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Ethical Issues Raised by Waiting for Geological Carbon Storage

By DONALD A BROWN on August 10, 2008 4:46 AM| 0 Comments

I. Introduction

This post examines ethical issues that arise when a government does not take action to reduce its greenhouse gas (GHG) emissions from coal fired powered plants because it plans to eventually use carbon capture and geologic storage technology (geologic carbon storage) to sequester carbon dioxide produced in coal combustion.

As more fully set out in a prior post, geologic carbon sequestration is a hopeful but unproven technology for reducing climate change's threat which raises a number of ethical issues that should be considered in regard to its deployment. (http://climateethics.org/?p=38)

This post looks in more detail at one of these ethical issues, that is, ethical issues that arise by waiting for this hopeful but unproven technology to be perfected while continuing to emit GHG from existing coal fired power plants.

Coal fired power plants produce a large percentage of the world's GHG emissions. For instance, 50 percent of the electricity generated in the United States is from coal and is even higher in China at 76 percent. (Pew 2008, NRDC 2007) Because of rising prices for natural gas and petroleum and due to the wide availability of coal compared to other fossil fuels, coal has increasingly become the fuel of choice for the electricity sector in many parts of the world. In addition, most governments have no plans to retire existing coal fired power plants and in some cases justify their continued use on the potential availability of geologic carbon storage technology. Many countries have announced intentions to continue to use coal to generate electricity while acknowledging the need to eventually sequester carbon in geologic formations to reduce carbon emissions into the atmosphere.

Yet coal releases more GHGs per unit of energy than other ways of producing energy including other electrical production from natural gas and petroleum. Many countries have announced intentions to continue to use coal to generate electricity while acknowledging the need to eventually sequester carbon in geologic formations to reduce carbon emissions into the atmosphere.

II. Delays in Geologic Carbon Storage Research

For several decades, geologic sequestration has been identified as a very hopeful technology that will allow electricity generation to use cheaper and abundant global coal reserves without contributing to climate change. Although there are several projects around the world that are testing geologic sequestration's ability to successfully store carbon, recently there have been a number of high visibility delays and cancellations of important geologic sequestration research projects that have been widely viewed to be important to assess this technology's usefulness as a reliable and cost-effective climate change solution. For this reason, it is likely to be a decade at least before there is a strong scientific basis for concluding whether and under what circumstances geologic carbon storage is a reliable technology for preventing carbon dioxide from entering the atmosphere as a result of coal combustion.

In addition, geologic carbon storage may adequately sequester carbon at some sites while being unacceptable at other sites. In addition, to determine a specific site's suitability additional geologic research will be necessary to determine whether there are geologic leakage pathways and the existence of cap rock on the site necessary to assure that carbon dioxide injected at high pressures will not eventually leak back into the atmosphere and thus defeat the purposes of geologic carbon storage. Some parts of the world in which coal is being widely used to generate electricity may not be suitable sites for geologic carbon storage despite its potential acceptability elsewhere because of highly variable geology on the site. Additional site specific research to determine a specific site's suitability may further delay widespread deployment of geologic carbon storage technology even if current demonstration projects conclude that it works for some sites.

The highest profile US geologic sequestration research cancellation involved a project known as

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FutureGen, which President Bush announced in 2003. The project had been funded by a utility consortium with subsidies from the US government. and was going to build a plant in Mattoon Illinois that tested the most advanced techniques for converting coal to a gas, capturing pollutants, and burning the gas for power. (Wald 2008) The project design called for carbon dioxide from coal combustion to compressed and pumped underground with monitoring devices determining whether gases would escape into the atmosphere. About $50 million had been spent on FutureGeen before the United States government pulled out of the project in January of 2008 when projected costs nearly doubled to $1.8 billion accompanied by fears that costs would go even higher. (Wald 2008) In addition, according to a New York Times report, electricity utilities have also been canceling their commitments to coal gasification plants that would make geologic sequestration more affordable with higher levels of carbon dioxide storage. (Wald 2008)

Because of the potential of geologic carbon storage to allow continued use of coal combustion without adverse climate change impacts, the potential of geologic carbon storage could become an excuse for business-as-usual approaches to the use of energy even though there are open questions about the efficacy and cost-effectiveness of this technology to store CO2 in the long-term in the quantities that it is now be produced by existing fossil fuel combustion at electric generating plants.

In addition, since geologic carbon storage may be effective at some sites but not effective for other sites, the potential of this technology's use as a mitigation technique that can be applied to existing and planned coal fired power plants is very questionable given the possibility that existing coal fired power plants may not be located near potential geologic carbon storage sites that are economically and environmentally adequate locations for carbon storage.

For these reasons, the efficacy of geologic carbon storage as an effective method of mitigating the effects of climate change many not be ascertained for many years in the future, perhaps decades.

In addition, the additional costs of carbon capture and storage may make this technology economically undesirable compared to other carbon reduction technologies. Therefore, even if geological carbon storage proves to be a technically sound method for keeping carbon dioxide produced by electricity production out of the atmosphere, it may not be affordable and therefore may not be eventually deployed.

