2024 PROJECT PEER REVIEW

U.S. DEPARTMENT OF ENERGY
BUILDING TECHNOLOGIES OFFICE

BTO Peer Review: Educating Zero Energy Professionals (EZEP)

Educating Zero Energy Professionals (EZEP)

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Project Summary

OBJECTIVE, OUTCOME, & IMPACT

The objective of the EZEP portfolio is to engage diverse audiences—including high school students, technical school students, collegiate students, industry professionals, and academic institutions—to train, develop, and build awareness for a skilled building decarbonization workforce. The impact is a diverse cohort of professionals to advance energy and emissions reductions in U.S. buildings.

TEAM & PARTNERS

Program Sponsor & Leadership: U.S. Department of Energy

Project Management & Execution: NREL

Subcontractors:

The National Energy Education (NEED) Project

STATS

Performance Period: 10/01/2023-06/01/2025

DOE Budget: $210,000

Milestone 1: Building Science Education series retrofit module (March 2024)

Milestone 2: SD Pathways Summary Report (June 2024)

Milestone 3: ZEDD Summary of Recognized Programs (September 2024)

Problem

- According to *A National Blueprint for the Buildings Sector* from the U.S. Department of Energy (DOE), meeting U.S. building decarbonization goals will require a **robust and diverse network of professionals** to design, manufacture, market, install, and operate low-carbon building technologies and solutions (U.S. Department of Energy, 2024).

- "Addressing employers' challenges in finding skilled workers will take an intentional effort to **attract more people to the field, improve their skills,** and make **entry to the field more straightforward"** (Truitt et al. 2020).

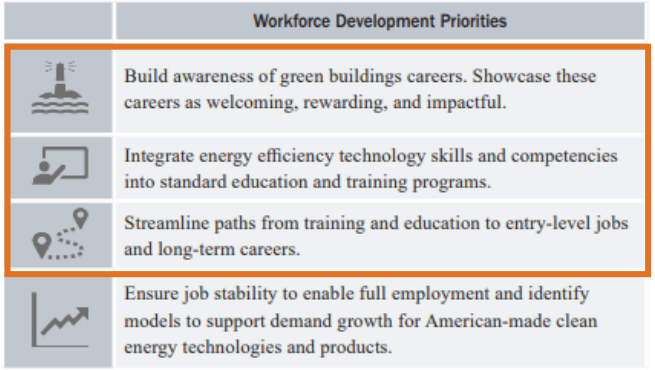


Figure 1. Building Technologies Office Workforce Development Priorities. *Source:* U.S. Department of Energy 2022.

Alignment and Impact

- Growing a **skilled building decarbonization workforce** will help **develop markets** and **enable deployment** of low-carbon technologies and solutions across the buildings sector (U.S. Department of Energy, 2024).
- Project success is measured by **engagement, collaboration, and partnership with industry to train, develop, and build awareness** for the skilled building decarbonization workforce.

Addressing Market Barriers

*The US Energy Employment Report (USEER) found that a **large majority of energy efficiency employers had difficulty finding qualified candidates** due to a lack of technical skills, small applicant pool, and lack of industry-specific knowledge (Truitt et al., 2022).*

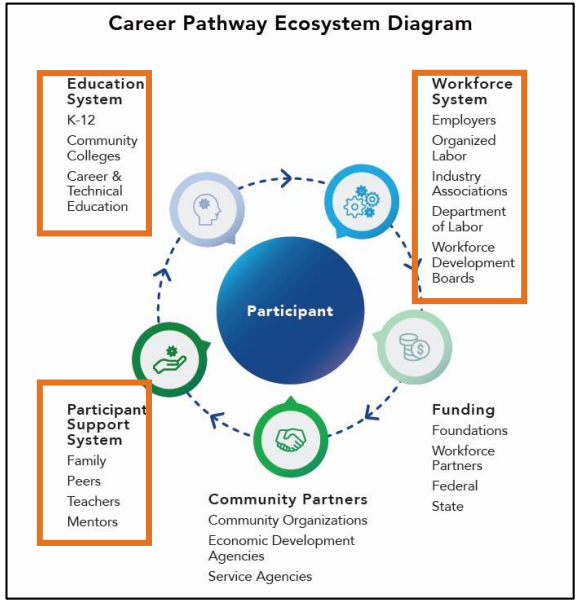


Figure 2. Focus areas of EZEP in the Career Pathway Ecosystem. *Source:* U.S. Department of Energy 2024.

