
Conventional, Alternative, and Renewable Energy: Realizing America's Energy Future

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ABSTRACT

As global energy demands continue to grow and concerns with greenhouse gas emissions accelerate, the proposed role of alternatives to conventional fossil fuels continues to expand. In reality, the rate of expansion may not be sufficient to meet our emerging short and mid-term energy needs. Fortunately, fossil fuels are here to stay, at least for decades to come, and will provide a foundation for the transition that will likely occur. Systems analyses can provide a framework to understand the critical challenges and opportunities with this transition and provide insights on the impacts of key decisions along the path to an emerging energy future more fully supported by alternative and renewable energy sources. Technology insertion will have marked impacts on both conventional and “unconventional” fossil fuels and could lead to “unconventional” sources seemingly becoming more “conventional” over time. As pressures to manage carbon emissions and enhance our energy security continue to increase, coupled systems analyses can illuminate the impacts and complex interdependencies created by emerging alternative energy technologies (e.g., biofuels) and impacts on other resources (e.g., water consumption, energy utilization, etc.).

The journey to a secure energy future requires the continued, sustained development of all energy resources. This journey will benefit from a systems approach that emphasizes the continued expansion of “persistent, low carbon energy resources (e.g., fossil with sequestration, solar, wind, and nuclear), energy efficiency, carbon reutilization, and sustained investments in science and technology. Fortunately, our collective experience working on complex earth systems has prepared us well to realize this future.