

Managing the Energy Transition to 2100

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Abstract

By 2100, world population is estimated to reach 10 billion, with a doubling in global energy demand, while the number of vehicles on the road will double by as early as 2050.

Climate change risk, the water-food-energy Nexus and local air quality impacts from mobility and industrial processes are all significant concerns with a large number of global stakeholders.

Unconventional gas and oil production via hydraulic fracturing, rapid decrease in the cost of solar PV and growth in wind technology provide opportunities for new technology development to address stakeholder needs.

These concerns and opportunities will drive an unprecedented rate of technology change in energy and chemicals over the next 100 years.

Multiscale modeling will play a highly important role in assessing energy pathways and in development and scale-up of new technologies. The new RAPID process intensification institute led by the American Institute of Chemical Engineers and the U.S. Department of Energy provides many opportunities for collaboration between industry, academia, and US National Labs in addressing these challenges. It's a very exciting time with the growth of interest in future energy and chemicals.

Biography

Joe Powell (Joseph B. Powell, Ph.D.) is a Fellow of the American Institute of Chemical Engineers and has been Shell's Chief Scientist - Chemical Engineering since 2006. In 1988, he joined the Process Development Department at Shell Technology Center Houston, where he has led R&D programs in new chemical processes, biofuels, and enhanced oil recovery, in addition to a Hunters innovation group.

Dr. Powell has been co-inventor on more than 125 distinct patent applications, with more than 55 granted, and has received several industry awards including the A. D. Little Award for Chemical Engineering Innovation (AIChE 1998), R&D100 Award (R&D Magazine) and American Chemical Society Team Innovation Award (2000), U. Wisconsin College of Engineering Distinguished Achievement Award (2009), AIChE Process Development Division Service Award (2012) and Practice Award (2017).

He is co-editor and chapter author of the book Sustainable Development in the Process Industries: Cases and Impact, John Wiley & Sons, New York (2010), and has served AIChE in various roles including Process Development Division Programming chair, Spring Meeting Program Chair (2015) and Co-Chair (2012), Chemical Technology Operating Council, Executive Board Programming Committee, Pilot Plants 12B Area Chair, Shale Gas and Sustainability Topical Chairs.

Joe currently serves on the U.S. National Academy Board on Chemical Sciences and Technology, U.S. Department of Energy Hydrogen Technical Advisory Committee, editorial committee of Annual Review of Chemical and Biological Engineering, and was elected to the Board of Directors of AIChE (2016).

He obtained a Ph.D. in Chemical Engineering from the Univ. of Wisconsin-Madison (1984), following a B.S. in Chemical Engineering from the Univ. of Virginia (1978).