

# **Sustainability Activities in the National Academy of Engineering**

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# On-going Activities

## Grand Challenges for Engineering

4 themes: Sustainability, Health, Security, and Joy of Living

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide Access to Clean Water
- Restore and Improve urban infrastructure
- Advance Health Informatics
- Engineer Better Medicines
- Reverse Engineer the Brain
- Prevent Nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery

Summit Series:

2013 – London

2015 – Beijing

2017 – DC



# On-going Activities

## Grand Challenges Scholars Program

### Program Components

1. Hands-on Project OR Research Experience: Related to a Grand Challenge
2. Interdisciplinary Curriculum: A curriculum that complements engineering fundamentals with courses in other fields, preparing engineering students to work at the overlap with public policy, business, law, ethics, human behavior, risk, and the arts, as well as medicine and the sciences
3. Entrepreneurship: Preparing students to translate invention to innovation; to develop market ventures that scale to global solutions in the public interest
4. Global Dimension: Developing the students' global perspective necessary to address challenges that are inherently global as well as to lead innovation in a global economy
5. Service Learning: Developing and deepening students' social consciousness and their motivation to bring their technical expertise to bear on societal problems through mentored experiential learning with real clients

122 engineering schools have committed to educate grand challenge scholars (29 are active programs)



# On-going Activities

## Integrated Network on Social Sustainability

- NAE is a collaborator in the network, which is led by the University of North Carolina Charlotte (UNCC) - <https://clas-pages.uncc.edu/inss/>
- Network has annual virtual conferences to encourage a greater appreciation for social aspects of sustainability with a particular focus on engineering and its allied professions.

## *The Bridge*

- Past issues have covered sustainability topics
- Future Issues:
  - » 2018 – Oceans
  - » 2019 – Engineering for Disaster Resilience
  - » 2019 – Upgrading US Infrastructure



# On-going Activities

## Engineering for You Video Contest

- Asks people to create a 1-2 minute video that shows how engineering enhances quality of life and serves the needs of society.
- 2015 contest was on the Grand Challenges and 2016 was on Mega Engineering projects such as building sustainable cities.

## EngineerGirl website

- Designed for girls in elementary through high school and offers information about various engineering fields and careers, questions and answers, interviews, and other resources on engineering.
- Hosts an essay contest every year and in 2016 students were asked to describe a technology and the improvements it could provide in at least one of the four areas of engineering responsibility: safety, health, well-being, and environmental sustainability



# On-going Activities

## Frontiers of Engineering

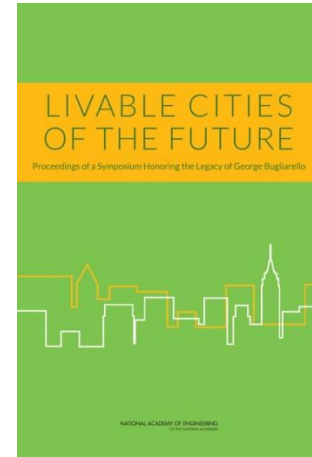
- Annual meetings in US, Germany, Japan, India, China, and Europe that brings together a select group of emerging engineering leaders from industry, academe, and government labs to discuss pioneering technical work and leading edge research in various engineering fields and industry sectors
- The meetings often have sessions on sustainability topics.



# Recent and Past Activities

## Livable Cities of the Future

- Proceedings of a Symposium Honoring the Legacy of George Bugliarello



## Sustainable Cities and Interdisciplinary International Education

- NAE was part of an NSF Partnership in International Research and Education grant that focuses on “Developing Low-Carbon Cities in the United States, China, and India through Inter-Disciplinary Integration across Engineering, Environmental Sciences, Social Sciences & Public Health.”
- The project developed a transformative international research, education, and outreach program to assist in the development of low-carbon, resource-efficient, healthy cities in the United States, China, and India.



# Recent and Past Activities

## Engineering, Social Justice, and Sustainability

- workshop addresses conflicting positive goals for engineering projects in impoverished areas and areas in crisis, both domestically and internationally.

## Climate Change Educational Partnership

- project to characterize the societal and pedagogical challenges posed by the interactions of climate change, engineered systems, and society, and identify educational efforts to enable engineers, teachers, students, policymakers, and the public to meet the challenges.

## Energy Ethics in Science and Engineering

- examined energy ethics issues that concern the responsible conduct of science and engineering and also those that arise in the interactions of science, engineering, technology, and society.



# Past Activities

## Industrial Ecology Series of Reports 1994-2001

