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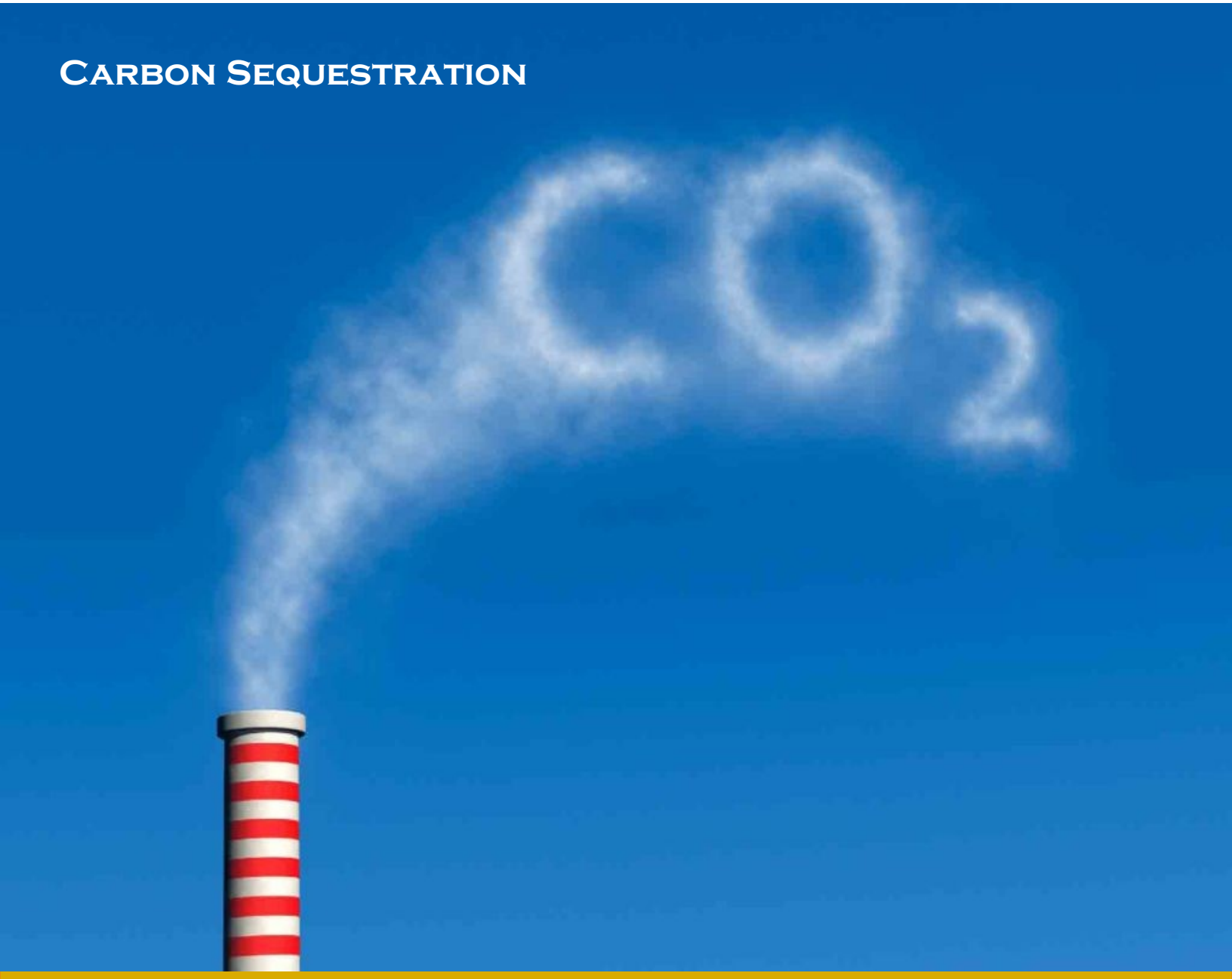
Climate SAR सार

Climate Science And Research

Carbon Sequestration



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FROM EDITOR

'Climate Change is about changing in climate patterns, including temperature, precipitation, winds and others'.

Accumulation of greenhouse gas emissions in the atmosphere is giving rise to global warming and climate change. Carbon dioxide emissions occur from combustion of fossil fuels in thermal power plants for generation of electricity. All your day-to-day activities that consume energy also contribute to carbon dioxide emissions.

In this issue I discuss about carbon dioxide removal processes also known as' CO_2 sequestration. It involves various ways to reduce the concentrations of carbon dioxide in the atmosphere by fixing it in the biosphere, hydrosphere, cryosphere and lithosphere of the earth system.

Climate Change Research Institute has started this bulletin on Climate Science and Research - '**Climate *SAR***'. In this third issue you learn about CO_2 Sequestration, ways to capture carbon dioxide from the point sources, from the atmosphere and potential ways to fix it.

