STRATEGIC ISSUES AND TRENDS

September 2008

Published bi-monthly by ASME Strategic Issues, Opportunities and Knowledge Committee

ASME
1828 L Street, N.W.
Suite 906
Washington, DC 20036
Phone: 202-785-7382
Fax: 202-429-9417
E-mail: pratta@asme.org

Infrastructure for the 21st Century

The infrastructure of the United States, from power plants to roads, is outdated and deteriorating from years of neglect. At the same time, the U.S. will soon need a broad range of infrastructural upgrades, especially in its energy infrastructure, to meet future environmental requirements and growing demand. This coincides with long-term projects in China, India and other developing countries. As a result, there are many opportunities and challenges for Mechanical Engineers in developing infrastructure for the 21st century.

America's physical infrastructure is in poor shape as many systems near the end of their projected life spans and decades of underfunding take their toll. The ASCE estimates that a $1.6 trillion investment is needed over a five year period to bring the nation's infrastructure up to good condition. This includes investments in transportation, energy, water treatment, waste treatment, security, schools and public places. Similarly, a recent report released on the anniversary of the Minneapolis bridge collapse outlined the $140 billion needed for major repairs or upgrades for 1 in every 4 of America's bridges. At the federal level, consumers are cutting back on gasoline consumption, leading to an expected $3.8 billion deficit next year in the Highway Trust Fund.

The United States' energy infrastructure is also in need of upgrading to meet more rigorous environmental standards. After 30 years of inactivity, the atomic energy industry is applying to build new, safer and more efficient nuclear power plants. The nation's coal fired plants, which provide over 50% of the nation's energy, are on average between 30 and 40 years old. Only 25% of these plants have been retrofitted with scrubbers and relatively few use modern flue gas clean-up systems. In order for coal to compete with cleaner technologies over the next 20 years, the industry will need to upgrade to promising, but expensive, clean coal technologies like IGCC (Integrated Gasification Combined Cycle).

Carbon and other environmental regulations in the United States and abroad will require significant public and private sector investment in carbon-free sources of energy, including solar, wind, hydro and biomass. According to the Energy Information Administration (EIA), worldwide energy demand is expected to grow by 50% from 2005 to 2030. The EIA expects the fastest growth to occur in renewable energy sources at a still modest pace of 2.1% a year. The second fastest growth is projected to occur from coal at 2.0% a year. However, effective action on global climate change could drive faster yearly growth in renewable energy at the expense of coal.

→

ASME
SETTING THE STANDARD

In emerging markets in Africa, the Middle East, Latin America, Eastern Europe and Asia, annual infrastructure spending is expected to jump by 80% in the next three years alone, according to Merrill Lynch. This growth will be lead by China's continued investment in transportation and energy infrastructure. India, Russia and the Middle East are also forecast to lead the world in infrastructure investment over the next decade. Over the longer term, the EIA estimates that 85% of the increase in energy demand from 2005 to 2030 will come from non-OECD countries.

ASME Implications

New transportation infrastructure will mean greater demand for mechanical engineers and the cars, planes, trains, construction equipment and other machines they develop. Mechanical engineers will also be in demand for designing water treatment systems, sewer systems, climate control systems for new buildings and mining and drilling equipment. In all these areas, mechanical engineers will be challenged to build greater energy efficiency into the design and integration of these systems.

Mechanical engineers will also be challenged to create new ways to grow the global energy infrastructure to meet growing demand while reducing greenhouse gas emissions. The challenge includes not only renewable sources of energy, but also nuclear, clean coal and large-scale carbon sequestration systems. In a recent web survey of ASME members for the Global Summit on the Future of Mechanical Engineering, about three-quarters of ASME members agreed that the profession will play a critical role in addressing climate change. Innovations are likely to be all the more important in emerging economic regions like China and India, where inclusion of first-generation development could minimize the need for costly retrofitting.

ASME is already taking the lead in preparing the profession for the opportunities and challenges of building infrastructure for the 21st century. ASME-ITI has begun to explore the feasibility of a risk-based methodology to help guide the allocation of limited resources to address the nation's crumbling infrastructure. ASME-ITI will work as a convener to bring together mechanical engineers with other stakeholders. In addition to that effort, ASME can work with its partners to encourage and develop a curriculum for engineers to address future challenges and opportunities. Lastly, ASME can play an important role in keeping their membership and the broader public informed through its publications and general membership meetings. By taking a lead in this area, ASME can help meet the following strategic objectives:

- Better serve our core customers (C1)
- Develop new and expanded market relevant content (I2)
- Provide effective representation and advocacy for the engineering profession (I3)