# Engineers for a Sustainable World



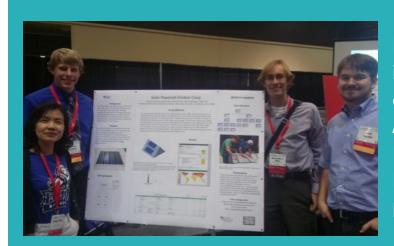
2014-2015 Annual Report



ESW-UT-Austin helped introduce hundreds of kids to sustainability and STEM at the annual Explore UT festival (read more on page 10)

trip to San Mateo
Ixtatan, Guatamala, to
build an irrigation and
water treatment system.





in the annual student competition of the American Society for Engineering Education and presented in Seattle!

This document was created by Alexander Dale, Chris Thai, Karen Kaminsky, Alexandria Julius, and Berlyn Hubler with support from the entire ESW network that made these projects and events possible. We hope you enjoy it.

## To the ESW Community:

We've had a great year. With a larger team than ever, our network has grown, and our support and programs have gotten much more robust. Along with diverse funding streams and a new overarching thread around resilient communities, the focus of the past year has definitely been one of both internal and external resilience.

Our chapter network continues to rapidly expand, growing by 20% to 50 chapters. Several of those additions transitioned existing student organizations because ESW was a better fit for the projects they wanted to work on, demonstrating the value of our focus on domestic projects.

Even as we add more chapters and strengthened Chapter Relations to help them do more, we've also been developing an increasingly robust and valuable set of educational programming. We transitioned from webinars to short courses, which has allowed us to provide a deeper focus on a range of topics, improve interactivity, and add a small new revenue source. Our Wicked Problems in Sustainability Initiative is also headed into its third full year, and we're looking at new ways of integrating with first year courses.

While our revenue increased by 67% in the past year, and the Annual Conference was self-supporting, we still ended the year negative due to lower corporate sponsorships and individual donations. We ran our first full donation drive in December, and hope that the results of future drives will strengthen our finances with additional active professionals in our network.

The biggest piece of internal resilience is this: in August, we officially received our 501(c)(3) status and tax-exemption. That provides many new opportunities that we're starting to take advantage of. We're proud of what we've done in the past year, and feel that our strengthened set of programs and internal structure puts us in a great position to raise more support and expand our offerings further in 2015-2016!

Sincerely,

Dr. Alexander Dale Executive Director Engineers for a Sustainable World



Canal cleanup in Rochester, NY, as part of the 2015 Annual Conference. A sunny way to wind down after several days of people and presentations!





ESW-UBC's very established student-run biodiesel lab, a core part of the tour at the Engineering Education for Sustainable Development conference in June!

You'll see a slight change in terminology throughout this and other documents - the use of ESW-HQ rather than ESW-National, and the Leadership Team rather than National Team. We're always looking at where we can improve, and as we get more non-US participation – particularly Canadian chapters – those terms just didn't make sense anymore!

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## **Our Vision**

A world of environmental, social, and economic prosperity created and sustained by local and global collective action.

## **Our Mission**

To forge innovative, lasting solutions to local and global sustainability challenges. We:

- **Design** and implement sustainable projects through our student and professional chapters.
- Educate and train individuals and organizations on sustainable policies and practices.
- Build a global network of communities with a shared culture of sustainability.

# The Year in Photos



PROJECTS: Urban farming, rice hulling, and a mobile disaster relief vehicle



**EDUCATION: Short courses, WPSI on sustainable housing** 



COMMUNITY: Regional and Annual conferences, national network and identity

## **New Chapters (cont. below)**







# The ESW Network at a Glance

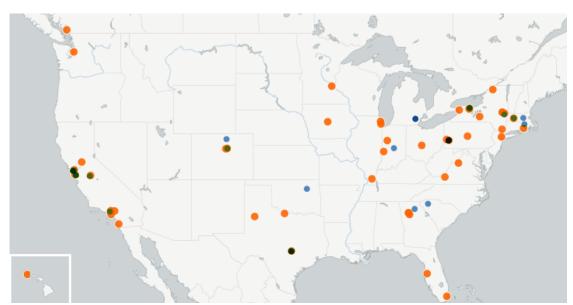
1250+ Active Members 40% Female Members 100+ Different Majors

## **Project Topics**

Chapters Working: On Campus: 97% In the Community: 83% Internationally: 41%



## Where is ESW?



## **New Chapters (cont.)**









# **Reviewing our Strategic Goals**

## Goal 1: Empower chapters to enact impactful projects

Chapters remain our core stakeholders. With several staff members devoted to helping new chapters get started, and an ever-expanding Chapter Relations (CR) department (with seven coordinators for 2015-2016!), we're now supporting an active network of 50 chapters. In the past year we've strengthened that support, added new channels of communication, and continued efforts to help share best practices between chapters.

