



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

12th
October,
2023

Carbon Capture, Utilization and Storage (CCUS)

-A net zero Initiative



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Azadi Ka
Amrit Mahotsav



CO₂ and its impact in global context

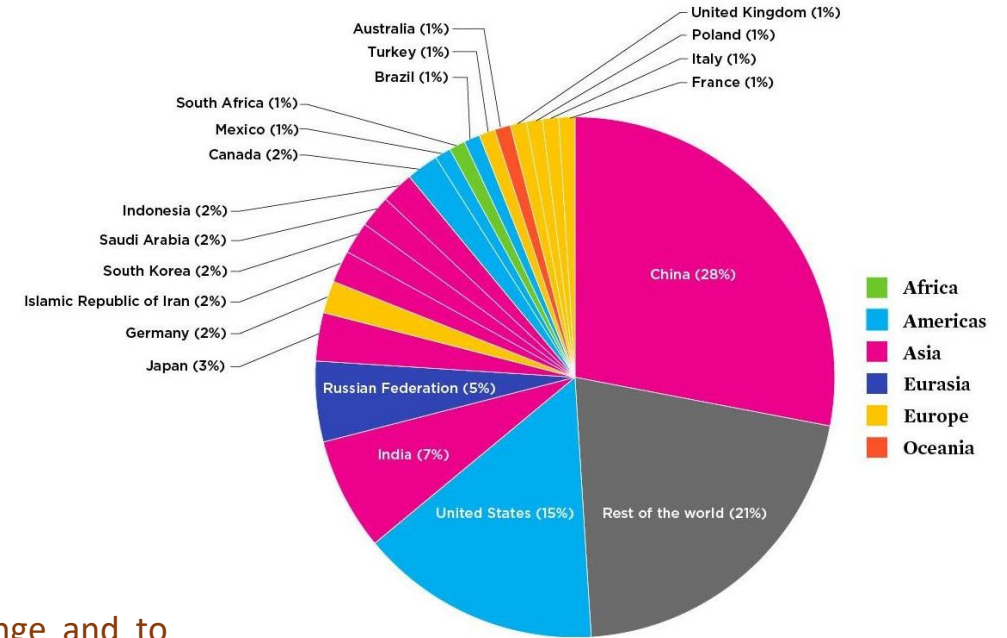
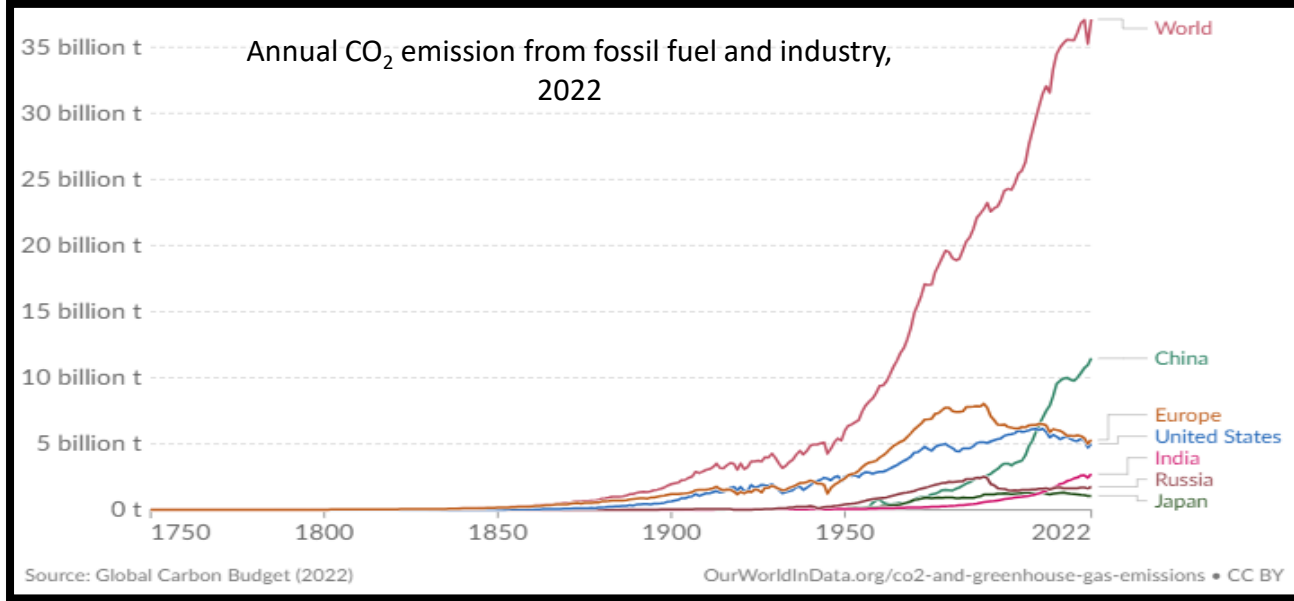
India's CO₂ emission scenario

