

Target: High School Students

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Actions for Industry:

1. Contact your local Learning for Life office for more information (www.learningforlife.org)
2. Sponsor a Career Exploring post in a field or fields of engineering relevant to your company. Show occupational diversity – kids don't know the wide variety of things engineers can do.
3. Provide scholarship support to high school students
4. Provide internships, work-study programs, and research opportunities for high school students

Target: Community Colleges and Beyond

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Actions for Industry:

1. Provide internships and research opportunities for community college students (strategy to retain local talent)
2. Provide scholarship support to community college students for tuition and textbooks (support and facilitate academic success)
3. Target scholarships to associate's in science holders to further education in engineering
4. Develop pre-engineering academies in partnership with local schools and community colleges
5. Sponsor contests for engineering students at community colleges focused on innovative approaches to local issues (offer awards, celebrate creativity, teamwork, collaborative approaches, systems thinking, etc.)
6. Establish, support, and/or participate in summer bridge programs for community college students
7. Establish innovative programs, partnerships and targeted outreach efforts at K-14 level (e.g. establish and support Project Lead the Way programs)
8. Change attitude about who can do engineering
9. Students need to make informed choices about the options available to them – need for better engineering marketing, e.g. "A day in the life of an engineer?"
10. Need to take the message about engineering to underrepresented communities in the engineering profession, e.g. women and students of color – tomorrow's engineering challenges require input from diverse voices and experiences

11. Advocacy in high schools, community colleges and at national level to address the declining interest in engineering
12. Set up field trips or open-house day type programs for students
13. Offer programs on the diverse array of activities engineers are engaged in

Target: Women in Engineering

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Actions for Industry:

1. Your industry is rooted in communities across the country. This is a huge benefit in workforce development. You are well positioned to lead collaborative talent development efforts in your communities and realize the benefits of the resulting qualified workforce.
2. Make your efforts count and be cumulative over the long term: take a systems approach and leverage existing initiatives and networks to support long-term change. There is no single silver bullet: the challenge is multifaceted and has many culturally embedded aspects. It will take time, creativity and consistent effort to see results.
3. Bring visionary leadership and other key resources (internships, funding) to regional efforts that support STEM education across the educational spectrum. If these do not exist, create them.
4. Partner with other industries and groups in your region that have aligned goals: chambers of commerce, business organizations, economic development agencies, professional societies, engineering diversity organizations. Work specifically with groups that have access to underrepresented students: Churches, and community organizations, Women in Engineering Programs, Multicultural Engineering Programs. Build, organize, and lead a coalition of these groups to have lasting impact and develop all the talent in your communities.
5. Constantly encourage others to lead for building the engineering workforce for the future. Get on advisory boards to K-12 schools, community colleges, informal education efforts, engineering schools and ask questions about who participates, what the barriers and boundaries to participation my minorities and women are, why they exist, and how they can be lifted. Follow through to support removal of barriers and increasing access for all.
6. Become very knowledgeable about the root causes of low participation in STEM by women and minorities such as: educational access, image of the profession, lack of role models, lack of mentors, lack of awareness of career options, feelings of isolation as a minority, lack of family knowledge and support, lack of self confidence, uninteresting and discouraging classroom experiences, desire for socially relevant work, unable to afford education, and lack of knowledge about higher education. Use resources like the WEPAN Knowledge Center at wepanknowledgecenter.org and other sources to build your organization's knowledge.
7. Invest in realigning ALL your messaging to be consistent with "Changing the Conversation". Make sure that every representative who interfaces with young people is engaging before an audience of young people and can effectively advance your efforts.
8. Ensure that your workplace climate is welcoming to young people of any race, ethnicity, gender, sexual orientation, ability. The young talent you bring to your organization is a precious resource. Be strategic and carefully manage their experiences on the job.
9. Look for creative ways to engage more women and other underrepresented groups. Can you find a way to employ more women with flextime or job sharing? What do other underrepresented groups need? Special equipment or job responsibilities for disabled workers, special transportation?
10. Focus outreach efforts on parents of young people to show that you have high quality jobs that their children can aspire to.
11. There are many potential partners who have the same goals: develop all the talent for future STEM careers—girls, boys, all races and ethnicities, preferences and abilities. Build a community-based collaborative effort to build an ongoing source of workers for your needs.

Target: Universities and Beyond

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Recommended actions from the U.S. Power and Energy Engineering Workforce Collaborative's report "**Preparing the U.S. Foundation for Future Electric Energy Systems: A Strong Power and Energy Engineering Workforce**" found at <http://www.iece-pes.org/workforce/workforce-collaborative/>.

Actions for Industry:

1. Maintain workforce development and hiring activities in spite of the economic downturn to avoid future power system reliability problems due to massive delayed retirements
2. Communicate with university undergraduate students to offer an exciting image of an energy engineer's work that will make a difference to the company, its employees, the region and beyond. Point out the new skills that engineers will be acquiring for successful transformation of the electric power system
3. Offer development opportunities to undergraduate and graduate students; examples include mentoring, scholarships, internships, cooperatives, senior capstone projects, part-time jobs, and research support. Research support can be provided by offering data, allowing testing of innovative ideas, enabling access to company engineers for information and guidance, and providing financial sponsorship through fellowships and research project support.
4. Seek beneficial opportunities through cooperation with universities. Talk with faculty about workforce needs and major business and technical challenges; listen to their education and research plans. Find ways to work together.
5. Communicate with college deans and department chairs about strategic corporate and industry challenges, innovations needed by industry, importance of educating students to become power and energy engineers, and the need to hire new faculty. Brainstorm about ways to maintain a high quality and cost efficient educational system. Again, find ways to work together.
6. Facilitate life-long learning through innovative programs with community colleges and universities. Reward participation in professional associations.
7. Participate in collaborative efforts among industry, government, and educational institutions to address workforce issues (such as state consortia formed with the assistance of the Center for Energy Workforce Development). Take advantage of opportunities to leverage company resources to achieve common objectives such as in building the student pipeline
8. Support retraining of electrical engineers from other disciplines to the power engineering field whether in hiring new employees or in cross-training existing employees.

Other suggested reading (<http://www.pserc.wisc.edu/ecow/get/publicatio/specialepr/workforcec/>)

Engineering in K-12 Education: Understanding the Status and Improving the Prospects, *Committee on K-12 Engineering Education, NAE and NRC*

Changing the Conversation: Messages for Improving Public Understanding of Engineering, *National Academies*

Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future, *The National Academies Press*