## **A Stronger Chapter Relations**

Chapter Relations develops relationships with as many chapters as possible to provide support and advice regardless of the situation:

- Jess Damicis, then president of the University of Rhode Island ESW chapter (ESW-URI), received help from Candace Grogg, her Chapter Relations Coordinator (CRC). Candace helped Jess organize meetings and retain members and checked in with her periodically to make sure she and ESW-URI were staying strong.
- Sarah Seraj and Yamit Lavi, former and current CRCs of the South Region respectively, helped revive the dormant University of South Florida ESW chapter. The two CRCs set up a conference call with two generations of chapter leaders that had never talked to each other before to exchange information and plan next steps.
- Chris Thai, then CRC of the Western United States, helped the Harvey Mudd College ESW chapter
  host the first regional conference in the western US, attracting four chapters, 30 attendees, and
  creating some longer-term partnerships through the one-day event.

Nichole Heil, CRC for the Central Region, noted that through her relationship with the chapters, she was able to choose proper spotlights for the Chapter Features in ESW's monthly newsletters and have chapters take pride in their work. On the whole, chapter leaders enjoyed the relationships they developed with their CRCs. From an anonymous survey CR sent out to chapter leaders at the end of the academic year, CRCs received an average of 4.4 out of 5 on how well their chapter leaders liked working with them.

#### **Expanding Group Interactions Between Chapters**

Finding ways for chapters to interact is key. In addition to facilitating in-person connections at our second year of Regional Conferences and the Chapter Leaders Summit at the Annual Conference, CR expanded the scope of the virtual chapter leader calls (CLCs). Along with the standard calls between chapter leaders, new Project Workshops focused on connecting similar projects. The Project Workshops were a joint venture by the Projects and Education (Proj/Ed) team and CR, led by Nichole Heil. Building on the success of CLCs but engaging different student members, project managers of similar projects came together to discuss best practices and get advice about solutions to common roadblocks. We hosted two calls, focusing on international partnerships and solar carts. Facilitators guided the conversation to determine how chapter projects were doing and how they could be improved while encouraging discussion amongst the participants. We look forward to hosting more Project Workshops in the next year!



# **Program Focus: Small Project Grants**

In the spring of 2014, we gave out our first round of Small Project Grants, sponsored by professional member Hendrik van Hemmen. We gave out a second round in the fall of 2015, and wanted to show off some of the implemented projects from the first round and ideas from the second. These grants are up to \$500, aimed at supporting pilot-scale implementation by paying for materials.



Smith College: Seeking to both augment the functionality of outside seating on campus and make sustainable infrastructure visible, ESW-Smith has been designing and building a solar charging system for patio tables. A 2015 grant paid for materials, and final implementation will be finished by the start of the fall term.

Georgia Tech: ESW-GT designed and tested compost bins for dual use in Atlanta and the village of Zari in central India. Examining three different approaches for both practicality and economic feasibility, the team recommended one each for a single household, group of families, and a whole village, and focused on the system for the group of families as the most generally feasible.





Boston Professional: Fenway Park boasts some of the oldest continuous urban gardens in the country, dating back to the victory gardens of WWII. The Boston Professional chapter has been managing and improving a large plot. They've added fencing for rabbits and are in their second growing season, with produce going to local food pantries.

## Goal 2: Educate and train current and future engineers

Our educational programs have taken on a larger role as ESW-HQ has grown stronger and better able to manage and deliver content, rather than simply connecting members and chapters with resources. In the last year, short courses have replaced webinars (see next page for details), our WPSI supported a second successful year of courses, and we started to identify ways to support K-12 and faculty communities more directly.

## **WPSI + Faculty Support**

The Wicked Problems in Sustainability Initiative (WPSI) had a second year of full operations, with three courses at Pitt, RIT, and Rose-Hulman, three mentors, and 68 students participating. The annual topic was Sustainable Housing, and groups developed projects including home energy efficiency squads, consulting companies for slums, and homelessness.