CCUS/CCS Initiatives at OIL

Source Sink Scenario

Summary & Way Forward

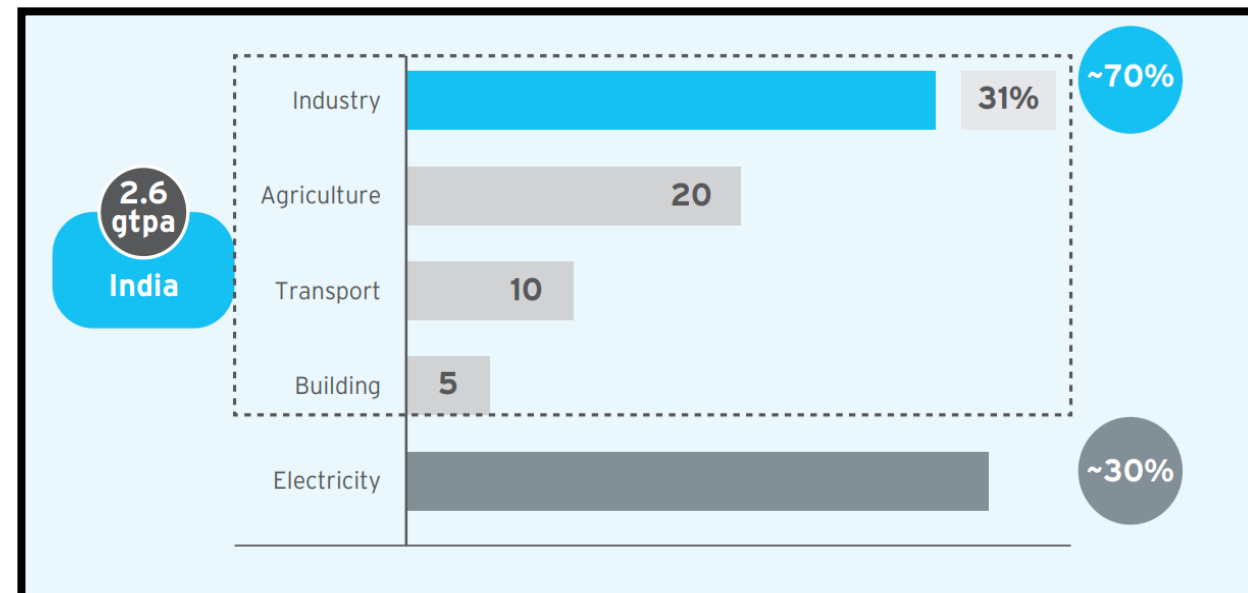
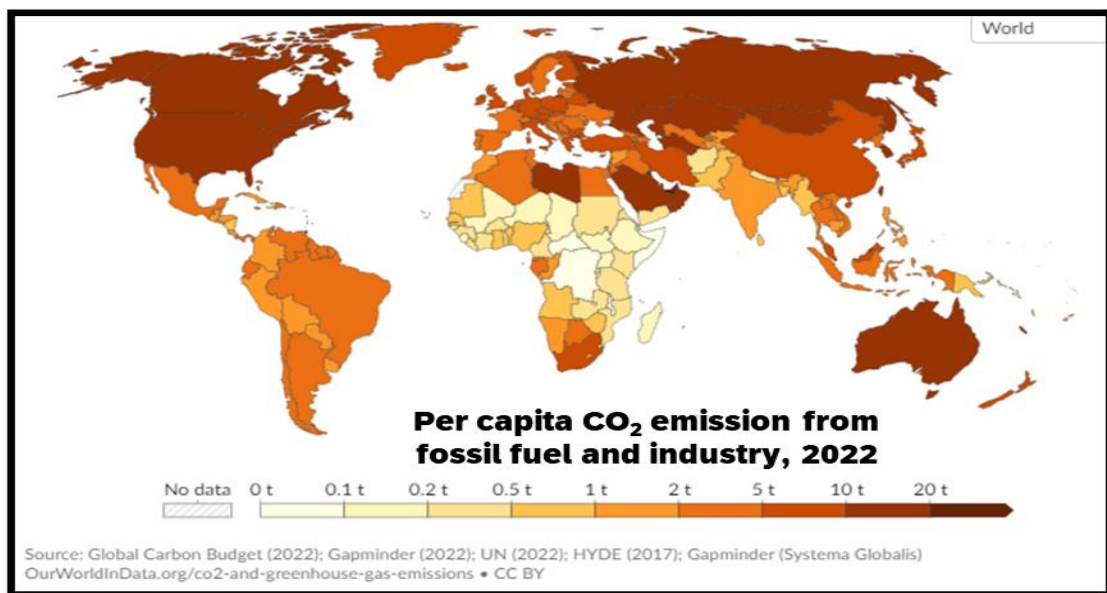
CO₂ & its Impact in Global Context



