U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

RACE TO ZERO
U.S. DEPARTMENT OF ENERGY
STUDENT DESIGN COMPETITION

Race to Zero Student Design Competition

National Renewable Energy Laboratory

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Project Summary

Timeline:

Start date: April 2013

Planned end date: TBD

Key Milestones

1. Release of Design Competition Guide (July)
2. Host competition event at NREL (April)

Budget:

Total Project $ for 2018:

- DOE for 2018: $585,000
- Cost Share: $52,000

Total Project $ 2013-2017:

- DOE: $1,905,000
- Cost Share: $116,000

Key Partners:

Collegiate Institutions, Faculty & Students
Industry Sponsor Partners & Expert Jurors
Confluence Communications

Project Outcome:

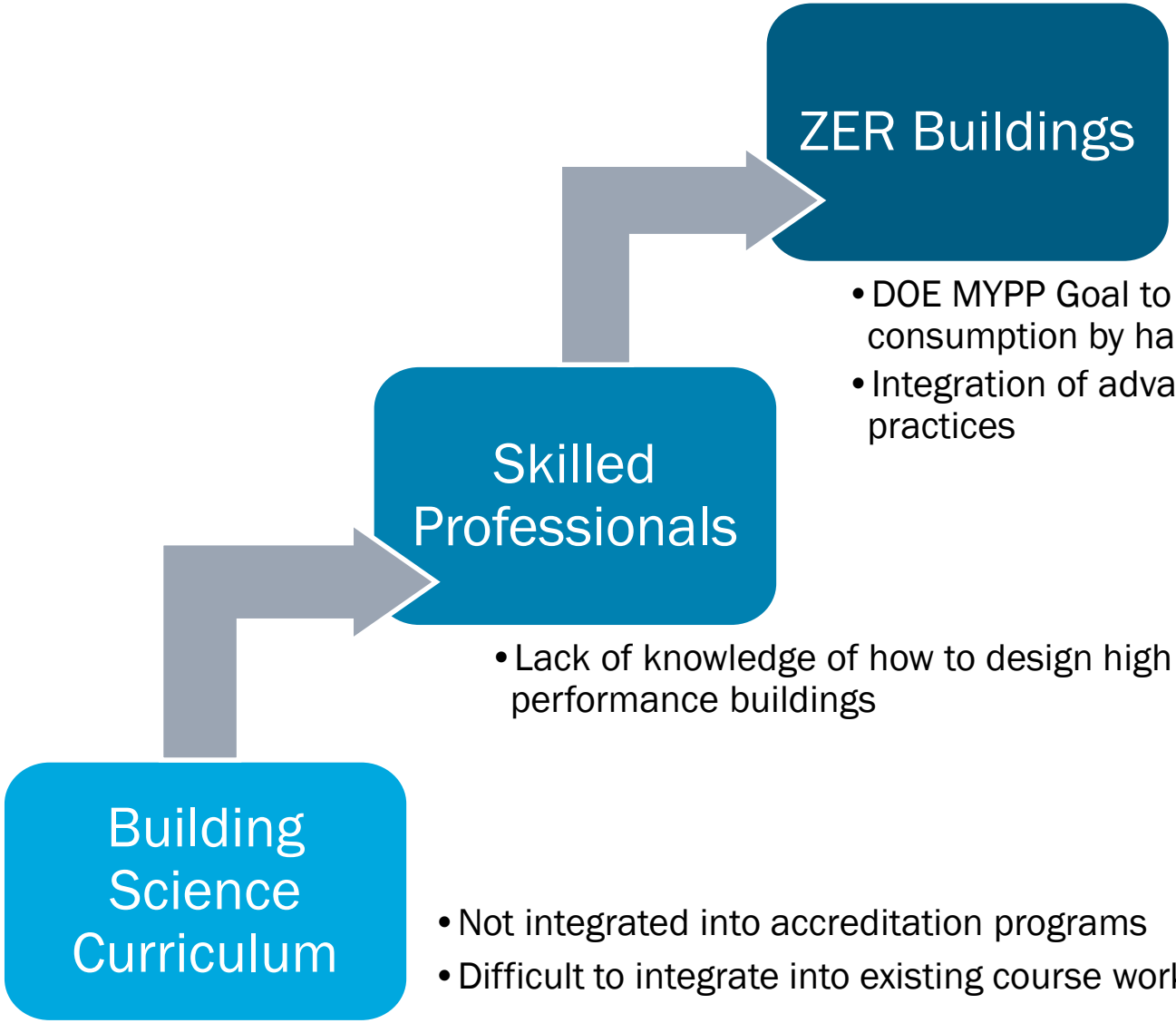
Inspire and develop the next generator of building science professionals and advance the enhance buildings science curriculum in universities.