This year's students had a more robust review process, faculty had more community, and the overall effort helped develop WPSI's value proposition and materials. We presented results from our survey of students' sense of confidence and professional responsibility at the ASEE Annual Meeting and reflections on the challenges and opportunities for scaling the program from the faculty perspective at the Engineering Education for Sustainable Development meeting. In a half-day summit at the Annual Conference, we selected the 2015-2016 topic of food waste, and will be welcoming several new schools to the initiative this fall!

#### K-12 Outreach

An increasing number of chapters are doing educational outreach projects, working with schools, afternoon programs, festivals, or summer camps to talk with younger students about energy, water, sustainability, and STEM. ESW-HQ has started collecting materials, curricula, and research on state science standards to help package and share them with other chapters.

One great example of a chapter's efforts is UT Austin's participation in ExploreUT, an annual all-campus event that invites kids of grades K-12 to come explore educational activities hosted by campus organizations. In the past, ESW-UT has set up a booth and let children build their choice of a solar, wind, or rubber-band car. In 2015, the chapter prepared an activity that would lift a LEGO man up from booth table using wind power. Before the kids arrived, the members created a fake land of destruction and placed Lego men in the midst of the destruction. The goal of the activity was for the kids to create a sustainable structure that would save the Lego men from the destruction. Around 200 kids visited ESW-UT's booth (check out the photo on page 2)!



After years of sporadic webinars that lacked the opportunity to dive into complicated topics, we piloted a series of digital short courses over the last year. These are 4-6 session courses aimed at both students and professionals, with topics that broaden engineering, provide new skills and sources of inspiration, and drive interactivity as part of learning. They're explicitly not MOOCs - they're capped at 30 people, interactive during live sessions, and flexible based on student interest. We ran four courses in the past year, with a wide range of topics and clear success.

## Wicked Problems in Sustainability

Wicked problems (technical term) are undefined, values-based, and path-dependent - think urban planning or water usage in the US west. This course was our pilot, and built off experience with WPSI to look at how to approach ill-formed problems.



## **Ecological Economics for Scis and Engrs**

In contrast to traditional economics, ecological economics considers a broader system of society and ecosystems - like the services of a coral reef. In partnership with NESSE and INET, this course looked at theory, case studies, and practical next steps with a mixed US-European group.





## Intro to Life-Cycle Assessment

We focused on setting up LCA questions and interpreting results rather than using software, aiming to help students and professionals become 'LCA literate' and comfortable with a new way of thinking, and practicing thanks to a partnership with Sustainable Minds.



## **Making Energy Efficient Buildings**

We all spend lots of time in buildings, and they consume 40% of our energy. Looking at both new and existing buildings, hightech and low-tech approaches, this course covered how we assess and model usage, a variety of ways to improve designs and retrofit structures, and guest case studies.

# Goal 3: Enable groups to share knowledge and create lasting sustainability solutions

We continue to create and improve ways to bring the various parts of ESW's network together. At the chapter level, this includes a stronger regional conference program, better internal event planning guidelines, and more chapters for more robust regions in general. Externally, it means planning our programs to involve external partners and find new ways to work together to accomplish bigger things.

## **Regional Conferences**

Fall 2014 represented the second year of our Regional Conferences. We supported two, on opposite parts of the United States - at the Ohio State University and at Harvey Mudd College in Southern California. Both featured a solid day of activities, food, and connections between chapters, with over 120 total participants. One of the successes of RegCons is internal - they were planned primarily by chapters with supporting documents and registration from ESW-HQ. A locally-run model makes RegCons more sustainable as an entity, and we continue to improve the guidance documents with each event. Both events also connected new on- and off-campus organizations to ESW as speakers, helping to build longer-term partnerships. One key example is the Claremont Home Energy Retrofit Project (CHERP), whose leader, Devon Hartman, was a speaker at the ESW-HMC RegCon, and is now on the ESW-HQ advisory board. ESW-HMC is also working with CHERP to get students working on energy efficient housing in the greater community.

## **Programmatic Partnerships**

We strive for cooperation rather than competition, and we've cross-advertised programs with other organizations for several years now. This year, however, we focused on building partnerships for specific long-term programs. We hosted a short course on ecological economics with the Network of Early-Career Sustainable Scientists and Engineers (NESSE) and the Institute for New Economic Thinking's Young Scholars Initiative. We're a supporting organization for Spark Clean Energy's Cleantech UP entrepreneurial program (just starting now). And we've been finding ways for organizations to tie into our planning efforts - expect to see more partners on ESW's programs, and look for ESW in new places as well, like hosting a networking session for engineers at the 2015 annual Association for Advancement of Sustainability in Higher Education (AASHE) meeting.



