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2253 Rethinking the Emissions Challenge for Transforming Our Energy System

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Globally, 41% of electricity generated comes from coal and it will continue to play a critical role in many nations' energy portfolios for decades to come. For example, in the U.S. and China--the world's two largest economies and two largest users of electricity--coal is abundant, indigenous, affordable and engrained within the existing infrastructure. While new technology offers promise for cleaner energy generation, the existing built infrastructure will continue to be used for decades and must be dealt with to reduce greenhouse gas emissions. To correctly define the challenge and accurately determine a global point of departure, history must be considered. Over the last few decades, the U.S. has sequentially reduced harmful components of fossil fuel emissions (particulates, sulphur oxide, nitrogen oxide, mercury) by adding unit processes. Each additional unit filtered a specific undesirable contaminant at a compounding cost to the industry, and ultimately to the energy consumer. These efforts have resulted in a 70% reduction in non-carbon dioxide emissions. The U.S. now faces the addition of another extremely expensive unit process to capture carbon dioxide. Developing countries have a greater reliance on coal-based electricity, yet are understandably reluctant to adopt this costly unit process approach for reducing emissions. Their most urgent priorities are human health and environmental quality. Therefore, a new paradigm is needed that will allow developing countries to bypass these costly sequential systems and participate in global emission reductions. In August 2009, Energy Secretary Steven Chu said, "What the U.S. and China do in the next decade will determine the fate of the world." Business as usual is simply not an option. This talk will explore whether the potential solution set is larger than that currently being considered. It will outline the potential benefits of integrated emissions capture and storage, where all emissions other than water, oxygen and nitrogen are captured and managed as an asset or stored safely underground. It will consider whether co-sequestration could become a critical tool in China and India, as well as in the U.S. where the geological, physical and cost constraints of an additional unit process for carbon dioxide could prove problematic. Further, this discussion will outline the S&T challenges of co-sequestration and whether costs can be reduced by taking all emissions to finished chemistry underground. Finally, it will explore a joint strategy for working with China to accelerate the development and global deployment of co-sequestration technologies.

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