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Frequently Asked Questions about

Carbon Capture and Sequestration

Why is Carbon Capture and Sequestration critical to Addressing Climate Change?

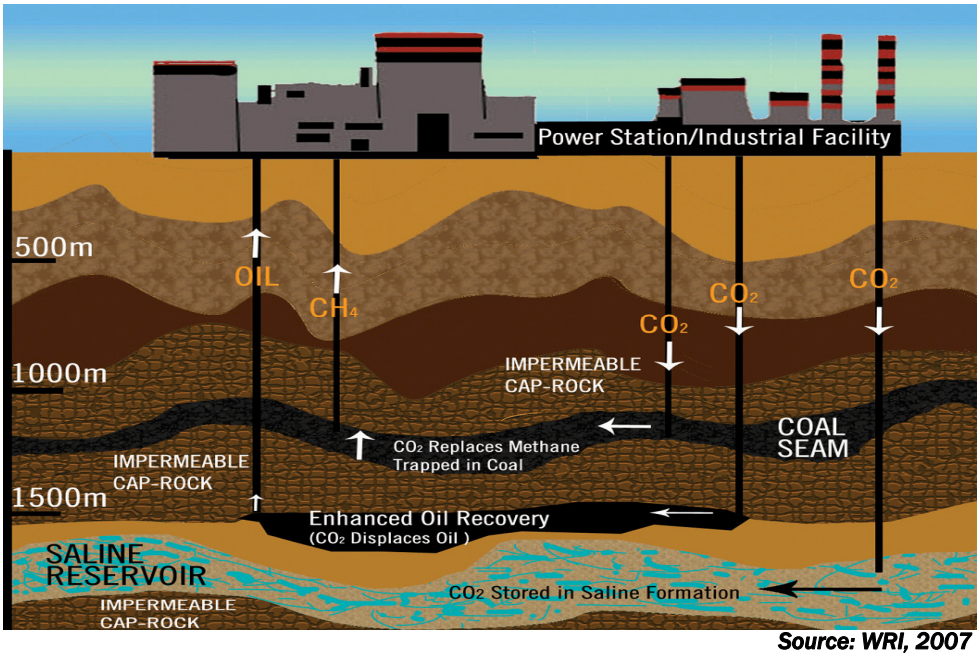
The world's leading scientists agree that we need to reduce current greenhouse gas emissions by 60-80% in a relatively short amount of time to avoid the more serious impacts of global climate change. To meet the climate challenge, Congress will need to use every option on the table.

A market-based cap and trade system, the expansion of renewable energy capacity, and aggressive energy efficiency and conservation measures are all essential parts of the climate change solution, but in the near term these can only partially supplant our dependence on coal.

Coal currently provides 50% of U.S. electricity, is the most carbon-intensive fossil fuel and a major source of greenhouse gas emissions. In order to transition to a low-carbon economy, we must also invest in carbon capture and sequestration as a bridging technology to reduce today's carbon dioxide (CO_2) emissions.

Carbon capture and sequestration, or CCS, involves the capture of CO_2 from power plants and other large industrial sources, its transportation to suitable locations, and injection into deep underground geological formations for long-term sequestration. CCS offers a way to greatly reduce carbon emissions from electricity generation as we simultaneously expand renewable energy capacity and increase energy efficiency.

Carbon Capture and Sequestration



Source: WRI, 2007

How can CCS help meet U.S. climate and energy goals?

The U.S.'s reliance on coal to meet half of our electricity needs presents a major challenge to dramatically reducing U.S. greenhouse gas emissions. While it is clear that "business as usual" will lock the U.S. into an unsustainable and increasingly risky and costly climate future, coal is cheap and abundant and is expected to constitute a substantial portion of the U.S. electricity mix in the near-term. Indeed, existing coal-fired power plants will operate for decades to come and new coal plants are currently being constructed or planned. Without CCS, these plants will emit billions of tons of CO_2 over their lifetimes.

CCS provides a bridge between our coal-based energy present and a low-carbon energy future. The widespread adoption of CCS technologies will reduce CO_2 emissions significantly and help the U.S. meet near-term energy demand until alternatives can provide sufficient and reliable electricity.

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If we are expanding renewable energy, do we need CCS?

Renewable energy will clearly play a critical role in moving us to a low-carbon future. But the challenge of reducing emissions by 60-80% in the coming decades and simultaneously meeting increasing energy demand is daunting.