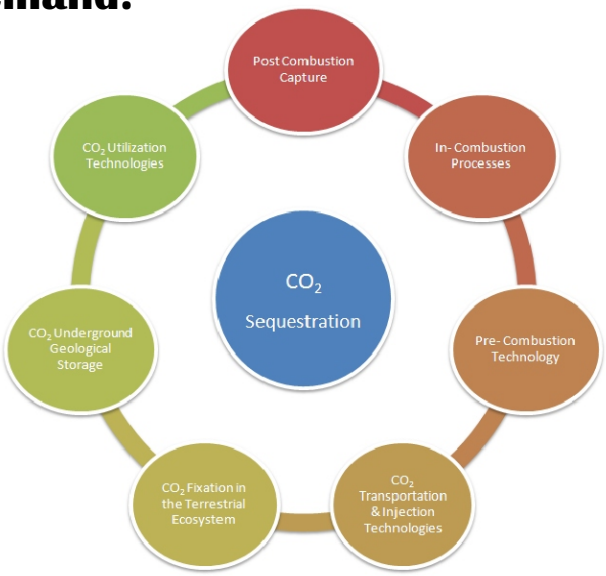
Happy reading and send your feedback to contactus@ccri.in

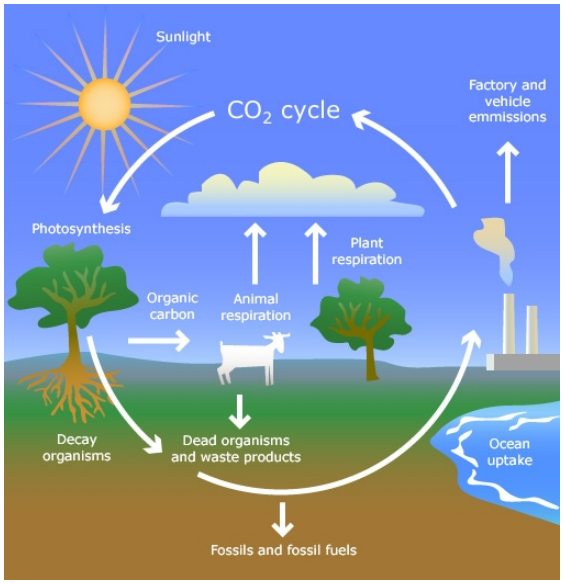
Malti Goel
CEO, Climate Change Research Institute

WHAT DO YOU UNDERSTAND BY CARBON SEQUESTRATION?

Carbon Sequestration is a climate change mitigation option. It requires sucking of excess carbon dioxide (CO_2) from the atmosphere and storing it away permanently. The CO_2 can also be utilized in producing chemicals and energy fuels.

Carbon Sequestration has been proposed as a way to slow the atmospheric and marine accumulation greenhouse gases, which are being released by burning of fossil fuels for meeting our energy demand.

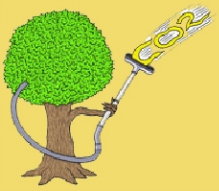




The Global Carbon Cycle is interaction of CO_2 among Atmosphere, Biosphere, Hydrosphere, Cryosphere and Lithosphere. The terrestrial and atmospheric carbons pools are strongly interacting with are another.

Trees are natural carbon sinks as they take in CO_2 from air, in a process called photosynthesis. Trees effectively break down the CO_2, in the presence of sunlight and release oxygen. Morning walks one pleasing as oxygen content in air is more in the parks.

Fast growing trees are the most efficient way to sequester atmospheric carbon.



A GLOBAL THERMOSTAT

The amount of Carbon Dioxide (CO_2) in the air had been relatively constant until the industrial revolution took place in 1750s. The pre industrial concentration of CO_2 was 280 parts per million by volume (ppmv) i.e. in one million air molecules 280 molecules are of carbon dioxide. In a way this much carbon dioxide maintains the Global Thermostate at an average temperature of 14.43°C.

According to scientific assessments made by Inter governmental Panel on Climate Change (IPCC) the concentration of carbon dioxide has become 400 ppmv in 2014. This is pushing more energy in the atmosphere. To maintain temperature of thermostat, we need to find ways to remove CO_2 from air.

The IPCC assessments further predict that 450 ppmv of CO_2 can give rise to an increase in global temperature by 2°C in 2100. This has been set as an upper limit. Any increase beyond 450 ppmv can prove to be disastrous.

Scientists have developed an air sucking machine to remove CO_2 from atmosphere, so that it can be sold in the market for various uses.

CTO and co-founder Peter Eisenberger in front of Global Thermostat's air-capturing machine.

Do you know a millions of such machines would be required to be place around the globe to bring down CO_2 concentrations in the atmosphere?

HOW TO CAPTURE CO_2 FROM POWER PLANTS?

Thermal Power plants from coal combustion emit higher concentration of Co_2 in the atmosphere. The gases coming out of these plants can have up to 300 times more CO_2. This is mixed with other pollutant and toxic gases. The biggest difficulty in capturing CO_2 is removal of impurities and getting a pure carbon stream.

