Integration of Coal-Fired Energy Systems with CO_2 Sequestration*

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Abstract

Upon ratification, the recent climate treaty negotiated in Kyoto, Japan, would require the United States and other developed nations to reduce their emissions of greenhouse gases below 1990 levels by the year 2010. Because most anthropogenic greenhouse gas emissions (particularly CO_2) come from the use of fossil energy, this agreement has the potential to affect the entire fabric of society. Here, we present a practical and revolutionary method that can sequester greenhouse-gas emissions and at the same time benefit both agriculture and the economy. The proposed strategy utilizes an innovative application of chemical processes to convert CO_2, NO_x, and SO_x emissions into valuable fertilizers [mainly, NH_4HCO_3 and $(NH_2)_2CO$] that can enhance sequestration of CO_2 into soil and the earth subsurface, reduce NO_3^- contamination of groundwater, and stimulate photosynthetic fixation of CO_2 from the atmosphere. This invention integrate pollutant-removing fertilizer production reactions with coal–fired power plants and other energy operations, resulting in a clean energy system that is in harmony with the earth ecosystem. This technology could contribute importantly to global CO_2 sequestration and clean air protection. When this technology is in worldwide use because of its high efficiency and carbon credit, in addition to the benefit of clean air protection and stimulation of photosynthetic fixation of CO_2 from the atmosphere, maximally 283 million tons of CO_2 per year [equivalent to about 5% of the CO2 emissions from coal–fired power plants in the world] from smokestacks can be placed into soil by the use of this technology.