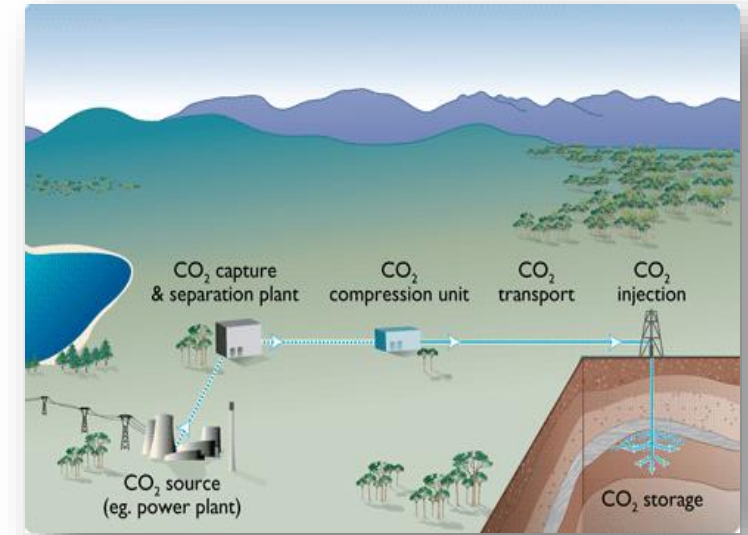
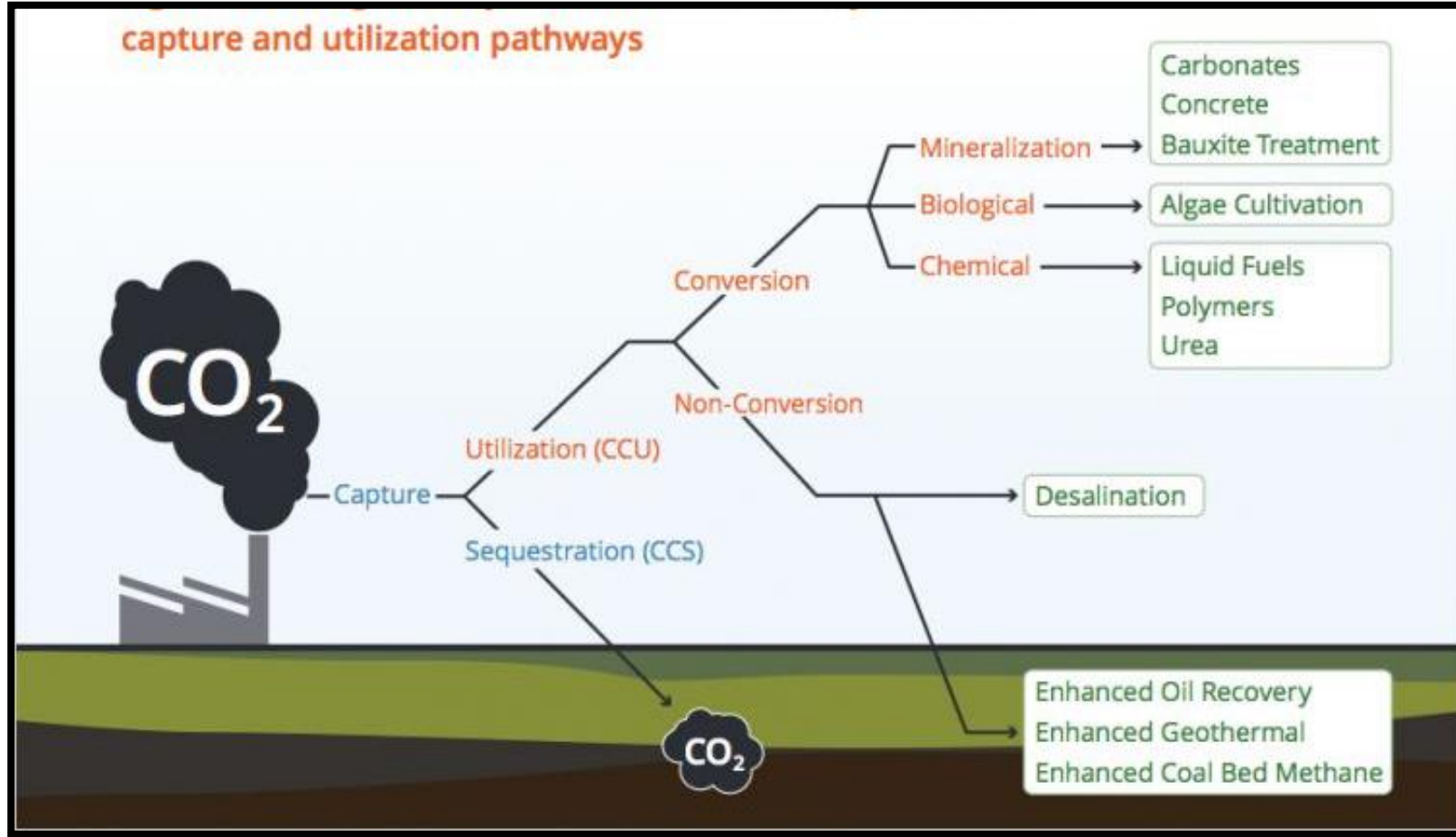
- ❑ Carbon Capture, Utilization and Storage (CCUS) is essential to combat climate change and to achieve the stringent CO₂ emission reduction commitments towards COP 26 and Paris Agreement
- ❑ Carbon dioxide accounts for 80 per cent of global warming since 1990 (WMO Report)
- ❑ Global average temperature rose at the rate of 0.14° C per decade
- ❑ Global energy related CO₂ emissions grew by 0.9% or 321 Mt in 2022, reaching a new high of 36.8 Gt (IEA Report, 2023)
- ❑ India stands at 3rd in emitting CO₂ (7% to global contribution) followed by United States (15%) and China (30%), the largest emitter of CO₂ in the world