Our 2015 Annual Conference was hosted by ESW-RIT. Thanks to an amazing effort by the RIT organizing team and the ESW-HQ conference committee, we were able to bring together 250 students, professionals, and faculty members for three amazing days!



Sharing: Design review session for feedback on active projects, results of WPSI's second year, improved toilets for Haiti at the poster fair



Connecting: The chapter leaders summit, working on planning a community, and the 2015 Inter-Chapter Challenge in partnership with Rochester ROOTS



Inspiring: Enid Cardinal, Subash Rao, Melissa O'Mara, and Colin Harrison 🕇

**↓** Leaders: the 2015 RIT conference team and 2016 hosts UC Berkeley



# Goal 4: Establish ourselves as a key sustainability player in engineering

ESW's establishment means two primary things: making sure that our internal structures are stable and sustainable and making sure that others - individuals, colleges and universities, corporations, media outlets, etc. - know about our programs and value propositions. With respect to internal resilience, this is the core area, making sure that we are fiscally and organizationally sustainable.

## Tax-exempt 501(c)(3) Status

For the first 12 years of existence, ESW operated with fiscal sponsors. As part of restructuring in the last three years, we incorporated in 2013, and successfully received 501(c)(3) tax-exempt status in August of 2014. This status is one of the biggest pieces of establishment, providing credibility and eligibility for a much wider set of funding – as well as tax-deductibility for our sponsors and donors. This year, thanks in part to higher revenue, we'll be filing our first 990-EZ forms. We're excited about the broader transparency and validation this provides to potential funders.

## A Robust Digital Office (of Volunteers!)

ESW's staff, the Leadership (neé National) Team, has grown from five volunteer members in 2012-2013 to 25 in 2014-2015. Because many of our members stick around – we have an 80% retention rate – we've gradually seen the age and status of the team increase. While we were all undergraduate students in 2010, we're now mostly professionals. The extra experience and networks of this older team help bring ESW to new places and talk with more potential partners. We also work to continually improve our internal communication to keep everyone both in contact and excited about what ESW is up to!

## **Academic Chops**

Externally, ESW has been represented at four academic conferences and one major public event in the past year. With conferences in Vancouver, Seattle, Schenectady, and Doha, we've talked about ESW's educational programs and the research that has been done with them, while getting feedback on ways we can better support faculty. At the EPA's National Sustainable Design Expo – a recurring part of our calendar – we get to talk with both schools from around the country and the general public, and show off what our chapters are doing while inviting new participation. Finally, we published a peer-reviewed paper in the International Journal of Service Learning Engineering, alongside three chapter advisors. This helps advisors get credit for their work with ESW, and establishes ESW in formal terms.



# **The Road Ahead**



We've spent a year iterating existing programs and building internal structure. In the next year, we'll be expanding and adding to our programs. Here's what you should look for:

**Double the number of short courses.** We ran four short courses this past year, but we're planning on eight in the next one - a few repeats, but also several new topics and audiences. We'll look at decarbonization, low-tech engineering, teaching sustainability, design skills, and repeat our courses on Life-Cycle Assessment and Wicked Problems.

**Building a new set of programs and projects around community resilience.** In planning for almost a year, we've decided on a focus of 'resilient and sustainable communities' for our next several years of project initiatives. It's a topic that touches a lot of non-technical fields, but also one where every participating chapter can make real progress. Look for the first piece in this large puzzle with the Resilient CommUnity Design Challenge - more details coming this September.

**Supporting current and future faculty.** ESW occupies a unique multidisciplinary position and has a strong presence in the engineering education community. In the next year, we'll be expanding that role by maintaining an archive of course materials for sustainability in engineering, and developing a peer-reviewed certification program on teaching this content.

**Partnering on more programs.** The best programs of the past year involved expertise and networks from partners - our Ecological Economics Short Course with NESSE or conference sessions from Dayaway Careers. We're building partnerships with several new organizations – for CommUnity, short courses, and more – to help bring sustainability and engineering to new groups, and new people to ESW!

**Streamlining conference planning.** In building internal structure the past year, we've focused on documenting our conference planning practices. We want to see every chapter be able to host a Regional or Annual conference, and we've written some large documents and brought on two new Leadership Team members to help make that possible. Look for a clear application process, stronger support, and RegCons in more areas.