Approach: Comprehensive Workforce Programming

The Educating Zero Energy Professionals (EZEP) portfolio supports the growth and development of the skilled building decarbonization workforce across career stages by **building awareness and encouraging the adoption of building science and zero energy design education and resources.**

High School

SD Pathways

- Connects Solar Decathlon alumni with high school classrooms for STEM career talks.

U.S. DEPARTMENT OF ENERGY Solar Decathlon Pathways

Post-Secondary

Solar Decathlon International

- Support to organizers of international Solar Decathlon competitions, sharing best practices.

Solar Decathlon India

Zero Energy Design Designation (ZEDD)

- Recognition for collegiate programs preparing students for 21st century building careers.

ZERO ENERGY DESIGN DESIGNATION U.S. DEPARTMENT OF ENERGY 2024-2027

Building Science Education Series

- Online educational content that allows learners to build fundamental building science knowledge.

U.S. DEPARTMENT OF ENERGY Solar Decathlon Building Science Education

Continuing Education

SD Pro

- Cohort-based training for professionals to develop building science expertise and practical, zero energy design skills.

U.S. DEPARTMENT OF ENERGY Solar Decathlon Professionals

Approach: SD Pathways Builds Career Excitement

- SD Pathways leverages industry perspective, building excitement and **helping high school students learn about the green buildings workforce** to “enable high performance buildings nationwide” (U.S. Department of Energy, 2022).
- Aligns with Better Buildings Workforce Accelerator strategies to **connect with K-12 students and educators:**
  - ✓ Importance of real-world learning.
  - ✓ The benefit of personal interactions.
  - ✓ The value of local connections.
  - ✓ The necessity of proper messaging.

Pairs Solar Decathlon alumni with high school classrooms for STEM career talks to personalize and bring real-world perspective on green building professions.

Approach: Equipping the Global Building Decarbonization Workforce

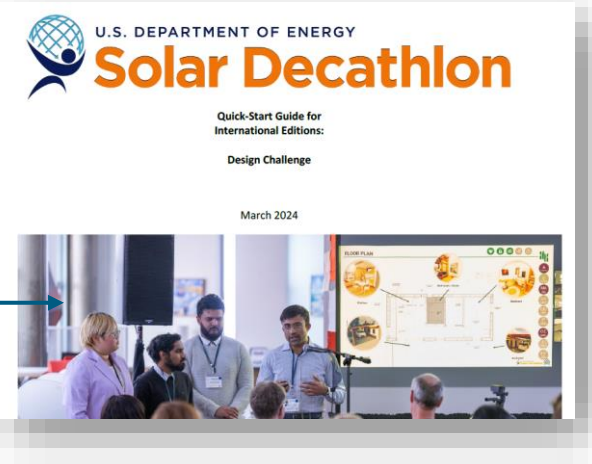
Solar Decathlon International **scales the Department of Energy's leadership** beyond the U.S., leveraging DOE and NREL **competition management expertise** to offer strategic support and peer exchange on international programming.

Solar Decathlon Africa
Design Challenge 2024
COMPETITION RULES

Division name	Division Code to use
DV RD 1 - Residential Division	
Single-Family Housing	
House	**SFH**
Villa	**SFV**
Riad	**SFR**
Multifamily housing	
Multifamily house	**MFH**
DV CC 2 - Commercial Division	
Multi-unit Building	**MUB**
DV CM 3 - Community Division	
Education Building	**EB**

Figure 8. Divisions in SD Africa 2024 Design Challenge, adapted from U.S. editions. *Source:* IRESEN 2024.

