J. Ind. Geophys. Union (January 2016)
JIGU Special Volume-1/ 2016 pp: 64-66

Emerging Considerations about the Sustainability of CCS for EOR and other Downstream Applications: A Policy Perspective

R. Gopichandran
Vigyan Prasar, New Delhi
E-mail: r.gopichandran@vigyanprasar.gov.in

ABSTRACT
The paper briefly states important policy related aspects such as enabling access to CO_2 on a sustained basis supported with appropriate infrastructure. These aspects cannot be overlooked if the benefits of carbon capture, storage and utilization are to be up-scaled over time. This will also create an incentive for high emitters of CO_2 to enable mitigation, with cross – sectorial implications for integrated management of emissions.

INTRODUCTION

The importance of carbon capture and storage cannot be over emphasised, particularly as a mitigation measure with respect to climate change impact management. Production of power and use across several sectors entails the release of carbon-dioxide with significant impacts on climate systems. While the capture of CO_2 by itself has enormous value for mitigation, its subsequent use to enhance oil recovery from wells adds value to these mitigation measures. Recent papers by Hill et al., (2013) and Hidug (2012) highlight the twin advantages of use of captured CO_2 to enhance oil recovery and further explore the fate of CO_2 remaining within the reservoirs. The latter could generate additional mitigation benefits.

The present paper takes stock of some of the recent considerations in this context through a policy perspective especially at a juncture when India and countries with similar circumstances of growth may like to consider enhancing CO_2 capture options. It is well known that some portions of CO_2 injected in to the wells also return to the surface with oil production and can be separated and re-injected as part of a reuse strategy.

POLICY LINKAGES IN THE SEQUESTRATION AND USE INTERFACE

Several major policy highlights have been made by the Advanced Resources International, Inc. (2010) in the context of the above stated. It has been emphasized that the CO_2 storage in oil reservoirs and CO_2 enhanced oil recovery provide critical solutions for reducing GHG emissions. This is based on the experiences in commercial applications for nearly three decades: albeit, at a scale of some consequence predominantly in the United States. This has also helped establish extensive networks of CO_2 pipelines; duly integrated with anthropogenic sources of CO_2. This is however, constrained by not – so - easy availability of CO_2 of reliable quality and quantity. Enhancing access to CO_2 calls for appropriate infrastructure with related incentives for capturing CO_2. Interestingly oil producers could be expected to pay for the CO_2 because it can be used to recover oil. Carbon capture and storage mechanisms therefore become important to ensure adequate supply of CO_2. These multiple benefits however call for well integrated regulatory fiscal and non-fiscal measures supported by institutional mechanisms.

A workshop organised jointly by the International Energy Agency and the Organisation of Petroleum Exporting Countries on CO_2–Enhanced Oil Recovery with Carbon Capture and Storage emphasised the importance of CO_2–EOR for the longevity of hydrocarbon assets. These could however be specific to regions and circumstances of extraction. Policy makers may like to take note of the fact that CO_2-EOR with carbon capture and storage is seen as an early stage mitigation option for duly capturing CO_2 from multiple and large point sources. It will therefore be useful to dovetail CO_2 capture and reuse with involvement of large scale CO_2 generators.

The workshop further discussed the dynamics of the behaviour of oil fields with respect to enhancing the storage of CO_2 vis-à-vis reservoir pressure, fracturing, etc. It is therefore important to understand the qualitative and quantitative aspects of storage and intended use before technological measures supported with policies are mainstreamed. Typically environmental management policies, programs and projects have to support well-designed monitoring, reporting and verification tools to ensure success. Appropriate capacity building of personnel to sustain transitions is equally crucial.

Godec (2012) at the above stated workshop deliberated on the occurrence and distribution of CO_2 during EOR with suggestions for increasing CO_2 storage. This is also aligned with a lesser CO_2 foot print of oil extraction processes. However, some of the significant challenges as highlighted by Godec pertain to balancing a requirement of CO_2 with steady supply and regulations for long term monitoring, and setting of pipelines. This particular aspect

is important especially for legislation on environmental impact, assessment and establishing trade offs for larger scale community benefits. This is further substantiated by the National Enhanced Oil Recovery Initiative (2012); that established a coalition of stakeholders from various sectors related to energy including oil and gas industries regulators and decision makers, signifying synergies across sectors. The initiative recommends incentives for capture and infrastructure projects including pipelines, probably with the assumption that this will promote mitigation benefits. This is further expected to enhance technological innovation for CO_2 capture and its distribution across large areas.

The initiative further draws attention to the possibility that anthropogenic sources of CO_2 may have to be given greater attention for capture compared to natural sources. The Petroleum Technology Transfer Council (2012) links the occurrence of mature wells that are not responsive any longer to primary and secondary methods of oil recovery as useful sites for EOR. The Council has highlighted the fact that the USDOE has transformed the concept of CCS to Carbon Capture, Utilization and Storage (CCUS) emphasising the utilisation and storage aspects. Eric (2012) reiterates the above stated and cites the case of the Texas Clean Energy Project that has delivered multiple benefits across sectors. This is particularly relevant for the power and oil sectors.