Solution??

Decrease CO₂ emission
Start CO₂ Sequestration



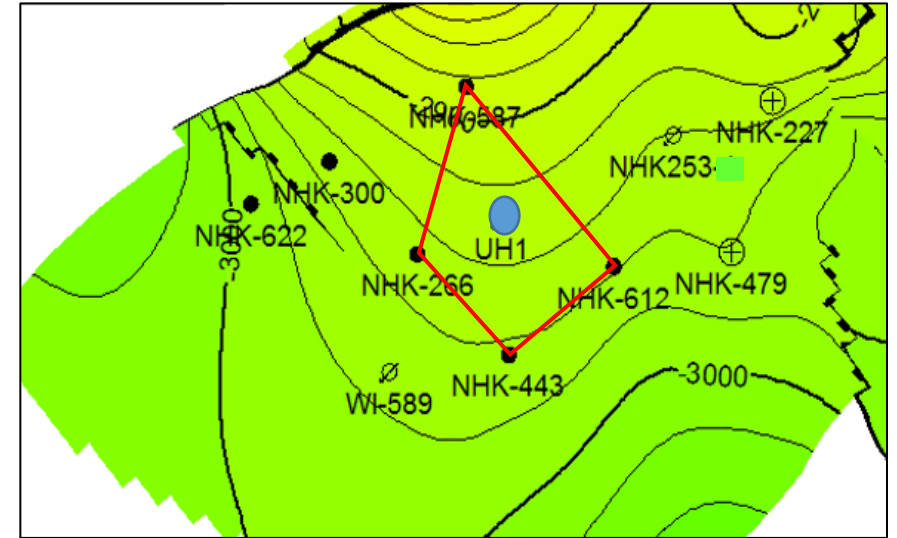
- ❑ 3rd largest emitter of CO₂ in the world - 2.6 gigatonne per annum (gtpa) in 2022
- ❑ Per capita CO₂ emissions - 1.9 tonnes per annum, < 40% of the global average and about 1/4th of China
- ❑ Expected CO₂ emissions - > 4 gtpa by 2030
- ❑ India's present reliance on coal for meeting over 70% of its electricity needs-key source
- ❑ India's target to Net Zero by 2070; reducing CO₂ emissions by 50% by 2050



OIL at advanced stages of identification & field implementation of different CCUS/CCS projects

CO₂ EOR in Nahorkatiya Oil Field

- ❑ STOIIP – 14.26 MM m³, Current oil recovery – 32%
- ❑ Oil production - 132 m³ / day of oil with 40% water cut
- ❑ CCUS (CO₂ Miscible Flood EOR) planned for achieving oil recovery of 38%
- ❑ Inverted five spot pattern identified for CO₂ EOR
- ❑ 40% of the injected CO₂ is expected to be sequestered
- ❑ Possible CO₂ source - BCPL, Dibrugarh or IOCL Digboi Refinery

