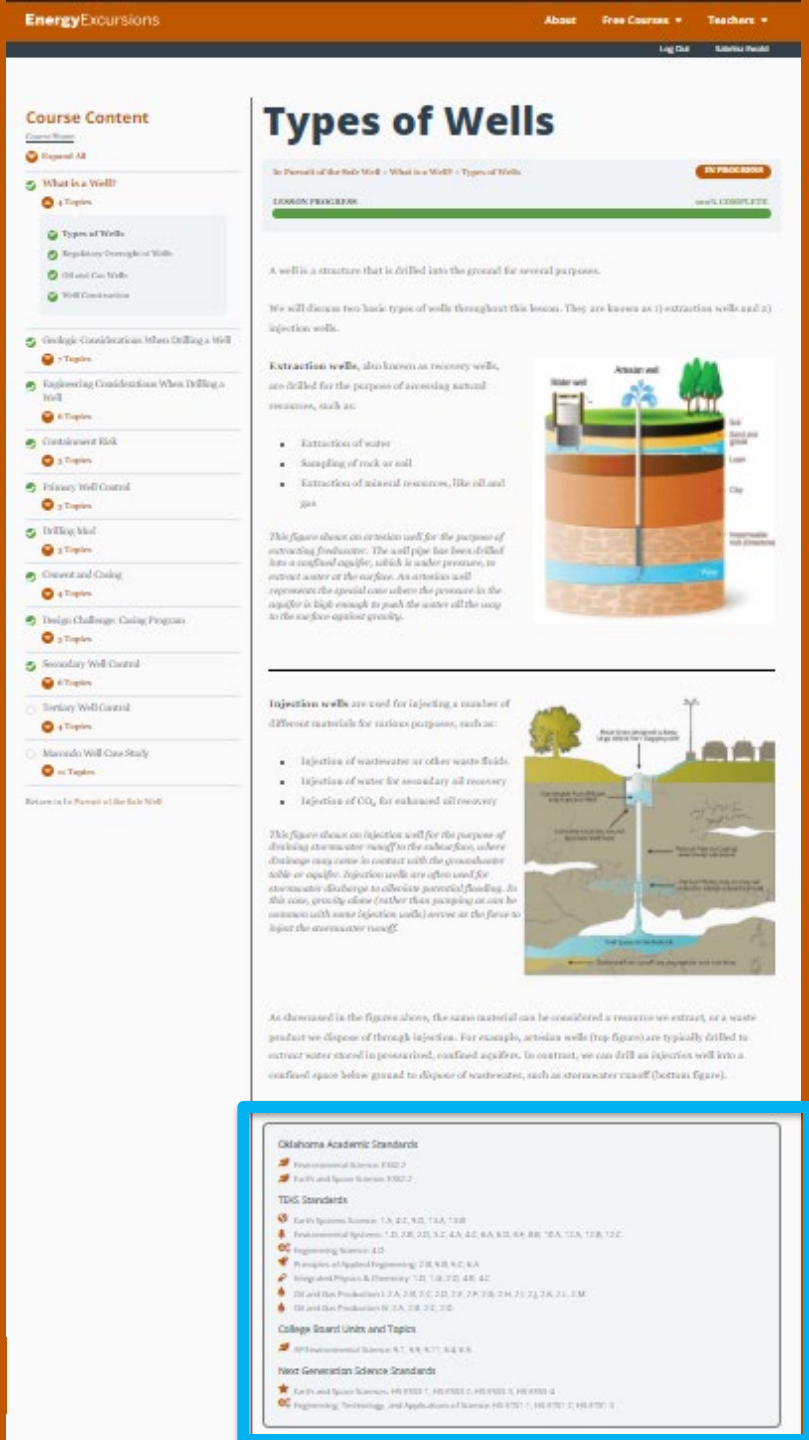
- **24-25 high school science Texas high school science standards (TEKS)**
- **AP Environmental Science Standards**
- **Next Generation Science Standards (NGSS)**