**New leadership and new ideas.** This year's Leadership Team has more schools represented -19 – than ever before. With the departure of our long-term leader Alexander Dale, we've brought on a new Executive Director, and we're expanding our Board of Directors with diverse new skills and backgrounds. All of these will keep new ideas flowing, even as we continue to grow our existing programs.

**A bigger network.** After two years, we are confident in our ability to grow without losing the personal connections that make ESW the strong community it is today. We have a target of 20 new chapters by July 2016, along with a focus on building the number of professionals involved and the value we provide to them with their memberships.

## **Financial Statements**

The past fiscal year showed both strong and weak points. Strengths include a rise in revenue in all categories, a new small but promising revenue stream from our short courses, a revenue positive Annual Conference, and our first paid employee in modern times. Weaknesses include underperforming individual donations, no general sponsors or grants, and retroactive pay for the Executive Director resulting in a net loss of \$7k.

Overall revenue rose 60% from \$32k to \$52k. A larger chapter network and the highest percentage of chapters in good standing, plus new professional membership provided the biggest non-conference increase, and one that promises to continue for FY16. Strong conference attendance and generous sponsors increased conference revenue by \$10k as ESW-HQ took on primary financial responsibility for the Annual Conference. However, our winter giving fundraising campaign, while an improvement over last year and attracting twice as many donors, only achieved 60% of its target for donations.

On the expense side, the Annual Conference, as our primary physical program, remains the biggest expense, accounting for just under 40% of costs. Another 30% was due to finally paying our Executive Director, including retroactive pay from FY14. This commitment to paid staff is an important part of organizational longevity, but will require additional resources for sustainability. The remaining 30% is a combination of program expenses, travel costs for the few physical meetings that our leadership team has, and legal obligations such as registering to solicit donations.

We finish the year with a net loss of \$7k, approximately the amount of the retroactive pay from FY14. The board is confident that with continue chapter growth and stronger donation campaigns from a more established professional base our core operations will be revenue neutral in the next year. We continue to pursue a social entrepreneurial model to minimize the need for grants and donations, and the revenue neutral conferences and educational programs reflect these goals. We are pursuing some larger grants to support new project initiatives during their first few years, but expenses for those programs are contingent on grant success.

We would not be able to operate and offer the programs and services that we do without the support of our donors and sponsors. Thank you for your continued support!



## **Income/Expense Report**

**Net Operating Income** 

Income		Expenses	
Member Dues	\$ 13,450	Administration	\$ 14,232
Donations	\$ 10,296	Fundraising	\$ 5,492
Conf. Registration	\$ 15,581	Programs	
Conf. Sponsorships	\$ 12,000	Programs - Shared	\$ 12,345
<b>Educational Programs</b>	\$ 468	Chapter Support	\$ 1,779
<b>In-Kind Donations</b>	\$ 815	Conference - Annual	\$ 23,100
Merchandise Sales	\$ 694	Conference - Regional	\$ 913
Total Income	\$ 53,304	Education	\$ 1,676
Cost of Goods Sold	\$ 1,000	Total Programs	\$ 39,813
Gross Income	\$ 52,304	Total Expenses	\$ 59,538
Overall			
Gross Income	\$ 52,304		
Total Expenses	\$ 59,538		

\$ (7,234)

# **Sources of Support**

## **2015 Annual Conference Sponsors**













## **General Sponsors**





## **Partner Organizations**



# \*sparkcleanenergy





#### **Individual Donors**

Emerald (\$200+)

Andrew Beck
Robert Best
Michael Brownell
D.J. D'Agostino
Alexander Dale
Jonathan Dale
Alex Devaux
Patrick Eells
Michael Frey
Alexandria Julius
Brian Lange
Laurie Scarbrough

Jade (\$75+)
Mike Alcazaren
Erin Rose Briggs
Anna Chung
R. Derek Chung
Nichole Heil
Calvin Holic
Thomas Holic
Judy Lao
Doralyn Moody
Michael Potts
Tomas Ringer-Silva

Marilyn Waite

Maureen Alcazaren Ben Bucior Joan Calomino Vince Calomino Julie Chow Jordan Crolly Harvey Mudd College's ESW Chapter Frances Hayslett Alyssa Hubert Berlyn Hubler Nancy Huntingford Karen Kaminsky Ann Richardson Sarah Seraj Ramesh Talreja Chris Thai Clay Tilton

**Green** (\$30+)

We are always looking for additional donors, both large and small. You can choose to support ESW in general or fund a specific program or need. We accept donations online or by check, and donations are fully tax-deductible per our 501(c)(3) status. Your gift enables us to provide all of the programs in this report, empower a growing network of chapters, and help change the career paths and futures of technical students across North America and beyond.