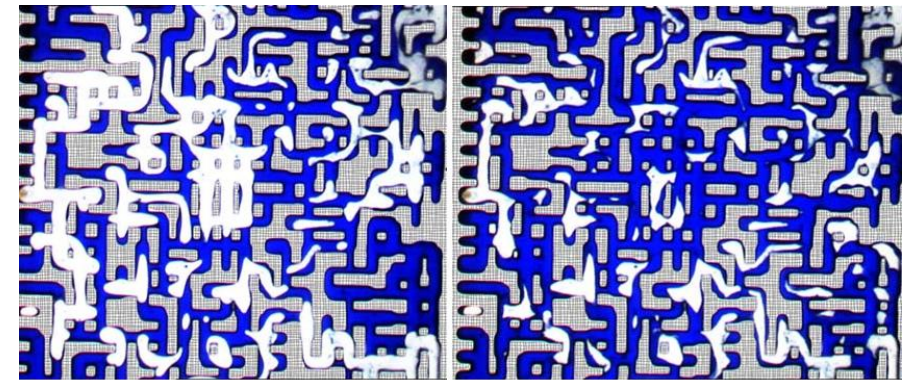
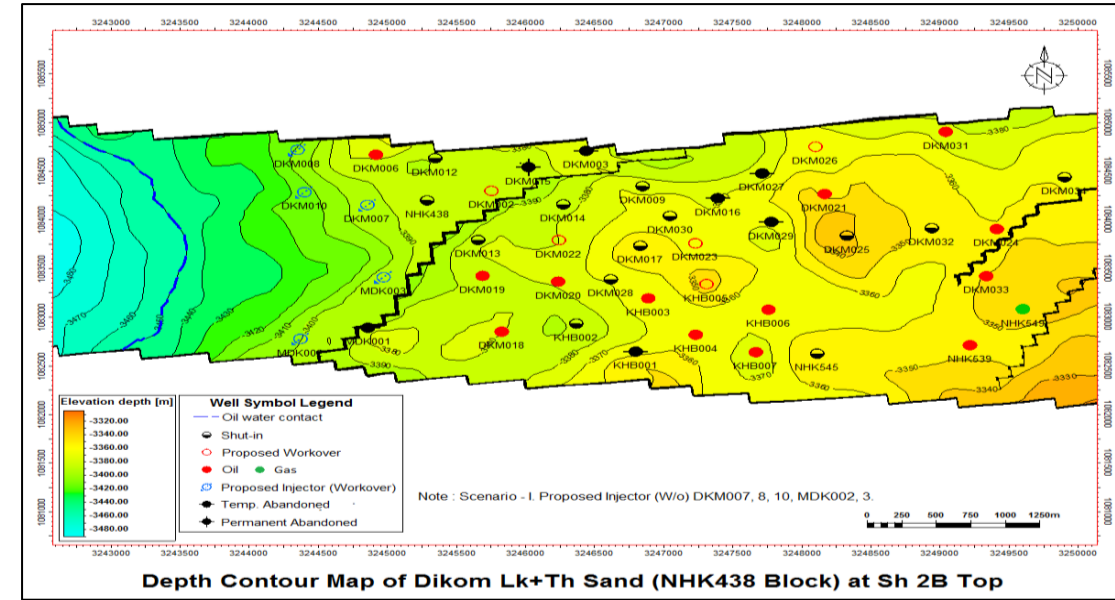


Current Status:

- ❑ Injector well drilled in 2022 & water injection to continue for 5 years to jack up the pressure close to MMP of 211 KSC
- ❑ CO₂ injection through injection well @ 70 TPD after achieving the MMP level
- ❑ Tender for “Feasibility Study for surface facilities to address design issues and operational challenges associated with the pilot implementation” **to be published shortly**

CCUS Initiatives at OIL: CWI in Dikom Oilfield

- ❑ STOIIP – 32 MM m³, Current oil recovery – 34.6%
- ❑ Laboratory experiments indicated Carbonated Water Injection (CWI) increases oil recovery by 10-12% over water flood
- ❑ 5 wells identified for Carbonated Water injection in Dikom Field
- ❑ Tentative CO₂ requirement: 70 TPD for 10 years
- ❑ Possible CO₂ source - BCPL, Dibrugarh or IOCL Digboi Refinery
- ❑ Design Engineering & Costing Study (FEED basis document and Cost Estimates on all aspects of the designed project) awarded to EIL