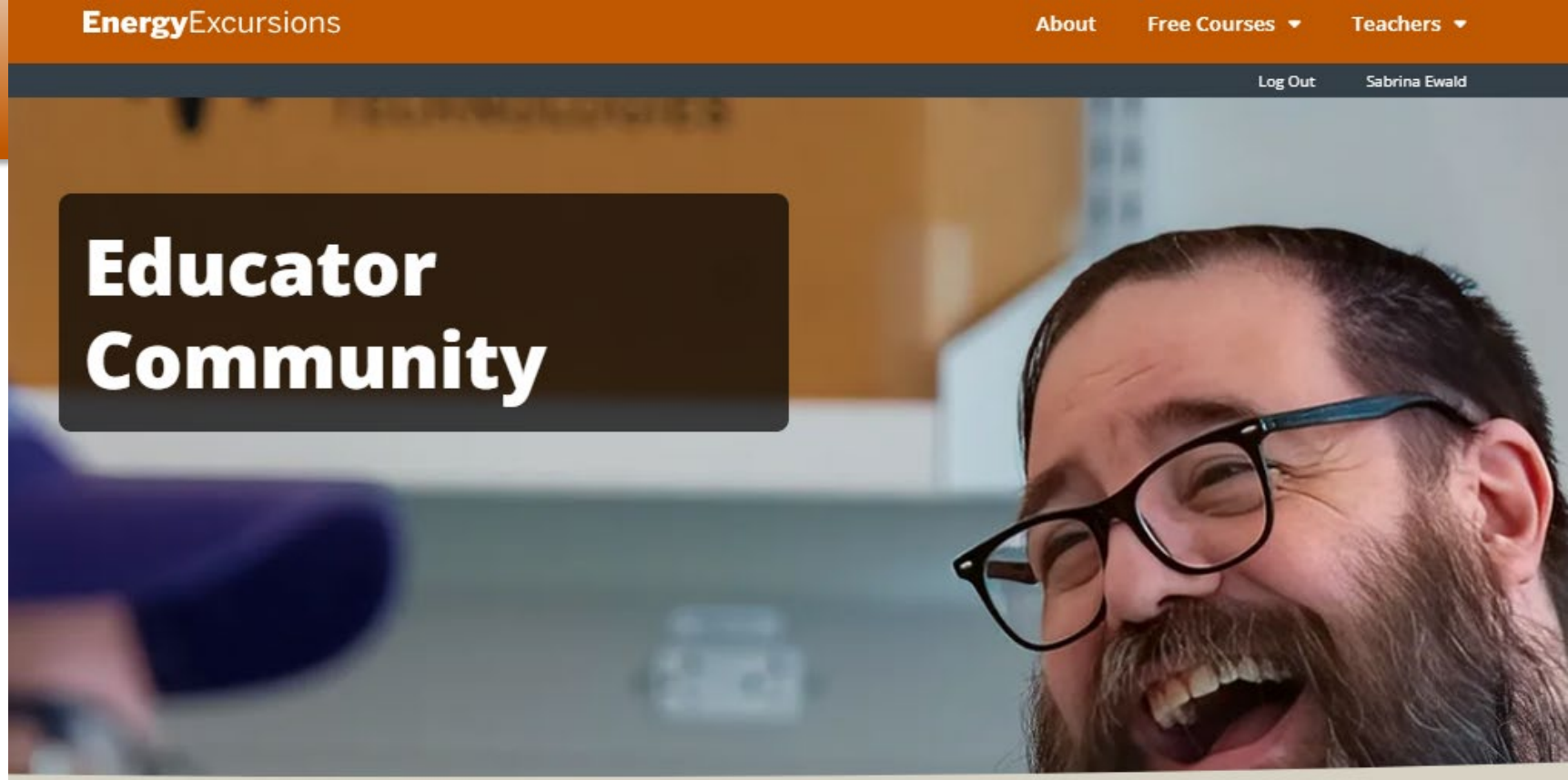


Mini Courses

- **Drilling Engineering (*In Pursuit of the Safe Well*)**
- **Carbon Storage (*Put It Back*)**
- **Energy-Water Nexus (*How Much Water Does It Take?*)**
- **Energy Portfolio Mix (*Energize the Future*)**
- **Geothermal (*Energy is a Hot Topic*)**



Continued Classroom Support



All Lessons & Activities

Free lessons and activities are available to teachers and all resources are correlated to 24-25 TEKS, NGSS, and AP Environmental Science Standards. Lessons and activities are organized by high school courses and Energy Excursions courses. We are also building a library of phenomena-based activities that focus on engineering concepts.

High School Course Activities

Visit this page to view lessons and activities specifically designed for AP Environmental Science, ESS, and Environmental Systems/Science.

View Lessons & Activities

Energy Excursions Course Activities

If you are interested in student activities or full lessons built for a specific Energy Excursions course, visit this page to view available resources.

