

Sustainability in the Chemical and Energy Industries

Jeffrey J. Siirola

Eastman Chemical Company
PO Box 1972
Kingsport, Tennessee 37662
siirola@eastman.com

There is much interest in environmental protection, greener chemistry, and the general notion of sustainability within both the chemical processing and energy industries. In this presentation, sustainability will be examined in the context of long term raw material and energy availability, energy intensity, global warming threats, and the desire for strong economic growth. Population and economic trends, material and energy resource and availability data, and elementary systems engineering principles are applied to help elucidate sustainability issues related to global economic growth, raw material choices for the chemical and energy industries, the satisfaction of expected energy needs, and greenhouse gas impacts. Simple concepts from chemical structure and carbon oxidation state, stoichiometry, and thermodynamics are useful for understanding and screening among raw material and energy alternatives at present and going forward. Such analyses can provide guidance for evolving and optimizing overall global chemical and energy industries and suggest that a sustainable future path may be feasible.