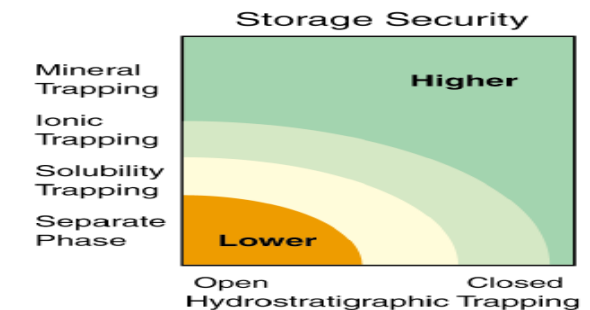
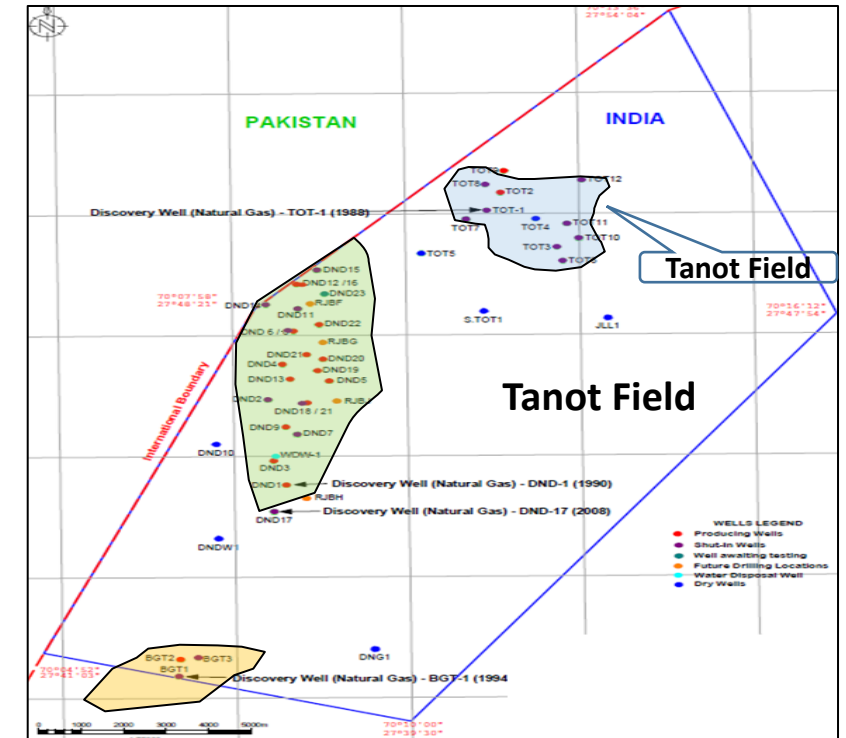
Residual Oil (white) after WI

Residual Oil (white) after CWI

Evaluation of feasibility for permanent storage of CO₂ in saline aquifers/reservoirs in Tanot Field of Rajasthan

Plan for detailed study

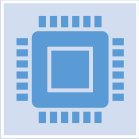
- ❑ Review of all geological parameters prevalent in the area for assessment of sufficiently stable geological environment
- ❑ Reservoir continuity and seal presence
- ❑ Geo-mechanical studies
- ❑ Volumes of CO₂ that can be accommodated in the reservoirs safely along with well injectivity
- ❑ Evaluation of plume movement through detailed simulation
- ❑ Review of the health of drilled wells of OIL
(for well integrity, casing condition & leakage possibility)





MoU with M/s LINDE GmbH, Germany

- ✓ Develop bilateral co-operation in exploring the possibility of CCS/CCUS
- ✓ Utilizing LINDE's vast expertise in capture, transportation and surface facility build up for CCS/CCUS initiatives



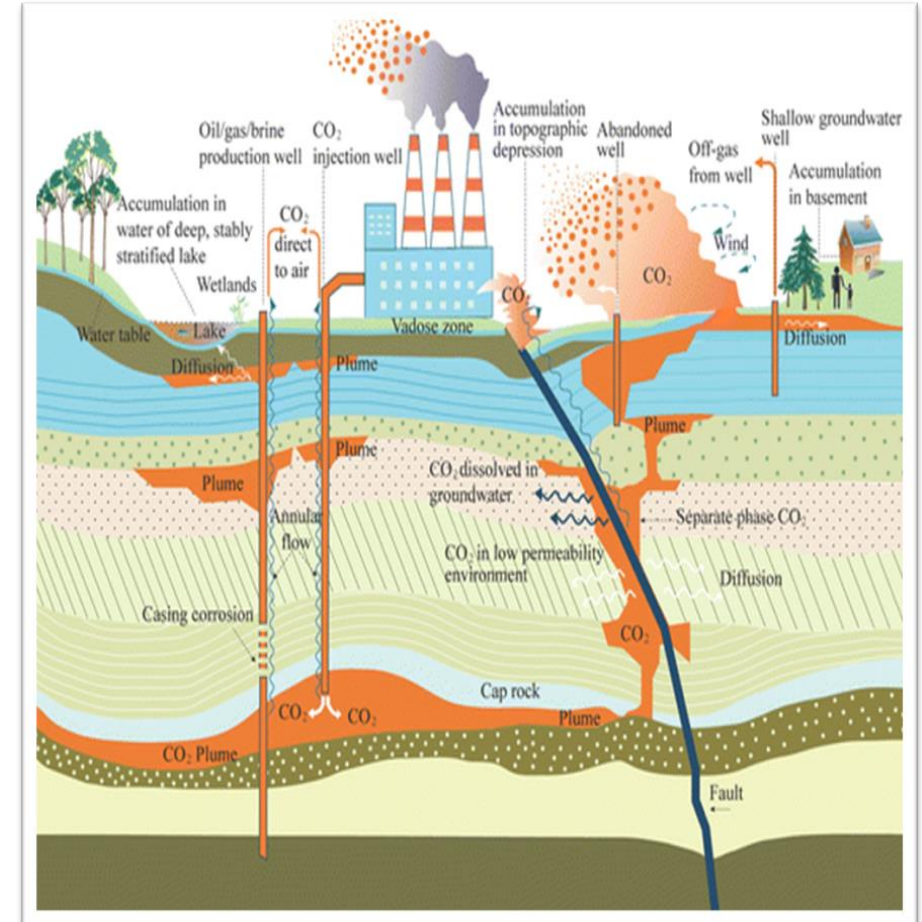
Project with IIT- Bombay

- ✓ MoU with IIT Bombay
- ✓ Estimate CO₂ storage potential in identified reservoir and develop a risk-assessment & management framework