View Lessons & Activities

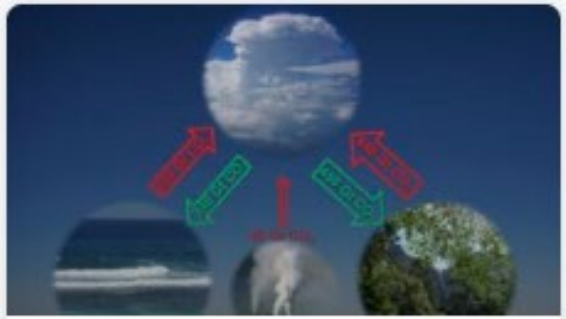
Phenomena in Science and Engineering Activities

Phenomena-based activities can spark student engagement, while connecting classroom content to everyday observations. Phenomena-based activities can help kick-off your lessons and spark student curiosity.

View Lessons & Activities

Earth and Space Science/ESS

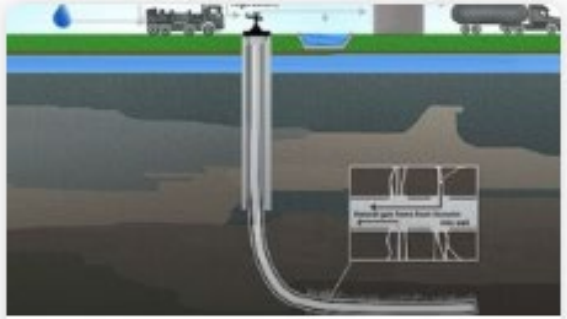
Featured Lessons & Activities



CO2 Emissions from Fossil Fuels at the Global Scale

This activity examines carbon dioxide emissions related to fossil fuel consumption. Students will use data from the Statistical Review of World Energy, an industry benchmark ...

READ MORE »



Hydraulic Fracturing Experiment With Jell-O

During this hands-on activity, students will simulate hydraulic fracturing of a well to visualize how rocks can fracture when fluids are injected at high pressure. ...

READ MORE »

Climate Analysis Using Planktonic Foraminifera

The focus of this lesson is to integrate data analysis as part of teaching Geologic History and understanding how scientists determine historical atmospheric conditions. Data-driven ...

READ MORE »

HOW we engage with teachers to encourage energy literacy

Choose Energy

1. Summer teacher workshop
   Energy Science and Technology Institute (ESTI)

2. Online energy classroom resources
   EnergyExcursions.com

3. **Educator Outreach Events**
   Educator Conferences and Partnerships

Educator Conferences

Our department faculty and staff attend educator conferences to engage with K-12 STEM educators and to provide hands-on workshops.

Upcoming conference workshop topics in November 2024:

hydraulic fracturing, carbon storage, geothermal

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Presented by STAT SCIENCE TEACHERS ASSOCIATION of TEXAS

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NEW ORLEANS 24
NOVEMBER 6-9

Partnerships

By leveraging relationships and opportunities, we can work together with our partners to accomplish shared goals.

1. **State Regulatory Agencies**
2. **Professional Societies**
3. **Industry Associations**
4. **University Partnerships**

State Regulatory Agencies

State Regulatory Agencies - Railroad Commission of Texas

Through our regulatory training programs, UT Austin has formed partnerships with the RRC to collaborate on EnergyExcursions.com content and K-12 educator outreach events.

State Regulatory Agencies

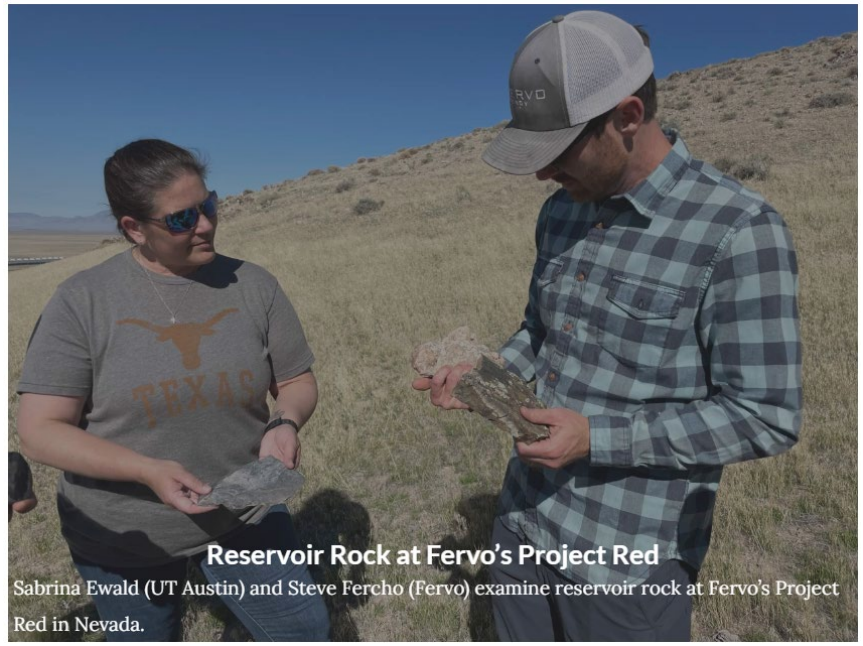
Field trip in October assisted with the development our *EnergyExcursions.com* Geothermal Course.