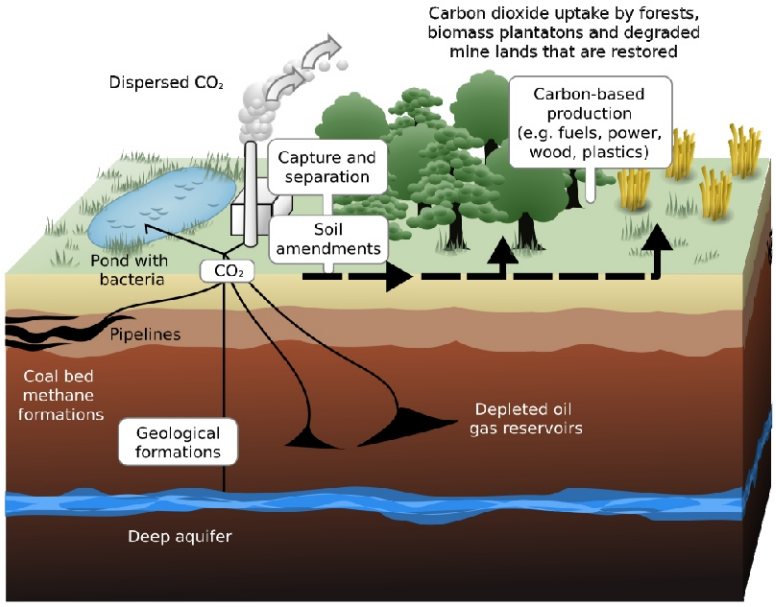
As the exhaust gases are full of pollutants, like NOx, SOx, CO_2 and particulate matter, technologies for capturing of carbon dioxide are developing. There are three ways to capture:

1) <u>Post-Combustion Carbon Capture</u> is to capture CO_2 from the exhaust of a power plant after combustion. It uses carbon scrubber systems and could potentially be applied to all existing power plants.

2) <u>Pre-Combustion Carbon Capture</u> is to convert coal into gas or liquid. Gasification process produces "syngas" from which carbon oxide can be separated, while the hydrogen rich gas is burned as fuel to produce power.

3) <u>Oxyfuel Combustion</u> burns fossil fuels in oxygen medium in place of air. The exhaust emission stream is mainly CO_2 and water vapor with no nitrogen. The water vapor can be separated by condensation, leaving the CO_2 as pure stream to be captured.

Potential options for storage of Carbon Dioxide.



CCRI BEGINS ENVIRONMENT AND CLIMATE CHANGE LECTURE SERIES 2015

Climate Change Research Institute (CCRI) organized the first lecture in the 'ECC Lecture Series 2015', on 13th February, 2015 at Indian International Centre, New Delhi. Many teachers as well as students from Sardar Patel Vidyalaya, Delhi Public School, Mathura Road, Appejay School, Pitampura and Navyug School, Motibag were among the participants in the lecture.

Programme was chaired by Prof. D.P. Agrawal, Former Chairman, UPSC and Chairman, Governing Council, CCRI. He welcomed all the participants and guests to the first lecture aim to educate the youth about the climate change challenges.

Dr. Malti Goel, President & CEO, CCRI gave concept of the Environment and Climate Change Lecture Series and introduced the theme of the lecture.

Sh. V.S. Verma, Former Member, CERC, while explaining the topic of the lecture "Future Energy Paradigms for Clean Environment" said that energy security and energy efficiency are concerns across the world. He shared his experience in the power sector with the audience and encouraged them, specially students to save electricity in their day-to-day work. This was followed by many questions from teachers as well as students and answers.

CCRI CELEBRATES EARTH DAY 2015

Second Lecture in Environment and Climate Change series was delivered by the Chief Guest Prof. D. P. Agrawal, Forman Chairman, UPSC and Chairman GC, CCRI on 'WASTE MANAGEMENT STRATEGIES'. He encouraged students towards cleanliness and to promote Swachh Bharat Abhiyan in our society and locality.

Dr. Malti Goel, CEO, CCRI apprised the students, who participated in large numbers from Navyug School, Sardar Patel Vidyalaya, New Horizen Public School, Amity International School and Universal Public School, about the importance of Earth Day, its genesis and current status.

Inter-School Slogan Writing Competition on

"*CLEAN EARTH - GREEN EARTH* "

Dr. B.C. Sabat, Dept. of Environment, Govt. of N.C.T. of Delhi shared his experiences and stressed on the need of becoming aware and making cleanliness a habit. Students from various schools also shared their experiences on the work done in their neighborhood.

Awards and Certificates were given away during the event held on 24th April 2015 at India International Centre to the winners and participants of Inter-school Slogan Writing competition. Eminent persons Mr. Gautam Sen, Ex-Executive Director, ONGC, Shri S. D. Tripathi, Ex-Executive Director-NHPC among others were present.

(The event was sponsored by Ministry of Earth Sciences and IIC)

Third ECC Lecture is on 'CO_2 Sequestration: A fresh outlook' by Dr. Malti Goel on 5th June, 2015

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