

Reining in carbon dioxide levels imperative but possible

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Implementing a plan to keep rising carbon dioxide levels from reaching potentially dangerous levels could cost less than 1 percent of gross world product as of 2050, a cost that is well within reach of developed and developing nations alike. Moreover, without simultaneous progress in the way energy is found, transformed, transported and used, the world is in danger of facing a severe energy crisis sometime within the next century. Those are the conclusions of a report by Klaus S. Lackner and Jeffrey D. Sachs of The Earth Institute that appears in the most recent issue of *Brookings Papers on Economic Activity* published by the Brookings Institute.

"Today's technology base is insufficient to provide clean and plentiful energy for 9 billion people," the authors write. "To satisfy tomorrow's energy needs, it will not be enough simply to apply current best practices. Instead, new technologies, especially carbon capture and sequestration at large industrial plants, will need to be brought to maturity."

Primary energy use worldwide is currently about 14 trillion watts each year and rising. This equates to 2.2 kilowatts (kW) per person globally and results in the release of nearly 25 billion tons of carbon dioxide into the atmosphere. Residents of the U.S., however, use 11 kW per person, 85 percent of which comes from burning fossil fuels, a process that contributes to the rising level of carbon dioxide in the Earth's atmosphere.

"Technology in general and energy at its base ultimately define the carrying capacity of the Earth for humans," says Lackner, director of the Center for Sustainable Energy at the Earth Institute. "If the rest of the world consumed carbon at the U.S. rate, carbon consumption and emissions worldwide would be six times what they are today. This would not only exhaust available oil supplies by the end of the century or sooner, but would also threaten widespread environmental damage."

That scenario is not so far-fetched, given the prospect for economic growth among the world's developing countries, especially India and China. In 2002, the so-called Annex I countries identified by the Kyoto Accord as developing nations accounted for just 41 percent of carbon dioxide emissions. By 2025 the Annex I share is expected to rise to 60 percent and at the end of the century could total nearly 80 percent of global emissions.

The concentration of carbon dioxide in the Earth's atmosphere currently stands at roughly 380 parts per million (ppm), an increase of more than 35 percent over pre-industrial levels, largely due to the burning of fossil fuels. At the current rate of increase, the world could reach 550 ppm well before the end of the century, with potentially disastrous implications for human well-being and the Earth's natural systems.

Lackner and Sachs, however, see vast room for progress in meeting the world's growing energy needs without threatening to destabilize the Earth's climate. In particular, they identify carbon capture and sequestration as an important part of any future plan to address the problem. Given the best available projections for energy use, economic growth and atmospheric dynamics, they find that a carbon capture and sequestration system could help keep carbon dioxide levels from reaching 500 ppm by 2050 at a cost of between 0.1 and 0.3 percent of gross world product.

Other large-scale solutions they identify include solar energy, clean coal technology and nuclear power, though they identify problems with each that must be resolved. The authors also see widespread use of hybrid engines as another readily deployable technology to help reduce carbon dioxide emissions. All together, a program to keep the Earth's carbon dioxide levels in check could cost less than 1 percent of projected gross world product as of 2050.

"Whatever we do, we know we are going to have to approach this complex problem in a multi-faceted way and from a global perspective," said Sachs, director of The Earth Institute. "The key is we have to start now and we have to commit ourselves to making a change before change is forced on us. Fortunately, there are promising technologies that may well offer us solutions at large scale and reasonably low cost."

Source: The Earth Institute at Columbia University

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