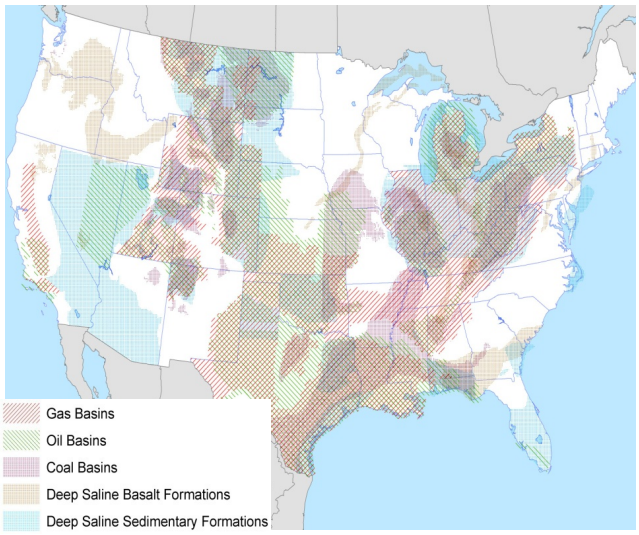
Despite recent growth in capacity, renewable energy sources such as wind and solar currently account for just 4% of U.S. electricity generation. Therefore, even with a rapid increase in our use of renewables it is unlikely that the U.S. could meet a major portion of electricity demand.

To be sure, it is essential that initiatives that promote renewable energy use and increase energy efficiency are implemented as quickly as possible. However, with the current reliance on coal in the U.S. and developing world, CCS will be a critical technology for meeting our goals of dramatic CO_2 reductions and meeting future energy demands.

Is there enough space to sequester all this carbon?

Large stationary sources in the U.S. emit 2-3 billion tons of CO_2 per year. A recent survey by the Department of Energy estimated that there is on the order of 1 to 4 trillion tons of sequestration capacity in oil and gas reservoirs, coal seams, and saline aquifers. Thus, there is likely space for many decades or more of injection.

Potential CO_2 Storage Capacity in the U.S.



Source: Battelle, 2006

Will the carbon really remain deep underground?

The trapping mechanisms in the geological formations being considered for sequestration have stored reservoirs of oil and gas for millions of years. Research and pilot projects have shown that CO_2 is highly likely to remain sequestered in well-selected and managed sites. Several pilot and demonstration projects have been sequestering carbon for over a decade, and monitoring systems have not detected any leakage.

What are the risks?

Most experts believe that properly conducted CCS projects have risks comparable to those of similar industrial activities such as underground natural gas storage and enhanced oil recovery. These risks can be managed, and should be compared with the risks of continuing to emit large amounts of CO_2 into the atmosphere. In order to minimize risks, it will be critical to have adequate regulatory oversight and projects done according to best practices standards. Developing guidelines for siting, monitoring and the long-term care of CCS projects is essential to making these technologies work.

Are CCS technologies ready to be deployed?

We are not yet in a position to widely use CCS technologies. But, we do know what policies need to be in place to make CCS viable:

1) **Large-scale demonstration projects that inform economic, technical, and regulatory decision making.** While each of the components of these technologies has been demonstrated, there is not yet a power plant that captures and sequesters its emissions. We need commercial-scale demonstration projects to test the range of capture and sequestration technologies. At these sites, we need careful monitoring to gain a better understanding of what happens to large volumes of CO_2 over long periods of time. This learning-by-doing will decrease costs and make CCS more competitive with other mitigation technologies.

2) **An incentive for power plants to use CCS.** Currently, there is no cost to emit CO_2 to the atmosphere. We need market incentives and complimentary coal policies to spur private investment in CCS and use of these technologies.

3) **A regulatory framework to ensure CCS happens safely.** Regulatory frameworks for CCS are beginning to emerge at both the federal and state levels, and are important steps forward. But there are potential gaps or overlaps in these frameworks on issues like property rights and long-term liability.

4) **A dialogue with the public to ensure acceptance of these practices.** There is little public awareness about CCS; greater public outreach and participatory dialogue on CCS projects is important to build public confidence in these technologies.

What is WRI doing with regard to CCS?

The **World Resources Institute (WRI)** has brought together a diverse group of over 60 stakeholder organizations interested in CCS. The WRI-led stakeholder group plans to produce road-tested guidelines with wide support from industry, governments, and the NGO community to ensure that CCS is done safely, transparently, and effectively. WRI has also published a series of issue briefs on CCS which are available on the WRI website <http://www.wri.org>:

Opportunities and Challenges for Carbon Capture and Sequestration
<http://www.wri.org/publication/opportunities-and-challenges-carbon-capture-and-sequestration>

Building Public Acceptability for Carbon Capture and Sequestration
<http://www.wri.org/publication/building-public-acceptability-carbon-capture-sequestration>

Liability and Financial Responsibility Frameworks for Carbon Capture and Sequestration
<http://www.wri.org/ccs-publication/liability-financial-responsibility>

For more information on WRI's work in this area, please contact Debbie Boger at dboger@wri.org or (202) 729-7849.