***Share competition management best practices** and lessons learned with international organizers, allowing them to **adapt U.S. competition requirements** to their context.*



Approach: ZEDD Embeds Building Science & Zero Energy Education in Collegiate Programs

ZEDD **embeds building science and zero energy design education** in collegiate programs, equipping entrants to the workforce with **industry-relevant skills** and enabling them to **work across existing industry boundaries.**

Building Science Education Curriculum		Zero Energy Design Practicum
Option 1: Solar Decathlon Building Science Education learning modules	+	*Option 1:* Solar Decathlon Design Challenge competition participation
Option 2: School-created building science education program addressing required learning objectives		*Option 2:* A zero energy building design project meeting DOE Zero Energy Ready Home certification or more stringent

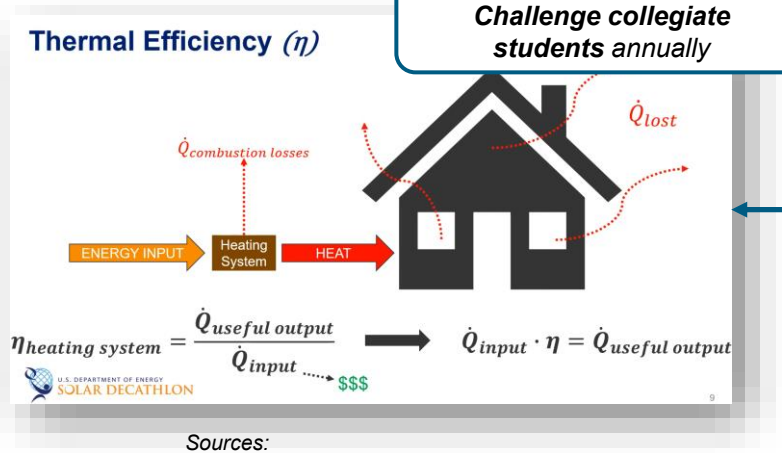
= *Students who are prepared to address building decarbonization in their careers*

Figure 5. ZEDD-recognized collegiate programs in the 2022, 2023, and 2024 cohorts

ZERO ENERGY DESIGN DESIGNATION
U.S. DEPARTMENT OF ENERGY
2024-2027

Approach: Foundational Building Science Education

The Solar Decathlon Building Science Education (BSE) series **"breaks down silos"** among industry professions and educational institutions by emphasizing a **"harmonized understanding of building science"** (Truitt et al., 2022).



*Offered to **1,000+ Design Challenge collegiate students** annually*

- 9 modules of short videos and quizzes, comprising **10+ hours of publicly accessible, online educational content** on topics such as:
  - ✓ Efficient HVAC systems
  - ✓ Building envelope
  - ✓ Life-cycle analysis
  - ✓ Renewables integration
  - ✓ Existing building retrofits.
- Prepares learners **with building science principles** paramount to the design of high-performance, energy-efficient buildings.

***5 organizational hosts** offer BSE to scale impact to their professional audience*

Sources:

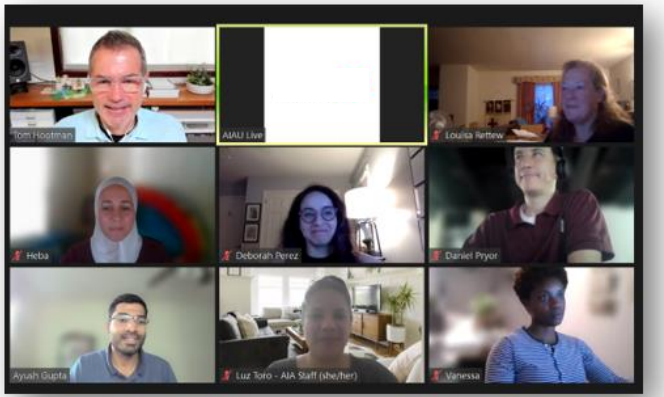
- *Completing the Circuit: Workforce Development for Advanced Building Construction and Grid-Interactive Efficient Buildings – NREL, 2022*

Approach: SD Pro Meets Professionals With Practical Education

- SD Pro offers practicing architecture and engineering professionals **strategic building science and zero energy education** and **collaboration with other professionals** to break down industry silos.
- 10-week **cohort-based** program to earn **continuing education** credit that includes online educational modules, a **hands-on design practicum**, and a deep dive with an **industry expert** instructor.