In a recent paper Eide et al., (2013) argues that adequate policy attention has not been conferred on CO_2 markets and therefore may affect the development of CCS on commercial scale. Policy makers are however urged to take note of the implications of utilisation and storage aspects before launching on integrated measures for mitigation and other benefits. This is further reinforced by the Centre for Environment Friendly Energy Research Newsletter (2012). This appears to have expanding recognition of CO_2 storage spaces with greater exploration potential in several parts of the world.

The special case of India on the prospects of carbon capture and storage technologies has been presented by the Wuppertal Institute for Climate, Environment and Energy with GIZ (2012). The report deals with the status of CCS in India, the potential storage in India, pathways for India's power sector and other industries to relate to CCS development, matching supply of CO_2 with the storage capacities, economic assessments of storage and lifecycle aspects of storage with respect to environmental impacts assessments for the coal sector in particular. This report was aligned with insights from China and South Africa; setting the context for a detailed policy framework.

Based on the above, it is interesting to note that CCS with special reference to utilisation for EOR is an evolving area with significant scope for embedding preventive approaches. Such approaches have to be specially aligned with the structural integrity of reservoirs at their end use followed by detailed assessments of the sources of CO_2 and sustained access supported with adequate infrastructure.

CONCLUSION

India in particular has demonstrated its ability to be resilient even as significant chaos was seen across the globe with economic downturns. The opportunity to capture CO_2 and enhance oil recovery is indeed quite exciting because it can complement economic benefits with environmental protection gains. Policy measures that trigger and foster innovations in this dynamic area of technologies and tools including monitoring and verification, should also help leap frog into newer regimes of technologies supported by robust management information support systems. These systems should establish linkages between emissions and impacts avoided by gains that will be achieved through EOR; further quantifying environmental impacts that will be generated through the use of such recovered energy substrates. The period of time that could be allocated for extended energy use should also be spent on identifying and mainstreaming additional alternatives and enabling transitions to an environmentally and economically efficient energy future.

REFERENCES

Eide, J., Herzog, H., and Webster, M., 2013. Rethinking CCS – developing quantitative tools for designing robust policy in face of uncertainty. Energy Procedia, Elsevier. http://sequestration.mit.edu/pdf/eide_etal_rethinking_ccs_ghgt11.pdf

Eric, R., 2012. CCS and Enhanced Oil Recovery: technology, business, & policy considerations for California. A presentation at the USEA workshop, Sacramento, June 27. http://www.usea.org/sites/default/files/event-presentations/09-12/summit_ccus_eor.pdf

Godec, M.L., 2012. From CO_2 - EOR to CCS: "Prospects and Challenges of Combining CO_2 - EOR with storage" Presentation at the IEA OPEC CO_2 - EOR workshop Kuwait, 7-8 Feb'2012. http://www.iea.org/media/workshops/2012/ieaopec/Godec.pdf

Hidug, W., 2012. Joint IEA –OPEC workshop on CO_2 enhanced oil recovery with CCS Kuwait

City, 7-8 Feb' Workshop Report, pp: 29. http://www.iea.org/publications/freepublications/publication/HEIDUG_Workshop_Report_IEA_OPEC_FINAL.PDF

Hill, B., Hovorka, S., and Melzer, S., 2013. Geologic carbon storage through enhanced oil recovery.EnergyProcedia, Elsevier. https://www.fossiltransition.org/filebin/images/ghgt11_hill_hovorka_melzer-2.pdf

Report: Advanced Resources International Inc, Arlington, VA, USA and Melzer Consulting, Midland, TX, USA 2010. Optimisation of CO_2 storage in CO_2 enhanced oil recovery projects, pp: 57. https://www.gov.uk/government/

uploads/system/uploads/attachment_data/file/47992/1006-optimization-of-co2-storage-in-co2-enhanced-oil-re.pdf.

Report: National enhanced Oil Recovery Initiative, 2012. Carbon Dioxide Enhanced Oil recovery: A critical domestic energy, economic, and environmental opportunity. pp: 35. Centre for Climate and Energy Solutions & Great Plains Institute. http://www.neori.org/NEORI_Report.pdf

Report: News letter from the Success Centre 2012. Successful News, Subsurface CO_2 storage – critical elements and superior strategy. (5): pp: 2. http://www.fmesuccess.no/doc/publications/news%20letter/success_newsletter_2012_october.pdf

Report: Petroleum Technology Transfer Council 2012. EOR moves into the mainstream, v, 18(3), pp: 16.http://www.pttc.org/newsletter/v18n3.pdf

Report: Wuppertal Institute for Climate environment and energy and GIZ 2012. CCS Global: Prospects of carbon capture and storage technologies (CCS) in Emerging Economies. Final Report to the German Federal Ministry for the Environment, Nature conservation and Nuclear safety (BMU) Part II: Country Study India, pp: 179.http://wupperinst.org/uploads/tx_wupperinst/ccsglobal_finalreport2_india.pdf.