Success is measured by the number of student teams, diversity of the team demographics, improved quality of submissions and increased involvement by the industry.

Team


U.S. Department of Energy
Race to Zero
Student Design Competition
RACE TO ZERO
STUDENT DESIGN COMPETITION

Challenge



- DOE MYPP Goal to reduce energy consumption by half
- Integration of advanced technologies and practices

- Lack of knowledge of how to design high performance buildings

- Not integrated into accreditation programs
- Difficult to integrate into existing course work

Challenge

FY 2019 Administration Research and Development Budget Priorities Memo

Mick Mulvaney, Director of O&B

Developing a Future-Focused Workforce

The Administration is committed to improving the technical training of the American workforce through Science, Technology, Engineering, and Math (STEM) education and apprenticeships. Emerging technologies will present tremendous opportunities for new job creation, but will also require a technically skilled and capable workforce to meet demand.

Challenge

BTO Multi-Year Program Plan

Residential Buildings Integration

Strategy 3: Accelerate market-wide adoption of energy saving solutions and the resulting benefits by addressing market barriers and expanding a skilled workforce to successfully increase energy efficiency in homes.

- RBI plans to engage 40 teams and 400 students in the competition by 2016, and 60 teams and 600 students in the future
- Inspire the next generation of innovative thinkers

Approach

Collegiate competition of zero energy ready building designs that effectively combine:

- ✓ Building America Program best practices
- ✓ Integrated energy efficiency and renewable energy technologies
- ✓ STEM educational benefits
- ✓ Multiple academic disciplines working together
- ✓ Future-focused workforce
- ✓ Industry collaboration

Approach

Annual Competition (Starting 2014)

- Easily Integrated in Existing Curriculum of 1-2 semesters

Critical Skill Development

- Building Science Seminar Training
- Collaborative Teamwork Experience
- Comprehensive Integrated Design
- Market-Ready Solutions (Design+Cost+Construction)

Two-Day Competition Event at NREL

- Team Presentations to Expert Jurors
- Networking
- Thought Leaders
- Career Connections

Impact

Since 2014, the Race to Zero has:

- Inspired over **2300 students**
- Involved **171 finalist teams** from 81 collegiate institutions
- Over **50% growth** in participation for last 3 years
- Engaged **dozens of industry partners** as sponsors mentors, and expert jurors
- Provided cost-effective **building science curriculum** enhancement
- Evolved to provided remain **market relevant**
- Grown from 3 to **6 contests**, with the addition of commercial category in 2018

Impact

"What a great experience to collaborate with peers (jurors), learn from the next generation of practitioners, and share/mentor the next generation of peers."

2017 Juror

"Learning the material in class then getting to apply it in a real world application was amazingly helpful…"

2016 Participant

"The competition really allowed me to understand the integration [of building science], something you don't get in the classroom."

2015 Participant

"The interdisciplinary nature helped me learn more than in a typical classroom - interacting with and understanding the priorities of engineers, building scientists, etc."

2017 Student

"There's so many things I never would have learned sitting in the classroom… Now I know ten times more than I did the previous year."

2015 Participant

"This competition forced students to get involved with the local industry and government agencies. This pushes them out of their comfort zone and prepares them for their careers."

2017 Faculty Advisor

"What [the Race to Zero] offers is something much more that what we can do in the classroom alone."