Week	Topic
Week 1	Introduction
Week 2	Planning and Setting Goals
Week 3	Passive Design
Week 4	Building Envelope
Week 5	Lighting
Week 6	Plug Loads
Week 7	Mechanical Systems
Week 8	Mechanical Systems
Week 9	Renewable Energy
Week 10	Final Presentations

Upskilling practitioners across industry in a collaborative, experiential learning environment.



*Course structure, learning plan, and course materials provided to **industry partners to market and scale** to their audience.*

Progress and Future Work: SD Pathways & SD Pro

In FY25, SD Pathways will redirect to focus on **alumni and industry support** of 2025 Design Challenge teams, as well as **online educational content** to build awareness for green building careers to a K-12 audience.

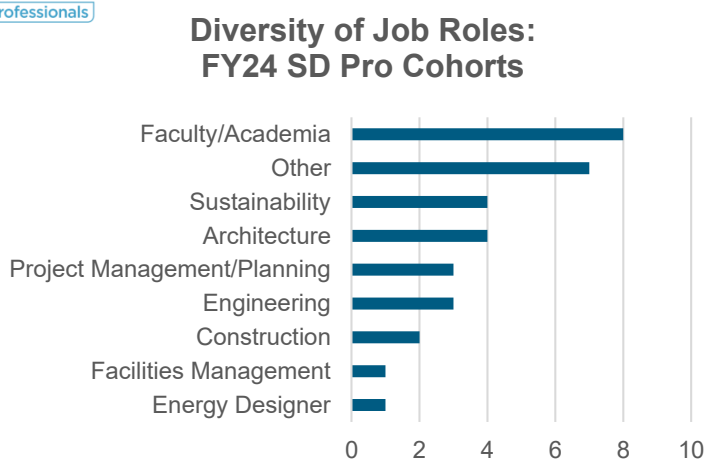
U.S. DEPARTMENT OF ENERGY Solar Decathlon Pathways

- **109 classrooms** reached
- **2,200+ students** reached
- **55 presentations delivered**

In FY25, SD Pro will continue its focus on **retaining and increasing industry partnerships** to scale building science and zero energy design experience to a diverse networks of professionals.

U.S. DEPARTMENT OF ENERGY Solar Decathlon Professionals

- **30 participants**
- **2 industry organization hosts**
- **3 cohorts**



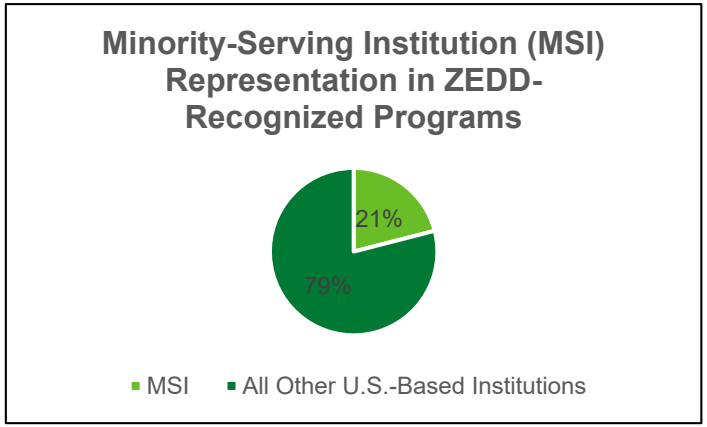
Progress and Future Work: Building Employer Awareness of ZEDD

Connecting students with potential employers **requires building industry awareness and demand** for these skilled, career-ready entrants to the workforce.