Nevada Division of Minerals (NDOM)

Through our TOPCORP program, we formed a partnership between UT Austin & the Nevada Division of Minerals:

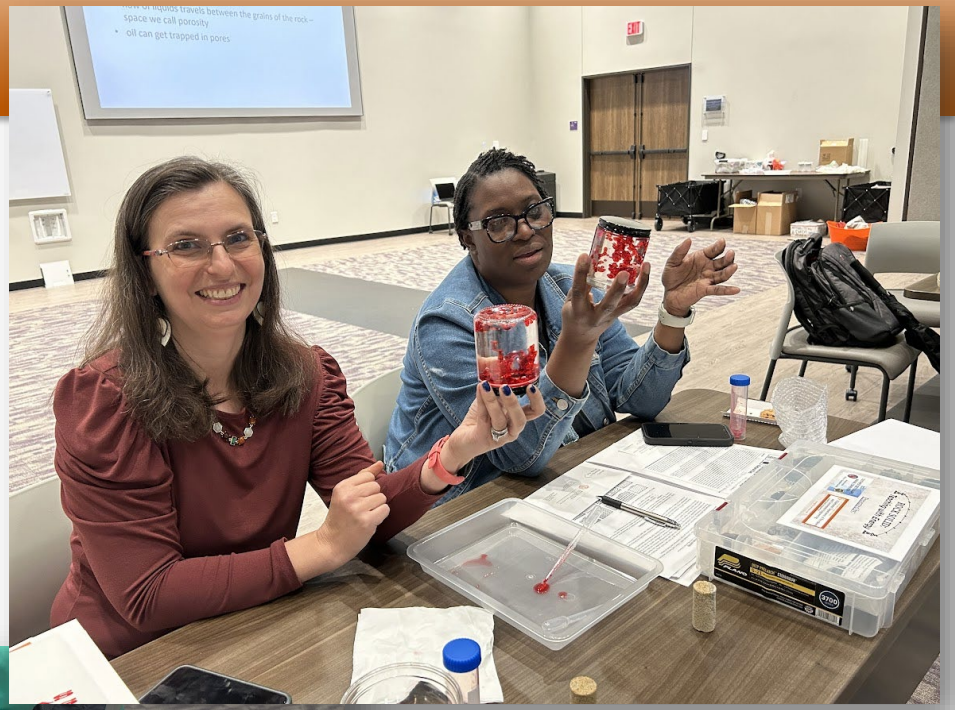
1. NDOM field trip to help create online geothermal course.
2. To collaborate on educator outreach events.

In March of 2025, UT Austin will be presenting at the NDOM annual Spring teacher workshop.



Professional Societies

Southwest Section of AAPG – Our outreach team provides the content and instruction for their K-12 energy/earth science workshop. This annual convention workshop is sponsored by Southwest Section members and local geological societies.



Next workshop will be Saturday, April 26th in Fort Worth, TX

Professional Societies

SPE-Permian Basin

- Our outreach team is collaborating with the Permian Basin chapter of SPE to design and provide an energy education workshop for high school teachers in the Midland/Odessa area.
- The ***West Texas Energy Summit*** is a 2-day workshop which includes classroom activities and site visits.
- Workshop will be held on June 11 – 12, 2025 in Midland, TX

Workshop Sponsors

Industry Associations

TEXAS MINING AND RECLAMATION ASSOCIATION (TMRA)

Surface mining

TMRA Teacher Workshops

The Texas Mining and Reclamation Association (TMRA) offers 5 summer week-long teacher workshops for science teachers and each gives an in-depth look into surface mining and reclamation and energy production.

Cross-pollination: surface mining / subsurface resources / regulatory

UT Austin Choose Energy

Railroad Commission of Texas

University Partnerships

University of Tulsa, Dept. Chair Mohan Kelkar

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Energy Science and Technology Institute

+

Energy Excursions.com

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THE UNIVERSITY of TULSA

Petroleum Science and Energy Transition Institute

+

Energy Excursions.com

Oklahoma Academic Standards

- Environmental Science: ESS3.2
- Earth and Space Science: ESS2.2, ESS2.5, ESS3.1

2023, 2024

Thank You!

Questions?

Please contact Sabrina Ewald and Hilary Olson for more information:

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holson@austin.utexas.edu