For these reasons, the potential of geologic carbon storage used as an excuse to delay the deployment of other greenhouse gas emission technologies and strategies could exacerbate adverse climate change impacts. If geologic carbon storage is relied upon to support business-as-usual use of coal combustion and it is ultimately determined to be technically ineffective or cost-prohibitive method to be used at some sites where coal combustion is currently being relied upon to generate electricity, then waiting for geologic carbon storage may greatly exacerbate climate change impacts because of the time lost and GHG emissions allowed while waiting.

III. Specific ethical issues entailed by waiting for geologic carbon sequestration

a. Immediate duty to reduce national emissions to a nation's fair share of safe global emissions. Given that GHG emissions are already causing harm to some people and places around the world, no nation that is already exceeding its fair share of safe global emissions may delay taking steps to reduce its emissions on the basis that new less costly technologies may be invented in the future. (Brown et al. Issue 6) For this reason, no nation exceeding its fair share of safe global emissions may defer taking steps to reduce its emissions on the basis that an unproven technology such as geologic carbon storage may be proven to be effective in the future as long as other options for reducing emissions exist. That is, each nation has an ethical duty to take steps that will as quickly as possible reduce its emissions to that nation's fair share of global GHG emissions that will not cause harm to human health and the environment of others. For these reasons, nations that are already exceeding their fair share of safe global emissions, are ethically obligated to use all currently available means of reducing GHG emissions such as renewable energy and energy demand side management to reduce emissions to their fair share of safe global emissions while other technologies such as geologic carbon storage are being tested and developed. That is, each nation is ethically required to put its nation's GHG emissions on an emissions reduction trajectory that will as soon as possible reduce its emissions to its fair share of safe global emissions. (What is each nation's fair share of safe global emissions is an ethical issue beyond the scope of this post that has been and will continue to be the subject of future posts on climateethics.org)

Some developing nations may be able to expand emissions levels without exceeding their fair share of safe global emissions yet since GHG gas emissions are already harming human health and the environment of some developed and developing nations, and given that large reductions in global emissions are necessary to stabilize GHGs in the atmosphere at levels will prevent harm, no developed nation can argue that it has the right to delay its GHG emissions reductions strategies. Of particular urgency is the need to deploy cost effective technologies such as demand side management techniques including energy conservation programs and renewable energy to the maximum extent possible while geologic carbon storage technology research proceeds. Each nation that is currently exceeding its fair share of safe global greenhouse gas emissions has an immediate ethical duty to pursue these GHG emissions reduction strategies to the maximum extent feasible.

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b. The effect of the UNFCCC on national obligations.
In 1992, by signing and eventually ratifying the United Nations Framework Convention on Climate Change, developed nations agreed to reduce their emissions based upon equity to prevent dangerous anthropogenic interference with the climate system. Subsequently, developed nations, with the exception of the United States, agreed to the Kyoto Protocol that included specific emissions reductions targets to be achieved between 2008 and 2012. If a nation complies with its Kyoto target, then a nation can make an argument that it is in compliance with its international GHG reductions obligations. Yet even if compliance with the Kyoto Protocol or a subsequent agreement under the UNFCCC might constitute compliance with treaty obligations, such compliance dose not necessarily satisfy ethical obligations to prevent harm to others and the environment. It is conceivable for instance, that for political reasons, the international community might agree to national emissions targets that are politically feasible but nevertheless sanction harm to some humans, plants, animals, and ecological systems. The ethical obligation to prevent harm when possible supersedes the international legal obligation to comply with a treaty obligation. Therefore, as a matter of ethics, even if a developed nation is in compliance with its Kyoto target, it may not wait for geologic carbon storage technology as long at it is exceeding its fair share of safe global emissions.

For similar reasons, a schedule in a treaty to achieve an emissions target does not relieve a party of the ethical duty to reduce emissions as quickly as possible to its fair share of safe global emission.

And so, a nation that delays deploying available technologies to reduce GHG emissions on the basis that new less costly technologies such as geologic carbon storage may be available in the future should be liable for any damages caused by the delay for as long as they are exceeding their fair share of global emissions that cause harm to human health and the environment.

c. The relevance of the cost of geologic carbon storage to emissions reductions obligations.
Some nations choose to pursue the hope of geologic carbon storage because coal reserves are plentiful, alternatives to coal for electricity generation are much more expensive because capital investments have already been made in coal fired power plants, and less costly technologies of electricity generation are not currently available. In regard to cost, no nation can ethically choose behaviors that harms others life, health, and safety on the basis that stopping harmful behavior will be costly to them in the absence of consent by the victims of the harmful behavior.

Yet, it would be irrational for any nation not to pursue cost-effective responses to climate change, that is climate change solutions that reduce GHG emissions at least possible cost. And so cost is an important consideration in any national climate change strategy. Yet cost is not an ethically acceptable element of a strategy to delay or ceasing harmful behavior. Once a nation determines its fair share of global GHG emissions that don't cause harm to others, it is ethically acceptable to choose the least costly ways of achieving necessary reduction goals. Therefore, cost-effectiveness analyses of any national climate change strategy is appropriate and rational, however, responsibility is not diminished simply on the basis that reductions will be costly.

For these reasons, a nation that chooses to rely upon geologic carbon storage is ethically responsible for any harm caused by the delay.

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