Whether it's because you benefitted from an ESW chapter as a student, or because you want to see more engineers think about sustainability inside and outside the classroom and their careers, consider making a donation today at <a href="http://bit.ly/SupportESW">http://bit.ly/SupportESW</a>.



# **Board of Directors**



Pittsburgh, PA Rensselaer '07 U. Chicago '09

Boston, MA SUNY Buffalo '10

New York, NY Stanford '65

Chicago, IL Northwestern '14



Northampton, MA Smith College '16

Palo Alto, CA Harvey Mudd '10 Stanford '16

Beijing, CN Princeton '06 Cambridge '08

Buffalo, NY U. New Hampshire '96 SUNY Buffalo '02

# **Advisory Board**



Syracuse, NY Clarkson '86

San Diego, CA Cal Poly - SLO '06 Point Loma Nazarene '11



Chicago, IL Northwestern '14

Claremont, CA Pitzer '77



Cleveland, OH McGill '96 UC Berkeley '01



Troy, NY UMO - Columbia '72 Iowa State '76, '80

# The ESW Chapter Network

California Institute of Technology

Clarkson University \*

**Cornell University** 

CSU Long Beach \*

CSU Los Angeles

**CSU Sacramento** 

**Eastern Mennonite University** 

Georgia Institute of Technology

Harvey Mudd College

Illinois Institute of Technology

Iowa State University

Kapi'olani Community College \*

Kennesaw State University \*

Miami-Dade

Midwestern State University

Northwestern University

Ohio State University

Pennsylvania State University

**Purdue University** 

Rensselaer Polytechnic Institute

**Robert Morris University** 

Rochester Institute of Technology

Rose-Hulman Institute of Technology \*

Seattle University

\* New for 2014-2015

Smith College Stanford University Stevens Institute of Technology SUNY at Buffalo **Texas Tech University** \* Union College United States Military Academy University of British Columbia \* University of California - Berkeley University of California - Merced University of California - San Diego University of Colorado Denver University of Kentucky - Paducah University of Pittsburgh University of Rhode Island University of Rochester University of South Florida University of St. Thomas University of Texas - Austin \* Virginia Tech

Boston Professional
Houston Professional
NY Capitol Professional
\* Pittsburgh Professional





Pittsburgh, PA U. of Pittsburgh '09, '13

Fort Collins, CO SUNY Buffalo '12 Purdue '14

Northampton, MA Smith College '16

Ann Arbor, MI Penn State '14



Pittsburgh, PA Robert Morris U. '14

Austin, TX

U. TX – Austin '14, '18

Berkeley, CA UC - Berkeley '17

Denver, CO U. of Pittsburgh '10 U. CO – Denver '15



Oakland, CA Smith College '14

Providence, RI
U. Rhode Island '15

Chicago, IL U. of Pittsburgh '13

Austin, TX
U. TX – Austin '14



San Francisco, CA U. CA – San Diego '14

Rochester, NY U. of Pittsburgh '13 RIT '17

Austin, TX
U. TX - Austin '16

Philadelphia, PA U. of Pittsburgh '13



Tulsa, OK Cornell '12, '13

Los Angeles, CA U. CA - San Diego '12

Atlanta, GA SUNY Buffalo '14

Rochester, NY RIT '16



Ann Arbor, MI Penn State '13, '15



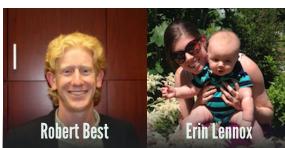
Greenville, SC Stevens '14



San Francisco, CA Stanford '16



Boston, MA Northwestern '12



Palo Alto, CA Harvey Mudd '10 Stanford '16



Troy, NY Rensselaer '08, '09, '14



Indianapolis, IN Purdue '11, '15



Pittsburgh, PA U. of Pittsburgh '15

# The Leadership Team

More information available at www.eswusa.org/leadership.



Boston, MA SUNY Buffalo '12

Merced, CA U. CA - Merced '15



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