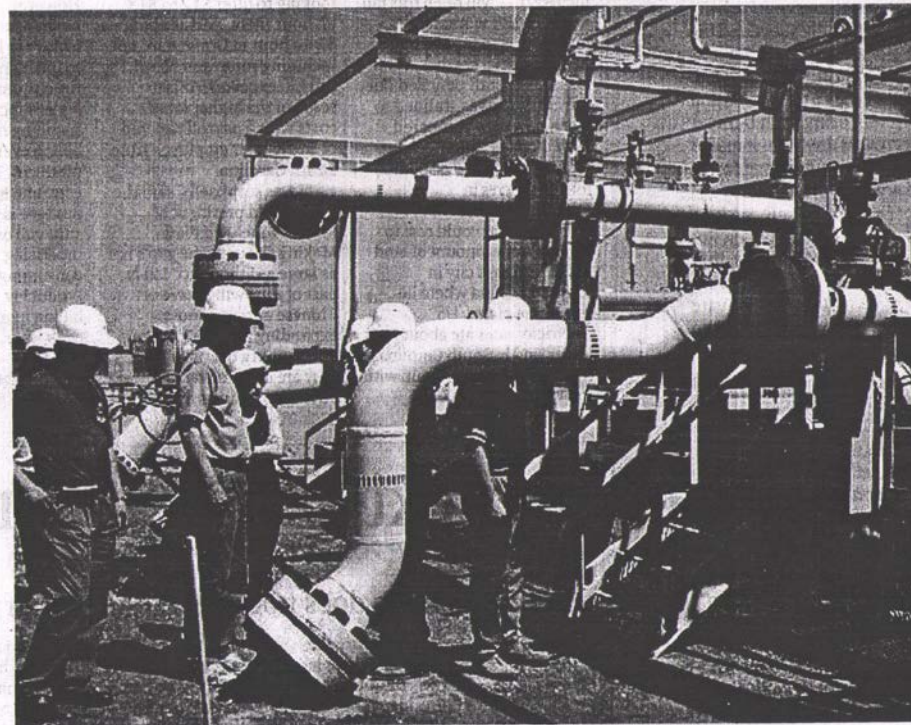


Carbon burial has yet to pass the test of fire



Fossil fuels will remain the main source of energy unless success is achieved in controlling fusion reaction on a commercial scale and some new innovation takes place. We do not have a clue yet in that direction. The accumulation of greenhouse gas (GHGs) emissions from fossil fuel combustion has been a serious concern. The prediction of their adverse impacts on humanity has led to an unprecedented increase in global actions and has stimulated worldwide efforts towards development of low-carbon energy technologies. Superpowers of the world, including the members of G8 nations, would meet in July 2008 to take stock of energy technology choices for finding ways to achieve substantial reductions in GHG emissions and review the recommendations made in Gleneagles Plan of Action on cleaner development aimed at powering a cleaner future.

The concern for global warming from increasing GHG accumulation in the atmosphere was first officially expressed in the United Nations Earth Summit held in Rio de Janeiro in 1992. The Framework Convention on Climate Change (FCCC) was laid down as a legal document, which came into force on March 21, 1994. This is the most widely accepted document on global climate concerns signed by 189 countries, till



Weyburn Oilfield in Saskatchewan, Canada: storing CO₂ to reduce greenhouse gas emissions

date. Accordingly the Conference of Parties (COP) was set-up in 1995 to negotiate the actions for stabilisation of GHGs in the atmosphere. In the third COP meeting held in Japan in December 1997, Kyoto Protocol was introduced. It provided for differentiated responsibilities for emission cuts of six GHGs by 5.2% on an average over 1990 level. It's for the first 'commitment period' of 2008-12. India signed the Protocol in August 2002. After this international agreement came into force on February 16, 2005, most countries including India, geared up project activity on carbon trading. The major share of projects is energy related.

The success of Sleipner project in Norway, Weyburn in Canada and others has fuelled hope not only for long-term storage of CO₂, but also for the enhanced fuel recovery as oil or gas from CO₂ sequestration in depleted oil fields and unmined coal beds. In the Norwegian gas platform 1 million tonne of CO₂ have been sequestered every year since 1996, whereas in the Weyburn project, additional 25% enhanced oil recovery is expected from CO₂ injection over the next 30 years. However, the efficacy of CO₂ sequestration is still being tested. Active storage of carbon in rocks to study mineralisation process and passive storage in saline aquifers as

The carbon dioxide (CO₂) sequestration (carbon capture and storage or CCS) is an emerging energy technology option for capturing excess CO₂ from air and fixing it permanently away from the atmosphere. Technology for CO₂ capture and storage is in research and development phase, but a few demonstration projects have already been launched.

solution trapping offer new potential for research to understand earth processes.

Most of carbon sequestration demonstration projects have been recognised as collaborative R&D projects by the international forum on carbon sequestration. So far, 22 countries have already joined the forum. India has also agreed to participate in it. The affirmative action on part of India to join the forum emanates mainly from her willingness to take part in the development of cost-effective technology through R&D. This year, many new initiatives have been announced by the European Commission and the UK to invite participation in projects and competitions for collaborative CCS projects.

But capture technology is very expensive. Also, risk and safety concerns are involved in underground storage. Corporate India is yet to express its willingness to participate actively. In India's energy security, coal-based energy generation will continue to play a significant role in addressing the concerns of development of electricity for all. It is timely to adopt new strategies for accelerated development of cutting-edge technology in coal-based generation.

Looking at the existing market-based mechanisms to address climate change; carbon trading (trading of certificates of reduction or CERs in carbon dioxide related emissions by introducing new technology) is an important development. The Clean Development Mechanism (CDM) allows countries to sell surplus allowances from the investments made in the projects aimed at reduction of GHG emissions. The mechanism would also enable countries to leapfrog through technology upgradation and transfer. The countries

required to cut down GHG emissions under Kyoto Protocol buy them to cover their reduction targets. Carbon is probably a gold mine for the energy industry and the process is expected to become a market of 2-3 billion Euros by 2010.

So far, the market for trading of carbon dioxide emissions has been growing noticeably in India. More than 1,000 projects have been registered projects. India's compliance on CDM has led to capturing of one-third of the total projects registered. The fate of CCS projects in CDM has also been deliberated. Some countries favour it, others do not. United Nations in the 24th Session of UNFCCC made a beginning by organising the in-session workshop on CCS.

The workshop highlighted the societal concerns and raised the main issues as those related to project boundary, leakage and permanency of storage. Recognising the critical role of CCS in mitigation of global climate change hazards, the G8 group of nations have taken the lead by inviting International Energy Agency and others to work on the short-term opportunities for CCS, enhanced oil recovery and CO₂ removal from production of gas and give their recommendations.

Keeping in view the urgency of deployment of CCS technology, the inclusion of CCS in CDM has come under spotlight. It is likely to become the hot subject of discussion in future deliberations. Countries are expected to put forward long-term policies for adoption of CCS. However, any inclusion of CCS under CDM could become an obscure decision because appropriate technology is yet to be developed and tested.

So, can the countries participating in CDM invest in large-scale infrastructures and still

make profits? If technology is to be transferred, would the Intellectual Property Rights be applicable? If yes, then what kind of trading would emerge? Whether CCS is a silver bullet or not would be obvious only after appropriate regulations are in place and participants are not forced to deploy CCS through an international agreement. Till then an ultimate solution to global warming and impending climate change will continue to evade us.

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