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P.O. Box 3524, La Romaine, Trinidad and Tobago, W.I. or UTT Building, Esperanza Road, Brechin Castle, Couva, Trinidad W.I. Website: www.the gstt.org Email: thegstt@gmail.com

Managing the transition – getting CO2-EOR to pay for future CO2 storage

Author: [1]Sonia Lopez, Richard Villarroel an Yan Dong
[1]Asi.lopez@repsol.com - presenter, Shell Trinidad and Tobago

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The world will continue to need energy, and oil for manufacturing, but with less CO2 emissions. An opportunity is to convert the cost of CO2 storage into a benefit with increased revenue, looking at CO2 utilization. For the oil industry this can be done with enhanced oil recovery, but this is a careful balance as the oil has been enhanced will have been in contact with CO2, so the produced oil may have more CO2. The project needs to work without becoming a gas cycling scheme.

Conventional CO2-EOR has been designed to minimize the use of CO2 and maximize the recovery of oil because CO2 is expensive. CO2-EOR can also be used for the dual purpose of EOR and CO2 storage. A study by the International Energy Agency (IEA) has shown that the profitability of conventional and dual-purpose CO2-EOR is highly sensitive to both CO2 and oil prices. Neither one is profitable unless the oil price exceeds $50/bbl, regardless of the cost of CO2. Therefore, it is unlikely that CO2-EOR will be implemented in a low oil price environment, and a carbon emission tax or capture credit will make dual-purpose CO2-EOR profitable at a lower oil price.

This paper provides an overview of carbon dioxide enhanced oil recovery (CO2-EOR) and carbon storage and its ability to reduce greenhouse gas (GHG) emissions in oil production to meet the challenge of decarbonization. The simulation model evaluated different scenarios to assess options for improving throughput gas injection rates in the field and the efficiency for carbon storage.

Preliminary simulations cases suggest that FDP focuses on CO2-EOR and storage strategy could be allowed to reduce GHG emissions; The estimated improved GHG emissions are around 6000 Kt equivalent CO2 for the total Asset.

In the simple injection case for GHG emissions, simulation suggests the storage will be marginal because production rises after 18 months, and the CO2 comes back from the reservoir. Injecting gas deeper in 6 new wells helps CO2 storage, but the gas comes back from the reservoir; a production constraint is needed to control the CO2 injection rates and reduces the facilities dimension, however a large facility for 7 Mscf/d is required.

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The estimated CO2-EOR incremental oil cumulative production range between is 22-93 Mstbo, which depends on the facilities, production constraints, and the amount and location of injector wells.