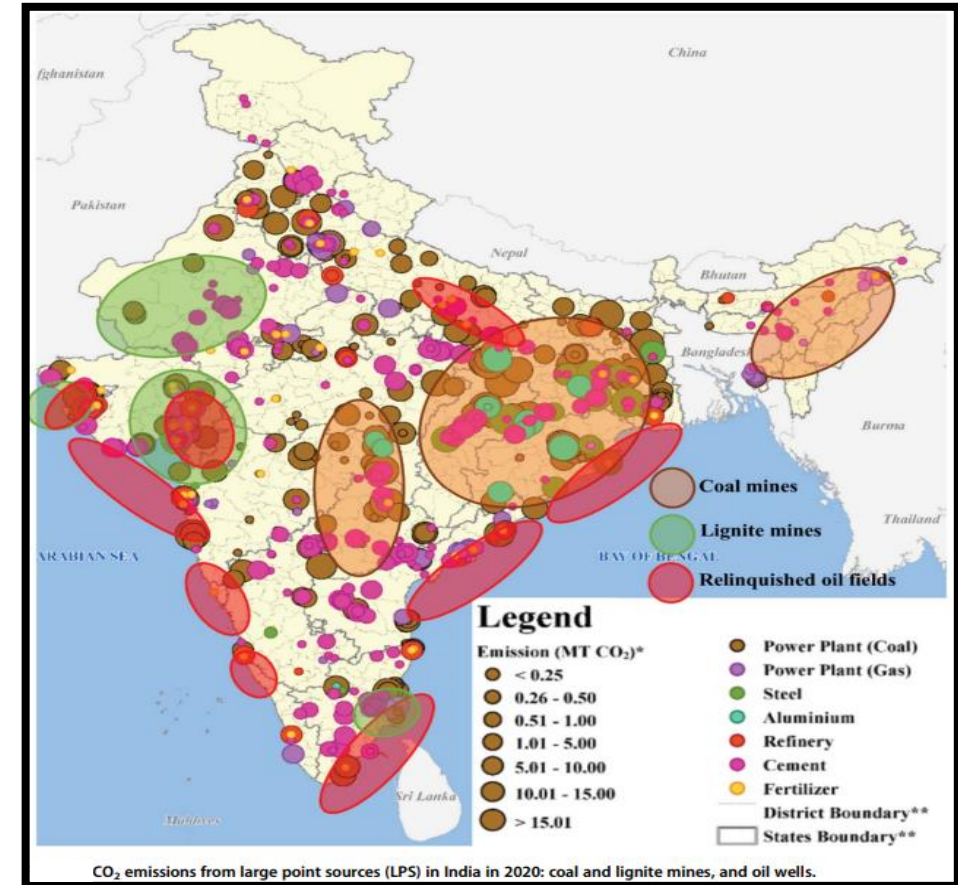
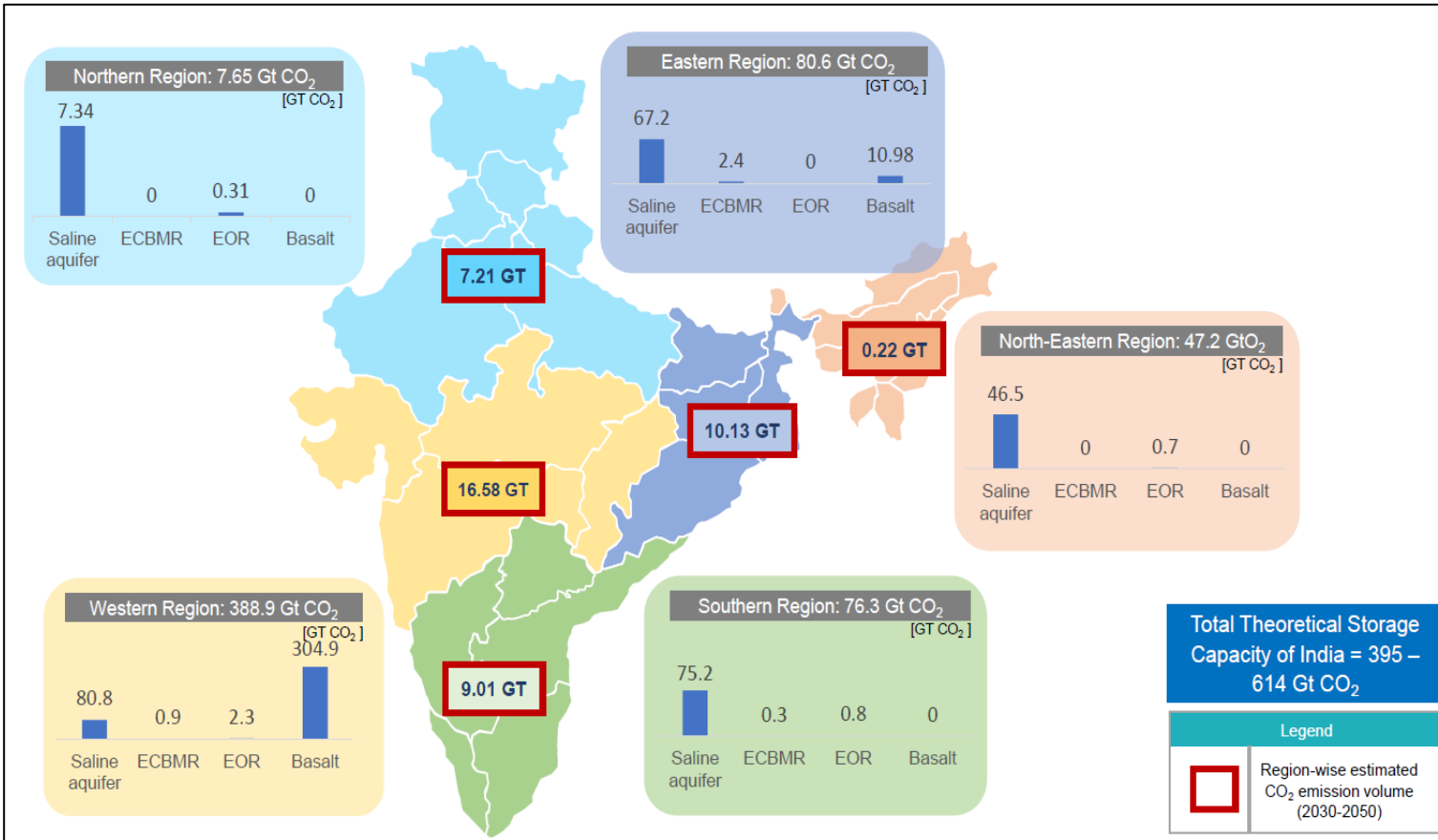