ZEDD Quick Stats

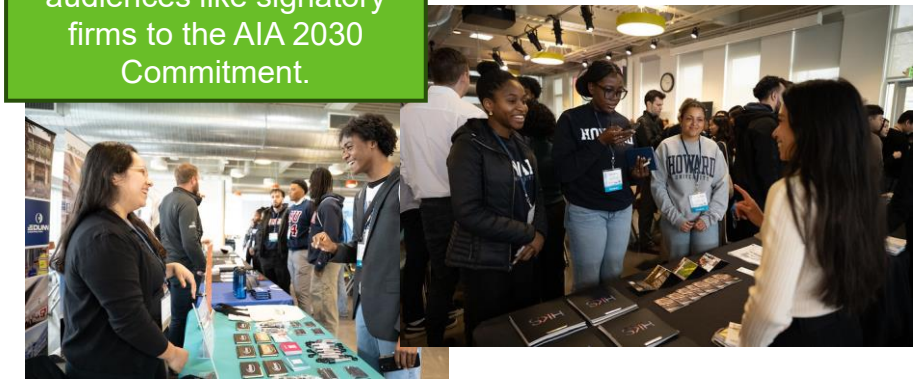
53 programs from 33 collegiate institutions in 2022-2024 cohorts

700+ career-ready students expected to graduate from 2024-2027 ZEDD cohort



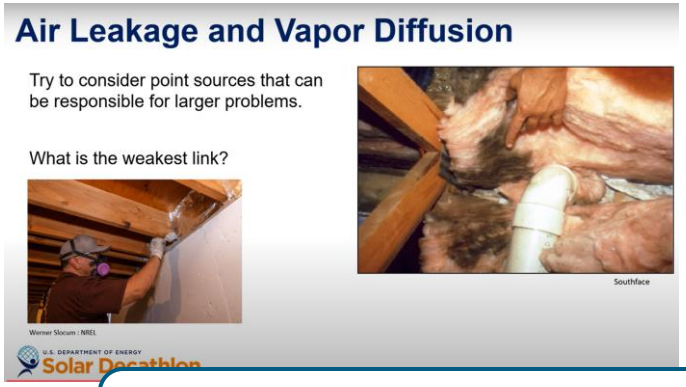
***MSI representation** in ZEDD-recognized programs can be compared to **14% MSIs of all U.S. degree-granting institutions** (Rivera, 2023).*

ZEDD will focus on connecting students with audiences like signatory firms to the AIA 2030 Commitment.



Progress and Future Work: Building Science for All

The Building Science Education (BSE) series has **reached learners of all levels**, including high school, collegiate, and professional audiences, to embed foundational knowledge across the career lifecycle.



*The **new Building Energy Retrofits module** helps learners address the 130 million existing buildings in the United States.*

BSE Quick Stats from Select Hosts

USGBC

- **3,205 Continuing Education (CE) hours** earned in FY24, **10,591 earned since 2019.**

ASHRAE

- **162 Professional Development Hours (PDHs)** earned in FY24, **461 earned since 2019.**

Design Challenge Stats

From 2022-2024, an average **70% of Design Challenge teams utilized BSE** to meet technical competition requirements.

700+ students used BSE in 2024 Design Challenge.

BSE Module	YouTube Views
Welcome	2,200
Buildings and Energy	14,874
Zero Energy Buildings	9,821
Building Envelopes	52,531
HVAC Systems	12,960
Lighting	5,062
Plug and Process Loads	1,094
Embodied Environmental Impact	989
Renewable Energy	4,435
Building Energy Retrofits	856
TOTAL	104,822

U.S. DEPARTMENT OF ENERGY Solar Decathlon Building Science Education

Thank you

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Reference Slides

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Project Execution

	FY2024				FY2025			
Planned budget	$210,000				$180,000			
Spent budget	$187,731 (as of August 2024)				*Planned $180,000*			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Past Work								
Building Science Education Series retrofit module								
SD Pathways Summary Report								
ZEDD Case Study								
ZEDD Conference Submissions								
Summary of EZEP Programs								
ZEDD Summary of Recognized Programs								
Current/Future Work								
Building Science Education Series updates								
ZEDD Employer Awareness Campaign								
SD Pathways Summary of Outcomes								
Summary of EZEP Programs								

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- **Department of Energy:** Program sponsorship, leadership, and direction
- **NREL:** Project management and execution
- **The National Energy Education (NEED) Project:** Subcontractor to manage SD Pathways outreach
- **USGBC, Built Environment Plus, AIA, ASHRAE, PNNL, EEBA:** SD Pro & BSE Partners

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