2017 Faculty Advisor

Impact

Race to Zero Career Connections

Thomas Simpson

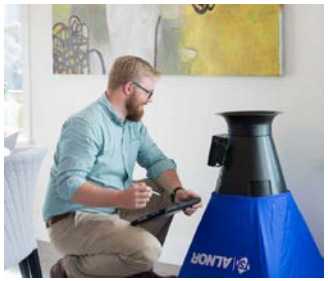
Lena Burkett

Nathan Kahre

Peter Schneider

DIGIBILT

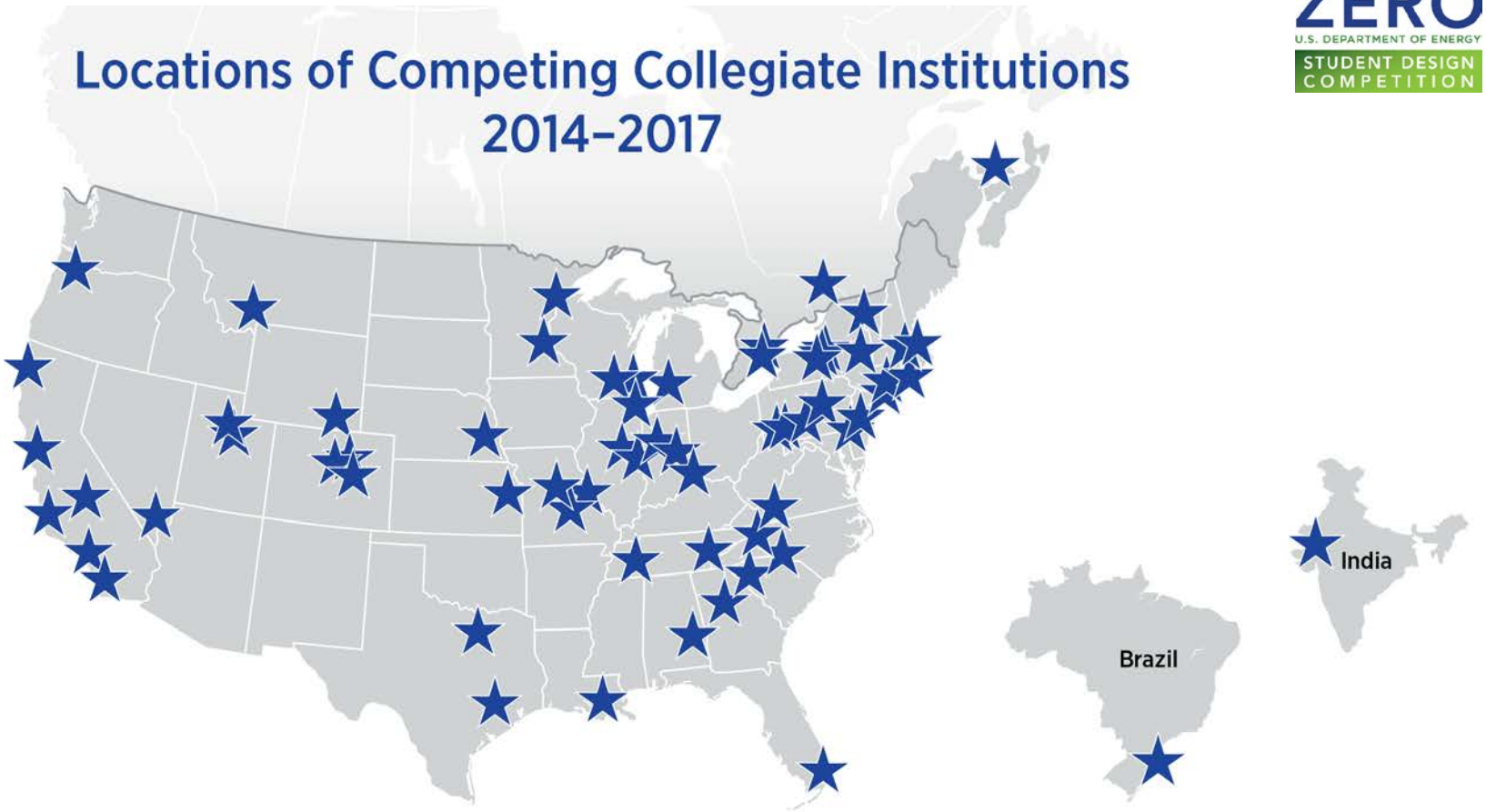
NREL
NATIONAL RENEWABLE ENERGY LABORATORY



thrive HOME BUILDERS
Homes that do more.