Collaborative Study with Texas A&M

- ✓ Evaluation of efficacy of CO₂ EOR in candidate reservoir in addition to field revitalization



Source: Risk Assessment of the Geological Storage of CO₂: A Review



- ❑ Source Sink mapping is important for development of De-carbonization strategy
- ❑ Identification of Project viability based on localized CO₂ emission volume

Current Gaps

- ❑ Absence of official support mechanism, mandate and regulation framework
- ❑ Lack of demonstration project
- ❑ Lack of support structure
- ❑ Establishment and propagation of Carbon market
- ❑ Financial support for early mover projects
- ❑ Incentive driven economic considerations for Carbon Sequestration



- ❑ Climate change has been the reality and CO2 Sequestration is the need of the hour to achieve Net Zero goals
- ❑ OIL has taken proactive initiatives both in the fields of CCUS/CCS along with identification of nearby potential sources
- ❑ CCS/CCUS projects involves various associated risks being first of its kind in Indian context
- ❑ A national legal and regulatory framework for safe & secure CO2 storage is required
- ❑ Need for Policy framework to develop viable Economic model for CCUS adoption & implementation
- ❑ Collaboration of various knowledge hubs for development of cost effective CCUS/CCS technologies required



Balance
Development and Climate Issue

A cautious approach to be taken sharing all the expertise/knowledge available across the Country for successful implementation of such projects to balance economic growth and climate issues – involve all stakeholders

Lend a Hand... even in a simple way

एक ओर
माँझी

THE FOREST
MAN OF INDIA



INDIA'S FOREST MAN PADMA SHRI JADAV
PAYENG WHO SINGLE HANDEDLY CREATED OVER
550 HECTARES OF FOREST, WILL FLY TO MEXICO
ON A SPECIAL INVITATION

Filmmaker

Shobhraj Sohani of Lankolle



HIS JOURNEY TO MEXICO WILL BE TO HELP THE
NORTH AMERICAN COUNTRY BECOME GREENER AND
HE WILL BE IN MEXICO FOR 3 MONTHS EVERY YEAR !

MEXICO HAS PROVIDED HIM VISA FOR 10
YEARS. PROUD OF YOU SIR ❤️

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(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

presents

IN CONVERSATION WITH

FOREST MAN OF INDIA

AND OIL'S GREEN AMBASSADOR



***Thank You
For Your
Kind Attention***