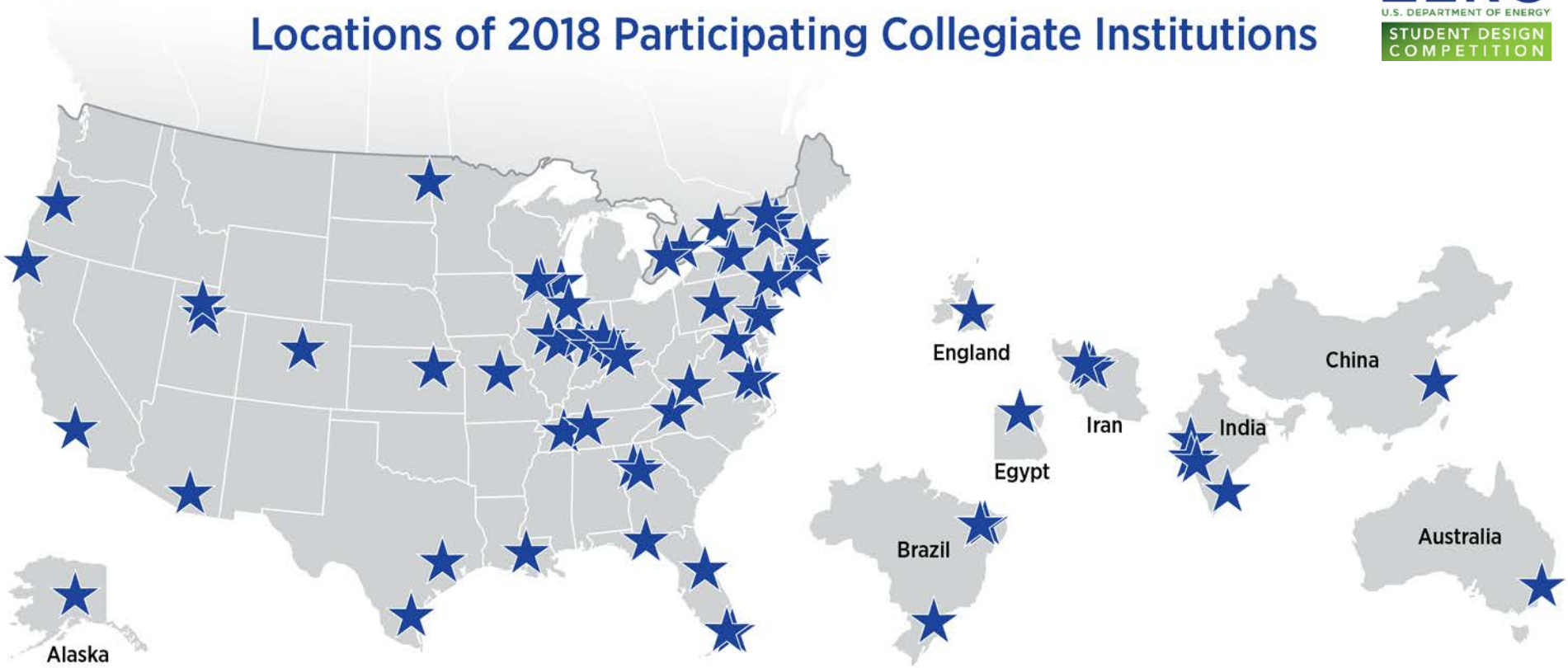
FAITHFUL+GOULD
Member of the SNC-Lavalin Group

Progress



131 Teams from 65 Finalist Collegiate Institutions, 2014-2017

Progress



84 Teams from 68 Participating Collegiate Institutions in 2018
38 New Collegiate Institutions in 2018

Stakeholder Engagement

225 students, sponsors, faculty, jurors, and staff at 2017 Race to Zero

Thank You to Our 2018 Sponsors!

SIPA Structural Insulated Panel Association

Plastics Pipe Institute

h+k

American Chemistry Council | Spray Foam Coalition

ASHRAE
Shaping Tomorrow's Built Environment Today

Spray Polyurethane Foam Alliance SPFA

NAHB

Owens Corning

IR Ingersoll Rand

Mitsubishi Electric
Changes for the Better

PIMA
Polyisocyanurate Insulation Manufacturers Association

NORESCO
United Technologies

DuPont Tyvek

Remaining Project Work

Thank You!

Vanderbilt University, Green 'Dore Designs team, Colorado Ranch Home project, Suburban Single-Family

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REFERENCE SLIDES

Project Budget

Project Budget: Project executed within annual budgets. Minimal budget increase annual through 2017 for additional services. $75k budget increase in 2018 for addition of commercial contest.
Variances: Describe any variances from original planned budget and identify if/how the project plan was modified.
Cost to Date: 95%. 2018 contest complete except for close out activities.
Additional Funding: Industry cash and in-kind sponsorship and participant registration fees.

Budget History					
FY2013– FY 2017 (past)		FY 2018 (current)		FY 2019 – TBD (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
$2,055,000	$116,000	$435,000	$52,000	TBD	TBD

Project Plan and Schedule

The Race to Zero Student Design Competition is an annual reoccurring activity. Milestones include monthly progress reporting, release of the competition guide, and hosting the competition event.

Project Schedule												
Project Start: 4/1/2017	Completed Work											
Projected End: 5/30/2018	Active Task (in progress work)											
	Milestone/Deliverable (Originally Planned)											
	Milestone/Deliverable (Actual)											
	FY2018 Q1			FY2018 Q2			FY2018 Q3			FY2018 Q3		
Task	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Past Work												
Monthly Progress Report	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Select and announce participant teams				◆								
Host bulding science training webinars						◆						
Host competition event								◆				
Current/Future Work												
Summary report									◆			